ARNO NUIJTEN

Deaf Effect for Risk Warnings

A Causal Examination applied to Information Systems Projects

DEAF EFFECT FOR RISK WARNINGS

CAUSAL EXAMINATION APPLIED TO INFORMATION SYSTEMS PROJECTS

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CAUSAL EXAMINATION APPLIED TO INFORMATION SYSTEMS PROJECTS

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Arno Lorenz Pieter Nuijten
born in Breda

ERASMUS UNIVERSITY ROTTERDAM

Doctoral Committee:

Promoters:

Prof.dr. G. van der Pijl
Prof.dr. H. Commandeur
Prof.dr. M. Keil

Other members:

Dr. K. Rohde
Prof.dr. G. Sarens
Prof.dr. E. Berghout

TABLE OF CONTENTS

ACKNOWLEDGEMENTS

CHAPTER 1. INTRODUCTION

1.1.   Introduction

The three figures on the title-page are named *Mizaru* (who covers his eyes), *Kikazaru* (who covers the ears) and *Iwazaru* (covering his mouth). They find their origin in the tenets of the philosopher Confucius who lived 2500 years ago in China. The figures represent the so-called Three Wise Monkeys. Monkeys were chosen because of their importance in China and Japan in the period these tenets were distributed. The meaning that was ascribed to these figures has developed over time and differs across cultures. In the ancient China and Japan they symbolized the proverbial principle to *"see no evil"*, *"hear no evil"* and *"speak no evil"* and thus be good of mind, speech and action. In the Western world the phrase is often used to refer to those who deal with impropriety by looking the other way, refusing to acknowledge it, or feigning ignorance. It is interesting to notice that in the history of these tenets, a fourth ape has been faded away. This 4th ape, named *Shizaru*,, originally ascribed *"do no evil"* which would have developed to *"not taking action"* in the western interpretation.

The topic of deafness for obtrusive signals apparently has a long history and has widely been shared across cultures. Even to date it is relevant when we consider numerous, often prestigious, Information Systems (IS) projects that are no longer approaching their goals and to which continued investments are no longer justified. For reasons not well understood, executives may either consciously or unconsciously ignore, reject or not hear warnings, even when those who provided it were bold enough to transmit the message. Keil and Robey (2001) provided the notion that executives' refusal to hear bad news might be one of the causes of the so-called "escalation" of Information Systems (IS) projects.

The escalation phenomenon refers to a failure to withdraw from a failing course of action. In this entrapment, people appear to stick to choices in which they already invested time or money, even when continuation is no longer rational. Staw (1976) used the metaphor of "Knee-Deep in the Big Muddy" for such entrapment situations, referring to the US-entrapment in their involvement in the Vietnam war. The momentum to withdraw has been lost and decision makers escalate their commitment to a risky though failing course of action. Simon (1997), p105 described this commitment to a once chosen course of action as an act of bounded rationality: "The action itself creates stimuli that direct attention towards its continuance and completion - Like a good book, if it's well written, tends to hold attention to the limits of its covers - and will actually decrease the individual's sensitivity to external stimuli". People apparently might become deaf to warnings when a chosen course of action has caught them, even if this course of action has lost its justification and should be stopped or redirected. They remain committed, or even further escalate their commitment to continuation, despite the warning signals.

Many prestigious IS-projects have been prone to escalation of commitment mechanisms. Even worse: a remarkably large number of case-studies use IS-projects as an example for

escalation (Drummond, 1999; Guah, 2008; Mähring & Keil, 2008; Montealegre & Keil, 2000; Pan, Pan, Newman, & Flynn, 2006). The upside of this is that more and more has become known about the mechanisms that fuel escalation of IS-projects, thanks to over 15 years of research. This includes studies about why IS-projects typically bear characteristics that might promote escalation of commitment. Unfortunately, even to date, too many prestigious IS-projects fail, despite the methods, tools and skills of IS professionals involved. At the time of writing these lines, the Dutch parliament announced an investigation on "failing governmental IS-projects" to be held in 2012.

Our study will focus on the so called ***Deaf Effect***, since there is room to contribute with research on this topic (Cuellar, 2009). This Deaf Effect could be one of the causes of escalation of IS Projects (Cuellar, 2009; Keil & Robey, 2001).   The main Research Objective of our study is to:

*"Contribute to the explanation of **Why** the Deaf Effect occurs in the applied field of escalating IS-projects".*

In order to elaborate our Research Objective, we first clarify some positions and assumptions that we take throughout this thesis on escalating IS-projects.

Not all IS-projects fail and not all failing IS-projects escalate.

Information Systems are of strategic value to many organizations. Investments in IS-projects are often surrounded by well developed instruments to support rational decision making, allocation of resources and monitoring. Recent figures on IS-project rates of success and failure still raise concerns. Ernst&Young (2009) reported that 48% of all started IS-projects end successfully. Most of the 52% failing IS-projects partially achieve their prior expectations. Four percent of all projects fail completely, according to their definion of 'failing completely'. In their CHAOS report, the Standish Group (2009) reported IS-project success rates of 32 percent in 2008 in the US. This refers to IS-projects coming in on budget and on time and meeting all the user requirements. This is an improvement, compared to the IS-project success rates of 16 percent in 1994 (Standish, 1995). The Standish Group reported that in 2008 44 percent of the IS-projects were seriously challenged by budget overruns, missed deadlines or features set that did not meet user requirements (53 percent in 1994). The Standish Group revealed that still 24 percent of the IS-projects ended in outright failure in 2008 compared to the 31 percent they reported on 1994.

Not every IS-project that fails to meet its objectives in terms of functionality, time span, costs or benefits could be labeled as *Escalating*. Escalation has been defined as continued commitment in the face of negative information about prior resource allocations coupled with uncertainty of goal attainment (Keil, 1995). This escalation of commitment can lead to IS-projects which seem to "take on a life of their own", continuing to absorb valuable resources without ever reaching its objectives. Like a runaway train, these runaway projects hurtle out of control, are difficult to stop, yet are in need of redirection or termination (Keil, Mann, & Rai, 2000a). While it is true that most runaways are eventually terminated or significantly redirected, there is evidence that suggests that these projects are

allowed to continue for too long before appropriate action is taken (Keil & Mann, 1997; Nulden, 1996). The escalating IS-projects are just a fraction of all IS-projects, but they are responsible for much negative attention and exposure. Or, as Keil and Mähring (2010) recently phrased it, these projects are recognized as the *Black Holes* in organizations' project portfolios, pulling away lots of valuable resources that could have been assigned to other strategic improvements to serve their organizations.

Based upon the various definitions of Escalating IS-projects (Keil, 1995; Keil et al., 2000a; Nulden, 1996), we phrased the following definition that we will use throughout this thesis:

Escalating IS-projects receive a stable or even increasing amount of resources from decision makers even when strong signals indicate that goal attainment of the project is no longer viable, since one or both of following conditions occur:

- *the project's organizational goals are no longer viable (i.e. project's rationale in terms of a positive business case that contributes to organizational goals);*

- *the project activities are no longer approaching the project's organizational goals.*

Not all escalating IS-projects suffer the Deaf Effect

Central to the concept of escalation is the notion of negative project status (Brockner, 1992). For a variety of reasons, the negative signals may or may not be visible to the key decision maker responsible for the decision of whether or not to continue the project. In some cases, negative project status is present, but may not be available to those in a position to terminate or redirect the project. One reason for this is that individuals in the organization may conceal negative information from their superiors, thereby promoting the escalation process through what has been referred to as the Mum Effect. In other cases, superiors are aware of negative information but choose to ignore it (or discount it heavily) due to certain cognitive biases, thereby promoting escalation through what has been referred to as the Deaf Effect (Keil and Robey, 1999). Escalation can occur either because the project status information is biased, or is not available, or because it is not attended to and interpreted correctly.

The upside and downside of commitment

A seemingly contradictory position in our study is that *commitment* to IS-projects might be undesirable. From empirical research we know that commitment to an IS-project has proven to be an important factor to its successful completion (Newman & Sabherwal, 1996). IS Project Managers and developers must be committed to the process and believe that the project is valuable to the organization. However, *escalation of commitment* is no longer in the best interest of the firm. Organizations that continue to put resources in an escalating IS-project are likely making a mistake since the additional money spent does not provide the business effect that the project was intended to accomplish. The organization is wasting valuable resources, which could probably be better invested somewhere else. In

these cases, the IS-project team appears to act no longer consistent with the organization's interests in terms of risk-appetite and cost-effectiveness.

The Project Owner as key decision maker

Notwithstanding the relevance of project teams and project managers in decision making, we are are interested in the deafness of the business executive who has been labeled as *IS Project Owner* (Andersen, 2010; Bentley & Weber, 2009). The role of Project Owner as described by Van Der Merwe (1997), is identified across various established project management methods, and has been labeled as "*Executive*" in Prince2 (OGC, 2002) or "*Project Sponsor*" in PMBOK *(PMI, 2008)*. This IS Project Owner is considered to be the executive that is finally responsible for ensuring that a project achieves its organization objectives[1]. This person should ensure that 1. the project retains its business focus, 2. that there are clear responsibilities and 3. that the work, including the risks, is actively managed. This executive is chairman of the project board. He or she represents the business and is responsible for the business case (Bentley & Weber, 2009). The IS Project Owner is responsible for the ultimate product the IS-project has to deliver and is finally responsible for taking strategic go/no-go decisions. Where the IS Project Manager is more tied to its own project, the Project Owner is mainly representing the organization's interests and is seen as the link between the project and its stakeholders (Andersen, 2010; OGC, 2002; PMI, 2008). Turner (Turner & Müller, 2004) contrasts the interests of Project Owners and Project Managers. The Project Owner provides financial resources and gives approval at the end of different stages, while the Project Manager "manages the project on a day-to-day basis". The Project Owner is the person who is the "*Principal*" who hires the Project Manager (the "*Agent*"). The Project Manager is managing a project that the Project Owner sees as important for his organization. These *Principal-Agent* positions have been followed in many studies on escalating IS-projects as well (Keil et al., 2000a; Mahaney & Lederer, 2003). In these studies, the executive who acts as Project Owner is considered to behave as a rational principal who guards the interests of the firm's stakeholders (which could be shareholders, citizens or other – depending on the nature of the organization). He or she should prevent the IS-project team from acting in a way that is inconsistent with the organization's interests in terms of risk-appetite and cost-effectiveness[2].

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[1] Not all IS projects have the Project Ownership concentrated in one Executive. For example Governmental projects may have Project Ownership distributed across multiple executives. Olsson, N. O. E., Johansen, A., Langlo, J. A., & Torp, O. 2008. Project Ownership: implications on success measurement. **Measuring Business Excellence**, 12(1): 39-46.

[2] We prefer the term '*organization's interest*' over the more refined term of '*stakeholders' interest*'. Refined chains of Principal-Agent relationships could exist at the level of stakeholders, shareholders, boards of directors, supervisory boards and internal audit commitees. These chains of responsibilities and roles vary across countries in multi-tier structures of corporate governance depending on legal requirements and on ownership structures that are sometimes diffuse. Although very relevant for research in corporate governance at country-level and at firm-level, we have chosen not to include these refinements in our study, since we focus on an individual IS project at micro level.

Bounded Rationality of Project Owners

A problem would arise if the assumption that the Project Owner always acts as a rational representative of the stakeholders does not hold. A Project Owner that shows risk-seeking behavior and escalation of commitment to the project, would no longer act as guardian of the organization's interests (as a Principal). Similar to the studies on the commitment of project teams, empirical studies from the field also report that early involvement and commitment of the IS Project Owner to his or her IS-project is key for project success (Andersen, 2010; Bryde, 2008; Helm & Remington, 2005). Here, the benefit of commitment might also lead to escalation when managers - who often also made the initial decisions to start and continue - further increase their commitment when faced with substantial setbacks (Sabherwal, Sein, & Marakas, 2003). Korzaan and Morris (2009) suggests that escalation of commitment could be promoted by these managers' behavioral characteristics. Korzaan and Morris (2009) refer to these management characteristics as both individual personality traits and variant psychological states that consist of beliefs, attitudes and heuristics which could interact with organizational, social and project characteristics. So where IS Project Owners are expected to act as rational principals, they might be subject to heuristics, beliefs and biases in their decision making, which are developed by former experiences with IS-projects and the circumstances (such as pressure, need for achievement) of the decisions they face. The most important and strategic IS-projects may be rewarded with the organization's most experienced and involved Project Owners, which inevitably come with their own heuristics, beliefs and biases as well. Although their success with previous projects might be considered a benefit, it can nurture bounded rationality in their decision making as well, especially when it comes to risk-taking. In a large scale study with 656 executives from American and Israel, March and Shapira (1987) found that most managers see risk-taking as an endeavor where they can use skills, exert control and beat the odds, further described later by Shapira (1995), p49. March & Shapira assessed that managers appeared to ignore parts of risk warnings, since they assume that they don't apply to them personally. Shapira (1995), p63-64 reported that negative feedback information might encourage managers to persist in taking risks even more than in case they received positive feedback information. This can make Project Owners deaf for risk warnings, even if a credible source blows the whistle that continuation of a project is no longer in the organization's interest.

Deaf Effect of Project Owners as reported by Internal Auditors

Based on interviews with internal IS auditors, Keil and Robey (2001) described the Deaf Effect as a failure to respond to messages of impeding IS-project failure. The auditors recalled instances in which they had reported bad news about projects only to find that their concerns were ignored by executive management. Several auditors underscored the importance of developing relationships with managers in the organization. The following account of a whistle blowing incident by an IS auditor illustrates this point. *"I think,"* the auditor said, *"the way we handled it made a difference. We suggested they really look at these issues. We have got some major problems, and I think just the way we came about it,*

as a team player instead of a policeman. And that 'We want to help you; we see that this project's out of control; we can see that maybe some things you're not getting the truth on because you're so close to it; but this is what we see.' Even though we are an independent appraisal organization, we are still part of the same corporate team, and our goals are their goals basically. We all want the company to do well." (Case #182).

Keil and Robey (2001) concluded that effective whistle blowing may depend on organizational factors, like organizational size, the historical commitment by executive management to the internal audit function and the independence of auditing from management authority. As the quotation suggests, the effectiveness of whistle blowing could be influenced by the presentation of the message and a partnership relation between the bad news messenger and the Project Owner as well.

Further Insights from Empirical Research on Deaf Effect of IS Project Owners

Cuellar (2009) defined the Deaf Effect phenomenon as occurring "when a decision maker doesn't hear, ignores or overrules a report of bad news to continue a failing course of action". This scope assumes that there is a well-informed and objective messenger that sends a risk warning to the executive. So we exclude messengers who withhold or attenuate their message, which is referred to as the Mum Effect. This has been subject to other studies that contributed to an explanatory model for keeping mum based on Whistle Blowing Theory (Keil, Smith, Pawlowski, & Jin, 2004; Miceli & Near, 2002; Near & Miceli, 1995; Park, Im, & Keil, 2008; Park & Keil, 2009; Ramingwong & Sajeev, 2007; Ramingwong, Sajeev, & Inchaiwong, 2009; Rosen & Tesser, 1970; Smith, Keil, & Depledge., 2001).

Few studies have explored the Deaf Effect of executives as reported by the internal IS auditors interviewed by Keil and Robey (2001). Based upon a laboratory experiment with student subjects, Cuellar, Keil, and Johnson (2006) found the Bad News Messenger's (internal auditor's) perceived *credibility*, and the decision maker's *gender, age and years of experience* influenced Deaf Effect (Cuellar et al., 2006). *Credibility* of the source was composed of two dimensions: expertise and the extent to which the messenger could be relied upon to make true assertions, operationalized by Cuellar as labeling the internal auditor as "crywolf" (Cuellar et al., 2006). In a second study, Cuellar (2009) could partially confirm that the Deaf Effect was influenced by the *Role Prescription* of the Bad News Messenger (does the messenger's role include reporting to executives on this project). Furthermore, Cuellar found that male and female decision takers differed in Risk Perception after receiving the auditor's bad news message. In a third study the expected influence of *Cultural Dimensions* and *In-group Collectivism* could partially be confirmed from an experiment that was replicated in US, Germany and China (Cuellar, 2009). Based upon a multiple case-study, Cuellar suggests that decision taker's *Optimism* and *Illusion of Control* (Staw, Barsade, & Koput, 1997) could be candidate determinants of the Deaf Effect. It could be hypothesized that if the IS Project Owner perceives that he has substantial skills and abilities and can exert control over the project outcome, it might cause him to perceive a report of bad news as less relevant leading him to ignore it. Finally, from the multiple case-study Cuellar suggested that a highly Politicized Environment would also be a candidate determinant of the Deaf Effect that needs further investigation.

1.2.   Research Objective and Scope

Based upon the factors that have been identified as determinant or candidate to be of influence on the Deaf Effect, we refine our Research Objective, by including three perspectives that we will study, as follows:

"Contribute to the explanation of Why the Deaf Effect occurs in the field of escalating IS-projects", by examining main causal effects and interaction effects from following three perspectives:

1. *The "Collaborative Partner vs Opponent"* Relationship *between Internal Auditor (Bad News Messenger) and Project Owner (Decision Maker);*

2. *Project Owner's* Perceived Control *heuristic which might cause biased processing of the auditor's risk warning (bounded rationality);*

3. *The presentation of the risk warning either with the focus on* Gains *or with the focus on* Losses.[3]

The relevance and meaning of the "Collaborative Partner vs Opponent" construct will be elaborated later based upon Stewardship Theory.

The "Perceived Control" construct will be elaborated further based upon Illusion of Control Theory. At this moment we provide its definition (Thompson, Armstrong, & Craig, 1998) as: *"people's own judgment of the extent to which they can control an outcome in a specific situation."*

The so-called "Gain/Loss framing" construct will be elaborated later based upon Prospect Theory. At this point it makes sense to explain that this construct does not refer to actual winning or losing, but refers to the presentation (framing) as gain or loss (the glass is half empty or half full).

Furthermore we refine our scope as follows:
*   The decision maker of study (*unit of analysis*) is the executive who acts in the role of IS Project Owner;

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[33] In order to visualize the suggested effects of those three factors we propose the reader to imagine to be driving his/her car with a passenger sitting next to the driver. The passenger provides a risk warning and recommends to redirect or stop. Would the reader tend to show deaf if the passenger was seen as opponent or as partner. Would it make a difference if the message was framed positive or negative. And would it make a difference if you consider yourself to be in control. We propose these factors could be of influence and could interact.

- The Bad News Messenger acts in the role of *internal auditor* who meets the professional standards of the Institute of Internal Auditing (IIA, 2004). These standards address the criterion of a bad news messenger who is acting as a credible source - i.e. who has the expertise and could be relied upon to make true assertions (Cuellar et al., 2006). Furthermore they address the criterion that the internal auditor would operate from an Auditing Function which is independent from management authority (Keil & Robey, 2001)[4].

1.3.   Proposed Contribution of this Study

Contribution to Research on Escalating IS-projects

This study aims to contribute to research on Escalating IS-projects, by extending former examinations of the Deaf Effect (Cuellar, 2009; Keil & Robey, 2001) and bringing knowledge a step further towards a more holistic comprehension of the Deaf Effect. Therefore we examine three theories to explain the Deaf Effect individually and relate these theories to each other. We also aim to obtain insight into *How* they influence the Deaf Effect in the domain of IS-projects. We will elaborate further our contribution to research on Escalating IS-projects in the literature review we present in the next chapter.

Contribution to Research on Internal Auditing

Although our study is mainly anchored in research on Escalating IS-projects, it could contribute to research in the field of Internal Auditing as well. Keil and Robey (2001) used internal auditors as a source of information in order to explore the Deaf Effect. The auditors recalled instances in which they had reported bad news about IS-projects only to find that their concerns were ignored. Several auditors underscored the importance of them developing relationships with managers in the organization. As quoted earlier, one of the interviewed auditors mentioned that the Deaf Effect was avoided by his relationship with management as a Collaborative Partner vs as on Opponent: "*just the way we came about it, as a team player instead of a policeman" and "We all want the company to do well."* (Case #182). So it appears that our study at interpersonal level could contribute to knowledge of the effectiveness of internal auditors at micro-level. Our study might as well contribute to research of the effectiveness of Internal Audit functions in organizations, which still is a relatively unexplored area (Sarens, 2009).

Resuming, with our study on explaining the Deaf Effect for internal auditors' warnings we aim to contribute (1) to research on escalating IS-projects, (2) to research on Internal Audit effectiveness and (3) to the practice of decision making on strategic IS-projects. Since our

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[4] The IIA professional standards on internal auditing (2004) prescribe that the internal auditor should meet standards on **a.** proficiency (1210)- knowledge and skills, **b.** due professional care (1220) – apply skills, prudency and care , **c.** organizational independence from executive management (1110) , **d.** individual objectivity (1120) – impartial, unbiased attitude, avoid conflicts of interest, **e**. both in fact and appearance (1130).

main research objective departs from the Deaf Effect in escalating IS-projects, we embed our study in that field of research. In the final chapter we will relate our research findings to literature and research on Internal Audit effectiveness.

1.4.   Structure of this Thesis

Below we describe how each Chapter of this thesis contributes to our research objective.

In *Chapter 2* we will further refine our research objective, the contribution of our study and how it is related to other studies. We will first describe the entrapment phenomenon of Escalation of Commitment and how it has been explained in literature. Next, we will focus on theories and factors that affect escalation in the field of IS-projects. We proceed with a review of studies that could be related to the Deaf Effect. This will be followed by an elaboration of the three theories - Stewardship Theory, Illusion of Control Theory and Prospect Theory. This provides us with a refined scope and allows us to define the research questions that we aim tro answer with our empirical studies. To ensure the feasibility of our approach for this empirical part, we review strategies, designs and instruments that others have developed and have applied the field of Escalating IS-projects.

In *Chapter 3* we will elaborate the Research Design that forms the common basis for the empirical chapters of our study. This defines the principles, structures and techniques we will use to find the answers to our research questions. We also describe how the individual empirical chapters strengthen each others' contribution by means of triangulation.

Within the empirical *Chapter 4* we will evaluate whether the Deaf Effect could be caused by (1) Gain/Loss framing of the risk warning and (2) whether the messenger is seen as a Collaborative Partner or as an Opponent. In this Chapter we will also consider whether these factors could interact and through which mediating paths they may cause the Deaf Effect. This will be based on a laboratory experiment with 199 students with moderate working experience.

Within the empirical *Chapter 5* we will describe our second laboratory experiment on the Deaf Effect for the internal auditors' risk warning. We will evaluate whether the Deaf Effect could be caused by (1) decision makers' Perceived Control and (2) whether the messenger is seen as a Collaborative Partner or as an Opponent. We will consider whether these factors could interact and through which mediating paths they may cause the Deaf Effect. This will be based on an experiment with 134 part-time students with relevant working experience.

In the empirical *Chapter 6* we will move our study from artificial laboratory conditions to field conditions. In an experiment that is situated in one organization, we provide employees of that organization with risk warnings from internal IS-auditors according the organization's reporting standards and procedures. We will assess whether employees in different roles show different sensitivity for this information as expected from Illusion of Control Theory. We expect that managers will be less sensitive for the probability

information and perceive risks differently than internal auditors. This can contribute to the understanding of managers' Deaf Effect for internal auditors' risk warnings.

In the empirical *Chapter 7* we proceed on the quantitative studies of chapter 4 to 6 with an explorative qualitative study on the Deaf Effect for auditor warnings in the context of IS-projects. We will describe the insights that were obtained from interviews with senior and executive internal audit staff on Deaf Effect situations. We include the factors of our quantitative studies, and we aim to obtain a more rich and refined view on how these and other factors might affect the Deaf Effect, what conditions could promote the Deaf Effect, how Deaf Effect emerges and developes over time, and how messengers tend to react. We specifically focus on elements that could determine whether the messenger of a risk warning is seen as a Collaborative Partner or as an Opponent.

In *Chapter 8* we integrate the findings and conclusions from the empirical Chapters 4 to 7 in order to answer our main Research Questions. We will discuss our main findings related to the research objective and the scope that we described in Chapter 1. We will review methodological choices in the research design of our study which we described in Chapter 3. We will also discus the contribution of our study to research in the field of Escalating IS-projects and in the field of Internal Auditing. We will describe some practical implications of our study for internal auditors, for managers and for organizations in general. Finally, we will suggest opportunities for further research.

The overall structure of this thesis is presented in figure 1-1.
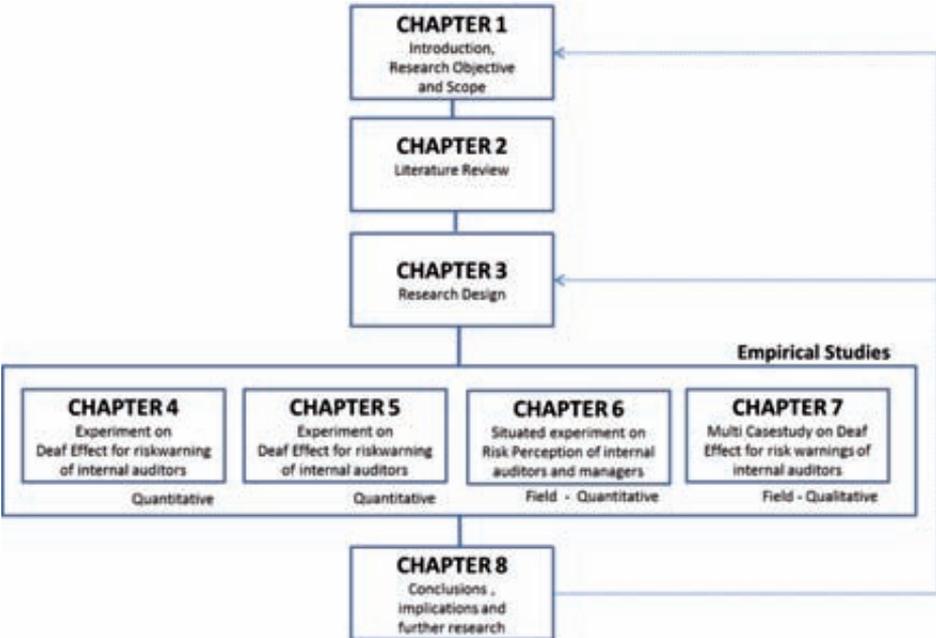
Figure 1-1 Structure of the PhD-Thesis

CHAPTER 2. LITERATURE REVIEW

2.1.   Introduction

In Chapter 2 we will further refine our research objective, the contribution of our study and how it is related to other studies. We will first describe the entrapment phenomenon of Escalation of Commitment and how it has been explained in the literature. Next, we will focus on theories and factors that contributed to escalation in the field of IS-projects. Then we focus on literature related to the Deaf Effect. Departing from the Deaf Effect studies in the field of Escalating IS-projects we will discuss insights from Listening research, Warning Research and Organizational Attention. We continue with a description of Corporate Governance Theories and Stewardship Theory in particular. Prospect Theory and Illusion of Control Theory will also be introduced, as a basis for the empirical chapters where we will use them. The final section of this literature review takes the perspective of research methodology and design. This creates a point of reference for a feasible Research Design of our empirical studies that we will elaborate in Chapter 3.

2.2.   Escalation of Commitment

Escalation of commitment refers to a behavioral entrapment which was first mentioned as *The Rosencrantz and Guildenstern Effect* (Rubin & Brockner, 1975). In this entrapment, people appear to stick to choices in which they have already invested time or money. They apparently can't withdraw. An early example refers to someone who has contacted a service-number on the phone and is waiting in a queue. While waiting-time proceeds, should he or she wait any longer or rather hang-up and try again. Another example refers to a man who is confronted with the choice of walking to his destination (for an important meeting) or waiting for the bus, which he expects will get him to his destination faster and in greater comfort. As time passes, the costs associated with continued waiting increases, but so does the presumed proximity of the goal. Hence, the greater the passage of time, the greater the conflict. And the greater the conflict, the greater the pressures to act decisively – either by withdrawing or by committing oneself to remain in the situation.

Where these examples refer to the entrapment in situations of investments of time, the phenomenon is also found in business investment decisions (Staw, 1976). It would be expected that individuals would reverse decisions or change behaviors that appear to result in negative consequences. However, within investment decisions, negative consequences may actually cause decision makers to increase their commitment and undergo the risk of further negative consequences. Staw (1976) used the metaphor of "Knee-Deep in the Big Muddy" for this entrapment situation, referring to the US entrapment in their involvement in the Vietnam war.

In a sequence of experimental studies various theories have been tested in order to explain the escalation phenomenon. The most prominent theories will be briefly listed first, before we elaborate some of the theories further in the next sections of this literature review.

Self-Justification Theory

Self-Justification Theory attributes escalation to the reluctance of individuals to admit to themselves or to others, that previous resource allocations were unwise. Consequently they may invest additional resources in an attempt, consciously or unconsciously, to demonstrate the correctness of those earlier decisions. The more that individuals have invested in the course of action, the higher is the likelihood of escalation (Brockner, 1992). Continuation of this cycle of investments, problems and further investments to justify previous investments constitutes escalation. This Theory is based upon Festinger's theory of *Cognitive Dissonance* (Festinger, 1957), which explains that people tend to seek for consistency between behaviors and their self-esteem. If an individual has suffered a set-back, but it's not possible to restore the loss, there may be a large need to protect one's ego or self-esteem. Individuals attempt to bolster their ego through various rationalization devices (Staw & Ross, 1978). They may absolve themselves of any personal responsibility. Or they may cognitively distort the magnitude or implications of the setback by perceiving it as less negative or even as a blessing in disguise. However, if negative consequences continue to occur, the individual must eventually either suffer a large loss of self-esteem or lose contact with reality through continued self-justification.

Expectancy Theory

Expectancy Theory suggests that individuals estimate the subjective utility of allocating additional resources based upon an assessment of the value of goal attainment (rewards minus costs) as well as the probability that allocation of further resources will help attain the goal. If the reasons for earlier poor performance are perceived to be unstable and temporary, they consider the probability of goal attainment to be more favorable[5]. Therefore they will be likely to commit more resources. Escalation is more likely when individuals believe that they are closer to the eventual goal and when the pay-offs associated with the course of actions are large (Rubin & Brockner, 1975). There are numerous subforms of Expectancy Theory (Staw & Ross, 1978). They share the view on the individual as cognitively energetic in assessing the subjective utilities of alternatives and take action accordingly. The expectancy mechanism appears to be most relevant to commitment when there is a possibility of recouping one's losses through a future course of action. After suffering a setback, the individual would be predicted to focus on future outcomes and the probability of reaching these outcomes with future behavior. Commitment would show when the previous course of action has higher subjective expected utility than alternatives.

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[5] One could argue whether subjective expected utility could drive escalation behavior. As we show in section 2.5, it is considered to be a mechanism of rational decision making based upon subjective probability estimations. The studies we refer to here however focus on the biases of these subjective probability estimations.

Prospect Theory

In *Prospect Theory*, outcomes are expressed as positive or negative deviations (gains or losses) from a neutral reference point, which is assigned a value of zero (Tversky & Kahneman, 1981). Although subjective values differ among individuals and attributes, the value function is commonly S-shaped, concave above the reference point and convex below it. The value function suggests that individuals are risk-seeking when choosing between two loosing options but risk averse when choosing between two winning options (Kahneman & Tversky, 1979). Therefore the decision may depend on the way it is framed (Whyte, 1986). Later in this thesis, Prospect Theory and its assumptions will be explained further for the purpose of this study. Within Escalation literature, Prospect Theory is mainly reflected in the so-called *Sunk Cost Effect* (Arkes & Blumer, 1985; Garland, 1990). When deciding between canceling or continuing a failing project individuals may take sunk costs into account. These sunk costs represent irrevocable investments that should be irrelevant since the past cannot be changed (Whyte, 1991). While considering these costs as losses, Prospect Theory explains decision makers' tendency to choose the risk-seeking option in terms of adding more resources to the troubled course of action.

Decision Dilemma Theory

Decision Dilemma Theory focuses on situations where information on past performance does not clearly indicate failure (Bowen, 1987). The tendency to escalate commitment is attributed to a variety of motives, including economic considerations, curiosity and a desire to learn more about the phenomenon (Bowen, 1987; Brockner, 1992).

Self Presentation Theory

According to *Self Presentation Theory*, the organization culture influences escalation decisions. Escalation is more likely when organization culture values consistency in behavior or makes people unwilling to admit failure (Brockner, 1992). Self Presentation Theory is important in examining the effects of a social opponent as well as an audience observing the course of action (Brockner, Rubin, & Lang, 1981).

Modeling Theory

Modeling Theory explores the conditions under which individuals are more likely to imitate others' behavior. It is closely related to *Social Comparison Theory* (Festinger, 1954). Modeling Theory suggests that in the absence of objective standards of correctness, managers base their actions on the behavior of others (Brockner et al., 1984) which could promote escalation behavior.

Agency Theory

Agency Theory focuses on situations in which an individual or organization (the *Principal*) delegates tasks to another individual or organization (the *Agent*) (Eisenhardt, 1989). Escalation is considered more likely when the Agent has some information that the

Principal doesn't have - i.e. the conditions for adverse selection exist (Harrison & Harrell, 1993). Furthermore, escalation is more likely when the Agent's goals is not congruent with the Principal's goal.

The Theories listed above have dominated escalation-literature in the 80's and 90's in order to explain the phenomenon of persistence to a failing course of action. Even in the past 10 years still many studies have been done that tested extensions or adapted versions of these theories, such as Regret Theory (Ku, 2008), mental accounting of sunk time (Soman, 2001) or re-interpretation of self-justification effects (Schulz-Hardt, Thurow-Kröning, & Frey, 2009). Also information-asymmetry according to Agency Theory has been further elaborated (Berg, Dickhaut, & Kanodia, 2009) in the context of escalation behavior. Managers' Rational Thinking Style has recently been studied in its contribution to Escalation Behavior (Wong, Kwong, & Ng, 2008). Another recent study investigates backfiring effects of warnings (Schulz-Hardt, Vogelgesang, Pfeiffer, Mojzisch, & Thurow-Kröning, 2010).

To complete the introductory purpose of this section, the following developments and sub-streams should be mentioned with regard to this stream of literature on the escalation phenomenon. First, many studies refer to a typology as introduced by Ross and Staw (1986) that structures the factors that influence escalation of projects. The factors are clustered by their research discipline of origin: Psychological, Social, Organizational and Project factors. Secondly, it should be noted that, next to the explanatory experimental studies, the research stream shows a number of case-studies often describing escalated projects (Ross & Staw, 1986, 1993; Royer, 2003). A remarkably large number of case-studies use IS-projects as an example for escalation (Drummond, 1999; Guah, 2008; Mähring & Keil, 2008; Montealegre & Keil, 2000; Pan et al., 2006). This has developed over the last 15 years to an applied research stream on Escalating IS-projects, next to applied studies in other domains, such as professional sports (Staw & Hoang, 1995), lending and banking (Drummond, 2002; Staw et al., 1997) or political decision making (Ross & Staw, 1986). The research stream on Escalating IS-projects will be described further in the next section.

2.3. Escalating IS-projects

In this section we provide an overview of factors that have a causal relationship with escalation of IS-projects. Furthermore we provide further insight into the process of escalation and de-escalation. In order to structure the overview of causal factors, we follow the four perspectives on escalation as proposed by Keil and Mann (1997) which is based upon the typology by Staw and Ross (1987) and presented in the figure below.
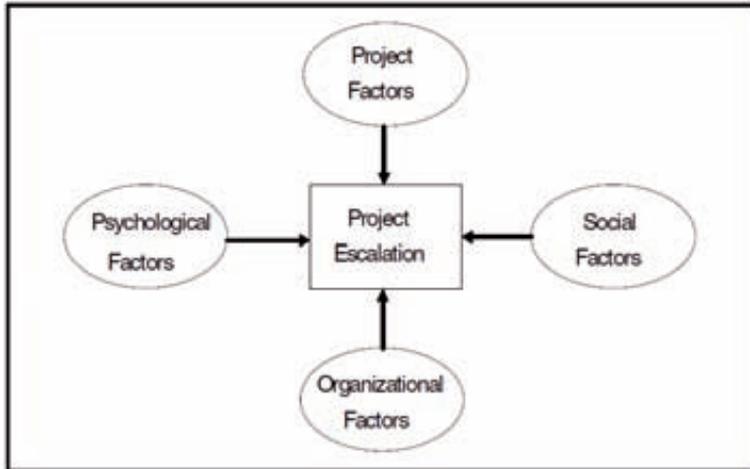
Figure 2-1 Four categories of factors that cause escalation of IS-projects

2.3.1. Project Factors

Project factors are the objective features of the project itself and how it is perceived by management. Several project-related factors could be identified in being of influence on escalation of commitment. These factors include the costs and benefits associated with the project as well as the expected *difficulty* and *duration* of the project. Projects are more prone to escalation when they involve a *large potential pay-off*, when they are viewed as requiring a long-term investment in order to receive any substantial gain, and when set-backs are perceived as temporary problems that can be overcome (Keil, 1995). Based upon their survey amongst IS-auditors, Keil and Mann (1997) associated inadequate *project control* mechanisms, unclear *scope*, unclear *time* and *resources, changing requirements* and lack of project *monitoring by senior management* with project escalation. This particularly applies to Information Systems projects given their large investments, the invisible nature of software and milestones, volatility of requirements and the intangibility of benefits all of which create ambiguity and may cause them to be especially susceptible to escalation (Keil & Flatto, 1999). Inaccuracy due to *project status reporting* errors and biases (Snow & Keil, 2001) could promote escalation.

Across many studies, the project's *level of sunk cost* and *percentage of completion* have proven to be of influence on project escalation (Garland & Conlon, 1998; Keil et al., 2000a). Boonthanom (2003) found that the level of project decision unit (group vs individual) was relevant and that *group-level decision making* promoted project escalation. In the same study he found that *explicit decision guidance* was able to attenuate the escalation behavior, especially at the individual level. *High closing costs* and the *infeasibility of alternatives* were proposed to contribute to escalation (Sabherwal et al., 2003). The absence of a de-escalation strategy also promoted escalation (Boonthanom, 2003).

2.3.2. Social Factors

Social factors are those factors of the environment in which the nature of social structures influence the decision process. *Leadership norms* may influence a decision to continue a failing course of action. There may be social rewards for persistence on a project so as to turn a losing project into a winner. If being consistent and successful is strongly valued in the society or the organization then persistence in the face of a losing project may be viewed as the appropriate behavior (Staw et al., 1997). Staw et al. (1997) indicate that *External Justification* towards the social environment may affect decision maker's behavior. There may be social costs of withdrawal in which termination or redirection of a project might result in losing face. Accountability to others, such as the project team, can overwhelm rationality of decision making. Managers may hesitate to recognize losing projects when their external reputation is at risk and when information about a project's performance is not widely known. This indicates that commitment to a project is not an isolated affair. The decision maker might also be surrounded by a homogenous group of "yes-men" who filter out (Park & Keil, 2009) messages that disagree with the situation as perceived by the manager. When such a group of people share opinions and assess situations in the same manner, this so called *Groupthink* could promote escalation since bad news reports are not acted on. The decision maker's personaliy type (Stumpf & Dunbar, 1991) could strongly be of influence on being surrounded by "yes-men". Another form of Groupthink is called *Group Polarization* which does not require any strong personality decision maker, surrounded by "yes"-men. This Group Polarization is the increase in the extremity of the average response of a subject population (Myers, 1976). More simply phrased, people tend to make more extreme decisions when being part of a group, because the initial preference of individual group members is strengthened following group discussion (Isenberg, 1986; Jones & Roelofsma, 2000). There are two special cases of group polarization, risky shift and cautious shift (Jones & Roelofsma, 2000). Groups whose means lean slightly towards risk taking become even more prone to take risks (Rothwell, 1986). In cautious shift, people slightly leaning towards risk-averse behavior will tend to be more risk-averse after group discussion. Due to risky shift, groups consisting of individuals leaning to escalation were even more likely to escalate after group discussion than before (Brockner, 1992).

Furthermore, *Cultural differences* between countries could be of influence on social pressure and decision makers' tendency to escalate as well (Keil, Im, & Mähring., 2007b). Cultural dimensions such as Power Distance, Time Orientation and Uncertainty Avoidance (Hofstede, 2001) could influence managers' tendency to continue a failing course of action in order to avoid or postpone face losing.

2.3.3. Organizational Factors

Organizational Factors are characteristics of the organization that influence decision making processes and could allow or promote escalation behavior. First, organizations may have a particular *organizational culture* (Hofstede, Hofstede, & Minkov, 2010) that could promote escalation due to *organizational silence* (Park & Keil, 2009), *retaliation-*

culture (Keil et al., 2004) or *shirking* behavior (Keil et al., 2004; Mahaney & Lederer, 2010).

An organization with multiple projects, business units and scarce resources could cause *competitive arousal* (Ku, Malhotra, & Murnighan, 2005) with escalation as a result. In situations where competitive arousal occurs people's attention will be restricted and, in striving to win the competition, people will be more willing to take risk to achieve that goal (Mano, 1994). Time pressure, social facilitation and rivalry can increase competitive arousal (Ku et al., 2005).

Unclear *organizational structures and values* could also lead to escalation. When there is an unclear division of responsibilities, signals indicating problems in a project could be missed as managers assume that others are attending to those signals. Signals may be lost because of the struggling who and how should respond to them (Wissema, 2002). Unclear *policies and standards* may cause a lack of decision guidance (Boonthanom, 2003) which otherwise could have prevented or attenuated escalation behavior.

Organizations may be prone to *institutional inertia* which results in imperfect sensory systems that make them impervious to changes. Therefore they are slow to respond to external stimuli, missing signals on failing projects which could cause escalation as a result. Similarly, political resistance to the idea of terminating or redirecting a project might result in escalation. An organization's identification with a product or a project could also promote escalation (Staw et al., 1997).

Continuation in assigning additional resources to projects is only possible as long as the organization has *slack resources* that could be allocated to this project. As this factor was explicitly addressed in a early case-study by Keil (1995), most (if not all) of the case-studies listed later in this chapter share the organizational characteristic of having room for a decision to continue further allocation of additional resources to the project (government, financial institutions).

The organizational characteristics as described above partially explain why *governmental environments* provide a context that could nurture escalation, as proposed by Davis and Bobko (1986).

Many studies in the field of escalating IS-projects have proposed *Agency Theory* (Eisenhardt, 1989) as providing an explanation for escalation behavior. This theory assumes that the organization's Principals and Agents do not have congruent goals and withhold sharing of information. In several studies (Mahaney & Lederer, 2003; Turner & Muller, 2004) it has been confirmed that Agency Theory may explain escalation due to shirking and limited reporting between the well-informed Project Manager (as Agent) and senior management (in the position of Principal). Agency Theory did not prove robust across some situational characteristics such as country specific cultural differences (Sharp & Salter, 1997).

2.3.4. Psychological Factors

Psychological factors refer to the typical biases in decision maker's perceptions and responses to situations that might cause escalation, such as the project characteristics, the social characteristics and the organizational characteristics of the situation the decision maker finds him/herself in.

Information Systems projects may typically shape conditions for these psychological factors to play a role in escalation behavior.

The *Responsibility Effect* refers to decision maker's biases in the case when they have had personal responsibility for initiating the project. This personal responsibility might influence their observations and problem recognition in face of negative feedback and may cause them to persist in continuation. This could be explained by *Self-Justification Theory* or *Self-Representation Theory* that were described earlier and explain why people feel committed to the decisions they have made earlier. Schulz-Hardt et al. (2009) provided an alternative explanation for the Responsibility Effect, since it would express that decision makers show consistent preferences between alternative solutions over time (such as an individual's centralization/decentralization preferences).

Even without initial personal responsibility, typical IS-project characteristics such as the large investments, time horizon, the intangible nature of deliverables and changing requirements could make decision makers prone to the *Sunk Cost Effect* (Arkes & Blumer, 1985). If the decision maker's attention is captured by unrecoverable losses, he/she will likely show risk-seeking behavior according to *Prospect Theory* and he/she will continue investments to a risky course of action, the IS-project. Various ways of *Framing* that pull decision maker's attention to the losses perspective of a decision to continue/redirect a project (Fagley, Coleman, & Simon, 2010; Levin, Schneider, & Gaeth, 1998; Wong et al., 2008), could explain his or her tendency to make risk-seeking decisions, consistent with Prospect Theory.

The *Completion Effect* often accompanies the Sunk Cost effect. When people perceive that a project nears completion, the goal of completing the project overrides economic considerations and even accountability (Conlon & Garland, 1993). The Completion Effect might confound or interact (Moon, 2001) with the Sunk Cost Effect. Moon (2001) found that at high levels of completion, the effect of sunk cost approached an exponential curve as the level of completion increased. Keil et al. (2000a) found that the Completion Effect was a better classifier of projects that escalated than models constructed from Self-Justification, Prospect Theory and Agency Theory.

2.3.5.   De-escalation Strategies

De-escalation studies are of interest since the Deaf Effect could be considered as a failure to de-escalate (Cuellar, 2009) p.19. Understanding the conditions under which de-escalation occurs may shed a light on why it might not occur despite clear warning signals being available that de-escalation is needed. Mähring and Keil (2008) define de-escalation as "the reversal of escalating commitment to failing courses of action, either through project termination or redirection". From a process perspective Montealegre and Keil (2000) proposed that de-escalation is a gradual process instead of a sudden event. The patterned sequence of events resulted in the de-escalation phases as presented below.

Phase 1: Problem Recognition	No corrective action can be taken until actors in a position of authority begin to acknowledge the problems and their seriousness. Often, what can appear to outsiders as an obvious case for withdrawal may not outweigh the accumulated commitment of those inside the organization, particularly those who have played a role in championing the project. In many cases, it appears that either internal or external pressure must exist before problem recognition can occur.
Phase 2: Re-examination of Prior Course of Action	During this phase, actors begin to question the wisdom of the previously chosen course of action and problems are scrutinized, but their commitment has not dropped so precipitously as to dictate immediate withdrawal.
Phase 3: Searching for Alternative Course of Action	In this phase, further evidence of problems is often sought and an alternative course of action is identified and legitimized. Consultants can sometimes help legitimize a new course of action and impression management can also facilitate the process. However, the decision to embark on a new course is still going to be difficult, especially if it results in loss of face for decision-makers.
Phase 4: Implementing an Exit Strategy	Given the political nature of escalating projects, merely identifying an alternative course of action is insufficient to bring about change. The alternative course must be legitimized and sold to various actors. Moreover, all of this needs to be done, if possible, in a way where impressions are managed so as to allow face-saving on the part of key executives who backed the failing course of action. Implementation of the exit strategy can be particularly challenging if certain actors have a vested interest in the previously chosen course of action.

Figure 2-2 De-escalation Process Model

In a more recent article Flynn Flynn, Pan, Keil, and Mähring (2009) proposed a de-escalating maturity model (DMM) for trying to deal with runaway projects. This model identified five levels of organizational maturity, covering the steps in the figure below. *Level 1 - Discipline to change project plan* covers the capability to re-evaluate and refine plans (step D). Level 2 covers *Discipline to detect deviations from project plan and prevent escalation* (step A&B). Level 3 covers *Discipline to execute project plan* (step E). Level 4 covers *Discipline to encourage bad news reporting and to change attitudes and behaviors* (step B&C). Level 5 refers to *Discipline to engage in organizational learning* (step F).
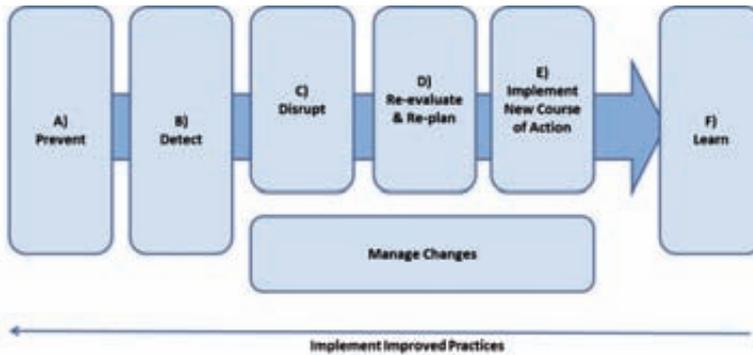
Figure 2-3 De-Escalating Maturity Model

Simonsen and Staw (1992) proposed de-escalation by reduction of self-justification and external justification effects. This could be achieved by 1. making negative outcomes less threatening, 2. setting minimum target levels that if not reached result in change of policy, 3. evaluating decision makers on process rather than outcome. This should make decision makers more responsive to available evidence.

Tan and Yates (1995) found that instructions regarding normative economic principles effectively reduced sunk cost effects. Boonthamon (Boonthanom, 2003) proposed the de-escalation strategy of providing external stimuli promoting normative decision making.

2.3.6.   Consequences for our study

From this review of literature in the field of Escalating IS-projects, we learn that many causal factors have been studied individually from psychological and organizational perspectives. Studying the interaction between organizational and psychological factors could contribute to existing literature. So there appears to be room for our proposed study on the interaction between the messenger-decision maker relationship (according to Stewardship Theory) and psychological factors (according to Illusion of Control Theory and Prospect Theory).

Refering to the process model in figure 2-2, the Deaf Effect would be positioned as an attribute for failure in Phase 1 Problem Recognition. In figure 2-3 it would point at a deficiency of steps A and B to detect deviations and prevent from escalation. Finally, the de-escalation approaches as proposed by Simonsen and Staw (1992) suggest that framing could be of influence on the Deaf Effect. We will now further proceed with literature related to the Deaf Effect.

2.4. Deaf Effect

2.4.1. Deaf Effect in Escalating IS-projects Research

Within the extensive stream of research on escalation of IS-projects, only a few studies focus on the Deaf Effect. Based on a survey of internal auditors, Keil (Keil & Robey, 2001) described the Deaf Effect as a failure to respond to messages of impeding IS-project failure. The auditors recalled instances in which they had reported bad news about projects only to find that their concerns were ignored by senior management. A few particular studies (Cuellar, 2009; Cuellar et al., 2006; Cuellar et al., 2007) proceeded on this study and performed an examination on the Deaf Effect for bad news reporting in the field of IS-projects. In this section we will describe the main findings from these studies and discuss how our study could proceed and contribute.

Cuellar (2009) defined the phenomenon of Deaf Efect as occurring "when a decision maker doesn't hear, ignores, overrules a report of bad news to continue a failing course of action". In his study he refers to *Whistleblowing Effectiveness Theory* (Near & Miceli, 1995).

According to this theory, the whistle-blower's effectiveness is determined by (1) characteristics of the whistle-blower, (2) characteristics of the complaint receiver, (3) characteristics of the wrongdoer, (4) characteristics of the wrongdoing and (5) characteristics of the organization. The relative *Credibility* and *Power* of those actors was central in their model. Organization characteristics were focused on the organization's willingness to change (and terminate wrongdoing) and *whistle-blowing climate*. Their model was strongly based upon principles of Power Theories of Minority Influence and whether the whistleblower or wrongdoer has authority. They refer to internal auditors who have - in certain situations – roleprescribed power and authority so one would expect them to be effective whistle-blowers, according to Near and Micelli's model.

We saw earlier that – despite these assumptions –internal auditors regularly reported Deaf Effect in the field of escalating IS-projects (Keil & Robey, 2001). This suggests that there are other factors that could cause Deaf Effect. Cuellar found that credibility of the whistle blower – also included in Near & Micelli's model – was of influence on the Deaf Effect (Cuellar et al., 2006). Credibility was related to whether the whistle-blower could be expected to make true assertions. Cuellar also found partially confirmed that role-prescription of the whistle-blower and personal characteristics (gender, age, risk propensity) of the receiver, were of influence on the Deaf Effect .

Next to the Near&Micelli model at organizational level, Cuellar also included the psychological perspective of biased human information processing in order to explain the Deaf Effect. For that purpose the *Heuristic Analytic Theory* of Evans (2006) was introduced for explanation of the Deaf Effect. This theory is one amongst many other theories and models from cognitive psychology that describe human information processing. The Heuristic Analytic Theory assumes two levels of cognitive processing of information: *Heuristic Processing* and *Decision Processing*. The heuristic processing is based upon experiences, beliefs and heuristics and filters relevant information that will be

transferred to the decision processes. It thus assumes that the heuristic system provides "relevant information" as input for decision making. The Heuristic Analytic Theory was tested with *Message Relevance* as a proposed mediator for the Deaf Effect.
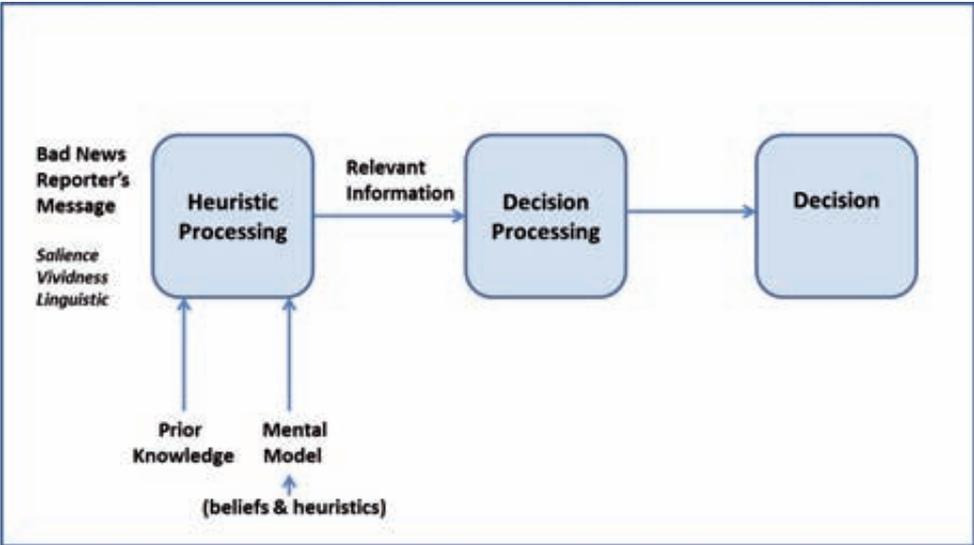
Figure 2-4 Heuristic Analytic Theory, applied on Deaf Effect by Cuellar&Keil

As mentioned, gender, working experience and risk propensity could contribute to the Deaf Effect. This could be explained by differences in prior knowledge or the mental model of the decision makers. Cuellar et al. (2006) found that *Message Relevance* acted as a mediator to the Deaf Effect. It partially accounted for the influence of *Credibility* and *Role-prescription* on the Deaf Effect. The message from a role-prescribed and credible whistle-blower was found more relevant and this relevance explained (partially) the reduction of the Deaf Effect in these conditions. Also *Risk Perception* of the receiver was found to be a mediator in this study. These mediators proved useful to obtain insight in the influence of messenger-characteristics and receiver-characteristics on the Deaf Effect. In a follow-up cross-cultural study (Cuellar et al., 2007), the influence of societal collectivism on the Deaf Effect was tested. Based on a case-study on the Deaf Effect, Cuellar (2009) proposed that decision maker's *Perceived Control* could be an interesting candidate for further study on the Deaf Effect..

2.4.2.   Deaf Effect in Cognitive Information Processing Research

One extension on Deaf Effect research as described in the previous section could be found in the direction of more refined models that describe human information processing of messages and warnings. As we saw, the Heuristic Analytic Theory (Evans, 2006) used the heuristics system as a filtering system with a 1-direction relation to the decision processing system. This Theory is one amongst many other theories and models from cognitive psychology that describe human information processing. Several models assume a more

refined – and complex – interaction between the heuristics and the rational systems. We postpone our description of the *System 1* and *System 2* model (Stanovich & West, 2002) to our description of Prospect Theory, since Kahneman strongly draws upon this model in explaining Prospect Theory (Kahneman, 2003). In order to explore models that could be interesting for the Deaf Effect for risk warnings, we made a step into the direction of understanding Deafness (Listening Theory) and we made a step into the direction of Risk Warnings (Warning Research).

Listening Theory focuses on the processing of any persuasive information that is intended to change receivers' attitudes (Bodie, 2009). Listening is defined as an active form of behavior in which individuals attempt to maximize their attention to, and comprehension of, what is being communicated to them through the use of words, actions and things by one or more people in their immediate environment. (DeFleur, Kearney, & Plax, 1993), p102. Two models of cognitive information processing are dominant in Listening Theory in order to explain the affective (emotional) and cognitive processing and interpretations of messages, as well as the different levels of attitude change. These include the *Elaboration Likelihood Model* and the *Heuristic-Systematic Model* of information processing.

The *Elaboration Likelihood Model* (Petty & Cacioppo, 1986) assumes different paths and conditions that would explain attitude change as a results of persuasive communication. It makes a distinction between Central Attitude Changes – positive or negative – and Peripheral Attitude Shifts. Central Attitude Changes are relative enduring, resistant and predictive of behavior. Peripheral Attitude Shifts are relatively temporary and unpredictive of behavior.
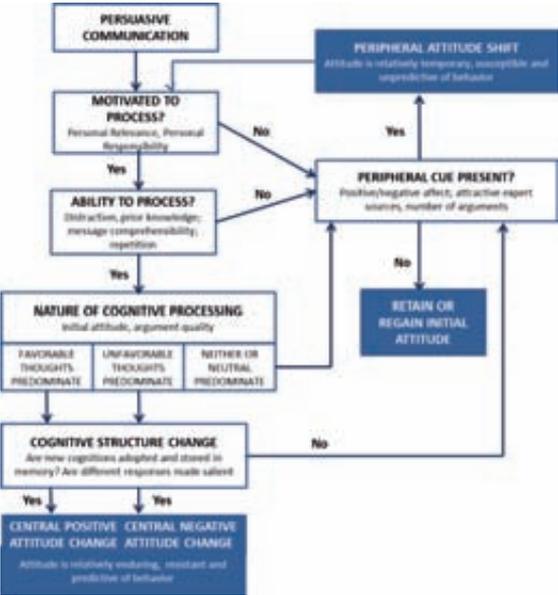
Figure 2-5 Elaborated Likelyhood Model of Listening (Petty & Cacioppo, 1986)

The *Heuristic-Systematic Model of Information Processing* (Chaiken, 1980) describes two levels in the processing of attitude change, which includes systematic processing and heuristic processing. In this model, information is either processed in a high-involvement and high-effort systematic way, or information is processed through shortcuts known as heuristics. For example, emotions are affect-based heuristics, in which feelings and gut-feeling reactions are often used as shortcuts.

Next to these explanatory models from Listening Theory, the explanation of the Deaf Effect for risk warnings on IS-projects could also be served by insights from other research on the effectiveness of warnings. This research is mainly centred around models for the effectiveness of safety-warnings (traffic signs, radiation warnings, health warnings). In a review of research on the effectiveness of safety-warnings, Laughery (2006) points at various models of human information processing that could explain compliance to risk warnings. Amongst models such as described by Rogers, Lamson, and Rousseau (2000), a central position in this stream of research is granted to the C-HIP model. With C-HIP, Wogalter and Dingus (1999) combined the communications and human information processing (C-HIP) models into a single theoretical framework for warning. This communication and human-information processing framework is a stages model, consisting of stages through which warning information flows. At each stage the information is processed and, if successful, "flows" to the next stage. Processing failure at any stage can block the flow and result in the warning not being effective. The C-HIP model is presented below. On the right side we translated it to our context.
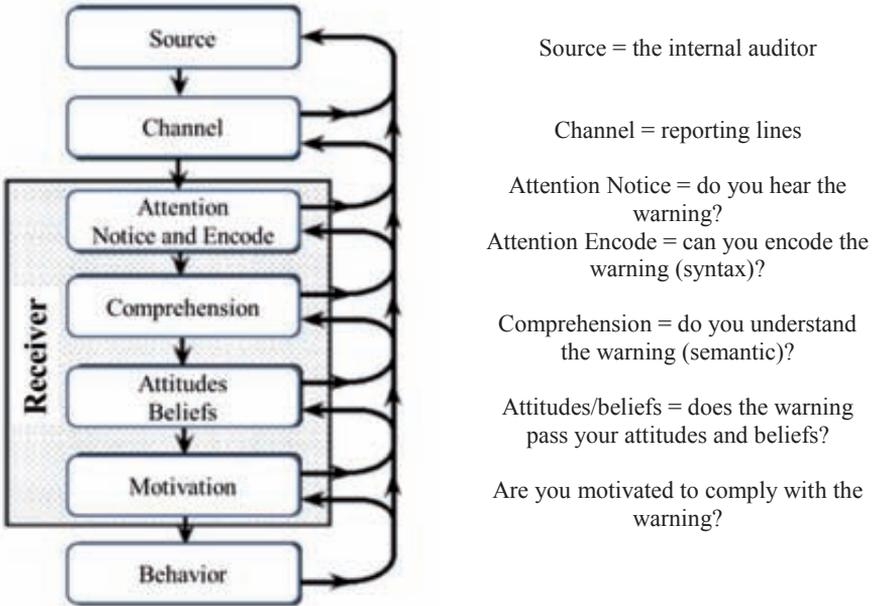
Figure 2-6 The C-HIP model of compliance to Risk Warnings (Wogalter & Dingus, 1999)

2.4.3. Deaf Effect in Organizational Behavior Research

The Deaf Effect in organizational behavior was suggested by March and Shapira (1987) based on their survey on managerial risk-taking in organizations. They assessed that managers appear to ignore parts of risk warnings, since these managers assume the warnings don't apply to them personally. They point at the dominant role of perceived control in managers' risk-preferences, risk-taking behavior and limited attention for risk warnings. Shapira (1995), p63-64 shows that negative feedback information might even encourage managers to persist in taking risks even more than in case they received positive feedback information. We will proceed on *Perceived Control* later in this study and – at this position – focus on the Deaf Effect from an organization perspective. This perspective assigns a central role to the decision makers' *Attention* for warnings in the organizational context.

Assuming that a well informed employee would be willing to report bad news, then the organization should allow communication channels to bring the warning to its destination. As Simon (Simon, 1997), p105 puts it: "Each member of the organization requires certain information in order to make correctly those decisions for which he is responsible. To ensure that the necessary information is presented to each member, a regular system of records and reports is devised, which automatically directs these stimuli into the proper channels". This organizational research follows Simon's (1997) notion of *bounded rationality* and *limited attention* of decision makers.

Focusing on the *Receptivity to Communication* Simon (1997), p216 suggests that the attention that will be given to a communication by its recipient is not simply a matter of logic. The source of the communication and the way it is presented, will determine for its recipient how much consideration he will give it. If formal channels are maintained, communications flowing through these channels will have their effect enhanced by the authority that their "official" character gives them. Unsolicited information or advice, on the other hand, may be given little or no attention.

The crucial point is whether or not the recipient of an order, or any other kind of communication, is influenced by the communication in his actions and decisions. In some cases formal authority may be a sufficient inducement to comply; but usually the communication must reason, plead and persuade, as well as order, if it is to be effective. For similar reasons, consideration must be given to whether the communication should be oral or written; and whether it should be in formal or informal language. In every case the state of mind of the recipient, his attitudes and motivations, must be the basic factors in determining the design of the communication. The function of the communication, after all, is not to get something off the mind of the person transmitting it, but to get something into the mind and actions of the person receiving it (Simon, 1997), p 216.

Ocasio (1997) conducts research on *organizational attention*. He suggests that research on managerial decision making on risks might have followed the lines of bounded rationality too much in order to understand limited management attention on risks. He identifies 3 levels of analysis: 1) individual, 2) social and 3) organizational. He suggests that the organization perspective on management attention is overwhelmed by research on the

other two. He links individual information processing and behavior to the organizational structure through the concepts of *procedural and communication channels* and *attention structures*.

Hoffman and Ocasio (2001) study the *organizational attention*, the socially structured pattern of attention by decision makers within an organization. They take on this perspective to explain how organizations distribute and regulate the attention of their decision-makers. This idea is based on three interrelated premises: 1) What decision makers do depends on what issues and answers they focus their attention on - *Focus of Attention*; 2) What issues and answers decision-makers focus on, and what they do, depends on the particular context or situation - *Situated Attention*, and 3) *Structural distribution of attention*.

Ocasio (1997) further elaborates on the principle of *Situated Attention* in contrast with the *Focus of Attention* principle that was discussed in the cognitive information processing models that are focused on bounded rationality. Situated Attention indicates that what decision makers focus on, and what they do, depends on the particular context that they are located in. According to this principle, the focus of attention of individual decision makers is triggered by characteristics of the situation which they confront themselves with, and this situated attention directly shapes individual's behavior (Ross & Nisbett, 1991). This principle provides a link between how individuals think and decide in any particular situation, and how the organization shapes the situations that individuals find themselves in. From this perspective, decision making is guided by situated attention as a result of organizational attention structures and interaction between participants in the firm's procedural and action channels.

2.4.4. Consequences for our Study

From research in the field of Escalating IS-projects we learn that the Deaf Effect is relevant and is relatively unexplored with regard to its interaction with organizational conditions. This provides room for our study. We also learned that *Message Relevance* and *Perceived Risk* could be of help in understanding the effect of organizational and psychological conditions on the Deaf Effect.. We found that the Deaf Effect for auditor warnings could only be partially explained by the factors *Authority*, *Role-Prescription* and *Credibility* from Whistleblowing literature. So other factors and theories might further contribute. From research in the field of Listening Theory we find that change of attitudes has a central position in predicting the Deaf Effect for persuasive messages. It would go too deep into psychology research to give attitude change a central position in our study. Especially since we are interested in the specific context of the decision maker's Deaf Effect for internal auditors' warnings. The C-HIP model from Warning Research clearly showed the relevance of comprehension – both syntactically and semantically – for the effectiveness of warnings. We will assume - and test - in our study that decision makers indeed comprehend the conditions and the warning on IS-project escalation they receive. The C-HIP stagemodel is very useful for further research on the Deaf Effect. From organizational research we learned that the organization structure and principles are important to explain the Deaf Effect – mediated by management attention. The corporate governance structure therefore could be very fruitful for further study, since it underpins

the communication structures, roles and relations within an organization – and thus could influence situated attention of decision makers. This would also suggest the factor *Attention* as a proposed mediator in our model of Deaf Effect. We included *Attention* in the early stage of developing and empirically testing our research model. We also found that *Attention* could not be measured in an unbiased way with selfreported measurements. However the principles of the interaction between organizational characteristics – the relationship between internal auditor and Project Owner – and psychological characteristics were confirmed to be interesting for further explaining the Deaf Effect.

2.5.   Stewardship Theory

In our study we focus on the Deaf Effect at an inter-personal level: with the internal auditor in the role of the provider of a Risk Warning and with the Project Owner's relationship with the messenger (as a Collaborative Partner or as an Opponent) to be a determinant for escalation behavior. In this section we describe these types of relationship, based on Stewardship Theory, a theory of Corporate Governance. First, we describe Stewardship Theory amongst other theories of Corporate Governance. Next, we will focus on the relationships according to Stewardship Theory compared to Agency Theory. From this relationship perspective, we will briefly discuss the relationship between internal auditors and managers. We will describe studies in the field of escalating IS-projects that applied a corporate governance theory earlier. Finally, we will discuss the consequences to our study.

2.5.1.   Corporate Governance Theories

The assumption that firms' executives might not necessarily act in a way that is consistent with the interests of the organization appears to be a starting point for raising the issue of Corporate Governance as initiated by Berle and Means (1932). They addressed the separation of the ownership and the control over the organization's activities. As described by the Organisation for Economic Co-operation Development (OECD, 1999), *"Corporate Governance involves a set of relationships between company's management, its board, its shareholders and other stakeholders. Corporate governance also provides the structure through which the objectives of the company are set, and the means of attaining those objectives and monitoring performance are determined. Good corporate governance should provide proper incentives for the board and management to pursue objectives that are in the interest of the company and shareholders and should facilitate effective monitoring, thereby encouraging firms to use resources more efficiently"*. Van Manen (1999) defined Corporate Governance as a process whereby stakeholders try to influence the decision making process of an organization and its subsequent implementation.

There are several corporate governance theories that provide principles to explain and improve an effective structure of relationships and incentives within an organization in order to serve the shareholders' interests. We will first discuss *Agency Theory*, since it formed the roots of research into and implementation of corporate governance since many decades (Fama, 1980, 1983; Jensen & Meckling, 1976). We will briefly discuss three other theories of corporate governance. Finally, we will elaborate on *Stewardship Theory* (Davis, Schoorman, & Donaldson, 1997) since it provides the theoretical basis for our research

questions and deviates from Agency Theory in its assumptions on effective relations and incentives.

Agency Theory (Fama, 1980, 1983; Jensen & Meckling, 1976) focuses on the relationship between a Principal (the affected party) and an Agent (the individual taking action). Agency relationships exist between the owners of a firm and its senior management, but they can also exist between different levels within a firm's hierarchy. The Agency problem is quite general and it 'exists in all organizations and in all cooperative efforts – at every level of management in firms' (Jensen & Meckling, 1986). Whenever one individual depends on the action of another, an Agency relationship arises. There are three problems that can occur in Agency relations: (1) goal differences, (2) risk tolerance differences, and (3) information asymmetry (Eisenhardt, 1989). The first general problem is differences in the goals of the Principal and the Agents. Agency theory assumes that, at least some of the time, organizational parties act opportunistically (i.e. on the basis of self-interest). Therefore, Principals must recognize that an Agent might act to maximize his or her own utility, rather than acting in the best interest of the Principal. Secondly, Principals and Agents may have different tolerances toward risk. Often it is assumed that Agents are more risk averse than Principals and will act in a self-serving manner when opportunities arise (Baiman, 1990). Third, information asymmetry is a critical component of Agency Theory. There are two general types of information that is not known equally by both sides: information that everyone would like to share and information that one or the other party might prefer to hide. Often discussions of information asymmetry tend to paint the Agent as concealing information that is potentially damaging to Principals. But Principals can conceal information that is potentially damaging to Agents as well (Eisenhardt, 1989). Agency theory focuses heavily on incentives and rewards as a means of aligning the interests of both Principals and Agents (Paape, 2007). The reduction of so-called Agency costs is a main objective when defining organization structures, monitoring and bonding of contracts in order to align interests between executives and shareholders (Jensen & Meckling, 1976). Agency theory however was also criticized since it would ignore bounded rationality of executives (Baker, Jensen, & Murphy, 1988; Miller, 1992), and – due to the assumption of mutual lack of trust - might even promote opportunistic behavior of executives (Nootenboom, 1999).

Before we move to Stewardship Theory, we briefly mention two other theories of Corporate Governance for reason of completeness. *Stakeholder Theory* (Freeman, 1994) takes into account corporate governance from a broader perspective of social responsibility and pays attention to a broad range of external stakeholders with multiple and divergent goals. Although increased societal pressure on organizations is more than relevant (Waddock, Bodwell, & Graves, 2002) and could certainly apply to ambitious IS-projects as well, this theory does not directly focus on the relation between internal auditors and executive management. Therefore we will not further include it in our study. *Resource Dependency Theory* (Pfeffer, 1972) posits that the ability of organizations to operate under an environment of complexity associated with its wider interdependencies is directly related to the quality and effectiveness of the directors who make up the board or its "board capital". This theory further suggests that corporate boards are governance mechanisms for managing such external and internal environmental influences and for reducing uncertainty under such an environment. This certainly applies for strategic

opportunities and threats in the field of information systems as well, which is confirmed in the role of Chief Information Officer which can be found in many executive boards (Kirkley, 2007). Since this theory doesn't focus on the relation between internal auditors and executive management, we will not further include it in our study. In our study we therefore we focus on Stewardship Theory and compare it with Agency Theory.

Agency Theory is the dominant paradigm in corporate governance research. Researchers in psychology and sociology however have suggested theoretical limits of Agency Theory (Hirsch, Michaels, & Friedman, 1987; Perrow, 1986). In particular, assumptions made in Agency Theory about individualistic utility motivations resulting in Principal-Agent interest divergence were critized on its model of man. Where individualistic, self-serving executive motivation is assumed, the shareholders should implement Agency prescriptions, when they are desirous of minimizing the risks associated with perceived nonalignment of Principal-Agent utility functions. Jensen and Meckling (1994) criticized this model of man as being an unrealistic description of human behavior. Doucouliagos (1994) argued that labeling all motivation as self-serving does not explain the complexity of human action. In order to complement Agency Theory, Davis et al. (1997) introduced *Stewardship Theory* of Corporate Governance that is mainly based upon Collaborative and trusted relations between Principals and Agents. This theory regards managers as good stewards to company's assets. The Stewardship Theory is contrary to Agency Theory by criticizing its assumption of goal conflict between the shareholder and the manager (the Principal and the Agent) and the need for extrinsic motivation. The theory aims to achieve that interests of the managers are aligned with that of the organization by facilitation, empowerment and intrinsic motivation. External incentives (such as compensatory rewards to executive management) might not always result in behavior that serves the shareholders' interest. Below you find a comparison between *Agency Theory* and *Stewardship Theory* as presented by Davis et al. (1997).

	Agency Theory	**Stewardship Theory**
Model of Man	Economic Man	Self-Actualizing Man
Behavior	Self-serving	Collective serving
Psychological Mechanisms		
Motivation	Extrinsic	Intrinsic
Social Comparison	Other Managers	Principal
Identification	Low value commitment	High value commitment
Power	Institutional (legitimate, coercive, reward)	Personal (expert, referent)
Situational Mechanisms		
Management Philosophy	Control Oriented	Involvement Oriented
Risk Orientation	Control Mechanisms	Trust
Time Frame	Short Term	Long Term
Objective	Cost Control	Performance Enhancement
Cultural Differences	Individualism	Collectivism
	High Power Distance	Low Power Distance

Table 2-1 Comparison between Agency Theory and Stewardship Theory (Davis et al., 1997)

Although Agency Theory and Stewardship Theory might be considered contradictory and mutually exclusive, Davis et al. (1997) suggests them to be complementary. Given their different assumptions on situational and psychological characteristics, they both contribute to achieve "effective corporate governance" across organizations and cultures that show different characteristics (such as time orientation, individualism, power distance). A similar approach is followed by Christopher (2010), who developed a *Multi-Theory model of Corporate Governance* that follow a contingency approach of aligning corporate governance principles from the different theories with the characteristics of an individual organization during its lifecycle. Sundaramurthy and Lewis (2003) even go further in bridging Agency Theory and Stewardship Theory: they claim that the theories need each other. Based upon a framework of organizational dynamics they describe the paradox between both models of Corporate Governance, the "control-based" Agency Theory and the "collaboration-based" Stewardship Theory. They show that both models, when isolated, can lead to reinforcing circles of dysfunctional dynamics if they are not counter-balanced by characteristics of the other. Agency Based corporate governance organizations can show strategic persistence in "control"-rigidity, which can finally lead to dysfunctional cycles of greater controls, distrust, polarization, impression management, splitting-turf wars, finally resulting to failure. In the Stewardship Based corporate governance organization, strategic persistence in "collaboration"-rigidity can finally lead to dysfunctional cycles of greater collaboration, groupthink, consensus seeking, complacency, threat rigidity, escalating group commitment, finally resulting to failure.

We conclude here that Sundaramurthy and Lewis (2003) suggest that both Agency Theory and Stewardship have their own assumptions, and show the pitfall that their countermeasures – more contracts or more collaboration – could reconfirm and strengthen their own assumptions. This confirms Argyris' claim of self-fulfilling prophecies regarding the nature of relationships that develops in organizations (Argryis, 1973). Agency Theory based organizations will likely attract and behold employees that feel comfortable within these principles. Within the paradigm of Agency Theory such organizations would react on falling performance with measures to improve goal congruence and reporting, thus reconfirming the assumptions of information asymmetry and incongruent goals. Stewardship Theory based organizations would attract and behold employees that feel comfortable within those principles. Within the paradigm of Stewardship Theory such organizations would react to falling performance with measures to improve collaboration and motivation. We interpret Sundaramurthy's and Lewis's (2003) claim that Agency Theory and Stewardship Theory are tied together since each cannot solve problems from the own paradigm within the assumptions of this paradigm – and therefore needs the other.

2.5.2.   Agency and Stewardship Relations – a Prisoner's Dilemma

Davis et al. (1997) suggests that there are psychological and situational factors that predispose individuals to Agency and Stewardship approaches to relationships. They suggest that the choice between Agency and Stewardship relationships is similar to a decision posed by the *Prisoner's Dilemma*. First, it is a decision made by both parties of a relationship. The psychological characteristics of each party predisposes each individual to make a particular choice. Second, the situational characteristics have an influence on the

choice. The management philosophy may have a significant impact on the choice by both parties. The cultural background (collectivism and power distance) of each party may also affect the choice. Finally, the expectation that each party has of the other will influence the choice between Agency and Stewardship. A longer history of these parties dealing with each other will provide more data to guide these expectations. The nature of the dilemma is illustrated in figure 2-7.

Principal's Choice

	Agent	Steward
Agent	Minimize Potential Costs Mutual Agency Relationship	Manager acts Opportunistically Principal is Angry Principal is Betrayed
Steward	Principal Acts Opportunistically Manager is Frustrated Manager is Betrayed	Maximize Potential Performance Mutual Stewardship Relationship

Manager's Choice (row label)

Figure 2-7 The Principal – Manager choice model (Davis et al, 1997)

Davis called for a more fine-grained analysis on Stewardship Theory vs Agency Theory relationships. He proposes that researchers should further inquire into the Stewardship mechanisms and examine their relative performance, their interactions with psychological conditions and the situational contingencies that affect them. There may be an interaction effect between the organization's philosophy and the psychological variables. He further points at the simplified assumption of a choice between Agency versus Stewardship relationships at a single point in time. Clearly, the role of a long-term relationship is central to the choice of Stewardship roles. One of the important implications of the theory of Stewardship is that if a mixed-motive choice is made and one party is betrayed, the inevitable progression of the relationship is toward an Agency model in which both parties no longer show vulnerability to the other. Researchers should explore the choice of Agency versus Stewardship relationships over time, incorporating variables that capture the dynamic nature of Principal-manager relationships. Finally, Davis suggest further research on interaction effects between the relationship and other organizational or psychological factors. Finally, Davis (1997) suggests to link Stewardship Theory to risk-taking behavior.

2.5.3. The relationship between Internal Auditor and Manager

The internal auditors have received an important position in the organization's corporate governance framework (Paape, 2007), p77. Since their origin they have been part of the monitoring instruments to serve the organization's interests within the Agency Based corporate governance framework. Therefore they are placed independently from those

monitored (the management board). They also need to be experts in their tasks framework (Paape, 2007). Their role and their relationship with management reflects the organizational corporate governance philosophy. For a long period, Agency Theory underpinned their relationship with management and determined their inspection – policeman - style role until late nineties. Early work on Internal Auditing from practitioners' perspective (Chambers, Selim, & Vinten, 1988) already discussed that a relationship of "Policeman vs Collaborative Partner" can be of influence on effective communication towards senior management. Related to this topic they reported the following to the practitioners: 1) Internal auditors may arrive at a role conflict (p.60) which is principally a conflict of reporting on people to whom the auditor likes to be seen as an adviser; 2) Audit recommendations may be ignored by management (p.65). Constructive and participative auditing can be of help to alleviate this problem; 3) Negative perception of internal auditing by managers adversely affects relationships and can blunt effective communication (p.68); (4). Internal auditors (p.72) might be seeking to be a "collaborative adviser" but might still be seen as "policemen" regardless. And 5) Managers often react hostile to the inspection style of auditing (p.73), in which situation the managers are inclined not to listen to the auditor or to benefit from his findings. These findings from internal audit practice suggest that an Agency-relationship to management can make the internal auditor less effective in his or her communication.

Since 1999, the contemporary approach of the internal audit profession extended the role of auditors towards both Agency Based (monitoring) and Stewardship Based (collaboration) in their definition of Internal Auditing, while it had been restricted to monitoring, inspection and assurance until then (Bou-Raad, 2000). The Institute of Internal Auditing currently defines internal auditing as follows (IIARF, 2011):

"an independent objective assurance and consulting activity designed to add value and improve an organization's operations. It helps an organization accomplish its objectives by bringing a systematic, disciplined approach to evaluate and improve the effectiveness of the risk management, control and governance processes" .

The organization's corporate governance philosophy is reflected in the organization's internal audit charter, the internal audit standards and practices and in the (Agency or Stewardship) relationships that internal auditors build up with management. As suggested by Davis et al. (1997) the effectiveness of these relationships may depend on the psychological conditions of the decision makers. So the interaction between the internal auditor-manager relationship and the manager's psychological conditions (heuristics) can be of influence on managers' Deaf Effect for internal auditor's warnings on an escalating IS-project.

2.5.4.   Corporate Governance Studies in the field of Escalating IS-projects

Although not directly related to Deaf Effect, several empirical studies in the field of Escalating IS-projects, have examined the influence of Corporate Governance on the escalation of IS-projects. These studies are based upon the principles and assumptions of Agency Theory. Relationships within organisations are defined in terms of Principals and Agents who have incongruent goals and information asymmetry. With a survey across

2200 IS-auditors, Keil et al. (2000a) tested four theories – including Agency Theory – to distinguish between escalated and non-escalated IS-projects. The model based upon the constructs of Goal Incongruence and Information Asymmetry performed well in classifying both escalated (78%) and non-escalated IS-projects (72%). Based on interviews with 12 IS-project managers, Mahaney and Lederer (2003) found confirmation that Agency Theory assumptions could explain IS-project failures and that contracts would likely mitigate goal conflicts and shirking. Mahaney and Lederer (2010) performed a survey across 428 information systems project managers concerning their project monitoring, shirking by systems developers, and project success. Greater project monitoring via planning and meetings predicted less shirking, and they confirmed Agency principles.

2.5.5. Consequences for our study

We learn from this literature section that Corporate Governance can have a large impact on how actors within an organization define their relations, communicate and aim to achieve their goals. We found that internal auditors' role strongly represents the organization's Corporate Governance model. Especially their relationship with management – such as the Project Owners in our study – is strongly determined by the Corporate Governance philosophy. We also found that Agency Theory and Stewardship Theory are based upon opposite assumptions, which can both be effective in organizational conditions that meet those assumptions. Furthermore, we found that neither Stewardship Theory nor Agency Theory could claim their assumptions to be superior and that both are needed for balance – in time or in circumstances – in order to prevent the other from reinforcing circles of dysfunctionality. Within the circumstances and the time pressure of delivering a strategic IS-project, several studies showed that Agency Theory principles can promote escalation. These studies assume the organization's management to be rational Principals that are withheld from crucial information by project managers (Agents) – the Mum Effect. Our study contributes with testing Stewardship Theory on the Deaf Effect. It takes the assumption that management – Project Owners – may not be rational Principals and can be driven by situated attention – determined by the interaction between their psychological conditions and organizational conditions.

2.6. Prospect Theory

In this section we provide a description of Prospect Theory for the purpose of our study. This description is without any attempt to show the richness and the refinement of the research related to this theory, as described by Wakker (2010). With this section we aim to provide the reader with sufficient theoretical background to the Framing Effect that we include in our study. We first describe normative theories on decision making under uncertainty. These theories provided the basis for development of Prospect Theory as a descriptive theory. We proceed with describing some of the effects that were found in Prospect Theory experiments. We continue with phases and identified operations that could explain these effects according to Prospect Theory. We proceed with a brief description of the typical value function and weighting of probability information. After having mentioned some additional notions made by Kahneman (2003) on Prospect Theory experiments, we conclude with the consequences for our study.

2.6.1 Expected Utility Theories - a basis for Prospect Theory

The most commonly applied model on rational decision is Expected Utility Theory (EUT). EUT claims that decision makers choose from risky or uncertain alternatives by comparing the expected utility values of these alternatives. Weighted sums are obtained by adding the utility values of alternatives multiplied by their probabilities. This suggests that there is a certain utility function that reflects the mechanism by which preferences are assigned to possible alternatives.

The most well-known version of EUT is described by VonNeuman and Morgenstern (1944) who assume that probabilities are 'objective' and can thus not be influenced by the decision maker. It should be noted that VonNeuman and Morgenstern's theory is normative of nature. It describes the way people assign values to possible alternatives in an ideal situation. They defined a set of assumptions about people's preferences, which is required before one can construct a utility function. This does not automatically imply that these assumptions are always met in reality. The following six axioms are typical for EUT: (1) **Ordering of alternatives**: A decision maker should be able to compare and order all alternatives, (2) **Transitivity**: If a decision maker prefers alternative A over alternative B, and alternative B over alternative C, the decision maker should also prefer alternative A over alternative C, (3) **Dominance**: Rational decision makers should never choose a strategy that is dominated by an alternative (better) strategy, (4) **Continuity**: Continuity of utility functions should exist; (5) **Cancellation**: The choice between two alternatives should depend on differences between the alternatives, not on results that are equal for both alternatives, (6) **Invariance (or substitution)**: A decision maker's choice should be indifferent of the presentation of the alternatives.

Another influential version of EUT is the Subjective Expected Utility Theory (Savage, 1954). In this version, probabilities are not defined 'objective'. Probabilities are merely seen as measuring the lack of knowledge and a representation of beliefs about the outcome and thus subjective to the decision maker. It is then theorized that the individual assigns subjective probabilities to the various prospects. The decision maker chooses the prospect with the best subjective expected utility, even though he/she does not actually make such an analysis or is aware that he possesses such 'probability assignments'. The subjective expected utility can depend on the decision maker's state or environment.

2.6.2. Prospect Theory – Effects

The many common and systematic violations of rationality, as defined by the axioms of EUT, people routinely tend to make, have led many authors to criticize EUT. These critiques imply that EUT is not a good descriptive model of decision making under risk. With Prospect Theory, Kahneman and Tversky (1979) proposed an alternative model for decision making under uncertainty. Instead of the prescriptive approach of EUT, they described how people actually make decisions. They proved in many field and laboratory experiments that people do not always make their decisions according to rational mechanisms. The reason for the development of Prospect Theory was the identification of a number of phenomena that occur in actual decision-making: the *certainty effect*, the

*reflection effect (*also called *the framing effect)* and the *isolation effect*. These effects violate the rules of rationality.

EUT states that the utility of outcomes is weighted by their probabilities. However, Kahneman and Tversky found that the process of weighting is not always done systematically. They found that "*people overweight outcomes that are certain, relative to outcomes which are merely probable* (Kahneman & Tversky, 1979, p.265)". This effect what they have called the *certainty effect*. This *certainty effect* is one type of violation of the invariance or substitution axiom of EUT, amongst others such as people neglecting the actual size of probabilities when probabilities of two alternatives are very small. An oftenly cited finding of Kahneman and Tversky was that if prospects were formulated as losses instead of gains the preference order would reverse.

Positive (Gains)	Negative (Losses)
(4,000; .80) < (3,000)	(-4,000; .80) > (-3,000)
(4,000; .20) < (3,000; .25)	(-4,000; .20) > (-3,000; .25)
(3,000; .90) < (6,000; .45)	(-3,000; .90) > (-6,000; .45)
(3,000; .002) < (6,000; .001)	(-3,000; .002) > (-6,000; .001)

Table 2-2a Preferences between positive and negative prospects

Table 2-2a (adapted from Kahneman & Tversky (1979) pp. 268) shows findings of Kahneman and Tversky about the preferences between several both positively and negatively formulated prospects. It is remarkable that for all four of the listed prospects the preference order is reversed when the prospects are reflected around zero. Kahneman and Tversky called this effect the *reflection effect or the framing effect*. These findings imply that people's behavior turns from risk averse in a positive domain to risk seeking in a domain of loss. Hence people prefer the prospect of a certain gain of 3,000 over a possible gain of 4,000 with probability .80, but prefer a possible loss of 4,000 with probability .80 over a certain loss of -3,000.

To simplify the choice between alternatives people often focus on the components that distinguish them. However, presenting combinations of prospects can lead to inconsistent preferences. Pairs of alternatives can be decomposed to common and distinctive components in different ways, leading to different preferences. Kahneman and Tversky called this phenomenon the *isolation effect*. Experiments showed how preferences could be changed by different presentations of probability and by different presentations of outcomes.

The following example as presented in table 2-2b presents both the isolation effect and the framing effect. It shows similarities with the scenario developed by Garland and Conlon (1998) and Wong et al. (2008) in order to test Prospect Theory as an explanation of risk seeking preferences in escalating projects.

Situation 1: In addition to whatever you own, you are given $1,000. You are then asked to choose between the following alternatives:

Alternative *a*: a gain of $1,000 with a probability of .50
Alternative *b*: a gain of $500 for sure

Situation 2: In addition to whatever you own, you are given $2,000. You are then asked to choose between the following alternatives:

Alternative *c*: a loss of $1,000 with a probability of .50
Alternative *d*: a loss of $500 for sure

Table 2-2b Example

Most people choose alternative *b* in the first situation and alternative *c* in the second situation. When prospects are formulated in there simplest form however, it shows that these are inconsistent preferences. Hence both alternatives *a* and *c* are equal ($2,000, .50; $1,000, .50) and both alternatives *b* and *d* are also equal ($1,500). This again is a violation of the expected utility hypothesis. In both situations most people neglect the amount that was given in advance, a component that was common in both situations. This implies that carriers of value of utility are a change of wealth rather than the final asset positions of wealth or welfare. This conclusion is the cornerstone of Prospect Theory (Kahneman & Tversky, 1979).

2.6.3. Prospect Theory – Phases and Operations

Prospect theory distinguishes two subsequent phases in the decision making process: an editing phase and an evaluation phase. The first phase, the editing phase, consists of a preliminary analysis of the offered prospects while in the second phase, the evaluation phase, the edited prospects are evaluated and the best one is chosen.

In the *Editing Phase* the offered prospects are organized and reformulated in order to simplify their evaluation and the choice of the best prospect. There are several operations involved in this process of organization and reformulating: (1) The first major operation is *coding*. As was shown earlier, people see prospects as gains and losses rather than as final states of wealth or welfare. Gains and losses are thus seen relative to a reference point, which most often a current asset position. However, formulation of the offered prospects and the expectations of the decision maker can influence this reference point, and therefore the coding of outcomes as gains and losses. (2) The second major operation is *combination*. Subsequent prospects can sometimes be combined into a simpler representation. (3) Another major operation is *segregation* of different components. Consider for example the prospect (500, .60; 200, .40), this prospect contains a risky component as well as a certain component. The segregation operations segregate these two components resulting in the following risky prospect (300, 60) and a sure gain of 200. (4) A fourth major operation is called *cancellation*. This operation involves discarding components that are shared by all offered prospects. (5) *Simplification* involves operations such as rounding probabilities and outcomes. For example the prospect (101, 51) will be simplified into (100,50). Furthermore extremely small probabilities will be round of to zero and thus discarded. And finally (6) the *detection of dominance* is an operation that

involves discarding prospects of which it is sure that there exists a better alternative prospect. Dominated prospect will be rejected without further analysis and evaluation.

The operations in the editing phase simplify the process of evaluation and should therefore always be performed when possible. It is however possible that some editing operations determine the further course of the editing phase. The final prospect resulted from the editing phase can depend on the sequences of performed operations which is likely to depend on the format and structure of the presented set of prospects.

The phase that follows after the editing phase is the *Evaluation Phase*. In this phase the decision maker evaluates all edited prospects and chooses the prospect with the highest value. In prospect theory the overall value of a prospect is expressed in terms of two scales, π and v. The first, π, reflects the impact of a probability on the overall value of a prospect by assigning a weight $\pi(p)$ to each probability p. The second scale, v, reflects the impact of a possible outcome on the overall value of a prospect by assigning a weight $v(x)$ to every possible outcome x. These scales thus represent the subjective values of both the probabilities and the possible outcomes associated with the probabilities.

These utility functions seem mathematical simple and are not very different from the utility functions as developed by expected utility theories. However, the observed effects as described earlier (certainty effect, framing effect and isolation effect) have led to the assumptions that values are attached to changes rather than to final states and moreover that decision weights do not coincide with stated probabilities. Therefore the value function $v(x)$ and the weighting function $\pi(p)$ are included in the utility hypothesis. These important properties of the utility hypotheses presented above distinguish prospect theory from earlier expected utility theories. The anomalies that result from the assumptions made in prospect theory are nonetheless unacceptable from a normative point of view. Whenever a decision maker discovers anomalies such as inconsistencies or violations of rationality it is assumed that the decision maker corrects them. It is however observed that in many situations anomalies are not discovered. Prospect theory therefore expects violations of decision rules as defined by EUT to occur.

2.6.4. Prospect Theory - Value and Weighting function

One of the essential assumptions of prospect theory is that the carriers of value are changes in wealth or welfare. Change in wealth or welfare is defined in prospect theory as change from a former state, or reference point, to a new state. Prospect Theory also states that magnitude of change is not absolute but relative to the magnitude of the reference point. To clarify this statement it is probability easiest to compare this relative value of change to our sensory system. Our sensory system enables us to perceive magnitude of stimuli as well as changes. We are however better capable to detect changes than to assess actual magnitudes although both are relative to a certain reference point. Consider for example our temperature detection system. Assessment of the temperature of water in a swimming pool for example, is highly dependent on the air temperature to which a swimmer is adapted. Furthermore it is also easier to discriminate between a change of 1°C and a change of 6°C than it is to discriminate between changes of 11°C and 16°C. Many sensory and perceptual dimensions share this property, which implies that the psychological response can be represented by a concave function above the reference point and a convex

function beneath the point of reference. The same is hypothesized by Prospect Theory to apply to evaluation of monetary changes.

The *value function* that assigns values to offered prospects is therefore hypothesized to be concave above the reference point, and convex below it. In other words, the marginal value of both gains and losses decrease with their magnitude. Furthermore the decrease of value by losing a certain amount of welfare has been found to be larger than the increase of value by winning the same amount of welfare. It is therefore hypothesized that the value function is steeper in the domain of losses than in the domain of gains. A visual representation of such a hypothetical value function is shown below. In order to facilitate the interpretation, we added the right figure containing all four possible outcomes *a* to *d* from the example in table 2-2b and their corresponding values $v(a)$ to $v(d)$. The upper accolade shows that in the Gains domain the risk averse prospect *b* is preferred over the risk seeking prospect *a*, since $v(b) > 0.5\ v(a)$. The lower accolade shows that in the Losses domain the risk seeking prospect *c* is preferred over the risk averse prospect *d*, since $0.5\ v(c) > v(d)$. Comparison of the size of these accolades also shows the steeper value function in the losses domain.
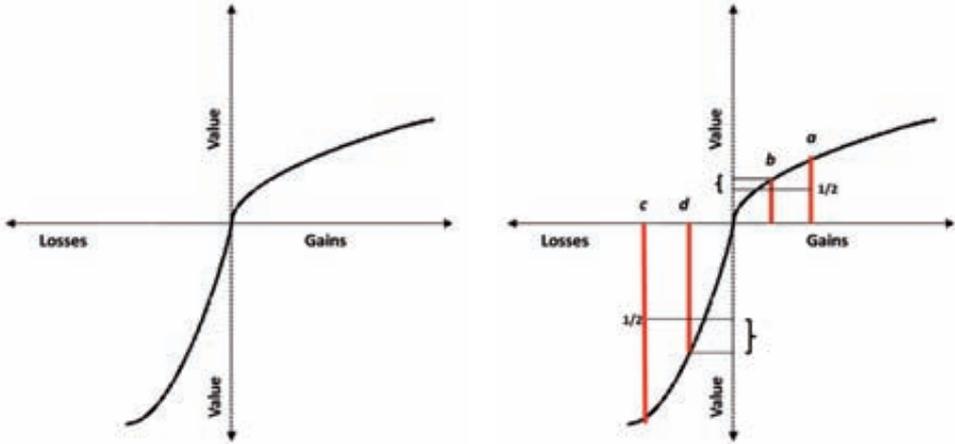
Figure 2-8a – A hypothetical value function in prospect theory

In Prospect Theory, as can be seen in the formulation of the utility function, the relative values of outcomes are multiplied with decision weights. The decision weights represent the subjective values of probabilities. With subjective is meant that people do not always evaluate probabilities consistently, but tend to underweight or overweight probabilities. Observations have shown that people tend to overweight small probabilities, implying that the weighting function $\pi(p) > p$, for small *p*. For middle and large probabilities however, probabilities are often underweighted, implying $\pi(p) < p$. Kahneman and Tversky explain this by means of a phenomenon called subcertainty. Subcertainty refers to the fact that they found evidence that suggests that: for all $0 < p < 1$, $\pi(p) + \pi(1-p) < 1$. A visual representation of a hypothetical weighting function is shown in figure 2-8b. Note that the function departs from above the virtual 45 ° line for very small probabilities but is less steep.
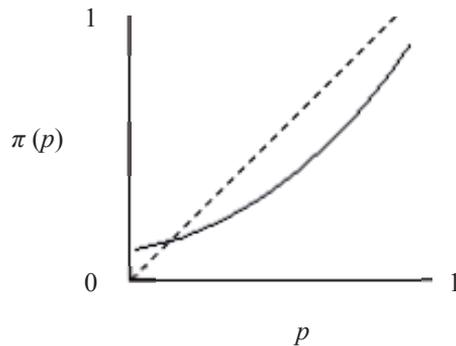
Figure 2-8b A hypothetical weighting function

2.6.5 Prospect Theory related to System 1 and 2 information processing

Based upon a review of Prospect Theory experiments, Kahneman (2003) discussed the Framing Effect and why this is not always confirmed in experimental studies. Below we list some of the principles that were mentioned by Kahneman (2003) as far as they are relevant to our study.

The first principle that determines Framing Effects, is based upon the distinction between two generic modes of cognitive function: 1) an *intuitive mode* in which judgments and decisions are made automatically and 2) a *controlled mode*, which is deliberate and slower. Prospect Theory studies intuitions, thoughts and preferences that come to mind quickly and without much reflection. Kahneman (2003) refers to the two types of cognitive processes who were labeled System 1 and System 2 by Stanovich and West (2002). The operations of System 1 are typically fast, automatic, effortless, associative, implicit and often emotionally charged; they are also governed by habit and therefore difficult to control or modify. The operations of System 2 are slower, serial, effortful, more likely to be consciously monitored and deliberately controlled. One of the functions of System 2 is to monitor mental operations of both systems. Kahneman (2003), p699 phrases that "System 2 monitors the activities of System 1" as a shorthand for a hypothesis about "what would happen if the operations of System 2 were disrupted".

The second principle is based upon the general property of perceptual systems that appear to be designed to enhance the accessibility of *changes* and *differences* (Kahneman, 2003), p703. Perception is reference-dependent: The perceived attributes of a focal stimulus reflect the contrast between that stimulus and a context of prior and concurrent stimuli. The framing of risky choices as gains/losses compared to a reference point (status quo, former value) is an implementation of this principle.

PERCEPTION | INTUITION SYSTEM 1 | REASONING SYSTEM 2

PROCESS

Fast
Parallel
Automatic
Effortless
Associative
Slow-learning
Emotional

Slow
Serial
Controlled
Effortful
Rule-governed
Flexible
Neutral

CONTENT

Percepts
Current stimulation
Stimulus-bound

Conceptual representations
Past, Present and Future
Can be evoked by language
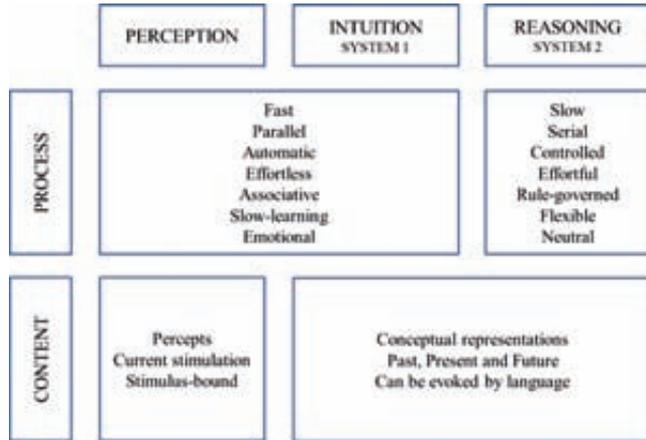
Figure 2-9 – The System 1 and 2 model (Stanovich & West, 2002)

A third principle is referred to as *Narrow Framing*. People are not rational-agents that make their choices in a comprehensively inclusive context, which incorporates all the relevant details of the present situation as well as expectations about all future opportunities and risks. Much evidence supports the contrasting claim that people's view of decisions and outcomes are normally characterized by Narrow Framing. The prevalence of the gains/losses frame illustrates narrow framing (Kahneman, 2003), p706, in which corrective actions of System 2 (based on knowledge and experience) are eliminated. The fourth principle is connected to the accessibility of thoughts. It is called *Attribute Substitution*, which says that "a judgment is said to be mediated by a heuristic when the individual assesses a specific target attribute of a judgment object by substituting a related heuristic attribute that comes more readily to mind" (Kahneman, 2003), p707. These principles of cognitive processing of risk information, are relevant to the design of Prospect Theory studies as ours.

2.6.6.   Consequences for our study

Research on Prospect Theory offers insights that are much more comprehensive than the single *Framing Effect* (reflection effect) that we will include in our study. Our literature overview in section 2.3.4. and in table 2-5 shows that the Gain/Loss Framing has been implemented earlier in experimental studies on Escalating IS-projects that use Prospect Theory as a lens. We will follow these predecessors in the field of Escalating IS-projects for the reason of the availability of instruments that have been tested earlier. The refinement and variety of Prospect Theory elements will be considered for future research.

2.7.   Illusion of Control Theory

2.7.1.   Perceived Control defined

Based on a case-study on the Deaf Effect, Cuellar (2009) proposed that decision maker's *Perceived Control* could be an interesting candidate for further study on the Deaf Effect.. According to Illusion of Control Theory, a level of Perceived Control that would be too high could promote risk-seeking behavior. In this section we describe the main definitions related to Perceived Control and Illusion of Control. These will be elaborated further in the empirical chapters where we apply them.

We define Perceived Control as *"people's own judgment of the extent to which they can control an outcome in a specific situation."* (Thompson et al., 1998). *"This judgment is based upon their judgment of how much they intend the outcome and the degree of connection between their action and the outcome".* Or phrased more simply (Thompson & Schlehofer, 2005) *"Perceived Control is the perception that one can take action to get desired outcomes".*

Since the construct of *Perceived Control* is defined for a specific situation – and thus interacts with specific situation characteristics - it should not be confused with two other related constructs, *self-efficacy* and *locus of control*.

"Self-efficacy refers to the perception that the self has the skills/abilities to enact effective responses" (Thompson & Schlehofer, 2005) . Self-efficacy is a term used to describe to what degree people believe that they are capable of taking those actions that are believed to be necessary to successfully manage situations like these. In relation to our research topic, self-efficacy influences a person's feeling of confidence or control. A high degree of self-efficacy can make individuals more optimistic about their personal capabilities to perform the actions that are required to reach their goals or to complete a project successfully.

Locus of control is a personality trait, independent from the specific task or situation. *"Locus of Control refers to the beliefs about the locus of reinforcements: whether or not people in general can get good outcomes and bad through their own actions (internal locus of control) or whether external factors control these outcomes (external locus of control)",* as defined by Thompson (Thompson & Schlehofer, 2005).

2.7.2.   Perceived Control and Optimistic Bias

Since *Perceived Control* is related to specific conditions, it could also explain irrational behavior in these conditions. In a sequence of so-called Illusion of Control experiments irrational decision making in chance conditions – simple games – was explained by Perceived Control being unrealistically high. Although Illusion of Control Theory originally applied to pure chance conditions (without any actual control), it has been used in many studies in order to explain risk-taking behavior in car-driving (Horswill & McKenna, 1999), health (Harris, 1996) and IS-projects. In a study on escalating IS-projects, Illusion of Control is described as "an expectancy of personal success probability inappropriately higher than the objective probability would warrant" (Keil, Depledge, &

Rai, 2007a). This phenomenon causes people to believe that statistical probabilities for (certain) risks do not apply to them. This belief can be caused by the development of a (too) high degree of confidence in their personal skills as a result of a previous history of success in a similar situation. If a predicted risk did not occur in past projects, people are likely to be more confident that it won't occur in the next project either. Furthermore, people will often attribute a favourable outcome to their skills in managing a situation (Keil et al., 2007a). This also means that if the person has been successful as a manager that he/she develops (over) confidence in his/her skills to avoid failure in general.

Other studies on Perceived Control in the field of Escalating IS-projects showed that 1. Low perceived control causes people to act in a more risk averse matter and makes them quick as to abandon a project (Du, Keil, Mathiassen, Shen, & Tiwana, 2007), 2. A sense of control could increase the expectation that risks can be avoided (Du et al., 2007), 3. Self-efficacy may influence the *Perceived Control* that Project Managers have over the project. If Project Managers continue to believe that the project is under their control, they may be more likely to continue failing projects (Whyte & Saks, 2007), 4. While executing a failing project, Project Managers who begin the project with high self-efficacy about successful completion of the project will tend to perceive a greater degree of control over the failing project (Jani, 2008).

We conclude that Individuals with a high level of perceived control, tend to have more confidence in their ability to make the project a success. They usually attempt to overcome problems by investing additional time, effort and money into the project, instead of abandoning it (Whyte & Saks, 2007; Whyte, Saks, & Hook, 1997; Wood, Bandura, & Bailey, 1990). They tend to take negative feedback less seriously since they are convinced that the project will be successful in the end. This can cause them to ignore or react too slowly to potential warning signs of failure, opening the door for project escalation (Wood et al., 1990).

Resuming, we conclude that a higher level of Perceived Control is likely to be correlated with lower level of estimated probability of failure. This would assume a tendency to take more risks and be deaf for probability information in a warning.

2.7.3.   Perceived Control and Learned Helplessness

In the previous section an unrealistically high level of *Perceived Control* was described as a determinant of escalation behavior by selective perception of confirmatory positive feedback information, and prospective focusing. This reinforces the level of Perceived Control, labeled by Staw (Staw & Ross, 1978) as the *Invulnerability Effect*. Several authors (Brockner et al., 1983; Staw & Ross, 1978; Wortman & Brehm, 1975) proposed a similar reinforcing mechanism when individuals have an unrealistically low level of Perceived Control that could induce escalation behavior as well, based upon the *Learned Helplessness Effect* (Wortman & Brehm, 1975). When people perceive that outcomes are not controllable by them, they will show selective perception of confirmatory negative feedback information, will have extremely low prospective focus, will cease to use relevant information in decision situations and will be further confirmed that they are not in the position to determine outcomes by taking actions. Staw (Wortman & Brehm, 1975)

proposes that with the learned helplessness effect, commitment would likely remain high even with repeated negative consequences. People simply tend to repeat the same behavior even if this behavior is inappropriate for a new set of circumstances.

2.7.4. Perceived Control and Risk Perception

Other studies show that a high level of *Perceived Control* could result in the decision maker's low level of perceived risk (Du et al., 2007; Sjöberg, 2000a), which could drive him or her to risk-seeking behavior. *Risk Perception* is defined as a "decision maker's assessment of the risk inherent in a situation" (Sitkin & Pablo, 1992). According to Sitkin and Weingart (1995), this assessment reflects the degree to which an individual perceives a particular situation as negative (Douglas, 1985), as a threat (Jackson & Dutton, 1988) and as out of control (Baird & Thomas, 1985). Perceptions of high risk would lead people to be more risk averse than would perceptions of low risk. A decision maker's *Risk Perception* in a particular situation is influenced by many of the organizational, project and social characteristics as presented earlier, which makes it an important mediator of escalation behavior. It is also largely influenced by the psychological factors as presented in this chapter. For example, Sitkin and Weingart (1995) showed that individuals perceived the risky option in a positively framed situation to be more risky than that in a negatively framed situation, and hence they tended to be more risk averse in the former than in the latter situation.

The Sitkin and Pablo (1992) model further suggests that *Risk Propensity* is one of the determinants of *Risk Perception*. The idea is that the relative salience of a threat or an opportunity varies as a function of *Risk Propensity*. Individuals with a high *Risk Propensity* (i.e decision makers who tend to be risk seeking in a particular domain) would pay more attention and give higher weight to positive than to negative outcomes. Individuals with low *Risk Propensity* (i.e. decision makers who tend to be risk averse in that domain) pay more attention and give higher weight to negative outcomes than to positive outcomes[6]. Empirical studies confirm that *Risk Perception* mediates the effects of *Risk Propensity* on risk-taking behavior (Sitkin & Weingart, 1995). Wong (2005) found that *Risk Propensity* also had a direct effect on decision making under escalation situations.

2.7.5. Consequences for our Study

In this section we defined Perceived Control and explained the assumptions underlying Illusion of Control Theory. Illusion of Control Theory is pointed at (incorrect) estimations of probabilities of failure or success. Managers who perceive a High level of Control could ignore, and show deafness for, risk information and probability information in particular. For our empirical studies it thus could be very interesting to study whether the Deaf Effect could be related to the probability information in a Risk Warning in particular.

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[6] As we will describe later in section 6.2, *Risk Propensity* differs from *Risk Attitude* in the notion that it can vary across decision domains, while *Risk Attitude* is assumed to be a personality trait that is stable across decision domains.

2.8.   Methodologies and Designs in Escalating IS-Projects Research

In order to embed our study in the literature stream of Escalating IS-projects, we provide an overview of studies from methodological and design perspective. First we will list case studies in the applied research-stream of Escalating IS-projects. Next, we will provide an overview of theory-testing causal studies in the field of Escalating IS-projects. We list the following attributes of these studies: the variables in the study, methodology, respondents, region and the position within the typology of escalation-studies as presented earlier. We also include a brief description of operationalization and measurement of the constructs that are related to our study. This overview from methodological perspective will provide a starting point for the research design as we will describe in Chapter 3.

2.8.1.   Case Studies

In table 2-3 we provide an overview of case-studies in the field of Escalating IS-projects. It includes a description of the subject of the project, the sector and region. Furthermore, it lists the key-variables/theories that were dominant in the model that the author used in describing the case. Some non-IS projects are included that are closely linked to this stream of literature. These describe the escalation phenomenon within complex and ambitious mega-projects, which share most of the attributes with IS-projects, such as stakeholders, data-collection, procedures and phasing. Literature on escalating IS-projects draws on some of these articles.

Year	Subject	Sector	Region(s)	Key-variables / Theories	Reference
1986	$300 million project to host fair, Expo86	Mega Project (non-IS), Government	Vancouver	Project, Social, Psychological, Organizational Factors, Identify Escalation phases	(Ross & Staw, 1986)
1993	Lessons from the shoreham nucledar powerplant	Mega Project(s)	US	Escalation, Commitment, Decision Making, Project, Psychological, Social, Organizational determinants, Social Binding, External Justification	(Ross & Staw, 1993)
1995	CONFIG project	Expert system project	US	IT Project Escalation, Project, Psychological, social and organizational factors, External Justification, Competitive rivalry, Norms for consistency, managerial implications	(Keil, 1995)
1996	ADMIN project	IS Projects, mid-sized company	Sweden	Model of Escalation, Commitment, Professionalism, Decision Processes	(Nulden, 1996)
1996	Longitudinal study, 17 year implementation of Material Management system	IS-projects	US, Canada	Systems Development, project management, commitment, conflict, escalation, IT-projects, dynamics, psychological, social, project, structural	(Newman & Sabherwal, 1996)
1999	Taurus, £500 million project London Stock Exchange	IS-project, Finance	UK	Power, politics, managerial Control mechanisms, 'first order thinking' on management control	(Drummond, 1999)
2000	Implementation baggage handling Denver airport	IS-project, Denver Airport	Denver	De-escalation	(Montealegre & Keil, 2000)
2004	Implementation baggage handling Denver airport	IS Projects, Denver Airport	Sweden, United States	Decision-making, stages, Escalation Theory, Actor Network Theory, Information networks, Technology led strategy, Management failures	(Mähring, Holmstrom, Keil, & Montealegre, 2004)
2005	E-procurement project	IS-project, Borough Council	Singapore, UK	abandonment, information systems failure, stakeholder analysis	(Pan, 2005)
2006	E-procurement project	IS-Project, Borough Council	UK, Singapore	Escalation, de-escalation, Project evaluation model, Approach Avoidance Theory, Sequence of Events	(Pan et al., 2006)
2007	Implementation of 2 financial ERP modules	large IS-projects	New Zealand	Stakeholder, conflict resolution, governance, culture, power	(Johnstone, Huff, & Hope, 2007)
2008	Longitudinal case-study of implementation of the UK National Healthcare System	IS-project, Healthcare	UK	Project, Social, Psychological, Organizational determinants; Dead-line based escalation, Task Bypassing, Change work distribution, Detect-Decide- Do Approach	(Guah, 2008)
2008	New Deposit System in a mid-sized European bank	IS-projects, Finance	Europe	Process Model, Project management, Project Framing, drift, unsuccessful incremental adaptation, rationalized continuation, stages,	(Mähring & Keil, 2008)
2008	VUE, administrative system for all Danish universities	IS-projects, governmental	Danmark	De-escalation, roles, role interaction, case study, antecendent condition	(Mähring, Mathiassen, Keil, & Pries-Heje, 2008)
2008	Claims processing system	IS-project, Insurance company	Unknown	Rationality, business case, Icarus metaphor, destructive systems, de-skilling	(Drummond, 2008)

Table 2-3 Overview of Case Studies on Escalating IS-projects

This overview of case studies provides an extensive list of published work on escalated IS-projects. These case studies provide descriptive models on escalation and de-escalation of IS-projects. These descriptive models include roles, events, stages and determinants (psychological, social, project and organizational). Some of these descriptive models have further been used to categorize causal studies in the field of Escalating IS-projects. Many of the IS-projects that were studied are related to public services (governmental, transport, healthcare) and financial services. This might suggest that IS-projects in these areas might be more prone to escalation than IS-projects in private companies. The IS-projects in the case studies indeed show characteristics (such as high complexity, very large and long term investments, many stakeholders) that might be found relatively more in public and financial services than in private companies. On the other hand, private companies might be less accessible and might show less willingness to exhibit their failing IS-projects with researchers and with the public. Finally, the table shows that US, North-West Europe and Australia are highly represented in the case studies of escalating IS-projects. This could be explained by the concentration of IS-research in these regions. It could also point at cultural elements in these regions that could promote escalation of IS-projects. Furthermore this could be explained by relatively high transparency in these regions to share information on escalated IS-projects with researchers and the public.

2.8.2. Surveys

Table 2-4 lists the descriptive studies based on surveys in the field of escalating IS-projects. It also includes relevant surveys with a broader scope, when studies on Escalating IS-projects build upon them. This refers to more general surveys from the field of IS-project risks, management risk decision making and escalation in general.

This overview of surveys related to the research stream of Escalating IS-projects provides several findings. Many surveys have contributed to the description of clusters and rankings of risks and controls that apply to IS-projects. So they help project managers to pay attention to the important issues. It's interesting to notice that many surveys used respondents who are considered to be experts on IS-projects' controls and risks, which provides an insider-perspective.

Relatively few surveys take the outsider-perspective on IS-projects by choosing respondents such as internal auditors and executive management (Project Owners). The table shows that US and North-West Europe are largely represented in IS-project surveys. It's not clear to what extent results might be influenced by cultural biases.

Article	Subject	Respondent(s)	Branche	Region	key-variables / Theories
(Barki, Rivard, & Talbot, 1993)	Risk-classification in IS-projects	project-managers and user representatives of 120 running projects in 75 organizations	top 100 companies and govern-ment	Quebec	IS-project, risk, software metrics, software development risk
(Keil et al., 2000a)	Why Software Projects Escalate: An Empirical Analysis and Test of Four Theoretical Models	579 members of the ISACA in US	Escalating IS-projects	US	Software project management, Escalation, IS project failure, Self-Justification Theory, Prospect Theory, Agency Theory, Approach Avoidance Theory, Sunk Cost, Goal Incongruency, Information Asymmetry, Completion Effect
(Ropponen & Lyytinen, 2000)	Software Development Risks	83 project managers	IS Projects	Finland	Software Risk, risk management, software development, system failures, process improvement, mitigation,
(Miceli & Near, 2002)	What makes Whistle Blowers effective?	8587 employees of 15 major federal agencies	perceived wrong-doing	US	Organisational wrongdoing, Whistle blowing, power theory, resource dependency theory, minority influence theory, role prescribed, retaliation
(Wallace, Keil, & Rai, 2004)	Software project risks	507 software project managers	PMI	PMI	Perceived control, Perceived Importance of Risk, Risktypes, environment risk, execution risk, customer mandate risk, scope and requirements risk
(Kappelman, McKeeman, & Zhang, 2006)	Dominant dozen early warning signs of IS-project failure	19 experts and 55 IS-project managers	IS projects	US	early warning signs, project risks, IS-projects
(Mahlendorf, 2007)	Reducing Escalation of Commitment in High-Risk Investment Projects	550 managers and Internal Auditors	Projects in general	Germany	Cognitive limitations, perception deficit, self justification, evaluation errors, confirmation bias, perception threshold, background noise
(Snow, Keil, & Wallace, 2007)	Reasons for optimistic, pessimistic status reporting	65 IS-project-managers,	IS Projects	US	IS project, project management, estimation bias, reporting, optimistic, pessimistic

Table 2-4 Overview of Surveys on Escalating IS-projects

2.8.3. Experiments

Table 2-5 lists the causal studies based upon experiments in the research field of escalating IS-projects. Relevant experimental studies with a more general scope of escalation behavior, have already been listed in section 2.2. In this table we include the characteristics of the experimental designs, theories, the independent and the dependent variables and the methods applied for statistical analysis of the results. We also include the role perspective (Project Manager, Project Owner) that was proposed to the participants in these experiments.

Article	Subject	Research method(s)	Respondent(s)	Region	key-variables / Theories	independent variables	dependent variable	Analysis	Role-perspective
(Keil, Mixon, Saarinen, & Tuunainen, 1995a)	Understanding Runaway IT Projects: Results from an Interna-tional Research Program Based on Escalation Theory	Series of 3 laboratory experiments, between-subject	students	United States (US) and 1 Finland	IT Project Escalation, Self-Justification, Sunk Cost, Culture, subjective probability to continue, negative feedback, alternative course of action	exp 1 a. Prior Commitment b. Feedback (pos/neg); exp 2 a. sunk cost; exp 3. alternative course of action	exp 1. Willingness to commit additional resources; exp 2. Decide to continue or abandon project	ANOVA	Project-Initiator (or his successor). You are the president of CompuSys Corporation.
(Keil, Wallace, Turk, Dixon-Randall, & Nulden, 2000c)	An investigation of risk perception and risk propensity on the decision to continue a software project	Experimental, 3x3 factorial design, between subjects	242 undergraduate business students enrolled in an introductory IS course	United States (US)	Software project management, Risk perception, Risk propensity, Decision-making, Impact, probability	1. Risk Propensity, measured with Wallach's Choice Dilemma Questionnaire; 2. Probability of failure; 3. Magnitude of Potential Loss were manipulated on 3 levels	1. Risk Perception was measured with a 2-item likert questions 2. Decision-making wether or not to continue the project was measured by single 7-point likert scale	ANOVA	software project manager for Computer Diagnostics Corporation, a computer software company
(Keil et al., 2000b)	A Cross-Cultural study on escalation of commitment behavior in software projects	4 level between subjects experiment	536 undergraduated and master students enrolled in a introductory information system course	Finland, Netherlands and Singapore	Sunk Costs, Risk propensity, Risk perception, Uncertainty avoidance, Prospect theory	1. Risk Propensity was measured by single question according to MacCrimmon and Wehrung 2. Level of Sunk Costs was manipulated accross 4 levels 3. Cultural Uncertainty Avoidance, measured by 3 questions according to Hofstede	1. Risk Perception was measured with 4 questions, 2 directly and 2 assessed perceived probability of success 2. Willingness to Continue a Project was measured how likely they were to continue the project	PLS-analysis	Project-Initiator (or his successor) as the president of CompuSys Corporation.
(Smith et al., 2001)	keeping mum, towards and explanatory model	2x2 factorial Experiment	163 university students	US	Information System Development, mum effect, project management, whistle blowing	1. Perceived Impact 2. Perceived Risk propensity; 3. Perceived risk: negative consequences 4. Perceived Wrongdoing	1. Assessment - status ought to be reported; 2. Assessment - personal responsibility to report; 3. reluctance to report	MANOVA, PLS-analysis	lead systems analyst on an IS-project

Article	Subject	Research method(s)	Respondent(s)	Region	key-variables / Theories	independent variables	dependent variable	Analysis	Role-perspective
(Boonthanom, 2003)	Information Technology Project Escalation Effects of Decision Unit and Guidance	2 phase Experiment, within-subject for decision unit	phase 1: 474 business students, phase 2 427 students in 111 groups	US	IT Project escalation, individual, group, decision guidance, de-escalation strategy, experiments	1. Sunk cost low/high 2. % project completion low/high); 3. unit of decision making (individual vs group) 4. decision guidance	% probability to continue IS-project	ANCOVA	president of a small software company
(Sabherwal et al., 2003)	escalating commitment to information systems projects, stages	Experiment	Exp1: 86 students and exp 2 122 MIS students;		Organizational commitment; Project management; stages; Runaway projects, escalation theories	1. Factors were manipulated across 4 project stages	1. How much funding on a 5-point Likert scale 2. likelihood the project will succeed	ANOVA for each stage	
(Keil et al., 2004)	Climate, Information Asymmetry and Bad News About Troubled Projects	Experiment, 2x2-factor, between subject	134 graduate business students	US	Whistle blowing, Mum Effect, Agency Theory, Information Asymmetry	1. organisational climate 2. information asymmetry	1. Report bad news as measured with a 3-item measurement 2. ought to be reported was measured with 2-item scale and 3. personal responsibility was measured with 2-item measure	MANOVA, PLS-analysis	System Development manager
(Cuellar et al., 2006)	Deaf Effect Response, Heuristic-Analytic Theory	role playing experiment	60 students	US	Deaf effect, IT-projects, Heuristic Analytic Theory	Relevance, Salience and Perception of Auditor Credibility. These were operationalized using multi-item 7-point Likert scale.	decision to "Test further" or "Move to production". It is operationalized in a single, 8-point Likert scale question.	PLS-analysis	Subjects were cast as a project manager responsible for development of a new system to be put into production
(Tiwana, Keil, & Fichman, 2006)	Information Systems Project Continuation in Escalation Situations: A Real Options Model	Conjoint Experiment based upon sets of attributes	IT managers of 123 firms		Investments, Real Options, Rational Response, NPV, Warranted Continuation and Escalation, Business Case	1. Option to switch use; 2. Option to change scale; 3. Option to stage investments; 4. Option to abandon; 5. Option to grow; 6. Strategic Growth Option; Operational options	1. Likelihood of warranted continuation; 2. Overall Utility of the Project	Conjoint Analysis	

Article	Subject	Research method(s)	Respondent(s)	Region	key-variables / Theories	independent variables	dependent variable	Analysis	Role-perspective
(Cuellar et al., 2007)	The Impact of Collectivism on the Deaf Effect in IT Projects	experiment, 2x2 factorial design	undergraduate students	US, China, Germany, S-Africa, S-Arabia	Deaf Effect	1. Perceived Relevance of the Bad News Reporter's Message, 2. Credibility of the BNR, 3. Role Prescription of the BNR, 4. Institutional Collectivism, 5. In-group collectivism	Dependent Variable is the Decision to Continue Current Course of Action, 1-8 point semantic differential scale item	PLS-analysis	subjects were asked to assume the role of a project manager responsible for development of a new system for a bank
(Jani, 2008)	An Experimental investigation of factors influencing perceived control over a failing IT project	2x2x2x4 factorial between-subjects manipulation of project risk factors and initial task-specific self-efficacy; computer simulated 4 stages within-subject experiment	20 undergraduate students16 graduated students35 managers	US)	Project Control, Perceived Control, Escalation of Commitment, Project Risk management, Project management methods and tools, Self-Efficacy	1. Project Risk Factors (Endogenous/Exogenous) with negative feedback ; 2. Self-Efficacy (High/Low) was manipulated by providing successful or unsuccessful task experience	Repeated measures of 1. Perceived Control over the project, 2. Project Status; 3. Assessment of project Risk; 4. Commitment to the (failing) project. Perceived Control was measured with a single item scale ranging from 0 to 100	ANOVA	software project manager
(Park et al., 2008)	Mum effect, fault responsibility, time urgency,	2x2 factorial Experiment	192 undergraduate students	US	whistle blowing, mum effect, fault responsibility, time urgency	1. Responsibility and 2. Time-urgency	1. Willingness to report, 2. Assessment - Personal responsibility to report 3. Assessments - status ought to be reported	MANOVA, PLS-analysis	
(Park & Keil, 2009)	Mum effect, fault responsibility, time urgency,	2x2x2 factorial Experiment, between subject design	310 students	US	Organizational structure/policies, managerial practices, demographic dissimilarities	1. Organizational structure/policies,2. managerial practices, 3.demographic dissimilarities	1.) Willingness to report, 2. Assessment - Personal responsibility to report 3. Assessments - status ought to be reported	PLS-analysis	

Table 2-5 Overview of Experiments on Escalating IS-projects

The table which lists experiments in the field of Escalating IS-projects could easily be extended with closely related experiments from psychology that use project-conditions in order to test causal relationships related to risk-seeking and escalation. The table however is limited to studies that were performed in the mainstream literature on Escalating IS-projects. The overview shows that: (1) Most experimental studies in the field of Escalating IS-projects make use of students, with few exceptions to this rule using professionals from the field. Although not listed here, it should be noted that the tendency to use students is even stronger in studies in the field of psychology; (2) Most studies use a between-subject single-observation experimental design, including multiple independent variables. Few studies use within-subject designs that observe escalation-behavior over time. Studies in the field of psychology appear to be more extensive in testing various experimental designs with single vs repeated treatments and observations (Budescu & Bruderman, 1995; Gigerenzer, 1994; Keren & Wagenaar, 1987); (3) Measurement and manipulations in many experiments in the field of IS-projects have been adapted to this specific context. They show a variety of manipulation and measurement-methods across independent and dependent variables, from single items to multiple item scales. Scenarios are often replicated in other studies; (4) The decision maker is often placed in the position of IS-project manager or responsible manager of a software company. The corresponding project-frame might not necessarily hold for IS-Project Owners or managers in the company who are to realize the organization's goals with the results of the IS-project; and (5) Partial Least Squares (PLS) is applied across many studies in the field of Escalating IS-projects. Especially in experimental conditions with multiple independent variables, intermediate, moderating and dependent variables and in exploratory studies.

2.8.4.   Consequences for our study

From this review of literature in the field of Escalating IS-projects, we learn that our proposed study on the interaction between the messenger-decision maker relationship (according to Stewardship Theory) and psychological factors (according to Illusion of Control Theory and Prospect Theory) fits in the development of this research stream. We also find that our proposed central position of the Project Owner could provide a contribution to this research field, since most studies took the role of delivering Project Manager or Software Director as point of reference. From a methodological perspective it appears that valid measurement instruments are available and applied in this research domain. We also found that there were few mixed method studies published, although PhD-theses were not included in this overview. So there appears to be room for mixed method studies and a mixed quantitative and qualitative study could provide an interesting contribution to the research stream of Escalating IS-projects.

2.9.   Refined Scope and Research Questions

In Chapter 1 we phrased our Research Objective as follows:

"Contribute to the explanation of Why the Deaf Effect occurs in the field of escalating IS-projects", by examining main causal effects and interaction effects from following three perspectives:

- *The "Collaborative Partner vs Opponent" <u>Relationship</u> between Internal Auditor (Bad News Messenger) and Project Owner (Decision Maker) – based on Stewardship Theory;*

- *Project Owner's <u>Perceived Control</u> heuristic which might bring biased processing of the auditor's risk warning (bounded rationality) – based on Illusion of Control Theory;*

- *The presentation of the risk warning either with the focus on <u>Gains</u> or with the focus on <u>Losses</u> – based on Prospect Theory.*

Based on our literature review we obtained more information on the predecessors and feasibility of this study. Therefore we will apply the following scope and assumptions: (1) The decision maker of study (*unit of analysis*) is the executive in the role of IS-Project Owner; (2) The study on Deaf Effect takes into consideration that someone is blowing the whistle or acts as Bad News Messenger. This provides a different context (including interaction effects) compared to other studies on Perceived Control (Keil et al., 2007a) or Prospect Theory (Sharp & Salter, 1997) in this domain; (3) The Bad News Messenger acts in the role of *internal auditor* who meets the professional standards of the Institute of Internal Auditing (IIA, 2004). These standards address the criterion of a bad news messenger who is acting as a credible source - i.e. who has the expertise and could be relied upon to make true assertions (Cuellar et al., 2006). Furthermore they assure that the internal auditor would operate from an Auditing Function which is independent from management authority (Keil & Robey, 2001)[7]; (4) We aim to re-use instruments that have been applied earlier in the field of Escalating IS-projects; (5) *Situational Attention* is a promising mediator that could be of help to understanding the influence of organizational and psychological factors on Deaf Effect. For reasons of feasibility we excluded it from our scope[8]; and (6) Our set of Research Questions should allow independent empirical

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[7] The IIA professional standards on internal auditing (IIARF, 2011) prescribe that the internal auditor is considered to meet standards on **a.** proficiency (1210)- knowledge and skills, **b.** due professional care (1220) – apply skills, prudency   and care , **c.** organizational independence from executive management (1110) , **d.** individual objectivity (1120) – impartial, unbiased attitude, avoid conflicts of interest, **e**. both in fact and appearance (1130).
[8] We have included *Situated Attention* in our initial design and pilot-tests but found that self-reported measurements cause ceiling effects. Valid measurement of Attention would require a research design (eye-tracking) that wasn't applied earlier in this domain and would have disturbed re-use of instruments from earlier studies.

substudies – qualitative and qualitative – that contribute to a more holistic view on the Deaf Effect in escalating IS-projects.

In table 2-6 we present the Research Questions that are based on our scope and assumptions and that will form the starting point for the research design that we will elaborate in Chapter 3.

	Research Question	Type of Question	Chapter
1	Could the *Gain/Loss Frame* of the Risk Warning and the Project Owner's *Stewardship relation* with the messenger (Collaborative Partner) be of influence on the Deaf Effect for a Risk Warning?	Why	4
	1.1 Could these influences interact?	Why	4
	1.2 Are these influences mediated by Message Relevance, Risk Perception and Estimated Probability to Succeed?	How	4
2	Could the Project Owner's *Perceived Control* and the *Stewardship relation* with the messenger (Collaborative Partner) be of influence on the Deaf Effect for a Risk Warning?	Why	5
	2.1 Could these influences interact?	Why	5
	2.2 Are these influences mediated by Message Relevance, Risk Perception and Estimated Probability to succeed?	How	5
3	Do managers and internal auditors have different perceptions of risk after receiving a Risk Warning, which can be related to their working experience?	Why/How	6
	3.1 Are these differences consistent with expected heuristics from Illusion of Control Theory – the Actor/Observer heuristic in particular?	Why/How	6
	3.2 Are these differences related to Risk Propensity?	Why/How	6
4	What other factors could be proposed to be of influence on the Deaf Effect, taking into account the influence of Partnership/Opponent relationship on Deaf Effect?	Why/How	7
	4.1 What other factors are proposed to be of Influence on the Deaf Effect?	Why/How	7
	4.2 What other factors are proposed to interact with the Partner/Opponent relationship in its influence on the Deaf Effect?	Why/How	7
	4.3 What structures and attributes can we identify that can be of help to further explanatory studies on the Deaf Effect that will include those factors?	How	7

Table 2-6 Research Questions

We conclude this Chapter with table 2-7 in which we present a refined description the contribution of our study to existing literature.

AMBITION	Replicate	Improve	Innovate
Concepts	Deaf (Continue)	Contingency	
	Perceived Control (Ill. Contr. Theory)	Prospect Theory x Stewarship Theory	
	Gain/Loss Framing (Prospect Theory)	Illusion of Control Theory x Stewardship Theory	
	Collab Partner/Opponent relation (Stewardship Theory)		
Operationalize	Deaf (Continue) Perceived Control Gain/Loss Framing		Collab Partner/ Opponent relation
Apply	Deaf (Continue) Perceived Control Gain/Loss Framing		Collab Partner/ Opponent relation

Table 2-7 Contribution of this Study

CHAPTER 3. EMPIRICAL RESEARCH DESIGN

3.1.   Introduction

This Chapter is intended to provide a bridge between the former chapters and the empirical chapters 4 to 7. In this chapter we elaborate our research design (Verschuren & Doorewaard, 2007) which forms the common basis for the empirical chapters of our study.

Since the objective of this study is to contribute to knowledge on a relatively unexplored phenomenon, we think it would be appropriate to study the phenomenon from various perspectives and use a convergent research methodology, called triangulation (Webb, Campbell, Schwarts, & Sechrest, 1966). Triangulation can broadly be defined as "the combination of methodologies in the study of the same phenomenon". This metaphor is from navigation and military strategy where multiple reference points are used to locate an object's exact position. Collecting different kinds of data bearings on the same phenomenon could improve research accuracy in a similar way. From a validation perspective, Shadish, Cook, and Campbell (2002) reflect on the idea of multi operationism and argue that more than one method should be used in the validation process to ensure that variances reflect the trait and are not artifacts of the method.

Jick (Jick, 1979) suggests that triangulation, in addition to increasing validity and reliability, also enables researchers to capture a more complete, holistic, and contextual portrayal of the units under study. He promotes the idea that quantitative and qualitative research could be complementary. He also suggests that multi-methods could parallel theoretical triangulation and could contribute to synthesis or integration of theories that bear on a common problem.

3.2.   Conceptual Design

The Research Questions, as presented in table 2-6, are dominated by Why-questions that - individually and combined - could provide explanations for Deaf Effect and thus would require causal studies. Figure 3-1 figure shows the conceptual framework of our research design, applied from the *predictive validity model* as described by Libby (Libby, 1981) for causal studies in behavioral decision making. This will form the basis for the description of our research design in this chapter and in the empirical chapters 4 to 7. Key is that we aim to draw conclusions on the theoretical causal relationships at conceptual level: could Stewardship Theory, Illusion of Control Theory and Prospect Theory explain the Deaf Effect. Our research design has to provide the means to draw these conclusions based on observations and (statistical) analysis at operational level. The research design has to ensure that threats to validity (construct validity, internal validity and statistical conclusion validity) are ruled out, since these could provide alternative explanations for our results. We will discuss later in this chapter how we embed validity in our design, and we will show in the empirical chapters how validity is implemented and verified in the individual substudies.
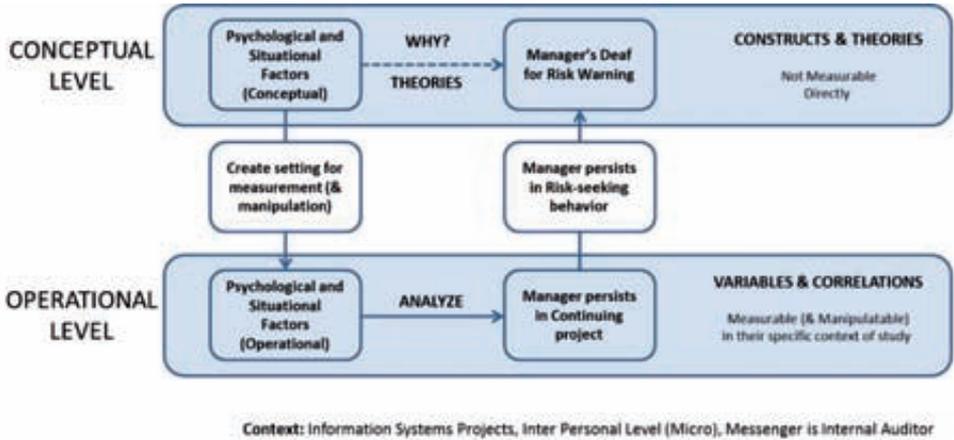
Figure 3-1 Conceptual and Operational Level of Deaf Effect study

We will first discuss the dependent variable in our study, the one that we aim to explain. As we saw in the literature review in Chapter 2, both Illusion of Control Theory and Prospect Theory have been tested in the field of Escalating IS-projects. We also found that the Deaf Effect for warnings was considered one of the mechanisms that could contribute to escalation of IS-projects. Deaf Effect assumes a context in which there is a messenger who provides a clear and obtrusive risk warning that continuation of the IS-project would no longer be viable. In this context we aim to explain how someone can be "deaf to a risk warning". We operationalized this construct in a manner consistent with Cuellar's studies on the Deaf Effect, in which the Deaf Effect is defined as "when a decision maker doesn't hear, ignores, overrules a report of bad news to continue a failing course of action" (Cuellar, 2009). Consistent with (Cuellar, 2009; Cuellar et al., 2006; Cuellar et al., 2007) we make *Continue* the operational dependent variable of our study. We will use the operational variable *Continue* for observations on whether the Deaf Effect occurs or not. This implementation also reflects that the decision to *Continue* is considered to be a *Risk Seeking* decision, since the Risk warning that the project was no longer viable – is rejected. As we could see in table 2-5, many experimental studies followed this implementation (Boonthanom, 2003; Keil et al., 2000c).

Next, we will describe how the main Research Question (contribution) for each empirical Chapter was translated into a structure to answer these questions: with concepts and theories at the conceptual level of our research design.

	MAIN EMPIRICAL CONTRIBUTION	**Theoretical Perspective**
Chapter 4	Messenger seen as Partner → Discontinue; Message Framed as Losses	Stewardship Theory Prospect Theory
Chapter 5	Messenger seen as Partner → Discontinue; Perceived Control	Stewardship Theory Illusion of Control Theory
Chapter 6	Probability of Risk → Perceived Risk; Role as Actor or as Observer	Illusion of Control Theory
Chapter 7	Messenger seen as Partner/ Opponent → Continue; Factors	Stewardship Theory Systems Theory Illusion of Control Theory Prospect Theory

Figure 3-2 Conceptual presentation of our research questions

In table 2-6 we saw that the Research Questions for each Chapter have been elaborated further into subquestions. The conceptual presentation of these more refined relations will be done in a similar form throughout the empirical chapters. At this point, it's most relevant to mention that our research questions dictate that most relations in our design will be causal. In these figures, causal relations are marked with an arrow. A variable at the end of any arrow – causal relation – in these graphs is an *endogenous variable*. A variable

that only serves as startingpoint for any causal relationship in these graphs is an *exogenous variable*. The variable that we ultimately aim to explain in each chapter is the *dependent variable Continue*. The variables that we manipulate in our study (*Messenger seen as a Collaborative Partner or as an Opponent*) – at the left side of the figures - are the *independent variables* (or *treatments*) of our study[9].

There are a few more extensions on this model that we need to clarify at this point. The variable Perceived Control is presented as a *Moderator Variable*. This variable changes the relationship between the Independent Variable and the Dependent Variable. The influence of moderation variables plays a very important role in our study. We will examine – for example - whether the Deaf Effect could be reduced by a Collaborative Partnership relation. With moderation analysis we further examine whether this applies to decision makers with either a high or a low perceived control. Later in this chapter we will explain how we will perform statistical moderation analysis for these interaction effects.

In the empirical chapters we will go one step deeper into the causal relations between independent variable and dependent variables. We will measure so-called *Mediating Variables*. We expect to find that a decision maker would show less Deaf Effect when the risk warning comes from a Collaborative Partner. *Mediation Analysis* would provide insight into whether this effect is direct or whether it is indirect by triggering a Mediating Variable (*Perceived Risk*, *Message Relevance*) that leads to the Deaf Effect. This mediation analysis brings additional understanding of the chain of causal relations that explains the Deaf Effect. We will explain later in this chapter how we will perform statistical mediation analysis in our empirical chapters.

Finally, there will be numerous other *extraneous* variables that could be of influence on the causal relationships that we examine. To a certain extent we can measure them and use them as Control Variables in our study. For example, if we know that Female respondents might be more sensitive to listening to a warning than male respondents, we could measue and control for gender in our study. The problem, however, is that it is not reasonable to include extensive lists of Control Variables in a study. Therefore, we accept that such Confounding Variables exist in our study. The main thing that we do is to disable them from causing a structural relationship with our observations on Deaf Effect. Such structural relationship could provide a rival explanation for any conclusion that our observation of the Deaf Effect must have been caused by the treatments on the Independent Variables in our experiment. Through Random Assignment of our treatments to groups of respondents, the influence of these Confounding Variables will be randomized when we compare the Deaf Effect between treatment groups. Typical Confounding Variables in our study are, for example, people's preconceptions of whether they consider internal auditors to be Collaborative Partners or Opponents. Another Confounding Variable is that respondents had earlier experiences with IS-projects that influenced their decisions. Randomization rules out structural effects of such Confounding Variables, but

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[9] For a description of principles of design and variables we used here, we refer to (Blumberg,2009) chapter 1; (Libby, 1981) and (Stone, 1978)

still they could cause very high levels of random noise in our research. This requires powerful treatments to overcome the noise and observe effects. As we will explain in Chapters 4 and 5, these Confounding Variables required much attention during the development and testing stages of our research, mainly in order to reduce background noise.

3.3. Empirical Research Strategies

Research Strategies are generic classes of research for gaining knowledge about a research problem. The choice of a Research Strategy should take into account their strengths, weaknesses and feasibility. For a mixed-methods strategy it is no less important to consider the characteristics of each strategy in order to achieve synergy between our substudies.

First of all, the Research Strategy should be feasible for answering our type of research questions. Table 3-1 (Yin, 2009) presents relevant situations for different research strategies, and describes which strategy could be feasible to answer our "Why"-typed research questions.

Method	Form of Research Question?	Requires Control of Behavioral Events?	Focuses on Contemporary Events?
Experiment	How, why?	Yes	Yes
Survey	Who, what, where, how many, how much?	No	Yes
Archival Analysis	Who, what, where, how many, how much?	No	Yes/No
History	How, Why?	No	No
Case Study	How, Why?	No	Yes

Table 3-1 Relevant Situations for Different Research Strategies (Yin, 2009)

The classification and considerations of McGrath (1981) further guided our choices on Research Strategies. This classification of "behavioral research strategies" – as presented in figure 3-3 - is shown as eight "pie slices" within a circumplex; but also as four quadrants, each with a related pair of strategies. The circular space is defined in terms of two orthogonal axis . The upper vs lower half refers to Research Strategies that use Obtrusive vs Unobtrusive operations: the researcher forces the participants in a particular setting that is "created" by the researcher. The left half of the figure is concerned with universal or generic behavioral systems. The right half is concerned with particularistic or concrete behavior systems. Within this two dimensional space there are three "maxima", points at which each of three mutually conflicting desiderata are realized at their highest values (marked A, B and C in the figure).
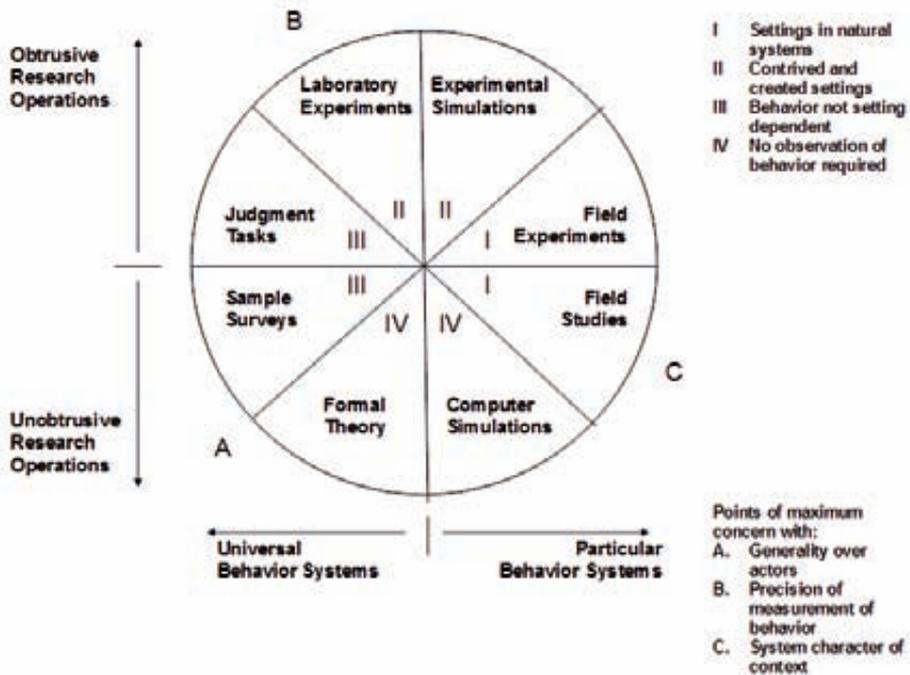
Figure 3-3 Research Strategies and Dilemmas (McGrath, 1981)

It is always desirable (ceteris paribus) to maximize **A.** generalizability with respect to populations; **B.** Precision in control and measurement of variables related to the behavior(s) of interest; and **C.** existential realism, for the participants, of the context in which those behaviors are observed. In figure 3-3, the maxima for A, B and C are shown as widely spaced points in the strategy circle. The very choices and operations by which one seeks to optimize any two points will minimize on the third. Therefore, McGrath calls the choice between these maxima a "three horned dilemma". Each Research Strategy is a compromise on achieving all three desiderata. This overview of Research provides us with the relative strengths and weaknesses of each Research Strategy. For example, strategies in Quadrant I have natural settings. The fieldstudy is unobtrusive and provides maximum realism of observations (C). The Field Experiment is more obtrusive and moves a step closer to Precision of Measurement (B) at the price of Context Realism (C). The Research Strategies in quadrant II have highly created and contrived settings, in which laboratory experiments maximize on precision of measurement (B). In Quadrant III, Sample Surveys provide observations of behavior that don't depend on a created setting. Therefore, Sample Surveys allow for high generalizability (A) of the observations across settings and respondents.

McGrath provided us insight into the strategic strengths and weaknesses of the Research Strategies that can be used to answer our Research Questions and showed the price you pay for a choice. Triangulation on Research Strategy would require that strengths and

weaknesses of substudies show synergy in answering our main Research Question. McGrath did not include Case Study as a specific implementation of Field Study in his overview of research strategies. Finally, our choice of Research Strategies was refined by looking at their consequences - strengths and weaknesses - at a more tactical and operational level. For that purpose, we used table 3-2 from Stone (1978), p116, which presents the dimensions on which the major Empirical Research Strategies vary.

Rated Dimension	Laboratory Experiment	Simulation	Field Experiment	Field Study	Sample Survey	Case Study
COST						
Initial "Set-up"	M	L-H	M-H	M-H	H	L-H
Marginal Cost per Subject	L	L-H	M	M	L-M	L-H
VARIABLES						
Strength of Independent Variables	L	L-M	M	H	H	H
Range of Variables	L	M	M	H	H	L-H
Potential to Manipulate Independent Variables	H	M-H	M	N	N	N
CONTROL						
Potential for Testing Causal Hypotheses	H	M-H	M	L	L	N[10]
Potential for Study to Change Researcher	L	L	M	M	L	H
Potential for Controlling Confounding Variables	H	M-H	L-M	L	L	N
ARTIFACTS						
Potential for Experimenter Expectancy Effects	H	M	M-H	M	L	H
Potential for Demand Characteristics	H	M	M-H	M	L	H
Potential for Evaluation Apprehension	H	M-H	M-H	M	L	H
SETTING						
Naturalness of Setting	L	M-H	H	H	H	H
Degree to which Behavior is Setting Dependent	H	L-M	H	H	L	H
GENERALIZABILITY						
Applicability of Study's Results to Different Populations	L-H	L-H	L	L	H	N

N None   L Low   M Moderate   H High

Table 3-2 Comparison of Empirical Research Strategies (Stone, 1978)

To answer our main (Why-typed) Research Questions of Chapter 4 and 5 we will follow the Research Strategy of Laboratory Experiments. *Laboratory experiments* take place in a

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[10] As we will describe later, Yin (2009) claims that explanatory case studies allow causal inferences. We will use an exploratory case study here.

setting specifically created by the researcher for the investigation of a phenomenon. With this research method, the researcher has control over the independent variable(s) and the random assignment of research participants to various treatment and non-treatment conditions (Boudreau, Gefen, & Straub, 2001).

This strategy allows us to maximize precision of measurement of universal behavioral systems (heuristics). It also allows us to test theories in an applied context by ruling out rival explanations**.**

To answer our main (Why and How-typed) Research Question of Chapter 6 we will follow the Research Strategy of a Situated Experiment (Greenberg & Tomlinson, 2004), which combines characteristics of a laboratory experiment with characteristics of a field experiment. *Field experiments* involve the experimental manipulation of one or more variables within a naturally occurring system and the subsequent measurement of the impact of this manipulation on one or more dependent variables (Boudreau et al., 2001). The situated experiment aims to maximize Context Realism (without intervention of operational processes), while taking care of Precision of Measurement requirements as are typical to laboratory experiments. Heuristics, as (theoretically) expected to be found at different groups in the field, will be tested on their main and interaction effects in a realistic setting. This setting is not entirely controllable, making it more difficult to rule out all rival explanations to a Why-question. Furthermore, its strength of context realism also limits generalizability of the results to other settings.

To answer our (Why and How-typed) Research Questions of Chapter 7 we will follow the Research Strategy of Case Studies. *Case studies* involve the intensive examination of a small number of entities by the researcher, where neither independent variables are manipulated nor are confounding variables controlled. Like field studies, case studies typically utilize questionnaires, coded interviews, or systematic observation as their preferred techniques for gathering data (Boudreau et al., 2001).

We strive for synergy between the quantitative experiments and the qualitative Case Study in to order examine theories that could explain the Deaf Effect. Therefore, we should realize how we can relate findings from both without confusing the characteristics of each substudy. To clarify this, Yin explains that generalization of the results from case studies differs from generalization of the results from experiments. In case of experiments, statistical generalization is applied. In case studies, analytical generalization is applied, as shown in figure 3-4. Statistical generalization uses level one inference and analytical generalization uses level two inference. Inference means how conclusions are made based on arguments or data. For a case study it is impossible to use level one inferences because there is only one or multiple cases which is not enough to use statistical generalization. In a case study, analytical generalization should be applied where developed theory is used as a template and empirical results from the case study should underpin that theory. In a multiple-case study design, replication may be claimed if two or more cases support the same theory (Yin, 2009).
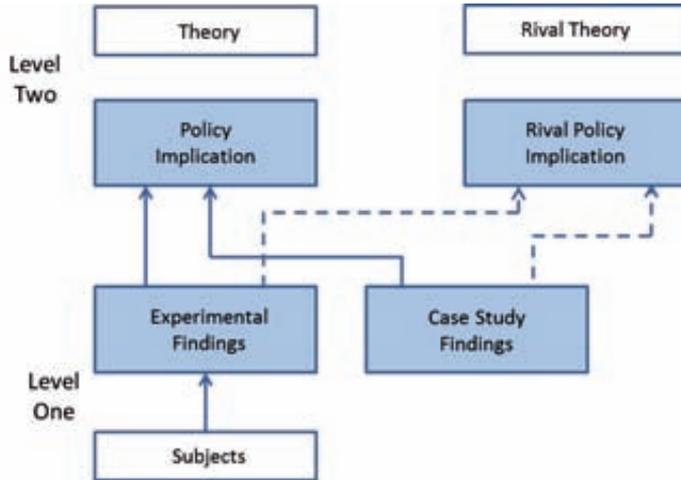
Figure 3-4 Making inferences: two levels (Yin, 2009)

In the table below we present how we obtain triangulation in research methods in our study by combining two laboratory experiments, a situated experiment and a case study with the goal of gaining insight into why deaf effect for risk warnings occur (in the domain of escalating IS-projects). The laboratory experiments provide methodological strength in terms of precision of measurement and deduction by testing a set of theoretically determined hypotheses. The situated experiment contributes to context realism and considers whether deafness is related to people's experience and whether it applies to the probability part of a risk warning as expected from literature. The qualitative multi-case study provides richer insight into the conditions for deafness and feedback loops between the bad news messenger and the decision maker. It also provides us with an inductive contribution from the interviews, which delivered unexpected findings that could be interesting to serve as propositions for further study on the Deaf Effect.

	Chapter 4 Laboratory Experiment	Chapter 5 Laboratory Experiment	Chapter 6 Situated Experiment	Chapter 7 Case Study
Precision of Measurement	H	H	M	M
Context Realism	L	M	H	H
Generalizability	H	H	L	M
Causal Inferences	H	H	M	L/M

Table 3-3 Triangulation of Research Strategies in our study

3.4.   Research Designs and Validity

Several classifications are relevant at the research design level. Given our choices of Research Strategy, we will mainly look at experimental designs and Case Study designs. Shadish et al. (2002) described a classification of experimental designs into (3) pre-experimental, (3) true experimental and (17) quasi-experimental designs. Secondly, they described four kinds of validity – internal, statistical conclusion, construct, and external validities. Thirdly, they also provided a list of major classes of threats to each of those types of validity: that is, they list classes of plausible rival hypotheses. Yin (2009) described classes of Case Study designs and also discussed choices in designs related to the types of validities.

Therefore, we will first briefly discuss the types of validity and validity threats, before we will describe our main choices in the research design of our experiments and Case Studies. For this reason, we change figure 3-1 towards the Predictive Validity model of McGrath (1981) which specifically is applied to the Research Question of Chapter 5. Since we aim to assess causal relations, our research design requires (1) temporal precedence, (2) statistically significant correlations and (3) control over alternative explanations (Blumberg, Cooper, & Schindler, 2008), p213.
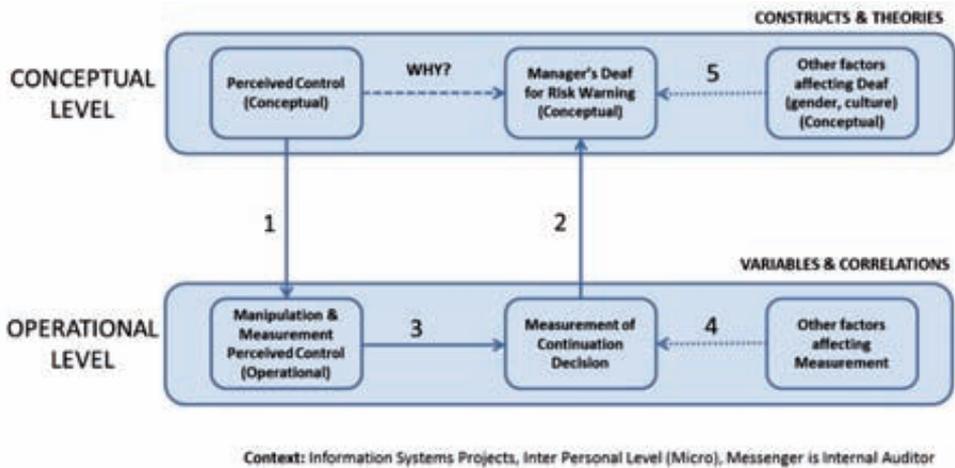
Figure 3-5 Predictive Validity model

In this figure we aim to answer a WHY question. Since we cannot measure this causal relationship directly, we will have to ensure that we can rely on the relations 1,2 and 3. So we have to ensure validity in order to rule out alternative explanations other than the causal relationship we aim to test.

Statistical Conclusion Validity is defined as the validity of inferences about the correlation (covariation) between treatment and outcome (Shadish et al., 2002) – referred to in Figure 3-5 as arrow 3. This type of validity addresses whether or not appropriate statistics were

used in the calculations on which the conclusions about the population of interest are based (Straub, Boudreau, & Gefen, 2004).

Internal Validity is defined as the validity of inferences about whether observed covariation between the presumed treatment and the presumed outcome (Relation 3) reflects a causal relationship from A to B as those variables were manipulated or measured (Shadish et al., 2002). It refers to the establishment of causality in a research model; the extent to which one can predict the endogenous variable by knowing the exogenous variable (Straub et al., 2004). Therefore, Relation 4 should be ruled out as a rival explanation for the observations. Random assignment of respondents to treatment conditions can rule out many alternative explanations for the measured results. Randomization reduces such alternative factors to random background noise.

External Validity is defined as the validity of inferences about whether a cause-effect relationship holds over variation in persons, settings, treatment variables and measurement variables (Shadish et al., 2002). Rival explanations from relationship 5 should be mitigated. We will have to consider and measure whether or not results could be limited to this setting.

Construct Validity is the validity of inferences about the higher order constructs that represent sampling particulars (Shadish et al., 2002). To rule out alternative explanations in relationship 1 and 2, measurements should prove reliable, and - in face of other constructs - shoud show sufficiently convergent on their own construct and should sufficiently discriminate from other constructs. We will have to measure Perceived Control using multiple measurements which will have to show results that are consistent.

Content Validity also refers to relationships 1 and 2. It concerns the degree to which items in an instrument reflect the content universe to which the instrument will be generalized. This validity is generally established through literature reviews and expert judges or panels (Straub et al., 2004). We will have to define Perceived Control and give a meaning similar to meanings that other researchers have given to it before.

Manipulation Validity is a measure of the extent to which treatments have been perceived by the subjects of an experiment (Straub et al., 2004). The treatments of Perceived Control should be proper and distinguish between groups with different treatments.

Research Design is mainly focused on replication and grouping of observations, as well as analysing relationships between and within these groups of observations. The design has to ensure validities as discussed above, in order to allow conclusions to be drawn on the observations. This applies to both experiments and Case Studies.

The laboratory experiments in Chapters 4 and 5 will have a between-group experimental design. This controls validity-threats by applying random assignment of treatment conditions to different groups of respondents. Construct validity will be ensured with multiple tests (cronbach alpha, exploratory factor analysis) on the appropriateness of the measurement model. Manipulation tests will be performed using MANOVA. The statistical analysis of proposed relations (main effects, moderated effects and mediated

effects) will be performed via Regression Analysis (Ordinary Least Squares) and Partial Least Squares (PLS).

The situated experiment in Chapter 6 will have a mixed design. It consists of within-subject treatments and measurements. It also compares between groups of subjects. The strength of this design is that all respondents receive all the treatments. This improves control over individual differences between respondents. Construct Validity will be ensured by statistical tests of reliability and convergent and discriminant validity. The statistical analysis will be performed using a Mixed Design ANOVA.

The Case study in Chapter 7 will have a replication of observations accros Multiple Cases and the research design will provide the measures to deal with/expose threats to validity as presented in table 3-4. We will use a Case Study protocol and Computer Assisted Qualitative Data Analysis Software (CAQDAS) in order to structure our observations.

Test	Case study tactic	Phase of research in which tactics occur
Construct validity	- Use multiple sources of evidence	Data collection
	- Establish chain of evidence	Data collection
	- Have key informants review draft case study reports	Composition
Internal validity	- Do pattern matching	Data analysis
	- Do explanation building	Data analysis
	- Address rival explanations	Data analysis
	- Use logic models	Data analysis
External validity	- Use replication logic in multiple-case studies	Research design
Reliability	- Use case study protocol	Data collection
	- Develop case study database	Data collection

Table 3-4 Four criteria for the quality of a Case Study research design (Yin, 2009)

We realized triangulation in our research design in several ways. First, we replicated the treatment and measurement model across multiple experiments with different groups and settings. We performed several different tests to assess reliability and validity within each substudy as well as across substudies. In addition, we used different designs across the substudies (multi-case study, between-subject experiment, mixed design experiment) in order to strengthen validities by using multiple methods.

3.5.   Data Collection and Respondents

One of the questions related to our research design referred to respondents that would be appropriate and available to serve our study. As shown in table 2-5, many of the experiments used undergraduate students. While the appropriateness of student subjects has been debated, there is a rich precedence for using students in studies on organizational decision tasks (Sitkin & Weingart, 1995), decisions associated with escalating IS-projects (Keil et al., 2000b; Park & Keil, 2009; Sabherwal et al., 2003; Smith et al., 2001) and the Deaf Effect in IS-projects in particular (Cuellar et al., 2006; Cuellar et al., 2007). The question to what extent students could be used within this experiment comes down to how

much emphasis is placed on external validity: should the subjects of our experiment function as exact surrogates for practitioners? Some scholars insist on having external validity for every study (Lynch, 1982, 1983), while others argue that external validity is not a requirement for rigorous testing of theory (Calder, Phillips, & Tybout, 1981; Calder, Phillips, & Tybout, 1982; Calder, Phillips, & Tybout, 1983). External validity may be sacrificed in order to achieve internal and construct validity. In that case homogenous samples, such as student subjects and laboratory experiments, are stronger. For theory testing, after internal validity is achieved, external validity is addressed by testing across multiple contexts. Cook and Campbell (1979) state that, in practice, external validity is often sacrificed for the greater statistical power that comes through having isolated settings, standardized procedures and homogenous respondent populations. For investigators with theoretical interests their estimate is that the types of validity, in order of importance, are probably internal, construct, statistical conclusion, and external validity (p. 83).

Therefore, the question in this situation is whether or not student surrogates act similar enough to actual practitioners in order to provide internal validity. This question is an empirical one (Liyanarachchi & Milne, 2005). Looking at the empirical literature, Birnberg and Nath (1968) indicate that student subjects are likely to differ from real world subjects in terms of skills, experience and personality traits. Ashton and Kramer (1980) in a review of the literature to that date found at least moderate support for using student surrogates in decision making tasks although not in studies of attitudes (such as toward corporate social responsibility). Ashton and Kramer report that psychological studies show that students and real world decision makers show "extremely similar information processing characteristics and biases" (p.3). They argue that students can act as surrogates in terms of theoretical studies as opposed to application studies. In this discussion, an important recent study that must be considered is one by Chang and Ho (2004) in which they ran an experiment comparing student and manager escalation behavior when project completion and market information was manipulated. The results of that experiment showed that managers and students had statistically the same likelihood to continue projects on 60% of the tests with managers having a higher likelihood on the remaining 40%. More importantly, the direction of the responses was similar for both the managers and students. Both tended to have lower likelihood of completion when the project was less complete than when it was more complete. The managers and students had different responses and response patterns for the funds allocation issues. These patterns are highly influenced by attitudes developed by managers' experience in the business world in which they learn that meeting profitability targets is a key to success. Students, however, without that experience, have not been so conditioned and therefore have different attitudes towards allocation of funds. Thus we see, that in an escalation situation, students responded similarly to practitioners in those escalation decisions where experience was not a factor.

For our study we will use students subjects in Chapter 4, since one of the main treatments is a *Gain/Loss framing* of risk information. As we know from Prospect Theory experiments, there is no experience requirement to make such treatment effective. In Chapter 5 we have *Perceived Control* as one of the main treatments. Since this treatment is likely to be connected to work-experience, we use subjects with relevant working

experience in this study. In the situated experiment of Chapter 6 we grouped subjects based on their working-experience, while other conditions remained unchanged and thus removed background noise from our experiment. In Chapter 7, we used experienced internal auditors who had encountered the Deaf Effect on IS-projects. No students surrogates would have been appropriate in this case of course. So with respect to data collection we triangulated by involving various groups in our substudies.

3.6. Statistical Analysis

3.6.1. Statistical Regression Analysis of Moderating Effects

In section 3.2. we already introduced Moderator variables at a conceptual level. Since these are crucial in our Research Questions, we will further describe what translations and statistical tests we will perform on these variables.

Types of Moderation Variables

The classic validation model determines the degree of association between independent variables and a dependent variable. In some circumstances the classic model does not provide a complete understanding of the phenomenon studied. More specifically Sharma et al. (1981) state that "in some cases the predictive efficacy of an independent variable and/or the form of the relationship may vary systematically as a function of some other variable(s)". For example: many behavioral models contain situational variables which are hypothesized to influence classical validation models. This provides an improved insight into the phenomenon examined. Sharma et al. (1981) defined a moderator variable as one which systematically modifies either the form and/or the strength of the relationship between an independent variable (IV), also called Predictor, and a dependent variable (DV), also called Critrerion. Moderator variables specify the form and/or magnitude of the relationship between the IV and the DV and are also labeled 'specification variables'. Sharma et al. (1981) developed a typology of moderator variables, using two dimensions.

	Related to DV and/or IV	Not related to DV and IV
No interaction with IV	1 Intervening Exogenous Antecedent Suppressor Additional IV	2 Moderator (Homologizer)
Interaction with IV	3 Moderator (Quasi Moderator)	4 Moderator (Pure Moderator)

Figure 3-6 Types of Moderator Variables

If the specification variable is related to the DV and/or IV, but does not interact with the IV (Quadrant 1), the variable is refered to as an intervening, exogenous, antecendent, suppressor or an additional IV, depending on its other characteristics. These are not considered to be moderator variables. Variables in the other three quadrants are refered to as moderator variables, sccording to Sharma et al. (1981). The moderator variable in Quadrant 2 operates by modifying the strength of the relationship whereas those in Quadrants 3 and 4 influence the form of the relationship between the IV and DV. The homologizer has the typical characteristic of partial variance: subgroups of the homologizer variable show different standard errors (measurement errors) and thus represent different strengths of the relationship between IV and DV. As an example Sharma et al. (1981) refer to time-effects where people become less (or more) accurate in performing tasks after a period of time. A Pure Moderator (Quadrant 4) differs from a Quasi Moderator (Quadrant 3) since it is related neither to the IV nor to the DV.

Two methods will be used in this thesis for identifying moderator variables: subgroup analysis and moderated regression analysis (MRA). According to Sharma et al. (1981) these cannot be considered to be interchangeable or equivalent procedures. Rather, in order to identify the presence and type of moderator variable, one must use both methods in tandem (Sharma et al., 1981).

In the *Subgroup analysis* the sample is split into subgroups on the basis of a third variable, the hypothesized moderator. If the variable treated as moderator already is in a discrete form, such as gender or Gain/Loss frame, subgroups are created for each value of such a dichotomous/trichotomous variable. We will follow this approach in chapter 4. Otherwise, respondents will be subgrouped for the number of standard deviations to the mean of the variable that is treated as a moderator. We will follow this approach in chapter 5.

After the subgrouping of the respondents, regression analysis typically is used to investigate the relationship between the IV's and the DV for each subgroup. In those instances in which the regression coefficients differ across subgroups, the variable is assumed to be a moderator variable. Without additional analysis however, one cannot identify whether the proposed moderator is a quasi moderator (Quadrant 3), in the case that the proposed moderator is also an IV itself, or whether it is a pure moderator, according to Sharma et al. (1981).

Moderated Regression Analysis is different from subgroup analysis because it is "an analytical approach which maintains the integrity of a sample yet simultaneously provides a basis for controlling the effects of a moderator variable" according to Sharma et al. (1981). In applying MRA to our study, with Gain/Loss framing (*GainFrame*) as a proposed moderator on the single IV Collaborative Messenger (*Collab*) and *Continue* as our DV, we should examine three regression equations for equality of regression coefficients.

      (1) Continue = a + b_1Collab
      (2) Continue = a + b_1Collab + b_2 GainFrame
      (3) Continue = a + b_1Collab + b_2 GainFrame + b_3CollabxGainFrame

According to Sharma et al. (1981), the following classifications are derived from these regression functions: If equations 1 and 2 are not significantly different (i.e., $b_3 = 0$; $b_2 \neq 0$), *GainFrame* is not a moderator variable but simply another independent variable (Quadrant 1) next to *Collab*. For *GainFrame* to be a pure moderator variable (Quadrant 4) equations 1 and 2 should not be different from each other but should be different from equation 3. (i.e., $b_2 = 0$; $b_3 \neq 0$). For *GainFrame* to be classified as a quasi moderator (Quadrant 3), equations 1, 2 and 3 should all be different from each other (i.e., $b_2 \neq 0$; $b_3 \neq 0$).

As proposed by Sharma et al. (1981) we will use a mixed method framework for identifying moderator variables, using both MRA and subgroup analysis, both based on regression analysis. We will describe later how we perform a moderation analysis with PLS as well.

Moderation and Interaction

Please note that calculations for the regression functions remain unchanged when we exchange the moderator and the predictor variable. Jaccard and Turrisi (2003) describe that the moderator approach to interaction analysis requires that a theorist specifies a moderator variable and a so-called focal independent variable. Situations arise when one theorist's moderator variable is another theorist's focal independent variable, and vice versa. For example, a consumer psychologist who studies product quality and product choice might be interested in the effect of product quality on product purchase decisions and how this is moderated by the pricing of products. In contrast, a marketing researcher using the same experimental paradigm as the consumer psychologist might be interested in the effect of product pricing on product purchase decisions and how this is moderated by product quality. In both cases, the designation of the moderator variable follows from the practical and theoretical orientations of the researcher. Neither specification is better than the other, and statistally the results of an interaction analysis will be the same in the two conceptualizations. The two designations simply represent different perspectives on the same phenomena and guide researchers to emphasize different aspects of the data. The moderator approach for interaction effects is commonly invoked in substantive research domains. Interaction effects scan be difficult to imbue with substantive meaning in an applied research setting. There is however nothing preventing the researcher from characterizing the data from both perspectives in such scenarios (Jaccard & Turrisi, 2003), p4.

We will achieve triangulation in statistical analysis of moderating effects in multiple ways. We analyze the interaction effects by using Moderated Regression Analysis and Subgroup Comparison of regressions (Aiken & West, 1991; Jaccard & Turrisi, 2003; Sharma et al., 1981). In addition to the conventional regression analysis, we tested for interactions with moderated Partial Least Squares analysis (Chin, Marcolin, & Newsted, 1996) as well and compared the results. We will explain PLS later in this Chapter.

3.6.2.   Statistical Regression Analysis of Mediation Effects

In section 3.2. we already introduced Mediator variables at a conceptual level. Since these will be used in our empirical chapters, we will further describe what translation and statistical tests we will perform on hypothesized mediator variables.

Mediator Variables

The classic validation model determines the degree of association between an Independent Variable (IV), also called Predictor, and a Dependent Variable (DV), also called Criterion. In some circumstances, the classic model does not provide a complete understanding of the phenomenon studied (Sharma et al. 1981). Mediation Analysis can help us understand the process by which the IV causes the DV. So it helps us to analyse, for example, the influence of the Messenger-Decisionmaker relationship on the Deaf Effect: i.e. is this effect mediated by *Message Relevance* or *Perceived Risk*?

Mediated Regression Analysis

The classical test for mediation was offered by Baron and Kenny (1986). First, we should perform three regressions: 1) The predictor variable to the mediator[11], 2) the predictor variable to the outcome variable and 3) the predictor and mediator together to the outcome variable. Next, we should establish that the conditions for mediation are met: which requires that the predictor variable should affect the mediator in the 1st regression, that the predictor variable should affect the outcome variable in the 2nd regression and that the mediator should affect the outcome variable in the 3rd regression. If these conditions hold in the predicted direction, then the effect of the predictor on the outcome must be less in the 3rd regression than in the second. Sobel's test (Sobel, 1982) is used in order to assess the approximate significance of the indirect effect of the predictor variable on the outcome variable via the mediator. Below, we test whether or not Perceived Risk (*PercRisk*) would mediate the effect of Perceived Control (*PercContr*) on Deaf Effect (*Continue*).

$$(1)\ PercRisk\ = a_1 + b_1 PercContr + \varepsilon_1$$
$$(2)\ Continue\ = a_2 + b_2 PercContr + \varepsilon_2$$
$$(3)\ Continue\ = a_3 + b_3 PercContr + c_3 PercRisk + \varepsilon_3$$

According to the Baron and Kenny (1986) test for mediation, we should first assess that there is a significant effect of *PercContr* on *PercRisk* (i.e. $b_1 \neq 0$). We should also assess that the predictor *PercContr* has a significant effect on Continue (i.e. $b_2 \neq 0$). Then, we should assess that the direct effect of the predictor *PercContr* on *Continue* is less when we take into account the role of the mediator *PercRisk* (i.e. $b_3 < b_2$). So the indirect path via

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[11] Throughout this thesis we consistently use the phrase "regression of X_1 and X_2 to Y", in which Y is considered to be the dependent or outcome variable that is observed and X_1 and X_2 are considered to be the independent or predictor variables who are manipulated. Formally correct this should be phrases as "regression of Y on X_1 and X_2".

PercRisk takes away some part of the direct effect of *PercContr* on *Continue*, and *PercRisk* is called a mediator. If no direct effect would remain (i.e. $b_3 < b_2$ and $b_3 = 0$) then we claim "full" mediation. If some direct effects do remain (i.e. $b_3 < b_2$ and $b_3 \neq 0$) then we claim "partial" mediation. And if the direct effect is not reduced at all ($b_2 = b_3$) then we claim "no" mediation of *PercRisk* on the causal relation between *PercContr* and *Continue*.

Comparison of size between the direct effect b_2 (effect of *PercContr* on *Continue*, not accounting for *PercRisk* as potential mediator) and direct effect b_3 (taking into account *PercRisk*) is conducted using the Sobel z-test (Sobel, 1982). This tests the significance of the indirect path via mediator *PercRisk* ($b_1 \text{x} c_3 \neq 0$).

We will achieve triangulation in statistical analysis of mediating effects in multiple ways. We analyze the mediation effects by using Mediated Regression Analysis and the Sobel z-test. In addition to these conventional regression analysis, we test for mediation with Mediated Partial Least Squares analysis (Iacobucci, 2008) as well and compare the results of both analysis methods. We also compare the mediation analyses beween the two laboratory experiments as described in Chapter 4 and 5. Will explain PLS next in this Chapter.

3.6.3. Partial Least Squares Analysis vs Regression Analysis

Regression Analysis is appropriate for testing Moderation Effects (Aiken & West, 1991; Jaccard & Turrisi, 2003; Sharma et al., 1981) and Mediation Effects (Baron & Kenny, 1986; Iacobucci, 2008). Not only does it provide insight into the strength and significance of relationships, but it also allows one to visualize and interpret these effects in various conditions and subgroups. Over the last decades, well developed, tested and discussed procedures have become available for the use of regression analysis in moderation and mediation analysis. For these reasons, we consider the regression analysis to provide a good basis for the moderation and mediation analysis in our study.

Regression Analysis also has some inherent assumptions and limitations, as discussed by Iacobucci, which could bring Partial Least Squares (PLS) into favour for mediation analysis (Iacobucci, 2008) as well as moderation analysis (Chin et al., 1996). Regression analysis has assumptions on the underlying data (such as normality) and requires testing and taking care of these assumptions in order to ensure statistical conclusion validity. One of the main assumptions is that the independent variables are not highly correlated (multicollinearity). In order to serve construct validity, we had to measure the same construct with multiple measurement items. If the results of these measurements are very consistent (high reliability and convergent validity) then Construct Validty is confirmed. The problem however is, that we cannot use these measurements in regression analysis, since they are too correlated. Therefore, we average all the measures for a variable into one single variable which we then use in our regression analysis, and at the same time lose the refined underlying measurements of the measurement model. PLS uses these underlying measurements.

Compared to the regression analysis, PLS has the advantage that it assesses the measurement model within the context of the structural model, rather than testing in two separate analyses (Gefen, Straub, & Boudreau, 2000). Additionally, PLS is able to identify path loadings across the entire model in a single run as opposed to multiple runs, as is required when using regression techniques. This results in a more rigorous analysis than when using factor analysis and regression alone (Gefen, et al. 2000, p. 24). As regression analysis does, PLS also seeks to show rejection of a null hypothesis of independent variables having no effect on the dependent variable while accounting for a significant amount of the variance in the dependent variable (Gefen, et al. 2000, p.27). PLS techniques perform the analysis by iterating between confirmatory factor analysis and path analysis until the change in variance explained is not significant. It then uses bootstrapping to estimate the significance of the paths. "Neither of these PLS significance estimation methods require parametric assumptions" (Gefen et al., 2000). Since PLS uses all measurements, the sample size can be smaller (Chin et al., 1996), with a standard rule of thumb suggesting that it be equal to ten times the largest number of structural paths directed at a particular construct in the structural model. For moderation analysis, these additional strengths of PLS could make it preferable to the more traditional moderated regression analysis (Chin et al., 1996). For mediation analysis, PLS provides the advantage of allowing us to analyse multiple paths simulateously (Iacobucci, 2008). This gives insight in the direct and indirect effects of each mediator in the model, taking into account all the other paths of the structural model.

In our use of PLS, we performed the PLS calculation to generate the basic PLS values and then used bootstrapping to compute the T-statistics for significance. As we could see in table 2-5, PLS has previously been applied in exploratory studies on the Mum Effect and the Deaf Effect on escalating IS-projects (Cuellar et al., 2006; Cuellar et al., 2007; Smith et al., 2001) and is appropriate for testing theories in the early stages of development. On the Deaf Effect there has been, to our knowledge, no precedence in testing interaction effects with moderation analysis. In this study we use smartPLS (Ringle, Wende, & Will, 2005) version 2.0. which includes the product indicator approach for moderating effects, as proposed by Chin et al. (1996).

For reasons of triangulation of statistical methods, we use both regression and PLS in our study. PLS is more robust and flexible. Regression analysis is more conservative in assessing moderating effects (hierarchical regression) and allows for better visual interpretation of the results. Cross-validation of the results contributes to validity and understanding of the moderating and mediating effects in our study.

3.7. Framework Empirical Research Design

We started this Chapter with our Research Questions. We proceeded with the Conceptual Design in which we presented the causal relations and theories. Then, we discussed Empirical Research Strategies that would be appropriate to test these causal relations. We proceeded with the characteristics of data collection and respondents. Finally, we discussed the statistical methods that we use. Based on these discussions - which included triangulation - we now conclude in table 3-5 what the main characteristics will be of the research design, which we will use in our empiral chapters.

Conceptual Research Design	Chapter 4	Chapter 5	Chapter 6	Chapter 7
Research Question	Explanatory	Explanatory	Explanatory	Explorative
Effects	Main Moderation Mediation	Main Moderation Mediation	Main Moderation	Main Moderation
Dependent Variable	Continue	Continue	Perceived Risk	Continue
Independent Variable	Collaborative Gain/Loss Frame	Collaborative Perceived Control	Probability Impact Actor/Observer	Collaborative Conditions
Mediating Variable	Message Relevance Perceived Risk	Message Relevance Perceived Risk		
Theories	Prospect Theory Stewardship Theory Heuristic Analytic Theory	Illusion of Control Theory Stewardship Theory Heuristic Analytic Theory	Illusion of Control Theory	Stewardship Theory Illusion of Control Theory Systems Theory

Technical Research Design	Chapter 4	Chapter 5	Chapter 6	Chapter 7
Research Strategy	Laboratory Experiment	Laboratory Experiment	Situated Experiment	Case Sudy
Research Design	Between Group	Between Group	Mixed Design	Multi-Case Study
Participants	199 Students	134 Parttime-Students	70 Internal auditors 32 Managers	12 Internal Auditors
Data Analysis	Regression Partial Least Squares	Regression Partial Least Squared	Mixed Design ANOVA	Iterative Coding, Analytic Memo Writing
Data Validity	ANOVA, Cronbach Alpha, AVE, Exploratory & Confirmatory Factor Analysis	MANOVA, Cronbach Alpha, AVE, Exploratory & Confirmatory Factor Analysis	Cronbach Alpha, Exploratory Factor Analysis	Case Study Protocol Case Study Database Chains of Evidence
Tool	SPSS rel 19 smartPLS rel 2.0	SPSS rel 19 smartPLS rel 2.0	SPSS rel 19	nVivo rel 9

Table 3-5 Framework Empirical Research Design

CHAPTER 4. DEAF EFFECT IN IS-PROJECTS: AN EXPERIMENT ON PROSPECT THEORY AND STEWARDSHIP THEORY

4.1. Introduction

The objective of this chapter is to contribute to the explanation of *Why* the Deaf Effect occurs in the field of escalating IS-projects. We concluded in Chapter 2 that interaction between decision makers' psychological conditions and corporate governance principles could explain the Deaf Effect. In this chapter we will empirically study whether or not two factors – 1. The Gain/Loss Frame of the Risk Warning and 2. The Relationship with the messenger – could explain the Deaf Effect. The expected influence of the Gain/Loss Frame is based on Prospect Theory. The expected influence of the relationship with the messenger – Collaborative Partner vs Opponent – is based on Stewardship Theory (elaborated in section 2.5). In table 4.0. we will first provide an outline of the research questions and assumptions that we make in this Chapter.

	Research Questions	Type of Question
4	Could the *Gain/Loss Frame* of the Risk Warning and the Project Owner's *Stewardship relation* with the messenger (Collaborative Partner) be of influence on the Deaf Effect for a Risk Warning?	Why
4.1	Could these influences interact?	Why
4.2	Are these influences mediated by Message Relevance, Risk Perception and Estimated Probability to Succeed?	How

Scope and Assumptions

- The decision maker of study (*unit of analysis*) is the executive in the role of IS-Project Owner;
- The Bad News Messenger acts in the role of *internal auditor* who meets the professional standards of the Institute of Internal Auditing (IIA, 2004). These standards address the criterion of a Bad News Messenger who is acting as a credible source - i.e. who has the expertise and could be relied upon to make true assertions (Cuellar et al., 2006). Furthermore, they assure that the internal auditor would operate from an Auditing Function which is independent from management authority (Keil & Robey, 2001)[12];

Table 4-1 Contribution of this empirical study

Cuellar defined the phenomenon of Deaf Effect as occurring "when a decision maker doesn't hear, ignores, overrules a report of bad news to continue a failing course of action" (Cuellar, 2009). Based on interviews with internal IS auditors, Keil and Robey (2001) described the Deaf Effect as a failure to respond to messages of impeding IS-project

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[12] The IIA professional standards on internal auditing (IIA, 2004) prescribe that the internal auditor is considered to meet standards on **a.** proficiency (1210)- knowledge and skills, **b.** due professional care (1220) – apply skills, prudency and care , **c.** organizational independence from executive management (1110) , **d.** individual objectivity (1120) – impartial, unbiased attitude, avoid conflicts of interest, **e**. both in fact and appearance (1130).

failure. The auditors recalled instances in which they had reported bad news about projects only to find that their concerns were ignored by executive management. Several auditors underscored the importance of developing relationships with other units in the organization. The following incident reported by an IS auditor illustrates this point. *"I think,"* he said, *"the way we handled it made a difference. We suggested they really look at these issues. We have got some major problems, and I think just the way we came about it, as a team player instead of a policeman. And that 'We want to help you; we see that this project's out of control; we can see that maybe some things you're not getting the truth on because you're so close to it; but this is what we see.' Even though we are an independent appraisal organization, we are still part of the same corporate team, and our goals are their goals basically. We all want the company to do well."* (Case #182).In early work on internal auditing, Chambers et al. (1988), p.73, reported that *"the auditee's reaction to the inspection style of auditing was hostile. The auditee was inclined not to listen to the auditor or to benefit from the findings".* The Deaf Effect appears to be influenced by the style of auditing and the corresponding relationship with management.

In Chapter 2 we explained the two different roles of internal auditors, how they are related to corporate governance and how they are reflected in the relationship with managers. These will be briefly recapitulated. As part of organizations' Corporate Governance frameworks, internal auditors have a formalized role to provide risk information and to blow the whistle when the organization takes risks that might no longer be justifiable and consistent with the organization's interests. This corporate governance framework could be dominated by principles and assumptions of Agency Theory (incongruent goals and information asymmetry) or Stewardship Theory (congruent goals and information sharing).This determines whether the internal auditors - as exponent of this corporate governance framework - are supposed to **a)** monitor management risk-taking and expose management failures and decisions that are not consistent with organization' interests, or **b)** contribute to management performance by challenging and improving decision-making. In the first condition (based on Agency Theory principles) the internal auditor will act as an Opponent to management. In the second condition (based on Stewardship Theory), the internal auditor will act as a Collaborative Partner to management.

We expect that managers (Project Owners) are more likely to listen to the Risk Warnings from an auditor who is seen as a Collaborative Partner, regardless of the objectivity and credibility of the internal auditor to make true assertions on risks. We expect that managers will be less motivated intrinsically to listen to the Risk Warning, when the messenger is seen as an Opponent – such an internal auditor is often labeled as a 'policeman'. These expectations are based on the Stewardship principles.

Research on Stewardship Theory suggests that a Collaborative Partnership relation interacts with psychological heuristics (Davis et al., 1997) in its effect on decision making behavior. The Stewardship Theory itself even found its origin in sociology and psychology in relation to its principles to design corporate governance and relations within organizations (Sundaramurthy & Lewis, 2003). In this Chapter, we examine interaction with the Gain/Loss Frame of the Risk Warning according to Prospect Theory, since that is a widely accepted psychological heuristic. As we described in section 2.5, the Gain/Loss

Framing Effect is sensitive to experimental conditions (Kahneman, 2003) and thus a promising candidate for interaction with environmental conditions.

The Framing Effect is relevant to the field of project escalation since it influences the risk preference of decision makers with regard to a project. Loss framing could lead to stronger risk seeking behavior which can affect the decision to continue or abandon a project (Karevold & Teigen, 2010; Sabherwal et al., 2003). One example of this is that placing emphasis on the amount of resources already invested in a project can increase the commitment to the project and the determination to keep investing in its completion. This is known as the 'sunk cost' effect (Arkes & Blumer, 1985; Garland, 1990). The article describes that "*The basic sunk cost finding that people will throw good money after bad appears to be well described by prospect theory*". These sunk costs represent irrevocable investments that should be irrelevant since the past cannot be changed (Whyte, 1991).

Study	Key Findings
(Arkes & Blumer, 1985)	Level of sunk cost can influence people across a wide variety of decision contexts
(Northcraft & Neale, 1986)	People fail to consider opportunity costs and frame decisions as a choice between losses. Showing opportunity costs can alter framing of decisions and reduce sunk cost effect.
(Garland, 1990)	There is a linear sunk cost effect based on budget already invested. Higher percentages of sunk cost can lead to greater willingness to continue with a course of action.
(Garland & Newport, 1991)	Relative sunk cost is percentage of total budget already spent. Relative rather than absolute sunk cost affects people likelihood to commit additional funds to some action.
(Simonsen & Nye, 1992)	Accountability alleviates susceptibility to decision errors and reduce the sunk cost effect
(Conlon & Garland, 1993)	People's willingness to a continue a project are driven by the level of project completion rather than level of sunk cost per se
(Heath, 1995)	People are likely to escalate commitment when they fail to set a budget or when expenses are difficult to track
(Keil et al., 1995a)	Sunk cost effect can be reduced if people have an alternative project for which they can spend money. Finnish subjects have a smaller tendency to escalate their commitment at high levels of sunk cost compared to US subjects
(Keil, Truex, & Mixon, 1995b)	People are more apt to justify their decisions to continue a project based upon level of sunk cost rather than level of completion
(Keil et al., 2000b)	Across several cultures (Singapore, Netherlands and Finland) , the level of sunk cost has a significant direct effect on willingness to continue a project.
(Keil et al., 2000a)	IS-auditors discriminate escalated and non-escalated projects more strongly on indicators of the completion effect and agency theory than on indicators of the sunk cost effect
(Soman, 2001)	Decision making on Lost Time investments does not show Sunk Cost effects unless they are expressed in monetary quantities
(Wang & Keil, 2007)	Meta-analysis of 20 sunk cost experiments shows that the Size of Sunk Cost Effect is stronger in IT-projects opposed to non-IT projects
(Fennema & Perkins, 2008)	Trained and experienced subjects were less prone to the sunk cost effect than students. Most correct decisions were not made by ignoring sunk costs, but by attending to them consistently.
(Karevold & Teigen, 2010)	Managers' statements about project progress reveal their investment intentions

Table 4-2 Main findings from Sunk Cost studies related to escalating IS-projects

The table 4-2 is updated from Keil et al. (2000b) and presents the main findings from empirical research on the sunk cost effect that are relevant to research in the field of Escalating IS-projects:

We will elaborate on our hypotheses in order to further structure our investigation of Gain/Loss framing and the messenger-manager relation on the Deaf Effect. We will obtain more insight in this relation by analyzing mediating variables that could be derived from earlier studies.

4.2. Hypotheses

4.2.1. Main Effect of Messenger seen as Collaborative Partner vs Opponent

An internal audit department that is based on the principles of Stewardship Theory would build up a reputation of acting collaboratively with managers in the organization in order to make them and the organization perform better. The managers would consider these auditors' goals to be congruent with their own and those of the organization. The information on both sides would easily be shared in order to achieve the business goals. There would be no reason to hide information from one another (information asymmetry). According to this theory, managers would appear to be more receptive to (even negative results from) objective assessments performed by the auditors when they consider them to be Collaborative Partners instead of Opponents or policemen. Following this line of reasoning, managers would assign more relevance to the message of an auditor who is considered to be a Collaborative Partner then to the message of an auditor who is considered to be an Opponent or 'policeman'. If the auditor would provide the results of an assessment showing that a project should not continue, we expect that the manager is more likely to discontinue the course of action when the messenger is considered to be a Collaborative Partner instead of an Opponent..

This results in the following hypothesis:

H1. *Decision Makers are **less** likely to continue a course of action (respond deaf to a Risk Warning), when the Messenger is seen as a Collaborative Partner*

4.2.2. Main Effect of Gain vs Loss Framing of the Risk Warning

Several laboratory experiments in the field of Prospect Theory confirmed that decision framing (as losses compared to gains) is of influence on decision makers' tendency to take risk-seeking vs risk-averse decisions. Decision makers' preference for risk-seeking choice was tested as an explanation of continuation of failing courses of action, such as escalating IS-projects. We suggest that this preference also apply if a Risk Warning was provided and thus applies to the Deaf Effect.

This results in the following hypothesis:

H2. *Decision Makers are more likely to continue a course of action (respond deaf to a Risk Warning),when the Message is Framed as Losses*

4.2.3. Moderating Effects

As we explained in Chapter 3, moderation effects in applied fields often refer to so-called quasi moderators. Two factors show a direct effect on a dependent variable and appear to interact on each others effect on that dependent variable. The theoretical perspective that is chosen determines which effect is considered to be moderating the other effect. If we take Stewardship Theory as a starting point, we assess whether the effect of the messenger's Collaborative Partnership relation on the continuation decision is changed (moderated) by the Gain/Loss frame of the message. If we take Prospect Theory as a starting point, we would assess whether the effect of the message's Gain/Loss frame on the continuation decision is changed by a Collaborative Partnership with the messenger. Both are perspectives on the same interaction and both can be helpful in interpreting the interaction. Therefore, we do not exclude either of the positions in our analysis, both in the development of our hypotheses as well as in the analysis of the results[13].

Research on Stewardship Theory suggests that a partnership relation could interact with psychological heuristics (Davis et al., 1997) in its effect on decision making behavior. We take the psychological heuristics as confirmed in Prospect Theory as a starting point for the development of our hypotheses on interaction. Although Prospect Theory does not explicitly point at potential moderators of framing effects, Kahneman (2003) described several conditions that could be of influence on the relationship between Gain/Loss framing and Risk-preferences, such as "narrow framing", "no experience", "few information" and "personalization". In other conditions the relationship between Gain/Loss framing and Risk-preferences could be attenuated, or even reversed, as shown in an extensive literature review of framing experiments (Levin, 1987; Levin, Gaeth, Schreiber, & Lauriola, 2002; Levin et al., 1998). Studies that provided results that were inconsistent with expectations were more or less presented as deficient experiments compared to the original Prospect Theory experiments. Other researchers studied decision makers' perceived Winning/Losing conditions in interaction with Perceived Control or Positive/Negative feedback (Brockner et al., 1983; Forlani, 2002; Shapira, 1995) and found risk-preferences that were not consistent with Prospect Theory. Fagley et al. (2010) proposed an interaction of Prospect Theory's Gain/Loss framing with other perspectives that decision makers could follow and that could guide their observation, attention and biases.

Moderation Effects related to the Sunk Cost Effect could also be derived from a meta-analysis of 20 experiments across IT and non-IT projects by Wang and Keil (2007). They found a variability of the sunk cost effect much larger than one would expect from subject-

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13 As we described in chapter 3, the statistical techniques test on interaction- effects and perform identical tests for both positions

level sampling errors. Part of the variability could be attributed to the context of the experimental scenarios. Specifically, they found that the magnitude of the sunk cost effect was greater in experiments involving IT-projects than in experiments involving non-IT projects. They call for more primary studies that investigate potential moderators of sunk cost effects, as well as ones that investigate why IT-projects show more sensitivity to sunk cost. Prior studies suggested that the sunk cost effect could be reduced by: (1) avoiding negative framing (2) encourage people to focus on alternatives (3) making negative feedback unambiguous and (4) increasing decision makers accountability (Garland, 1990; Keil et al., 1995b; Northcraft & Neale, 1986)). So, the effect of negative framing may be attenuated by such conditions.

Research on Stewardship Theory suggests that a partnership relation could interact with psychological heuristics (Davis et al., 1997) in its effect on decision making behavior. Sundaramurthy (Sundaramurthy & Lewis, 2003) suggests that the effects of stewardship relations on decision making could differ in conditions of positive/negative performance and could cause reinforcing circles.

We expect that the Gain/Loss frame of the message could change the effect of the messengers' Collaborative Partnership on the decision to continue the course of action. We expect that when the message is presented as Losses, most attention of the decision maker (Ocasio, 1997; Simon, 1997) would be drawn towards losing and restricting the amount of attention to the relationship with the messenger. This results in hypothesis 3:

H3. When the Risk Warning is framed as Losses, Decision Makers are less likely to let their continuation-decision be influenced by the Messenger's Collaborative Partnership.

4.2.4.   Mediating Effects

In addtion to the analysis of moderating effects, we strive to contribute to insight into the Deaf Effect, by exploring mediating effects as well. In that sense we extend on the mediation analysis, as performed by Cuellar et al. (2006), by further testing whether or not Message Relevance could also be affecting the constructs and relations in our model. We will also study two other candidate mediators, which could help in further understanding how factors are of influence on the Deaf Effect.

Mediating role of Message Relevance

The very few experimental studies on the Deaf Effect (Cuellar, 2009; Cuellar et al., 2006; Cuellar et al., 2007) follow the Heuristic-Analytic Theory of Evans (Evans, 2006; Evans, 1996) in order to explain its causes. The dual model of information processing (heuristic and analytic) is shared with other researchers on biases and heuristics, such as System 1 and 2 cognitive processes (Kahneman, 2003; Stanovich & West, 2002), the Heuristic-

Systematic Model (Chaiken, 1980) and the Elaboration Likelihood Model (Petty & Cacioppo, 1986). These models differ on their assumptions on how the heuristic and reasoning processing co-operate and interact. The H-A theory (Evans, 2006; Evans, 1996) assumes that the Heuristic processing acts like a filter to select the relevant parts out of all the information that people are exposed to. This relevant information is being transferred for further rational processing and decision making in the Analytic processing. Other theories assume more interaction between the two systems (Kahneman, 2003; Stanovich & West, 2002) in which the systems complement each other. Consistent with Evans's H-A theory Cuellar found confirmation that Message Relevance was a mediator on some (but not all) of the determinants of the Deaf Effect (Cuellar, 2009; Cuellar et al., 2006; Cuellar et al., 2007). From a case-study (Cuellar, 2009) he concluded that decision maker's heuristics and biases (such as Illusion of Control) could also be of influence on the Relevance that a decision maker might assign to a Risk Warning. Therefore, we propose that *Message Relevance* could be mediating the decision to continue based on the Risk Warning as received and the decision maker's perspective of winning or losing. We propose that decision makers would report more Message Relevance when the Risk Warning comes from a Partner instead of an Opponent. In Sunk Cost experiments (Arkes & Blumer, 1985; Arkes & Hutzel, 2000; Garland, 1990) decision makers appeared to be risk seeking in the domain of losses. Assuming that decision makers might be focused on these losses, they might give less attention to other messages, such as the Risk Warning, and find them to be less relevant.

We propose the following hypotheses with regard to *Message Relevance* as mediator in the Deaf Effect:

H4a. Decision Makers assign more Relevance to a Risk Warning when the Messenger is seen as a Collaborative Partner

H4b. Message Relevance mediates the influence of the Messenger's Collaborative Partnership on the decision to continue a course of action

H4c. Decision Makers assign less relevance to a Message when it is Framed as Losses

H4d. Message Relevance mediates the influence of the Message being framed as Losses on the decision to continue a course of action

Mediating Role of Perceived Risk

In order to allow for effective contribution of risk-assessment devices on managers' decision making, Keil et al. (2000c) studied how information from a risk-assessment was of influence on the decision that managers made in experimental conditions. Of course, an analogous line of reasoning can be followed when the "risk-assessment device" would be an internal auditor who provides an obtrusive Risk Warning based on his/her professional risk-assessment. They confirmed that two relationships were holding: a) risk assessment devices have the intended effect on manager's risk perception and b) changes in risk perception translate to changes in decision making. Risk Perception has been defined as a "decision maker's assessment of the risk inherent in a situation" (Sitkin & Pablo, 1992; Sitkin & Weingart, 1995; Sjöberg, 2000b). Consistent with Keil et al. (2000c) and with various studies from Risk Research (Sitkin & Pablo, 1992; Sitkin & Weingart, 1995; Slovic, Fischhoff, & Lichtenstein, 1982) we propose that Risk Perception would be a reasonable mediator on managers' decisions based on the Risk Warning they received.

We propose that a decision maker's *Perceived Risk* would be influenced the most when the Risk Warning is received from a Collaborative Partner. The underlying assumption from Stewardship Theory is that the messenger and the decision maker are both aligned with the organization's goals and thus with each other. This suggests that *Perceived Risk* will tend to be aligned with the risk as presented by the Collaborative Partner who provided the Risk Warning.

With an experiment Sitkin and Weingart (1995) found that *Perceived Risk* partially mediated problem framing as gains versus losses. They hypothesized that positive frames, which emphasize situational threats to existing resources, may make the risks inherent in a situation more salient (inducing risk-averse behavior), whereas an emphasis on the upside potential for increasing limited holdings or recouping losses may decrease the salience of risks by increasing the salience of opportunities (inducing risk-seeking behavior). Their explanation is consistent with the nonlinearity that lies at the heart of prospect theory and its empirical support.

This results in the following hypotheses with regard to *Perceived Risk* as mediator of the Deaf Effect:

H5a. *Decision Makers perceive a higher level of risk, when the messenger of a Risk Warning is seen as a Collaborative Partner.*

H5b. *Perceived Risk mediates the influence of the messenger's Collaborative Partnership on the decision to continue a course of action*

H5c. *Decision Makers perceive a lower level of risk after a Risk Warning, when the message is Framed as Losses*

Message Framed as Losses → neg → Perceived Risk

H5d. *Perceived Risk mediates the influence of the Message being framed as Losses on the decision to continue a course of action*

Message Framed as Losses → Perceived Risk → Continue

Mediating role of Estimated Probability to Succeed

In their study on Sunk Cost effects, several researchers (Arkes & Blumer, 1985; Arkes & Hutzel, 2000; Garland, 1990) found that decision makers' *Estimated Probability to Succeed* mediates subsequent risk-seeking or risk-averse decision making. From a large survey across managers, March and Shapira (March & Shapira, 1987; Shapira, 1995) found that experienced managers with a history of success would tend to show risk-seeking behavior while over-estimating their probabilities to succeed, even when objective probability information was available. Also, other heuristics (such as Illusion of Control) that caused risk-seeking decision making were explained by biased Estimation of Probabilities to Succeed (Gilovich, Medvec, & Savitsky, 2000; Snow et al., 2007; Thompson et al., 1998). Therefore, we propose that *Estimated Probability to Succeed* would be mediating the decision to continue based on the Risk Warning as received and the decision maker's perception of winning or losing.

The first mediation would apply to the influence of the source of the Risk Warning (coming from a Partner or an Opponent) on the decision to continue a project (reject or follow the Risk Warning). We propose that the Risk Warning (with a given 1/3 chance to succeed) coming from a Partner would influence decision makers to report a lower Estimated Probability to Succeed the project than when it comes from an Opponent. The second mediation would apply to the influence of the gain/loss framing on the decision to continue. Several authors (Arkes & Blumer, 1985; Arkes & Hutzel, 2000; Garland, 1990) reported a higher Estimated Probability to Succeed in conditions of higher Sunk Cost, while referring to Prospect Theory as an explanation for risk-seeking preferences as a consequence. Therefore we propose that decision makers would report a higher Estimated Probability to Succeed, when they face their continuation decision from the perspective of losing (instead of the perspective of winning).

H6a. *Decision makers estimate the probability to succeed lower when the meesenger of a Risk Warning is seen as a Collaborative Partner.*

Messenger seen as Partner → neg → Estimated Probability to Succeed

H6b. *Decision Maker's Estimated Probability to Succeed mediates the influence of the messenger's Collaborative Partnership on the decision to continue a course of action.*

Messenger seen as Partner → Estimated Probability to Succeed → Discontinue
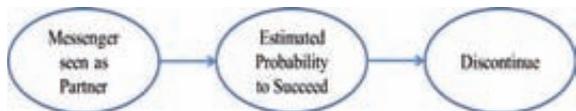
H6c. Decision Makers estimate the probability to succeed higher after a Risk Warning, when the message is Framed as Losses

H6d. Estimated Probability to Succeed mediates the influence of the Message being framed as Losses on the decision to continue a course of action

4.3.   Research Method

Since we aim to assess causal relations, we require (1) temporal precedence, (2) statistically significant correlations and (3) control over alternative explanations (Blumberg et al., 2008), p213. In order to meet these requirements of internal validity (eliminate explanations other than our hypotheses), we applied a 2x2 factorial between-subject experimental design. There are two different treatments (factors) that sort our observations (Treatment of Message Framing and the messengers' Collaborative Partnership). Each treatment has two levels (the message framed as either Gains or Losses; the messenger seen as a Collaborative Partner or as an Opponent). The four different treatment conditions were randomly assigned to participants, double-blind. In this way, participants' personal characteristics - either unknown or known to be relevant - could still affect their answers, but are transformed into random background noise. If these personal characteristics (such as pre-conceptions) would have a strong effect on respondents' answers, this would result in a very high level of background noise. The experimental design should be sufficiently powerful (signal to noise ratio) to assess statistically significant correlations between the independent variables and the dependent variable (*Continue*). Respondent characteristics that could be relevant (such as age, working experience, gender, risk-propensity, nationality) were measured as control variables. We reiterate these principles of between-subject experimental designs, because several choices in the four cycles of development and testing of our experiment scenario and measurements were made in order to improve the signal to noise ratio (strengthen the signal and attenuate noise). This was needed to successfully handle the disturbing influence of respondents' experiences and pre-conceptions - such as "auditors are collaborative or not", "IS-projects come with high costs and low gains". This finally resulted in the procedures, treatments and measurements as we describe in the next sections.

4.4.   Procedures & Respondents

The respondents who participated in this study were involved in under-graduate master courses on Accounting and Information Systems at four neighbor universities located within a seventy miles radius in the Netherlands and Belgium. Ninety-three percent of the students had a European nationality, dominated by Dutch and Belgian citizens. None of the participants were involved in pilot-testing of our study. The students participated on a voluntary basis at the first 20 minutes of their courses. In a double blind condition they received envelopes containing one out of four experimental scenarios at random. From the 210 returned envelopes we found 11 forms not to be sufficiently usable since the main

question (decision) was not answered in an unambiguous way (missing, scratched or multiple answers).

Size (N)	Description	Age	Working Experience	Gender	Nationality
199	Masterstudents Economics (accounting & information systems courses)	22.7 years (S.D. 2.3 yrs)	1.1 years (S.D. 1.8 yrs)	58% Male 42% Female	26% Netherlands 38% Belgium 28% Other Europe 8% Other

Table 4-3 Descriptives of the respondents

While the appropriateness of student subjects has been debated, there is a rich precedence for using students in studies with organizational decision tasks (Sitkin & Weingart, 1995), decisions associated with escalating IS-projects (Keil et al., 2000b; Park & Keil, 2009; Sabherwal et al., 2003; Smith et al., 2001) and Deaf Effect in IS-projects in particular (Cuellar et al., 2006; Cuellar et al., 2007). The question of whether students could be used within this experiment comes down to how much emphasis to place on external validity: should the subjects of our experiment function as exact surrogates for practitioners. External validity may be sacrificed to achieve internal and construct validity. For these types of validity homogenous samples, such as student subjects, and laboratory experiments are more important than the degree to which they function as exact surrogates for practitioners. For theory testing, after internal validity is achieved, external validity is addressed by testing across multiple contexts. Cook and Campbell (1979) state that, in practice, external validity is often sacrificed for the greater statistical power that comes through having isolated settings, standardized procedures and homogenous respondent populations. For investigators with theoretical interests their estimate is that the types of validity, in order of importance, are probably internal, construct, statistical conclusion, and external validity (p. 83).

Therefore, in this specific situation, the question is whether student surrogates act similarly enough to actual practitioners to provide a sufficient level of internal validity to draw conclusions on causes and effects. Ashton and Kramer (1980) report that psychological studies show that students and real world decision makers show "extremely similar information processing characteristics and biases" (p.3). In this discussion, an important study that must be considered is that of Chang and Ho (2004) who ran an experiment comparing student and manager escalation behavior when project completion and market information was manipulated. They concluded that in an escalation situation, students responded similarly to practitioners in the escalation decision where working experience was not a factor. Since our manipulation of Gain/Loss framing is not related to subjects' working experience, we think it is defendable that student subjects can be used as surrogates of managers for the study as described in this Chapter[14].

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[14] Please note that we arrive at a different conclusion on the manipulations of Perceived Control in Chapter 5.

The scenario for this experiment was developed and tested during a sequence of four pretests across part-time students and undergraduate students. The first three pretests covered a 2x2x2 factorial design, which we decided to split into the two 2x2 experiments of chapter 4 and 5. The original idea would require too much statistical power to test for moderating effects in a 2x2x2 design. The three pretests had provided insight into and improvements for the scenario, the manipulations and measurement model. Two separate final pretests were done for the 2x2 experiments of chapter 4 and 5.

One of the issues that we had to deal with was respondents' pre-conceptions on whether internal auditors in general act in a collaborative manner to managers or not. During pretesting with experienced subjects, we initially found the effect of this preoccupation to be so strong that respondents simply failed to recall treatments that were opposite to their beliefs. By personalizing the auditor as mr. Smith, throughout the scenario and the measurements, we succeeded to decouple the experiment from respondents' pre-conceptions of auditors' collaborativeness. In order to develop and test our experiment, we also asked participants for a textual explanation of their answers. On several occasions, we found that experienced respondents had personally been involved in a situation similar to the one described in the scenario. Although this supports the realism and relevance of the scenario we also found that experienced participants included elements of their own experience into the scenario. They filled in the blanks and anchored our scenario to other instances from their own practical experience, which of course resulted in a higher level of noise in the experiment that could harm the statistical power of our study. Therefore, we had to strengthen the treatments we used in our study in order to reduce noise.

4.5.   Treatments[15]

Respondents were asked to consider themselves in the position of the Project Owner of a strategic IS-project within an insurance-company. For the purpose of this study we developed and tested a scenario that was derived from earlier studies in the field of escalating IS-projects and which considered the typical elements we had included in our study. The scenario was mainly phrased in accordance with the scenario on escalating IS-projects as described by Wong et al. (2008). This scenario was adapted from the "blank radar plane" case modified by Arkes and Blumer (1985), which has been widely used to study escalation of commitment (Conlon & Garland, 1993; Garland, 1990) in order to test Completion Effect and Sunk Cost Effect, the latter of which is considered to be exemplary of Prospect Theory. We followed the version of the scenario provided by Wong et al. (2008) who rephrased the scenario according Tversky and Kahneman (1982) by offering two prospects with identical utility, while the risky choice had a 1/3 chance to succeed and a 2/3 chance to fail. This so called Risky Choice Framing[16] (Levin et al., 1998) was implemented as follows:

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[15] We refer to the appendix 4.A. after this chapter for a full description of the scenarios, the questionnaire and the detailed considerations.

[16] In the operationalization of framing we preferred the socalled *Risk Choice Framing* over *Attribute Framing* and *Goal Framing* (Levin et al, 2002; Levin et al, 1998). We found this operationalization having clear precedence and was least confounded other project characteristics with the manipulation.

According to standard procedures, Mr. Smith of the Internal Audit department has recently reviewed the testing-procedures of your project.
Mr. Smith reports that he has found serious weaknesses in the design and execution of the testing activities on the data exchange with other information systems.
*He estimates there is a **2/3 probability** that exchange of data would show reliability problems in the first month of operations. As a consequence, he reports that the project should be redirected and should not be continued as planned.*

The LOSS-scenario received the following treatment:

Taking into consideration the business case of the PENSION-VIEW project, this would mean that:

*If you decide to **CONTINUE** this project as planned, there would be:*
1/3 chance that the project will result in no LOSS compared to the business case
*2/3 chance that the project will result in **60 million euro LOSS compared to the business case***

*On the other hand, if you decide to **REDIRECT** this project, it will require an unplanned investment for additional testing and fixing and will cause delays that carry financial consequences. If you decide to **REDIRECT**, the project will result in **a sure LOSS of 40 million euro compared to the business case**.*

The GAIN-scenario received the following treatment:

Taking into consideration the business case of the PENSION-VIEW project, this would mean that:

*If you decide to **CONTINUE** this project as planned, there would be:*
*1/3 chance that the project will result in a **GAIN of 60 million euro***
*2/3 chance that the project will result in a **GAIN of nothing***

*On the other hand, if you decide to **REDIRECT** this project, it will require an unplanned investment for additional testing and fixing and will cause delays that carry financial consequences. If you decide to **REDIRECT**, the project will result in a **sure GAIN of 20 million euro**.*

The description of the involvement of the auditor in the Information Systems Project and the auditor's role in the position of bad news reporter, was adapted from the Deaf Effect studies of Cuellar (Cuellar et al., 2006; Cuellar et al., 2007). The treatment of the relationship between the Messenger and the Decision maker was phrased as follows for the low stewardship relation (low Collaborative Partnership):

*Mr. Smith has a long history of working **AGAINST** IS project teams with the goal of exposing project failings, thus embarrassing project owners. He is seen as policeman who does not add any value to the development process. Thus, Mr. Smith is treated as an **OPPONENT WHO IS NOT TO BE TRUSTED**.*

This treatment addresses the elements of "long history" (Davis et al., 1997), exposure of failings (Davis et al., 1997), being seen as a "policeman" (Chambers et al., 1988; Keil & Robey, 2001), acting as an opponent (Davis et al., 1997) and low mutual trust (Davis et al.,

1997. The high stewardship relation treatment contained the elements of being seen as a "collaborative partner" (Davis et al., 1997; Sundaramurthy & Lewis, 2003), a high level of mutual trust (Davis et al., 1997) and a contribution to management performance. This treatment was phrased as follows:

> *Mr. Smith has a long history of working **COLLABORATIVELY** with IS project teams with the goal of helping to identify and manage project risks, thus enabling project owners to be successful. He is seen as adding value to the process. Thus, Mr. Smith is treated as a **TRUSTED PARTNER**.*

4.6.   Measurement Model

In order to analyze relations between the constructs at the conceptual level of our model, we first translate these constructs into operational variables. These operational variables should serve proper measurement and support statistical analysis of relations at operational level. In order to transfer statistical results at operational level to conceptual level, the internal validity, construct validity and statistical conclusion validity of the model should be safeguarded and assessed first (Shadish et al., 2002). We will follow two different paths for statistical analysis of the operational model (multiple regression and PLS), both with assumptions and tests on validity issues. Both paths require that variables at operational level have been defined and measured properly. Thus, we assess validity first before building further with our analysis and conclusions. As presented by Straub et al. (2004), validity of the instrumentation (manipulation and measurements) should form a basis for achieving internal validity (ruling out rival hypotheses) and statistical conclusion validity.

In the table 4-4 we provide an overview of how we translated constructs to variables (called items). We refer to the appendix 4.A at the end of this chapter for a detailed description of the individual measurement items of the questionnaire we used within our experiment.

Content Validity

Content validity of this study refers to the essential question of whether our instrumentation (e.g. questionnaire items) pull in a representative manner that could be used to measure the content of a given construct (Cronbach, 1971). In table 4-4 we show that we adopted most definitions and measurement scales of our constructs from earlier studies. Only the measurements of the *Collab* construct were developed for this study, given our specific research scope of internal audit warnings and the relationship between auditor and management (Project Owner), according to Stewardship Theory principles. We took care of content validity by (1) incorporating the attributes of main articles on Stewardship-based relations (Davis et al., 1997; Sundaramurthy & Lewis, 2003) in general as well as in relation to internal auditing specifically (Kasima, Hanafib, & Rashidc, 2011) (2) consulting scholarly and practitioner experts and (3) following a 4-step development and testing process with open questions to testing-subjects to explain their answers.

Contruct	Type	Content	Measurement	Source of items
Continue	Endogenous, Dependent Variable	Decision to continue or redirect the project	One 8-point semantic differential scale item and 1-item 7 point Likert scale for validation purposes	Adapted from Cuellar (2006, 2007, 2009) on this scenario, altered during pretesting
MsgRelev	Endogenous Independent	Perceived Relevance of the Bad New Reporter's Message	Three 7-point Likert scale items	Adapted from Cuellar (2006, 2007, 2009) on this scenario
Collab	Exogenous Independent	Bad News Reporter seen as trusted collaborative partner or as non-trusted competitive opponent	One 7-point Likert scale item Two 7-point semantic differential scale items	Developed for this context and tested during 4 pretest-cycles, based upon Schoorman and Davis
RiskProp	Exogenous (control)	Risk Propensity of Decision maker	Four 7-point Likert scale items	Consistent with Sitkin & Weingart (1995)
RiskPerc	Endogenous Independent	Perception of Risk by Decision maker	Four 7-point semantic differential scales and One 7-point Likert scale	Consistent with Sitkin & Weingart (1995)
ProbSucc	Endogenous Independent	Estimated Probability to Succeed	One percentage scale item	Consistent with Arkes (2000), Garland (1990)
Gender, Nationality	Exogenous, Control	Respondents' gender and nationality	Translated to dichotomous dummy variables (Dutch/non-Dutch and Belgian/non-Belgian	
Age, Working Experience	Exogenous, Control	Respondents' age and years of working experience	1-item	
BeliefCollab	Exogenous, Control	Respondent's belief that auditors are collaborative	1-item 7-point Likert scale	Used during scenario development and testing
BeliefControl	Exogenous, Control	Respondent's belief that IS-projects are controllable	1-item 7-point scale	Used during scenario development and testing
BeliefFavor	Exogenous, Control	Respondent's belief that IS-projects are favorable	1-item 7-point scale	Used during scenario development and testing
PercContr	Exogenous	Respondents' Perceived Control	1-item percentage scale	Allows comparison between Ch4 and Ch5, item consistent with Du

Table 4-4 Measurement of Constructs

Manipulation Validity

As part of our between-subject experiment design, we intentionally exposed subjects to different treatments in order to control that independent variables (*GainFrame* and *Collab*) sufficiently vary across treatment-groups. Therefore, we test manipulation validity (Straub et al., 2004) in order to assess whether or not the treatments are effective as intended. During the development and testing of our manipulations we followed an iterative path of measuring and strengthening the manipulations that we used in our scenario (and reducing background noise, for example from respondents' preoccupations). In table 4-5a we present the mean values of the independent variable *Collab* for each of the four treatment conditions. The Gain/Loss treatment is used as an independent construct in our model. As expected from our pretests, we find the independent variable *Collab* to be different in the

Collab Low and Collab High treatment conditions, without changing as the result of the Gain/Loss treatment conditions. This indicates that the treatments are effective in size and direction.

	Treat Loss	Treat Gain	
Treat Collab Low	3.60 (1.26) N=49	3.42 (1.16) N=50	3.51 (1.21) N=99
Treat Collab High	5.45 (0.93) N=50	5.64 (0.79) N=49	5.54 (0.88) N=99
	4.53 (1.45) N=99	4.52 (1.49) N=99	

Table 4-5a Mean Values of Collab per treatment condition

Table 4-5b shows the results of an ANOVA in which the treatment conditions are entered as Independent variables and the *Collab* variable is considered to be the dependent variable. The table shows that the Collab treatments are highly significant (at .000) to their own variable and that *TreatGain* is not significant (.963) to the *Collab* variable. No significant interaction effects are found in the treatments (at .219). We consider the R^2 of .486 to be acceptable as a result of the iterative testing and improving of the treatment-conditions (and reducing background noise) in the scenario that was performed.

Independent	Type III Sum of Squares	F	Sig.
TreatGain	.002	.002	.963
TreatCollab	204.716	181.830	.000
TreatGain * TreatCollab	1.710	1.518	.219

Dependent Variable: Collab
R^2 is .486

Table 4-5b Manipulation Test ANOVA

Since the treat Gain/Loss manipulation acts like an independent variable in the model, the effectiveness of this manipulation was assessed during the sequence of pretests and derived from other studies that applied a similar manipulation (Conlon & Garland, 1993; Wong et al., 2008). We consider our manipulation tests to have sufficiently covered the testing techniques for manipulation validity as proposed by Straub et al. (2004).

Reliability

Before we will test the hypotheses, we first consider reliability and convergent as well as discriminant validity of how we measured our constructs. In table 4-6a we present the construct reliability Cronbach's alpha scores that measure the internal consistency with a

given construct's items (weighting them all equally). Hair, Anderson, Tatham, and Black (1998) suggest that a Cronbach's alpha score slightly lower than 0.7 might still be acceptable for exploratory research and Nunnally (1967) recommends a threshold value of only 0.6 for exploratory research. In the column at the right end of the table we present the Cronbach alpha scores we obtained in Chapter 5, using subjects with working experience instead of students.

Contruct	Items	Cronbach alpha	Cronbach alpha Chapter 5
Continue	2	0.944	0.913
MsgRelev	3	0.858	0.876
PercRisk	4	0.869	0.849
Collab	3	0.922	0.898
PercContr	3	n.a.	0.959
RiskProp	4	0.731	0.840

Table 4-6a Reliability of Measurements

Only the *Risk Propensity* measures raised concerns, but these were tested in many other studies and we also found more convincing results in chapter 5. We conclude that the reliability of our measurements of the constructs meet the thresholds. In the PLS-analysis we will extend Cronbach alpha reliability measurements with composite reliability scores and AVE scores.

Convergent and Discriminant Validity

Our validation of the instruments we used for data gathering, proceeds with assessing the convergent and discriminant validity (Shadish et al., 2002) of how we measured the constructs in our study (construct validity). This is done in order to assess whether or not our measurement-variables, that are supposed to tap into the same construct, indeed stick together and are not sticking too much to measurements that were supposed to tap into other constructs. For that purpose, we performed a Principal Components Analysis, which is an exploratory factor analysis of clustering measurements into factors. It does not take into account any available information on which measurements were intended to tap into which constructs. Using Varimax rotation and a fixed number of factors that was equal to the number of variables, we found the results as presented in table 4-6b.

The items in table 4-6b correlate higher with their own "construct" (factor) than they correlate with others (Shadish et al., 2002). As a consequence, we find convergent and discriminant validity confirmed in this table. In the PLS-section we will further extend these validity tests with confirmatory tests for convergent and discriminant validity as supported by the PLS-modeling.

	Component					
	1	2	3	4	5	6
Continue1	-.212	-.146	-.335	.224	**.826**	.117
Continue2	-.238	-.145	-.334	.167	**.813**	.158
MsgRelev1	.060	.379	**.795**	-.078	-.131	-.059
MsgRelev2	.087	.359	**.811**	-.026	-.200	-.024
MsgRelev3	.167	.208	**.786**	-.082	-.226	-.025
PercRisk1	**.811**	.161	.051	-.208	-.075	.022
PercRisk2	**.835**	.115	.102	-.137	-.097	.064
PercRisk3	**.789**	.118	.047	.028	-.137	-.289
PercRisk4	**.866**	.070	.134	.009	-.119	-.031
ProbSucc	-.175	-.260	-.079	.183	.331	**.718**
Collab1	.183	**.795**	.394	-.034	-.159	-.133
Collab2	.115	**.879**	.242	-.019	-.031	-.027
Collab3	.198	**.854**	.311	-.056	-.141	-.057
RiskProp1	-.082	-.180	.002	**.646**	.208	-.445
RiskProp2	-.076	.045	-.184	**.780**	-.064	.267
RiskProp3	-.101	-.009	-.063	**.774**	.075	.145
RiskProp4	-.051	-.051	.071	**.682**	.374	-.176

Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization.

Table 4-6b Construct Validity

Finally, validity testing as described in this section is strengthened in two ways. First, we performed similar tests with an equal measurement model in a different experimental setting as described in Chapter 5. We also replicated measurements and validity tests during the 4 steps of pretesting with approximately 200 test-subjects. Second, we followed two distinctive and well-established approaches for further analyzing our data and hypothesis testing. For these reasons, we performed both regression analysis and PLS-analysis to arrive at our conclusions on main-effects, mediating effects and moderating effects.

4.7. Results from Regression Analysis

In order to structure the results we first test the proposed main and moderating effects on the decision to continue or discontinue the project (the dependent variable *Continue*). These cover the first three hypotheses. Next, we analyze the proposed mediating role of Message Relevance (*MsgRelev*) which covers hypotheses 4a to 4d. In a similar way, we analyze the proposed mediating role of Perceived Risk (*PercRisk*) which covers hypotheses 5a to 5d. And we conclude with a similar analysis of the proposed mediation role of Estimated Probability to Succeed (*ProbSucc*) which covers hypotheses 6a to 6d.

4.7.1. Regression Analysis on Main and Moderating Effects

In order to test whether moderation effects could be found, we followed procedures according to Sharma et al. (1981) and we further used the operational guidance on multiple-regression of interaction effects as presented by Jaccard and Turrisi (2003) and

Aiken and West (1991). In Table 4-7 you find the results of the moderated regression analyses with *Continue* as dependent variable. The presentation of moderation effects is adopted from Tanriverdi (2006).

Variable(s) Entered	Model 1 Controls	Model 2 Main Effect	Model 3 Main Effect	Model 4[c] Interaction
Gender	.047	.059	.017	.021
WorkExp	.039	-.009	.097	.081
RiskProp	.381***	.351***	.280***	.270***
NationalityDutch	-.061	-.078	-.073	-.091
NationalityBelgian	.012	-.018	.032	.003
GainFrame		-.337***	-.329***	-.332***
Collab			-.395***	-.389***
Collab x GainFrame[b]				-.116*
R^2	.164	.274	.417	.429
F	7.409***	11.855***	19.092***	17.503***
ΔR^2		.110	.143	.013
ΔF		28.660***	45.630***	4.138*[a]

a. significance is .022 with T -2.034 for dataset N=199
b. component variables are standardized for moderation analyses
c. Durbin-Watson is 2.195
+p<.1, *p<0.05, **p<0.01, ***p<0.001
Dependent variable is Continue

Table 4-7 Moderated Regression Analysis on Continue

For interpretation of the model, we first take into account the subjects of our study and the control variables. We found *WorkExp* not to be significant, where it was found to be significant in earlier studies (Cuellar et al., 2006; Cuellar et al., 2007) and in our study as presented in the next chapter (table 5-7). The main explanation for this would likely be the low level and low variance in working experience of the subjects that participated in this study. Since our respondents consisted of approximately one third of Dutch students, one third of Belgian students and one third of students from other countries, it is also relevant to notice that *NationalityDutch* and *NationalityBelgium* did not have a significant influence on respondents' continuation decision.

Since earlier experimental research on Gain/Loss framing (*GainFrame*) has been done in our field of research, model 2 consists of the control variables of model 1 extended with *GainFrame*. Model 2 confirms a significant negative influence of *GainFrame* on the decision to continue, as was expected from Propect Theory studies and hypothesized here as hypothesis 2. From model 3 we conclude that *Collab* has a significant negative effect on *Continue*, which confirms hypothesis 1.

In hypothesis 3 we proposed that the negative influence of *Collab* on *Continue* would be weaker in the Loss domain and stronger in the Gain Domain. Therefore, we expect to find a significant negative regression coefficient for the interaction variable *Collab x GainFrame* in model 4. We found hypothesis 3 confirmed in table 4-7. According to procedures of Sharma et al (1981), that we described in chapter 3, we conclude that *GainFrame* is a quasi-moderator on the relationship between *Collab* and *Continue*

(dependent variable), since it not only acts as a moderator but has a direct effect on *Continue* as well.

For interpretation purposes we present the regression plots (without confounding variables) in figure 4-1 below. The figure shows that the regression lines in the Loss and in the Gain framing conditions are not parallel and don't intersect either within the range of treatment and measurement conditions we used in our experiment. Since the order of the two regression lines remains unchanged, this type of interaction is called "ordinal" (Jaccard & Turrisi, 2003), p78.
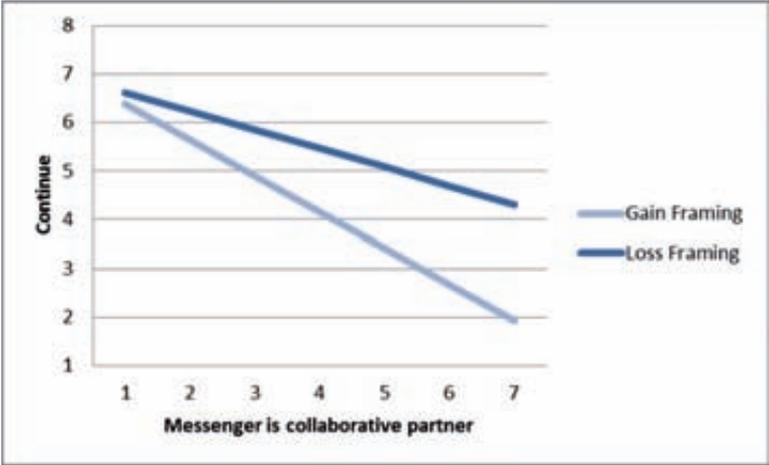
Figure 4-1 Regression plots with Gain/Loss framing as moderator[17]

The results of the moderation analysis also show that the interaction effect is consistent with our expectations. The decision makers who received the Loss Framing treatment are more likely to continue the project and thus repond with Deaf Effect after the Risk Warning. As expected, the regression line in the Loss Domain is more flat than the regression line in the Gain Domain. Respondents who receive a Risk Warning that is framed as Losses, are less influenced by the relationship they have with the messenger as a Collaborative Partner or as an Opponent. The decision makers who receive the Gain Framing treatment are more likely to discontinue the project and are more influenced by their relationship with the messenger as Collaborative Partner or Opponent.

4.7.2. Regression Analysis on Mediating Effects

In order to test whether mediation effects could be found, we followed the procedures according to Baron and Kenny (1986). First, we should perform three regressions: 1) The

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[17] For interpretation purposes, we used unstandardized regression coefficients in these plots, according to Aiken&West, taking into account the constants and scales of this figure.

predictor variable to the mediator[18], 2) the predictor variable to the outcome variable and 3) the predictor and mediator together to the outcome variable. Next, we should establish that conditions for mediation are met: which requires that the predictor variable should affect the mediator in the 1st regression, that the predictor variable should affect the outcome variable in the second regression and that the mediator should affect the outcome variable in the 3rd regression. If these conditions hold in the predicted direction, then the effect of the predictor on the outcome must be less in the 3rd regression than in the second. Sobel's test (Sobel, 1982) is used in order to assess the approximate significance of the indirect effect of the predictor variable on the outcome variable via the mediator.

We start our mediation analysis with *MsgRelev* as a proposed mediator between *Collab* and *Continue* (hypothesis 4b). The first out of three regressions shows the predictor (*Collab*) has a significant regression coefficient (at .000) to the mediator (*MsgRelev*) with b (s.e.) of .564 (.047), beta[19] of .654, t of 12.108 and R^2 of .428, in the proposed positive direction. Thus we conclude that the 1st condition for mediation is confirmed, which has been labeled earlier as hypothesis 4a. In the table below we describe the 2nd and 3rd regressions as required for mediation analysis according to Baron and Kenny (1986). Presentation of the results of these Causal steps Mediation results follows Wood et al (2008), using hierarchical regression and the *Sobel Z*[20] to test the approximate significance of the indirect effect via the mediator.

Predictors	b(s.e)	Beta	T	F	df	ΔR^2	Total R^2	Sobel Z
				Model 1				
Collab	-.071 (.011)***	-.415	-6.383	40.746***	196	.172	.172	
				Model 2				
MsgRelev	-.097 (.016)***	-.490	-6.221	43.640***	195	.137	.309	-5.411***
Collab	-.016 (.013)	-.095	-1.202					

Dependent Variable: Continue
N=199, Durbin-Watson is 1.887
*+p< .10 *p< .05 **p<.01 *** p<.001*

Table 4-8a Mediated Regression Analysis of Collab to Continue

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[18] Throughout this thesis we consistently use the phrase "regression of X_1 and X_2 to Y", in which Y is considered to be the dependent or outcome variable that is observed and X_1 and X_2 are considered to be the independent or predictor variables who are manipulated. Formally correct this should be phrases as "regression of Y on X_1 and X_2".

[19] With b (s.e.) we refer to the unstandardized regression coefficients and their standard errors. With *beta* we refer to the standardized regression coefficients that are corrected for the standard deviation.

[20] We used the Sobel Z calculator that is available on www. danielsoper.com. The following algorithm is applied by this calculator: $Z = ab / [(b^2 \times s.e._a{}^2) + (a^2 \times s.e._b{}^2)]$ where a is the regression coefficient for the relationship between the independent variable and the mediator and b is the regression coefficient for the relationship between the mediator and the dependent variable.

Based on this table we conclude that the conditions for mediation are fulfilled. The effect of *Collab* in model 2 appears to be less than in model 1. Furthermore the Sobel Z statistic showed a significant mediation. As a consequence, hypothesis 4b was confirmed[21].

Next we focus on hypothesis 4d with *MsgRelev* as a proposed mediator on the relation between *GainFrame* and *Continue*. The first out of three regressions shows the predictor (*GainFrame*) has a significant regression coefficient (at .031) to the mediator (*MsgRelev*) with b (s.e.) of .168 (.089), beta of .133, T of 1.818 and R^2 of .018, in the proposed positive direction. Thus we conclude that the 1st condition for mediation is confirmed, which has been labeled earlier as hypothesis 4c. In table 4-8b we describe the 2nd and 3rd regressions, needed for mediated regression analysis.

Predictors	b(s.e)	Beta	T	F	df	ΔR^2	Total R^2	Sobel Z
			Model 1					
GainFrame	-.095 (.016)***	-.379	-5.753	33.092***	197	.144	.144	
			Model 2					
MsgRelev	-.098 (.011)***	-.499	-8.843	62.127***	196	.244	.388	-1.846*
GainFrame	-.078 (.014)***	-.313	-5.552					

Dependent Variable: Continue
*N=199, Durbin-Watson is 2.066, +p< .10 *p< .05 **p<.01 *** p<.001*

Table 4-8b Mediated Regression Analysis of GainFrame to Continue

Based on this table we conclude that the conditions for mediation are fulfilled. The effect of *GainFrame* in model 2 appears to be less than in model 1. Furthermore, the Sobel Z statistic showed a significant mediation. As a consequence, hypothesis 4d was confirmed[22].

We proceed with analysis of *PercRisk* as a proposed mediator. We first focus on *PercRisk* as a proposed mediator between *Collab* and *Continue* (hypothesis 5b). The first out of three regressions shows the predictor (*Collab*) has a significant regression coefficient (at .000) to the mediator (*PercRisk*) with b (s.e.) of .289 (.057), beta of .339, T of 5.039 and R^2 of .115, in the proposed positive direction. Thus we conclude that the 1st condition for mediation is confirmed, which has been labeled earlier as hypothesis 5a. In table 4-8c we describe the 2nd and 3rd regressions, needed for mediated regression analysis.

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[21] Since the regression coefficient of Collab in table 4-8a model 2 is not significantly different from zero, there is no significant direct effect, so we find full mediation.
[22] Since the regression coefficient of GainFrame in table 4-8b model 2 is significantly different from zero, there is a significant direct effect, so we find partial mediation.

Predictors	b(s.e)	Beta	T	F	df	ΔR^2	Total R^2	Sobel Z
			Model 1					
Collab	-.071 (.011)***	-.415	-6.383	40.746***	196	.172	.172	
			Model 2					
PercRisk	-.061 (.013)***	-.305	-4.637	33.254***	195	.082	.254	-3.443***
Collab	-.053 (.011)***	-.312	-4.742					

Dependent Variable: Continue
N=199, Durbin Watson is 1.765
*+p< .10 *p< .05 **p<.01 *** p<.001*

Table 4-8c Mediated Regression Analysis of Collab to Continue

Based on this table we conclude that the conditions for mediation are fulfilled. The effect of *Collab* in model 2 appears to be less than in model 1. Furthermore the Sobel Z statistic showed a significant mediation. As a consequence, hypothesis 5b was confirmed[23].

We proceed with hypothesis 5d with *PercRisk* as a proposed mediator on the relation between *GainFrame* and *Continue*. The first out of three regressions shows the predictor (*GainFrame*) has not a significant regression coefficient (at .158) to the mediator (*PercRisk*) with b (s.e.) of .090 (.089), beta of .072, T of 1.005 and R^2 of .005, however in the proposed positive direction. Thus we conclude that the 1st condition for mediation is not confirmed, which has been labeled earlier as hypothesis 5c. In table 4-8d we describe the 2nd and 3rd regressions, needed for mediated regression analysis.

Predictors	b(s.e)	Beta	T	F	df	ΔR^2	Total R^2	Sobel Z
			Model 1					
GainFrame	-.094 (.017)***	-.376	-5.685	32.323***	196	.142	.142	
			Model 2					
PercRisk	-.077 (.012)***	-.385	-6.366	39.685***	195	.147	.289	-0.998
GainFrame	-.087 (.015)***	-.349	-5.761					

Dependent Variable: Continue
*N=199, Durbin-Watson is 1.939, +p< .10 *p< .05 **p<.01 *** p<.001*

Table 4-8d Mediated Regression Analysis of GainFrame to Continue

Based on this table we conclude that the first condition for mediation was not fulfilled. Second, the effect of *GainFrame* in model 2 was not less than in model 1. Furthermore, the Sobel Z statistic did not show a significant mediation. As a consequence, hypothesis 5d was not confirmed.

We proceed with analysis of *ProbSucc* as a proposed mediator. We first focus on *ProbSucc* as a proposed mediator on the relation between *Collab* and *Continue* (hypothesis 6b). The first out of three regressions shows the predictor (*Collab*) has a significant

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[23] Since the regression coefficient of Collab in table 4-8c model 2 is significantly different from zero, there is a significant direct effect, so we find partial mediation.

regression coefficient (at .000) to the mediator (*ProbSucc*) with b (s.e.) of -.5.291 (1.027), beta of -.349, T of -5.145 and R^2 of .122, in the proposed negative direction. Thus we conclude that the 1st condition for mediation is confirmed, which has been labeled earlier as hypothesis 6a. In table 4-8e we describe the 2nd and 3rd regressions as required for mediation analysis.

Predictors	b(s.e)	Beta	T	F	Df	ΔR^2	Total R^2	Sobel Z
			Model 1					
Collab	-.073 (.011)***	-.423	-6.453	41.638***	191	.179	.179	
			Model 2					
ProbSucc	.004 (.001)***	.340	5.178	37.036***	190	.102	.281	-3.159***
Collab	-.052 (.011)***	-.304	-4.632					

Dependent Variable: Continue
N=199, Durbin Watson is 1.917
*+p< .10 *p< .05 **p<.01 *** p<.001*

Table 4-8e Mediated Regression Analysis of Collab to Continue

Based on this table we conclude that the conditions for mediation are fulfilled. The effect of Collab in model 2 is less than in model 1. Furthermore, the Sobel Z statistic showed a significant mediation. As a consequence, hypothesis 6b was confirmed[24].

We complete this section on mediated regression analysis with hypothesis 6d proposing *ProbSucc* as a mediator on the relation between *GainFrame* and *Continue*. The first out of three regressions shows the predictor (*GainFrame*) has a significant regression coefficient (at .001) to the mediator (*ProbSucc*) with b (s.e.) of -4.881 (1.572), beta of -.219, T of -3.105 and R^2 of .048, in the proposed negative direction. Thus we conclude that the 1st condition for mediation is confirmed, which has been labeled earlier as hypothesis 6c. In table 4-8f we describe the 2nd and 3rd regressions, needed for mediated regression analysis.

Predictors	b(s.e)	Beta	T	F	Df	ΔR^2	Total R^2	Sobel Z
			Model 1					
GainFrame	-.094 (.017)***	-.372	-5.541	30.705***	191	.138	.138	
			Model 2					
ProbSucc	.004 (.001)***	.383	6.066	36.630***	190	.140	.278	-2.452***
GainFrame	-.073 (.016)***	-.288	-4.562					

Dependent Variable: Continue
*N=199, Durbin-Watson is 2.001, +p< .10 *p< .05 **p<.01 *** p<.001*

Table 4-8f Mediated Regression Analysis of GainFrame to Continue

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[24] Since the regression coefficient of Collab in table 4-8e model 2 is significantly different from zero, there is a significant direct effect, so we find partial mediation.

Based on this table we conclude that the conditions for mediation are fulfilled. The effect of *GainFrame* in model 2 is less than in model 1. Furthermore the Sobel Z statistic showed a significant mediation. As a consequence, hypothesis 6d was confirmed[25].

4.8.   Results from Partial Least Squares Analysis

Next to the more traditional Regression Analysis to assess our hypotheses on main effects, mediating effects and moderating effects, we followed an additional path of Partial Least Squares in order to obtain method triangulation. Compared to the regression analysis, PLS has the advantage that it assesses the measurement model within the context of the structural model, rather than testing in two separate analyses (Gefen et al., 2000). Additionally, PLS is able to identify path loadings across the entire model in a single run as opposed to multiple runs required using regression techniques. This results in a more rigorous analysis than using factor analysis and regression alone (Gefen, et al. 2000, p. 24). As regression analysis does, PLS seeks to show rejection of a null hypothesis of independent variables having no effect on the dependent variable while accounting for a significant amount of the variance in the dependent variable (Gefen, et al. 2000, p.27). PLS techniques perform the analysis by iterating between confirmatory factor analysis and path analysis until the change in variance explained is not significant. It then uses bootstrapping to estimate the significance of the paths. "Neither of these PLS significance estimation methods require parametric assumptions" (Gefen et al., 2000). In our use of PLS, we performed the PLS calculation to generate the basic PLS values and then used bootstrapping to compute the T-statistics for significance.

PLS has previously been applied in exploratory studies on the Mum Effect and the Deaf Effect on escalating IS-projects (Cuellar et al., 2006; Cuellar et al., 2007; Smith et al., 2001) and is appropriate for testing theories in the early stages of development. On the Deaf Effect it has, to our knowledge, no precedence in testing interaction effects with moderation analysis. As proposed by Chin et al. (1996), PLS could provide additional strengths to the more traditional moderated regression analysis (Chin et al., 1996). In this study we used smartPLS (Ringle et al., 2005) version 2.0. which included the product indicator approach for moderating effects as proposed by Chin et al. (1996). Our measurement model meets their criteria for moderation analysis, since it does not contain any formative constructs, which would have required alternative approach to assess and test for moderating effects .

4.8.1.   PLS Measurement Model Assessment

In the parallel section on regression analysis we performed Principal Components factor analysis in order to assess reliability, convergent and discriminant validity, through SPSS. In the context of the PLS-analysis we followed the steps as performed by earlier studies on

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[25] Since the regression coefficient of GainFrame in table 4-8f model 2 is significantly different from zero, there is a significant direct effect, so we find partial mediation.

the Mum Effect and the Deaf Effect on escalating IS-projects (Cuellar et al., 2006; Cuellar et al., 2007; Smith et al., 2001). Following these predecessors, we assessed the strength of the measurement model through tests of convergent and discriminant validity as well. Therefore, we conducted the tests as described by Chin (1998) and Fornell and Larcker (1981).

Convergent validity.

Two different assessments were made for convergent validity: (1) individual item reliability, and (2) construct reliability. We assessed the individual item reliability by examining the item-to-construct loadings for each construct that was measured with multiple indicators. In order for the shared variance between each item and its associated construct to exceed the error variance, the standardized loadings should be greater than 0.70. During early stages of scale development, even loadings of 0.5 and 0.6 may still be acceptable for an item if other indicators within the same block of measures have high loadings (Chin, 1998). As seen in table 4-9 none of the constructs include any questionable indicators.

Construct	Item	Item-to-Construct Loading
Collaborative Risk Warner	Collab1	0.944
	Collab2	0.893
	Collab3	0.950
Continue	Continue1	0.977
	Continue2	0.975
Warning Framed as Gain or Loss	GainFrame	1.000
Message Relevance	MsgRelev1	0.900
	MsgRelev2	0.912
	MsgRelev3	0.851
Perceived Risk	PercRisk1	0.849
	PercRisk2	0.856
	PercRisk3	0.818
	PercRisk4	0.870
Risk Propensity	RiskProp1	0.668
	RiskProp2	0.735
	RiskProp3	0.790
	RiskProp4	0.772

Table 4-9 Item to Own Construct Loadings

We also considered the construct reliability for each block of measures, as shown in table 4-10. Compared to the construct reliability analysis, as presented earlier in table 4.6a, we extend on the Cronbach alpha calculations with composite reliability scores and AVE scores.

	AVE	Composite Reliability	Cronbachs Alpha
Collab	0.864	0.950	0.922
Collab * GainFrame	0.862	0.949	0.922
Continue	0.953	0.976	0.951
GainFrame	1.000	1.000	1.000
Gender	1.000	1.000	1.000
MsgRelev	0.789	0.918	0.866
PercRisk	0.720	0.911	0.870
ProbSucc	1.000	1.000	1.000
RiskProp	0.552	0.831	0.730
WorkExp	1.000	1.000	1.000

Table 4-10 Construct Reliability

Composite reliability scores and Cronbach's alpha scores both measure the internal consistency with a given construct's items. Unlike the more traditional Cronbach's alpha, the composite reliability score does not assume that all indicators are equally weighted. Therefore Cronbach's alpha tends to be a lower bound estimate of reliability, whereas the composite reliability score is a better approximation under the assumption that the parameter estimates are accurate (Chin, 1998), p.320. Hair et al. (1998) suggest that a Cronbach's alpha score slightly lower than 0.7 might still be acceptable for exploratory research. Nunnally (1967) recommends a threshold value of only 0.6 for exploratory research. Table 4-10 shows that the construct reliability in our model exceeds these thresholds and has been established satisfactorily. Fornell and Larcker (1981) view Average Variance Extracted (AVE) as a measure of construct reliability. The guideline threshold for AVE is 0.5, which means that 50 percent or more variance of the indicators is accounted for (Chin, 1998). As table 4-10 indicates, all of the constructs in our measurement model exceeded the established criterion for AVE. The AVE value of .55 of RiskProp is considered to be no major problem, since this construct has been validated by other researchers (Sitkin & Weingart, 1995) and it shows an AVE value of .67 in Chapter 5 table 5-10.

Discriminant validity.

In our section on regression analysis, we performed a Principal Components Factor Analysis in order to test for discriminant validity. In this PLS-section we conduct two other tests for discriminant validity. First, we calculated each indicator's loading on its own construct as well as its cross-loading on all other constructs. Results are presented in table 4-11.

Construct	Item	Collab	Continue	Gain Frame	Gender	Msg Relev	Perc Risk	Prob Succ	Risk Prop	Work Exp	Collab * GainFrame
Collab	Collab1	**0.94**	-0.44	0.02	-0.08	0.67	0.33	-0.36	-0.15	0.16	0.01
	Collab2	**0.89**	-0.29	-0.03	-0.04	0.54	0.25	-0.26	-0.10	0.12	0.02
	Collab3	**0.95**	-0.41	-0.00	-0.09	0.62	0.35	-0.34	-0.18	0.13	0.06
Continue	Continue1	-0.40	**0.97**	-0.37	0.11	-0.54	-0.39	0.43	0.41	0.10	-0.15
	Continue2	-0.42	**0.97**	-0.35	0.07	-0.52	-0.40	0.43	0.35	0.11	-0.14
GainFrame	GainFrame	-0.00	-0.37	**1.00**	-0.01	0.13	0.06	-0.21	-0.10	-0.13	-0.00
Gender	Gender	-0.08	0.10	-0.01	**1.00**	-0.04	-0.05	-0.06	0.16	0.22	-0.04
MsgRelev	MsgRelev1	0.61	-0.46	0.08	-0.00	**0.90**	0.21	-0.30	-0.16	0.02	0.03
	MsgRelev2	0.62	-0.49	0.13	-0.03	**0.91**	0.23	-0.30	-0.14	0.00	0.05
	MsgRelev3	0.52	-0.50	0.14	-0.09	**0.85**	0.29	-0.28	-0.20	-0.02	0.13
PercRisk	PercRisk1	0.30	-0.34	-0.00	-0.05	0.22	**0.84**	-0.25	-0.28	-0.01	0.02
	PercRisk2	0.28	-0.34	0.03	-0.06	0.24	**0.85**	-0.24	-0.22	-0.06	0.14
	PercRisk3	0.30	-0.36	0.10	-0.03	0.21	**0.81**	-0.31	-0.10	-0.04	0.13
	PercRisk4	0.26	-0.34	0.09	-0.03	0.26	**0.87**	-0.25	-0.12	-0.01	0.04
ProbSucc	ProbSucceed	-0.35	0.44	-0.21	-0.06	-0.33	-0.31	**1.00**	0.23	0.07	-0.03
RiskProp	RiskProp1	-0.15	0.26	-0.04	0.08	-0.13	-0.15	0.08	**0.69**	0.04	-0.11
	RiskProp2	-0.11	0.27	-0.00	0.11	-0.15	-0.15	0.23	**0.72**	0.21	-0.12
	RiskProp3	-0.10	0.30	-0.10	0.10	-0.15	-0.19	0.19	**0.77**	0.26	0.05
	RiskProp4	-0.10	0.32	-0.13	0.19	-0.12	-0.14	0.15	**0.77**	0.13	-0.02
WorkExp	WorkExp	0.15	0.11	-0.13	0.22	0.00	-0.04	0.07	0.22	**1.00**	-0.07
Collab* GainFrame	Collab1*GainFrame	0.01	-0.14	0.00	-0.09	0.04	0.09	-0.03	-0.09	-0.11	**0.94**
	Collab2*GainFrame	0.01	-0.09	-0.00	0.07	0.12	0.03	-0.03	-0.06	0.00	**0.88**
	Collab3*GainFrame	0.05	-0.16	-0.00	-0.05	0.07	0.11	-0.03	-0.03	-0.08	**0.96**

Table 4-11 Item to Own Construct Correlation vs Correlations with Other Constructs

In the last nine columns of this table, the loadings for each indicator on its own construct are higher than the cross loadings for other constructs' indicators. Going across the rows, each indicator has a higher loading with its own construct than a cross-loading with any other construct. This provides good evidence of discriminant validity (Chin, 1998), p321.

As a second test of discriminant validity, we considered whether the AVEs of the latent constructs were greater than the square of the correlations among the latent constructs. When this is true, more variance is shared between the latent construct and its block of indicators than with another construct (Chin, 1998). As can be seen by reading across the rows of table 4-12, our measures passed this test thus providing additional evidence of discriminant validity.

Construct	Average Variance Extracted (AVE)	Collab	Collab* GainFrame	Continue	Gain Frame	Gender	Msg Relev	Perc Risk	Prob Succ	Risk Prop	Work Exp
Collab	0.86	-	0.00	0.17	0.00	0.00	0.43	0.11	0.12	0.02	0.02
Collab * GainFrame	0.86	0.00	-	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Continue	0.95	0.17	0.02	-	0.13	0.01	0.30	0.16	0.19	0.15	0.01
GainFrame	1.00	0.00	0.00	0.13	-	0.00	0.01	0.00	0.04	0.01	0.01
Gender	1.00	0.00	0.00	0.01	0.00	-	0.00	0.00	0.00	0.02	0.04
MsgRelev	0.78	0.43	0.00	0.30	0.01	0.00	-	0.07	0.10	0.03	0.00
PercRisk	0.72	0.11	0.00	0.16	0.00	0.00	0.07	-	0.09	0.04	0.00
ProbSucc	1.00	0.12	0.00	0.19	0.04	0.00	0.10	0.09	-	0.05	0.00
RiskProp	0.55	0.02	0.00	0.15	0.01	0.02	0.03	0.04	0.05	-	0.05
WorkExp	1.00	0.02	0.00	0.01	0.01	0.04	0.00	0.00	0.00	0.05	-

Note: Figures in the last 10 columns represent **squared** correlations among constructs

Table 4-12 AVEs vs Square of Correlations Among Latent Constructs

4.8.2. PLS Structural Model Assessment

With an adequate measurement model in place, we tested our hypotheses by examining the structural model. The explanatory power of a structural model can be evaluated by looking at the R^2 value (variance accounted for) in the final dependent construct. We first focus on a structural model which includes the latent constructs that represent the independent *Collab* and *GainFrame*, the dependent *Continue,* the moderator *CollabxGainFrame* and the control constructs *WorkExp*, *Gender* and *RiskProp* as we presented in table 4-7 on moderated regression. As presented in figure 4-2, in this structural model the R^2 for the final dependent construct *Continue* was .424 which is sufficient for further interpretation of the model.
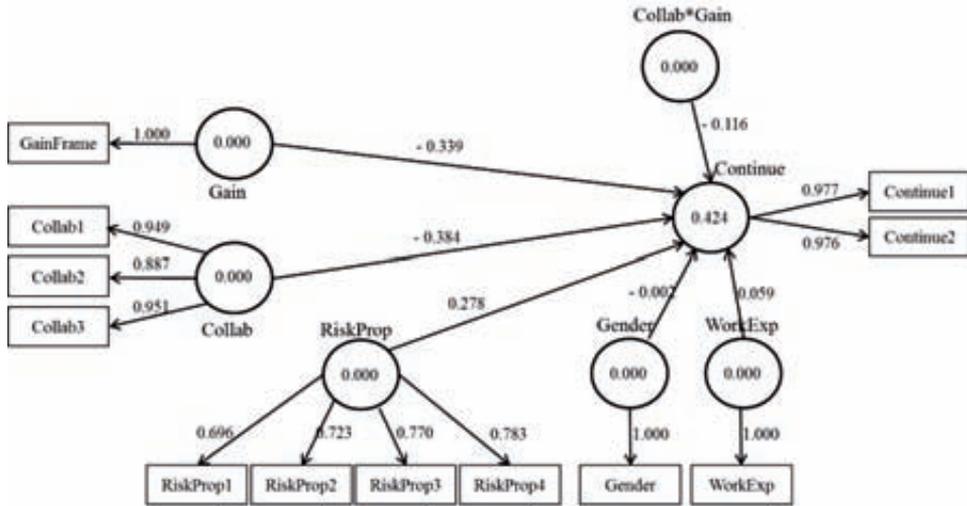
Figure 4-2 PLS Path Coefficients Moderation with 199 cases on Continue

After computing path estimates in the structural model, using the entire sample, the smartPLS bootstrapping method was used to obtain the corresponding t-values, with 199 cases. These results are presented in figure 4-3
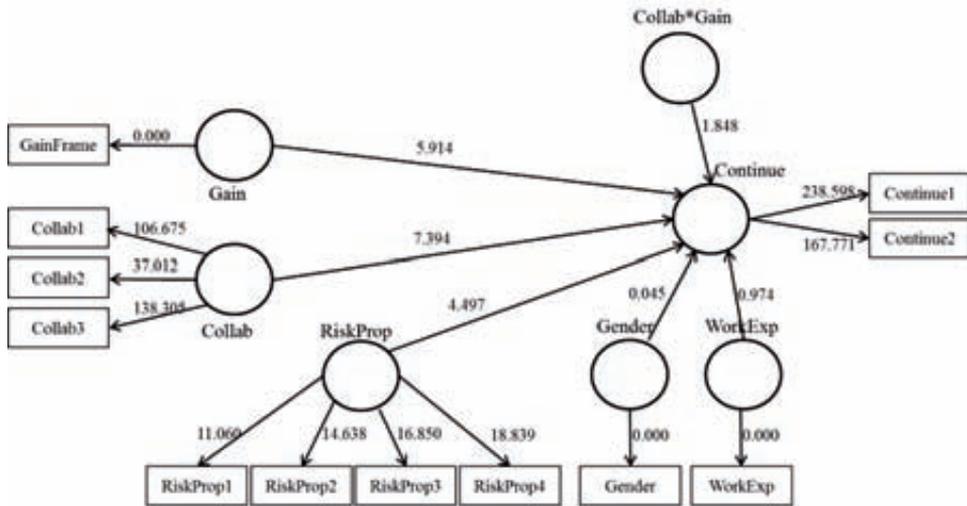
Figure 4-3 PLS Bootstrapping t-values Moderation with 199 cases on Continue

Path Coefficients and t-values for this model are presented in table 4-13 and these show that hypotheses 1 through 3 are confirmed by PLS as well (in addition to the confirmation found in the moderated regression analysis), while considering the same independent, dependent and control variables.

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	t-statistics (|O/STERR|)
Collab → Continue [a]	-0.384	-0.382	0.054	0.054	7.045***
Collab * Gain → Continue [c]	-0.115	-0.114	0.057	0.057	2.009*
Gain → Continue [b]	-0.338	-0.343	0.051	0.051	6.529***
Gender → Continue	-0.002	-0.000	0.056	0.056	0.043
RiskProp → Continue	0.278	0.288	0.059	0.059	4.661***
WorkExp → Continue	0.059	0.050	0.059	0.059	0.996

a) refers to hypothesis 1, b) refers to hypothesis 2 and c) refers to hypothesis 3

Table 4-13 Path Coefficients Of Structural Model with Moderator

Next, we extend our structural model with the constructs *MsgRelev, PercRisk* and *ProbSucc* for analysis of mediation, as we did in tables 4-8a through 4-8f with mediated regression analysis according to Baron and Kenny (1986). The difference we can make with PLS at this point of the mediation analysis is twofold. The first difference is related to our measurement model. We can use the individual measurement items per construct, instead of a single "averaged" measurement per construct which we had to use in regression analysis (Iacobucci, 2008), p20. Our measurement items of the independent variable *Collab* intentionally have a high level of multi-collinearity which cannot be handled in regression analysis. The use of multiple "parallel" measurements per construct reduces standard errors and thus increases reliability as well as power. The second difference is related to our causal model. Our mediated regression analysis was restricted to three focal constructs (per table 4-8a to 4-8f), we repeatedly analyzed one independent variable (*Collab*), one mediator (*MsgRelev*) and one dependent variable (*Continue*). PLS allows us to analyze all the various mediation paths simulateously, so that we can assess how the direct and the several indirect paths compete in explaining the effect of our independent variables (*Collab* and *GainFrame*) on our dependent variable (*Continue*). Iacobucci (2008), p33 suggests that such a broader mediation model provides a richer view of a phenomenon (the Deaf Effect) and the explanations. He refers to it as a specific form of implementing a broader nomological network in a study, which is encouraged by methodologists (Cronbach & Meehl, 1955).

In figure 4-4 we show the estimated path coefficients based on the PLS-algorithm. In figure 4-5 we present the estimated t-values for these paths based on the bootstrapping algorithm.
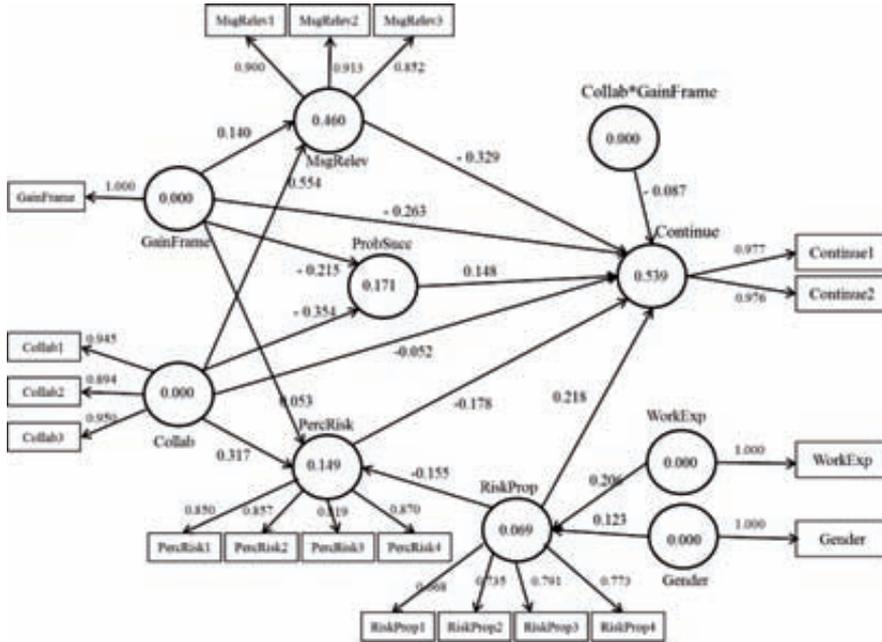
Figure 4-4 PLS Path Coefficients Moderation&Mediation with 199 cases
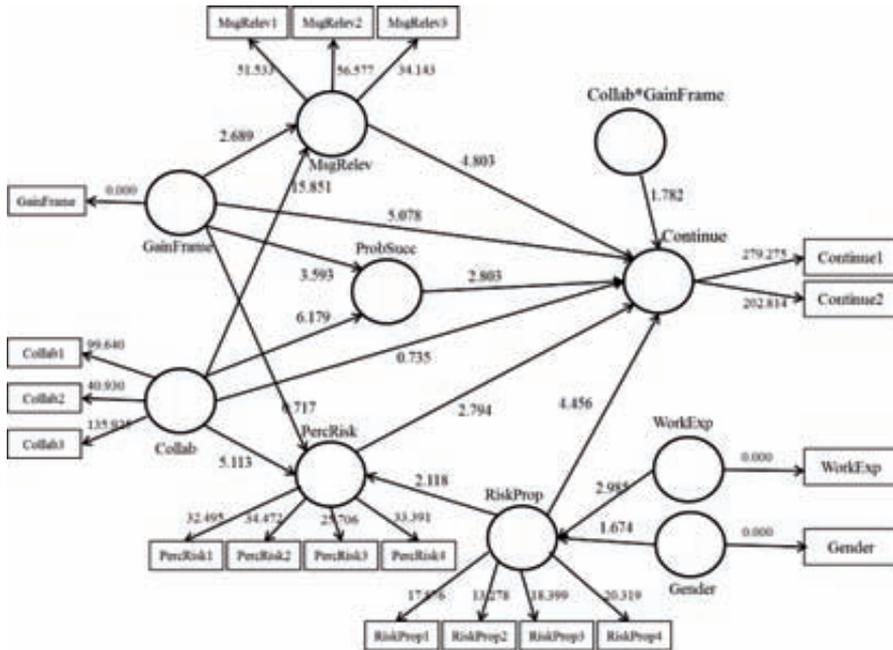
Figure 4-5 PLS Bootstrapping t-values Moderation&Mediation with 199 cases

106

The explanatory power of this extended structural model is satisfactory with a R^2 for the final dependent construct *Continue* of .539. The intermediate variables showed R^2 values of 0.460 for *MsgRelev* and .149 for *PercRisk* and .171 for *ProbSucc*. These R^2 values are sufficiently high to make interpretation of path coefficients meaningful. After computing path estimates in the structural model, using the entire sample, the smartPLS bootstrapping method was used to obtain the corresponding t-values, with 199 cases. These results are presented in table 4-14. Support for each hypothesis could be determined by examining the sign (positive or negative) and the statistical significance of the t-value for its corresponding path.

	Original Sample (O)	Sample Mean (M)	Standard Error (STERR)	t-statistics (|O/STERR|)
Collab -> Continue	-0.052	-0.054	0.070	0.735
Collab -> MsgRelev	0.664	0.668	0.041	15.851***
Collab -> PercRisk	0.316	0.315	0.061	5.112***
Collab -> ProbSucc	-0.353	-0.346	0.057	6.179***
Collab * GainFrame -> Continue	-0.086	-0.092	0.049	1.761*
GainFrame -> Continue	-0.262	-0.256	0.051	5.078***
GainFrame -> MsgRelev	0.140	0.138	0.052	2.688***
GainFrame -> PercRisk	0.053	0.050	0.074	0.717
GainFrame -> ProbSucc	-0.215	-0.217	0.060	3.593***
Gender -> RiskProp	0.122	0.122	0.073	1.673*
MsgRelev -> Continue	-0.329	-0.323	0.068	4.802***
PercRisk -> Continue	-0.178	-0.179	0.063	2.794***
ProbSucc -> Continue	0.147	0.145	0.052	2.803***
RiskProp -> Continue	0,217	0,223	0,048	4.455***
RiskProp -> PercRisk	-0,166	-0,172	0,078	2.117*
WorkExp -> RiskProp	0,206	0,207	0,069	2.984***

Table 4-14 Path Coefficients from Bootstrapping (Mean, Standard Error, t-Values)

This table shows that the direct effect of *Collab* on *Continue* in this model could not be rejected to be zero, having a t of 0.735. This means that on top of the indirect paths as described in the model (with mediation of *MsgRelev*, *PercRisk* and *ProbSucc*) no significant direct effect remains. The table also shows that the moderator effect (with t of 1.761) as proposed in hypothesis 1 is still significant, taking into account all the alternative paths of our model. However, its relevance dropped a little. Further analysis showed that this was mainly caused by introducing *MsgRelev* into our model. This makes sense given our hypothesis that decision makers in a loss domain would be blind to a difference between a Partner or an Opponent risk warner, since their attention would be drawn towards "losing" and less towards the auditors warning itself and who provided it.

In table 4-15 we present the results of our mediation analysis in PLS according to the guidelines as described by Iacobucci (2008). We group both the direct and indirect (mediated) path coefficients of *Collab* and *GainFrame* on *Continue*. The indirect path

coefficients are calculated by multiplying the coefficients from independent variable to mediator with the coefficient from mediator to dependent variable (Iacobucci, 2008), p25. The resulting path coefficients all share the ground that they include all the effects within the PLS-model as a whole. Therefore they can be compared in size and proportion. For each indirect path we present the calculated Sobel z statistics[26] (which represents the effect size of the mediating path compared to the direct path). For the purpose of comparison, we present the Sobel z statistics of regression tables 4-8a through 4-8f as well. Finally, we present our conclusions on the hypotheses.

	Effect	Sobel z from PLS	Sobel z from regression	Path coefficients	Proportion of Effect	Conclusion
Collab to *Continue*	Direct			- 0.052	13.8%	
	Via MsgRelev	- 4.635***	- 5.411***	- 0.218	57.8%	Hypothesis 4b confirmed
	Via PercRisk	- 2.480**	- 3.443***	- 0.056	14.9%	Hypothesis 5b confirmed
	Via ProbSucc	- 2.571**	- 3.159***	- 0.051	13.5%	Hypothesis 6b confirmed
	Total			- 0.377	100%	
GainFrame to *Continue*	Direct			- 0.262	75.3%	
	Via MsgRelev	- 2.352**	- 1.846*	- 0.046	13.2%	Hypothesis 4d confirmed
	Via PercRisk	- 0.694	- 0.998	- 0.008	2.3%	Hypoth 5d not confirmed
	Via ProbSucc	- 2.219*	- 2.452***	- 0.032	9.2%	Hypothesis 6d confirmed
	Total			- 0.348	100%	

Table 4-15 Overall results of our mediation analysis

Table 4-15 shows that the Sobel z values from the regression analysis tend to be consistent with those from the PLS-analysis, although they show differences in the significance of individual mediation paths. These differences could be related to the characteristics of both methods. The regression analyses as presented in tables 4-8a to 4-8f do not take into account other mediation paths in the model. This could explain the result, which is intuitively inconsistent, that *MsgRelev* is a full mediator for *Collab* to *Continue* and that *PercRisk* and *ProbSucc* are partial mediators as well.

4.9.   Other Relevant Results from the Experiment

4.9.1.   Open Questions

In addition to the hypothesis testing we performed in this chapter, the results of the experiment provided us with two additional sources of information that are of help in

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[26] We used the Sobel Z calculator that is available on www. danielsoper.com. The following algorithm is applied by this calculator: $Z = ab / [(b^2 \text{ x s.e.}_a{}^2) + (a^2 \text{ x s.e.}_b{}^2)]$ where a is the regression coefficient for the relationship between the independent variable and the mediator and b is the regression coefficient for the relationship between the mediator and the dependent variable.

answering the research questions of this chapter. First, we had asked respondents, throughout the development and testing stages of our experiment, to describe why they decided to continue or redirect. Second, we asked respondents for the percentage of estimated probability for the project to succeed (and to meet the business case). Since the auditor provided a Risk Warning that included the assessed chance of succeeding (1/3) and failing (2/3), we can compare these estimated probabilities across the four treatment groups with the information they had received. This could help in understanding whether the Deaf Effect could apply to the probability part of the Risk Warning in particular.

The open questions used in the test-stages – which we eliminated in the final execution of the experiment since it appeared to take too much of the respondents' time – provided us with the following findings from approximately 200 participants who joined the test-stages: (1) The history with the messenger as a Collaborative Partner or as an Opponent, dominated the arguments to continuer; (2) Some respondents extended quite easily on their reasoning from considering the internal auditor as a Collaborative Partner to, as a next step, considering the auditor to be a credible source; These are distinct constructs but may have a causal or correlational relationship; (3) The framing-manipulation (as Loss or Gains) was not visible in the arguments, which supports that manipulation of framing did not follow a rational path of reasoning in driving respondents' decision to continue; (4) Often, respondents' own experiences with similar projects were used in the arguments of the continuation decision. Given the experimental design of random assignment of subjects, this would not lead to differences between treatment groups.

4.9.2.   Estimated vs Given Probabilities to Succeed

The question posed to estimate the probability to succeed provided us with an additional perspective on this mediating variable of the Deaf Effect. In our scenario all subjects were provided with the similar Risk Warning coming from the internal auditor, that the probability to succeed with the project (and meet the business case) was assessed to be 1/3. We asked the subjects to provide a percentage on their estimated probability to succeed.

The estimations across the four treatment groups are presented in Table 4-16 below[27].

	Treat Collab Low	Treat Collab High
Treat Gain	45.0 % (22.2) N=49	33.4 % (18.0) N=49
Treat Loss	52.7 % (21.8) N=48	45.2 % (23.2) N=49

Table 4-16 Subjects' Estimated Probability to Succeed with given probability of 1/3

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[27] Please note that for this purpose we used the treatment variables instead of the independent variables that we used in our causal model and hypothesis testing.

The table shows that subjects who received the message framed as Gains and provided by a Collaborative Partner, showed a mean estimation to succeed that was consistent with the warning they had received. It's interesting that the probability information from the Risk Warning was attenuated when the messenger was seen as an Opponent and also when the message was framed as Losses.

4.10   Discussion and Implications

4.10.1.   Contribution of this study

Our model explained a substantial amount of the variance (53.9%)   in the subjects' decision to continue a course of action and thus respond with the Deaf Effect to the internal auditors' Risk Warning. However, Cuellar's studies, that were centered around source-credibility, provided even more with 62.8% and 62.5% of explained variance (Cuellar, 2009; Cuellar et al., 2006). The main difference is that we excluded this influential Credibility factor – operationalized as "crywolf"- from our model. The warning was provided by a source that meets professional standards of credibility. Before turning to a discussion of the study's limitations and implications for both future research and practice, it will be helpful to consider the following contributions of this study in light of these results.

First, this study introduced and tested the effects of two variables – (1) messenger's Collaborative Partnership and (2) the message framed as Gains or Losses – on the decision to continue a course of action despite the availability of a clear and obtrusive Risk Warning. Both constructs had not been tested in the context of the Deaf Effect earlier. Both provided a substantive and almost equal contribution in causing the Deaf Effect. Nevertheless, they differed in the mediating constructs through which they affected the decision to continue and thus reject the Risk Warning. The question of whether the messenger is seen as a Collaborative Partner or as an Opponent highly influenced the Message Relevance (*MsgRelev*) that people assigned to this warning and it influenced subjects' Perceived Risk (*RiskPerc*) and estimated Probability to Succeed (*ProbSucc*) equally. The construct on the relationship with the messenger was derived from Stewardship Theory. We contribute to research on Stewardship Theory by testing it at a micro inter-personal level between the internal auditor and senior management, where most studies consider Stewardship Theory at organizational corporate governance level. Our results were consistent with expectations according to Stewardship Theory. The message framing as Gains or Losses had an effect on the continuation decision in a way that was expected from Prospect Theory. With this study we also find confirmation that decision maker's estimated probability to succeed was influenced by the message framing. It was surprising that Perceived Risk did not turn out to be a strong mediator. However, this might be explained by our framing manipulation at the level of the message and not at the project as a whole. The mediating role of Message Relevance is consistent with the Heuristic-Analytic Theory, which has major similarities with the System1 and 2 concepts of decision making that was referred to in Prospect Theory literature. We contribute to both Stewardship Theory and Prospect Theory research by considering them both in a study, thus including interaction effects in a specific context.

Second, this study provides some amount of quantitative empirical support for the theoretical distinction between internal auditors choosing either the path of Collaborative Partnership or choosing the path of behaving as an Opponent in bringing their Risk Warning to senior management such as Project Owners. This Partnership-Opponent distinction was suggested by other authors (Chambers et al., 1988; Keil & Robey, 2001) and buttressed primarily with qualitative, anecdotal evidence. In addition, this study contributes by providing empirical support that this distinction might be contingent to conditions of message framing. Furthermore, it suggests (table 5-14) that probability information in a Risk Warning would be transferred the least biased when the sender would be seen as a Collaborative Partner and when the message would be framed as Gains.

Third, this study is one of the first attempts in examining the Deaf Effect with mediation analysis that provides insight into the proportional effects of direct and indirect paths. Together with moderation analysis, this provides a richer view on the causes of the Deaf Effect in the context of IS-projects and the role of various constructs. By combining different statistical methods of moderation and mediation analysis, we contributed to statistical conclusion validity. By combining exploratory and confirmatory factor analysis for convergent and discriminant validity and by performing various tests on measurement reliability, we contributed to construct validity for further research on these constructs in the context of Deaf Effect. And, by sharing main parts of our design across two different experiments, we also contributed to the external validity and nomological validity of research on the Deaf Effect based on the constructs and theories that we studied.

4.10.2.   Main Findings

The following summary provides an overview of the findings of this empirical study on main effects and moderation effects: (1) The decision makers are more likely to continue the course of action, the IS-project, after a Risk Warning that was framed negatively, as Losses. The decision makers are less likely to continue the course of action, when the message was framed positively, as Gains; (2) The decision makers are less likely to continue the course of action after the Risk Warning, when the messenger is seen as a Collaborative Partner. The decision makers are more likely to continue the course of action after the Risk Warning, when the messenger is seen as an Opponent; (3) The Risk Warning that is framed negatively - as Losses - attenuates the influence of the relationship with the messenger (seen as a Collaborative Partner or as an Opponent) on the decision to continue a course of action; (4) The estimation of the decision makers on the probability to succeed appears to be unbiased compared to the probability to succeed estimation provided in the Risk Warning when the Risk Warning is framed as Gains and the messenger is seen as a Collaborative Partner.

With respect to mediation effects, this empirical study provided the following findings: (1) The decision makers assign less relevance to the Risk Warning when the messenger is seen as an Opponent. They assign more relevance to the Risk Warning when the messenger is seen as a Collaborative Partner; (2) The strongest path of mediation in our model is delivered by the heuristic to assign relevance to – or 'filter' – messages dependent on whether the messenger is seen as a Collaborative Partner or an Opponent; (3) The influence of negative framing – as Losses – of the Risk Warning on decision makers' Deaf

Effect response, is only partially mediated and is mainly direct; (4) Perceived Risk is not significantly influenced by framing the Risk Warning as Losses. Message framing as Losses increases the Estimated Probability to Succeed and thus decreases the estimated probability to fail as well. So the probability part of Perceived Risk is influenced in our settings.

4.10.3.   Limitations of The Study

As is the case with all experiments, we should be cautious when generalizing the results of this study for several reasons. First, the experiment conducted in this study took a necessarily narrow focus so as to achieve a high degree of control over extraneous variables. There are, without doubt, other organizational and political factors that may also affect managers' Deaf Effect responses to Risk Warnings. In Chapter 7 we will explore such factors following a multi-casestudy approach. Some factors may not lend themselves to experiments. Furthermore, this experiment does not provide insight into any feedback loops between messenger and decision maker in which the Deaf Effect might evolve.

Second, in our study we focus on the Deaf Effect at inter-personal level: with the auditor as provider of an objective assessment and with the decision taker's view on the messenger (as a Collaborative Partner or an Opponent) as a determinant. Of course, this inter-personal view is only one level in the corporate governance framework implementation based upon either Stewardship Theory principles. We did not study any effects at a department-level or at an organizational level.

Third, our measures of the *Collab* construct in the context of Internal Auditor – Project Owner relationship were self-developed given our particular level (inter personal) and context. Although they were derived from literature, tested and improved in the preparations of this study and shared with experts, they ask for more refinement and testing.

Finally, as is customary to many experiments of this type, we have measured our constructs by self-report of student participants. Combined with the obtrusive nature of an experiment, this may restrict external validity of the results. It is possible that people's reaction to the treatment scenarios might differ from an on-the job reaction. It is also possible that self-reported measurements on Message Relevance, when asked to rate them on 7-point Likert scale, might not show entirely consistent results with measuring Message Relevance when subjects were involved in an eye movement tracking experiment. For this reason, the latter was proposed by Ball, Lucas, Miles, and Gale (2003) in order to measure Message Relevance in Heuristic Analytic theory experiments in psychology. This might also count for applied experiments as we performed here. The use of student participants could also restrict external validity of our results, although we replicated a significant part of the experiment in different experimental conditions with more experienced participants as well. The part that was not replicated (message framing as Gains/Losses) has been tested and confirmed in an impressive number of experiments on Prospect Theory.

4.10.4. Implications for Internal Auditors

Although not new of course, this study reminds the internal audit profession that the effectiveness of their service – reporting on risks and controls – includes the concepts of human information processing and bounded rationality.

One guidance on effective communication that could be derived from our study is related to the Gain/Loss framing. A message that is strongly framed as Losses or deficiencies may promote risk seeking behavior according Prospect Theory, as was confirmed in our study. A broadly applied form of presentation of audit messages is setting norms (such as the business case in our experiment) and to then exclusively report deficiencies where the addressee falls short compared to these norms. According to our study, a more balanced focus on achievements, opportunities and positive framing of the message could reduce the Deaf Effect. Framing the alternative choices in a positive way (as achievements, assets and real options) – and thus assigning value to the discontinuation of the project – could reduce persistence in the risky course of action. A positive framing of decision choices could go further than promoting risk averse choices according to Prospect Theory. It could also promote that the messenger would more likely be seen as a Collaborative Partner who is worth listening to. Additionally, the moderator effect we found in this study suggests that the advantage of being seen as a Collaborative Partner further reduces the Deaf Effect in these conditions. In the conditions of our study we even found that the message framing as Gains combined with a Collaborative Partnership relation resulted in unbiased processing of probability estimations that were part of the auditor's risk information.

A second guidance on effective communication of auditor warnings, applies to how to make use of the advantage of Collaborative Partnership in a particular situation. If the internal auditor might not directly be seen as a Collaborative Partner himself/herself, the audit executive – with a strategic collaborative partnership history with the manager – could be more effective in sharing concerns with executive management. Another scenario would be to share the factual concerns with a person or with persons who the decision maker sees as Collaborative Partner(s) and who are less incapsulated in the course of action (the project).

4.10.5 Implications for managers and organizations

The results of this study point at one of the pitfalls that organizations could face with regard to IS-projects. A pitfall would be that the stopping or redirecting of an IS-project would only be considered on its negative consequences. As we saw in the previous section with audit implications, Loss framing of the options (continue and redirect) would promote risk-seeking behavior. Positive framing of the message as Gains appeared to cause less biased processing of the risk warning and less influence of bounded rationality on decision making. The interesting paradox at organization level that may follow is that "if stopping of IS-projects is seen as a reasonable option representing value and opportunities, then the overall success-rate of the IS-projects may improve". Organizational damage caused by persistence in failing projects could be fueled if stopping of a project is not seen as a valuable option but instead as an unrecoverable loss.

In this study we saw confirmed that framing as Losses would promote risk seeking behavior and persistence in continuation of projects that were no longer viable. There might be a consequence of all the negative publicity on failing IS-projects: they bring a negative frame through which we observe such projects. Bounded rationality makes us even more sensitive for information on another IS-project that failed and could prevent us from noticing the positive contributions of many of these IS-projects.

4.A. APPENDIX - Scenario and Measurements

Experiment IS (Information System)-Project   (version R1 - f0s0)

Thank You for your willingness to participate in our study. The purpose of this experiment is to study business decision making and priority-setting in the field of IS-projects. Please carefully read the scenario below and respond to the questions. Please do NOT skip ahead through the pages of this experiment. Please do not discuss during the experiment.

SCENARIO

Imagine that you are the Senior Vice President of the Pensions Operations department within a large insurance company. You inherited a prestigious IS-project called PENSION-VIEW. As Project Owner, you became responsible for the successful implementation of PENSION-VIEW and for realizing the benefits for your organization with this in-house developed system.

With this IS-project you could be the first insurance company in the market that grants all citizens (customers and potential customers) access to the complete set of their personal pension information. If your insurance company is the first in the market to provide this service at a reliable level, the expected revenue to your company would be 60 million euros, as documented in a detailed business case for the project.

Your main competitors have all decided to wait for the supplier of a standard software-package to provide a module to the insurance-market that integrates and presents their pension data. If your implementation is too late or does not prove reliable during the first month of operations, you will miss your competitive advantage and your organization will gain nothing.

The main challenge and risk of the PENSION-VIEW project are the large number of interfaces to retrieve reliable information from other information systems that contain pension data.

Your PENSION-VIEW project is close to implementation and under time-pressure to continue implementation as planned.

According to standard procedures, Mr. Smith of the Internal Audit department has recently reviewed the testing-procedures of your project.

(TreatCollab = Low)

Mr. Smith has a long history of working **AGAINST** IS project teams with the goal of exposing project failings, thus embarrassing project owners. He is seen as policeman who does not add any value to the development process. Thus, Mr. Smith is treated as an **OPPONENT WHO IS NOT TO BE TRUSTED**.

(TreatCollab = High)

Mr. Smith has a long history of working **COLLABORATIVELY** with IS project teams with the goal of helping to identify and manage project risks, thus enabling project owners to be successful. He is seen as adding value to the process. Thus, Mr. Smith is treated as a **TRUSTED PARTNER**.

Mr. Smith reports that he has found serious weaknesses in the design and execution of the testing activities on the data exchange with other information systems.

He estimates there is a **2/3 probability** that exchange of data would show reliability problems in the first month of operations. As a consequence, he reports that the project should be redirected and should not be continued as planned.

(TreatGain is Low)

Taking into consideration the business case of the PENSION-VIEW project, this would mean that:

If you decide to **CONTINUE** this project as planned, there would be:

- **1/3 chance** that the project will result in **no LOSS compared to the business case**
- **2/3 chance** that the project will result in **60 million euro LOSS compared to the business case**

On the other hand, if you decide to **REDIRECT** this project, it will require an unplanned investment for additional testing and fixing and will cause delays that carry financial consequences. If you decide to **REDIRECT**, the project will result in **a sure LOSS of 40 million euro compared to the business case**.

(TreatGain is High)

Taking into consideration the business case of the PENSION-VIEW project, this would mean that:

If you decide to **CONTINUE** this project as planned, there would be:

- **1/3 chance** that the project will result in a **GAIN of 60 million euro**
- **2/3 chance** that the project will result in a **GAIN of nothing**

On the other hand, if you decide to **REDIRECT** this project, it will require an unplanned investment for additional testing and fixing and will cause delays that carry financial consequences. If you decide to **REDIRECT**, the project will result in a **sure GAIN of 20 million euro**.

Please determine whether you would be willing to continue or redirect, before you go to the next page.

Please provide your decision to continue or redirect the project

Using ONLY ONE of the 8 boxes below, indicate whether you would decide to continue the project as planned or redirect, and how strong your leaning would be (Please remember to mark only ONE of the 8 boxes): *(Continue1)*

Redirect				Continue as Planned			
☐	☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7	8
Definitely	Strongly	Somewhat	Slightly	Slightly	Somewhat	Strongly	Definitely

After this, please proceed with the following questions:

I will certainly continue the PENSION-VIEW project as planned (i.e., without redirection): *(Continue2)*

☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7
Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree

The assessment of Mr. Smith was highly relevant in forming my decision to continue or redirect the PENSION-VIEW project: *(MsgRelev1)*

☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7
Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree

The assessment of Mr. Smith was very important in forming my decision to continue or redirect the PENSION-VIEW project: *(MsgRelev2)*

☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7
Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree

My decision was most influenced by the assessment of Mr. Smith : *(MsgRelev3)*

☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7
Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree

I characterize the current status of the project as: *(PercRisk1p)*[28]

☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7
Significant Threat			Neutral			Significant Opportunity

I characterize the current status of the project as: *(PercRisk2p)*

☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7
Potential for Loosing			Neutral			Potential for Winning

I characterize the current status of the project as: *(PercRisk3p)*

☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7
Very Unlikely to Succeed			Neutral			Very Likely to Succeed

I characterize the current status of the project as: *(PercRisk4p)*

☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7
Unpromising			Neutral			Promising

I am eager to listen to Mr. Smith   ("eager" = "gretig" in dutch) *(Listen1)*

☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7
Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree

I am _____ to listen to Mr. Smith   ("reluctant" = "afkerig"; "eager"= "gretig" in dutch) *(Listen2)*

☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7
Very Reluctant	Reluctant	Somewhat Reluctant	Neutral	Somewhat Eager	Eager	Very Eager

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[28] Consistent with most researchers we presented High Perceved Risk as refering to focus on the downside of risk over its opportunities. Therefore we recoded PercRisk1p..4p to PercRisk1..4

Now, please answer the following questions:

I consider Mr. Smith to be a trusted partner to my PENSION-VIEW project: *(Collab1)*

☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7
Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree

I consider Mr. Smith to be a collaborative partner to my PENSION-VIEW project: *(Collab2)*

☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7
Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree

I consider Mr. Smith to be a _____ to my PENSION-VIEW project: *(Collab3)*

☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7
Non-trusted Opponent						Trusted Partner

On a scale from 0-100% I rate:

The level of Control I have over my project: *(PercContr3)*   [_____] %
(0% indicates "no control at all" and 100% indicates "complete control")

The probability I will realize the 60 million business case of the project: *(ProbSucc1)* [_____] %

Would you please fill in the following questions with respect to your background:

Age   [   ] Years

Gender   ☐ Male   ☐ Female

Nationality   [   ]

Years of Working Experience   [   ] Years

Years of Working Experience with IS-projects   [   ] Years

Does following description apply to your position?   Auditor   ☐ No ☐ Yes

                                         Advisor to management   ☐ No ☐ Yes

                                         Management   ☐ No ☐ Yes

How would you characterize large IS-projects in general: *(BeliefFavor1) (BeliefControl1[29])*

☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7
Very Unfavorable			Neutral			Very Favorable

☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7
Poorly Controlled			Neutral			Highly Controlled

Do you agree that internal auditors in general are collaborative to managers: *(BeliefCollab1)*

☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7
Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree

---

[29] The three questions on *BeliefFavor1*, *BeliefControl1* and *BeliefCollab1* are intended to measure and control the influence of the respondents' pre-occupations that could disturb the treatments from being effective as intended. These questions were crucial in the development and test of the scenario and the treatments to reach a proper level of signal to noise. These questions are not meant to test respondents' actual knowledge with regard to IS-projects and the role of internal auditors.

Finally, please mark your tendency to take risks compared to others

Your tendency to choose risky alternatives based on the assessment of other people on whom you must rely: *(RiskProp1)*

☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7
Extremely LESS Likely than Others			Neutral			Extremely MORE Likely than Others

Your tendency to choose risky alternatives relying on an assessment that is high in technical complexity: *(RiskProp2)*

☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7
Extremely LESS likely than Others			Neutral			Extremely MORE likely than Others

Your tendency to choose risky alternatives which could have major impact on the strategic direction of your organization: *(RiskProp3)*

☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7
Extremely LESS likely than Others			Neutral			Extremely MORE likely than Others

Your tendency to choose risky alternatives despite considerable failures in risky choices you made in the past *(RiskProp4)*

☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7
Extremely LESS likely than Others			Neutral			Extremely MORE likely than Others

Were you already involved in the pretesting of this study?   Yes ☐ No ☐

Thank you for your time and effort!

Please feel free to provide remarks:

CHAPTER 5. DEAF EFFECT IN IS-PROJECTS: AN EXPERIMENT ON ILLUSION OF CONTROL THEORY AND STEWARDSHIP THEORY

5.1. Introduction

5.1.1. Contribution

The objective of this chapter is to contribute to the explanation of *Why the* Deaf Effect occurs in the field of escalating IS-projects. We concluded in Chapter 2 that interaction between decision makers' psychological conditions and corporate governance principles could explain the Deaf Effect. In this chapter we will empirically study whether or not two factors – 1. Perceived Control and 2. Relationship with the messenger – could explain the Deaf Effect. The expected influence of Perceived Control is based on Illusion of Control Theory. The expected influence of the relationship with the messenger as a Collaborative Partner or an Opponent – is based on Stewardship Theory (elaborated in section 2.5). In table 5.1 we will first list the research questions and assumptions that we make in this Chapter.

	Research Questions	Type of Question
5	Could the Project Owner's *Perceived Control* and the *Stewardship relation* with the messenger (collaborative partner) be of influence on the Deaf Effect for a Risk Warning?	Why
	5.1 Could these influences interact?	Why
	5.2 Are these influences mediated by Message Relevance, Risk Perception and Estimated Probability to Succeed?	How

Scope and Assumptions

- The decision maker of study (*unit of analysis*) is the executive in the role of IS-Project Owner;
- The Bad News Messenger acts in the role of *internal auditor* who meets the professional standards of the Institute of Internal Auditing (IIA, 2004). These standards address the criterion of a Bad News Messenger who is acting as a credible source - i.e. who has the expertise and could be relied upon to make true assertions (Cuellar et al., 2006). Furthermore, they assure that the internal auditor would operate from an Auditing Function which is independent from management authority (Keil & Robey, 2001)[30];

Table 5-1 Contribution of this empirical study

In the previous Chapter we discussed Stewardship Theory and the two roles of internal auditors, as Collaborative Partners or as Opponents to management. In early work on

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[30] The IIA professional standards on internal auditing (Gleim, 2001) prescribe that the internal auditor is considered to meet standards on **a.** proficiency (1210)- knowledge and skills, **b.** due professional care (1220) – apply skills, prudency and care , **c.** organizational independence from executive management (1110) , **d.** individual objectivity (1120) – impartial, unbiased attitude, avoid conflicts of interest, **e**. both in fact and appearance (1130).

internal auditing, Chambers and Selim (1988), p.73, reported that *"the auditee's reaction to the inspection style of auditing was hostile. The auditee was inclined not to listen to the auditor or to benefit from the findings"*. The Deaf Effect appears to be influenced by the style of auditing and the corresponding relationship with management.

We expect that managers (Project Owners) are more likely to listen to the Risk Warnings coming from an auditor who is seen as a Collaborative Partner, regardless of the objectivity and credibility of the internal auditor to make true assertions on risks. We expect that managers will be less motivated intrinsically to listen to the Risk Warning, when the messenger is seen as an Opponent – such an internal auditor is often labeled as a 'policeman'. These expectations are based on the Stewardship principles.

Research on Stewardship Theory suggests that a collaborative partnership relation interacts with psychological heuristics (Davis et al., 1997) in its effect on decision making behavior. In this Chapter we elaborate interaction with Perceived Control.

5.1.2. Perceived Control and Illusion of Control Theory

In Chapter 2 we defined Perceived Control as *"people's own judgment of the extent to which they can control an outcome in a specific situation."* (Thompson et al., 1998). *"This judgment is based upon their judgment of how much they intend the outcome and the degree of connection between their action and the outcome"*. Or phrased more simple (Thompson & Schlehofer, 2005) *"Perceived Control is the perception that one can take action to get desired outcomes"*. In Chapter 2 we also described the difference between Perceived Control and related constructs such as Self-efficacy and Locus of Control.

Since Perceived Control is related to specific conditions, it could also explain irrational behavior in these conditions. In a sequence of socalled Illusion of Control experiments irrational decision making in chance conditions – simple games – was explained by Perceived Control being unrealistically high. Although this Illusion of Control Theory originally applied to pure chance conditions (without any actual control), it has been used in many other conditions as well in order to explain risk-taking behavior in car-driving (Horswill & McKenna, 1999), health (Harris, 1996) and IS-projects. In a study on escalating IS-projects, Illusion of Control is described as "an expectancy of personal success probability inappropriately higher than the objective probability would warrant" (Keil et al., 2007a). This phenomenon causes people to believe that statistical probabilities for (certain) risks do not apply to them. This belief can be caused by the development of a (too) high degree of confidence in their personal skills as a result of a previous history of success in a similar situation. If a predicted risk did not occur in past projects, people are likely to be more confident that it won't occur in the next project either. Furthermore, people will often attribute a favourable outcome to their skills in managing a situation" (Keil et al., 2007a). This also means that if the person has been successful as a manager that he/she develops confidence or even overconfidence in his/her skills to avoid failure in general.

Other studies on Perceived Control in the field of Escalating IS-projects showed that low perceived control causes people to act in a more risk averse matter and are quick to

abandon a project (Du et al., 2007), This study by Du et al. (2007) also suggested that a sense of control could increase the expectation that risks could be avoided. Whyte and Saks (2007) reported that self-efficacy may influence the perceived control that project managers have over their project. If project managers continue to believe that the project is under their control, they may be more likely to continue failing projects (Whyte & Saks, 2007). Jani (2008) reported that, while executing a failing project, project managers who begin the project with high self-efficacy about successful completion of the project will tend to perceive greater degree of control over the failing project. Individuals with a high level of perceived control, tend to have much confidence in their ability to make the project a success. They usually attempt to overcome problems by investing additional time, effort and money into the project, instead of abandoning it (Whyte & Saks, 2007; Whyte et al., 1997; Wood et al., 1990). They tend to take negative feedback less seriously since they are convinced that the project will be successful in the end. This can cause them to ignore or react too slowly on potential warning signs for failure, opening the door for project escalation (Wood et al., 1990).

Based upon these studies, we expect that a higher level of perceived control is correlated with lower level of estimated probability of failure. This suggests a tendency to take more risks and response with Deaf Effect to the probability information in a risk warning.

Since we are particularly interested in the interaction of Perceived Control with characteristics of a situation, we consider empirical evidence from experiments in the field of Illusion of Control Theory that showed context-sensitivity of Perceived Control. Many of the experiments on Illusion of Control Theory, depart from psychology and refer to chance conditions. The following examples give an impression on the type experiments that were performed in that domain (Thompson et al., 1998). In the first example, people can choose a lottery-ticket themselves (freedom of choice) or get assigned one automatically. The first group was less willing to change their ticket to another ticket than the second group. In the second example, people who were allowed to shuffle playing-cards or throw a dice oneself, estimated chances on success significantly higher than respondents who could only observe. As a third example, documents with a layout that showed some familiar characteristics (heading, logo, wordings) were found more reliable than blank or unfamiliar layout characteristics. Next, spending time on warming-up was of influence on estimated probabilities of success (even in pure chance conditions). As a final example, when someone is asked to predict the outcome of a roulette-throw, he estimates probabilities for this outcome much higher than without this prediction. These examples are based upon a literature overview by Thompon et al. (1998). The table 5-2a describes situational conditions that could be of influence on Perceived Control, mainly based upon Thompson's (1998) overview, complemented with other studies.

Constructs	Concepts	Type of Relation	Source
	Locus of Control	Causal, Positive	(Thompson et al., 1998)
	Self Efficacy	Causal, Positive	(Thompson et al., 1998)
	Perceived Post-decisional Control	Correlational	(Shapira, 1995)
Actual Control	Actual control	Causal, Positive	(Thompson et al., 1998)
	Management Control Systems	Correlational, Positive	(Sitkin & Pablo, 1992)
	Reliable Information	Correlational, Positive	(Helliar, Lonie, Power, & Sinclair, 2002; Shapira, 1995)
	Exogenous/Endogenous Risks	Causal, Endogenous: High, Exogenous: Low	(Jani, 2008)
	Task – Complexity	Causal, negative	
Familiarity	Information with familiar headings, symbols, names	Causal, Positive	(Langer, 1975)
	Practicing	Causal, Positive	(Langer, 1975)
	Familiar Design	Causal, Positive	(Bouts&Van Avermaer, 1992)
	Warm-up Period	Causal, Positive	(Ayeroff& Abelson, 1978)
	Domain Familiarity	Correlational, Positive	(Sitkin & Pablo, 1992)
Involvement	Freedom of Choice	Causal, Positive	(Langer, 1975)
	Performer vs observer (responsibility)	Causal, Performer: High Observer: Low,	(Langer, 1975)
	Time	Causal, Positive	(Thompson et al., 1998)
Competition	Confident (Insecure) Opponent	Causal, Low (High) Perceived Control	(Dykstra & Dollinger 1990)
Foreknowledge	Knowledge choice-outcome	Causal, Positive	(Wortman, 1975)
	Prediction/Post-diction	Causal, Prediction: High, Post-diction: Low	*(Strickiand, Lewicke & Katz, 1966)*
Need for the Outcome	Need for outcome	Causal, Positive	(Biner et al, 1995)
Intrusion of Reality	Asking for objective probabilities induces a rational analysis which eliminates illusory of control	Causal, Moderating	(Langer, 1975)

Table 5-2a Factors that influence Perceived Control

Factors such as *freedom of choice*, *prediction*, *need for the outcome*, *familiarity*, *competition* and *responsibility* are manipulated in experimental conditions as listed. In the field of stop/continue decisions in escalating IS-projects, these conditions could be induced by decision makers' organizational environment, such as: *freedom of choice*, *responsibility*, *clear goals and plans*, *incentives*, *scarce resources*, *use of standards* or *reliability of information*. Some of these factors are confirmed directly from literature on Escalating IS-projects. They are also confirmed in surveys that correlated managerial risk taking with Management Control Systems (Sitkin & Pablo, 1992), reliable information (Helliar et al., 2002; Shapira, 1995) and time to decide (Helliar et al., 2002). Compared to the overview in table 5-2a, Perceived Control is still relatively unexplored in the field of Escalating IS-projects.

5.1.3.   Moderator Effects found in Illusion of Control Theory experiments

In the table 5-2b we provide a list of factors that appeared to moderate effects. This table is also based the literature review on Illusion of Control experiments by Thompson et al. (1998).

Constructs	Concepts	Type of Moderation	Source
Emphasis on Success or Failure	Pattern of success (at the beginning, the end or random)	Subjects with feedback on consistent success at the beginning, over-remembered successes, considered themselves to be skillfull and estimated highest probabilities of success	(Langer&Roth,1975)
	Frequency of reinforcement of success	If the desired outcome happens frequently (regardless their actions), subjects consider probability of success higher	(Tennen&Sharp, 1973)
	Emphasis on failure	Emphasis on failure, reduces or eliminated Illusion of Control an may lead to overestimation of probability of failure (Learned Helplessness)	(Matute, 1994)
	Victims/non-victims	With similar level of actual control, former victims estimated probability of an accident higher than subjects who had not been victim of an accident before	(Paker, Brewer and Spencer 1980)
	Valence of outcome (gain positive or avoid negative)	Subjects who saw green-light as winning, estimated Probability of Success much higher than subjects who lost when the light did not come on	(Alloy and Abramson, 1979)
	Focus on costs of potential outcomes	Focus on negative attributes of the outcome, dampens illusion of control, results in lower probability estimates of success.	(Dunn and Wilson 1990);
Mood	Positive/Negative mood	Positive moods (temporary or stable) lead to overestimation of probabilities of success. Negative moods (temporary or stable) lead to overestimation of probabilities of failure.	(Alloy, Abramson and Viscusi, 1981)
Wishful Thinking	Imagine desired/undesired outcome	Imagination of a desired outcome causes higher probability estimations of success. Imagination of an undesired outcome causes higher probability estimations of failure	(Hogarth, 1987), (Babad & Katz, 1991)

Table 5-2b Factors that interact with Perceived Control

From this analysis of Perceived Control and interaction effects of Perceived Control, we now proceed with development of our hypotheses to explain the Deaf Effect from both Stewardship Theory and Illusion of Control Theory.

5.2. Hypotheses

5.2.1. Main Effect of Messenger seen as Collaborative Partner vs Opponent

An internal audit department that is based on the principles of Stewardship Theory would build up a reputation of acting collaboratively with managers in the organization in order to make them and the organization perform better. The managers would consider these auditors' goals to be congruent with their own and those of the organization. The information on both sides would easily be shared in order to achieve the business goals. There would be no reason to hide information from one another (information asymmetry). According to this theory, managers would appear to be more receptive to (even negative results from) objective assessments performed by the auditors when they consider them to be Collaborative Partners instead of Opponents or policemen. Following this line of reasoning, managers would assign more relevance to the message of an auditor who is considered to be a collaborative Partner then to the message of an auditor who is considered to be an Opponent or 'policeman'. If the auditor would provide the results of an assessment showing that a project should not continue, we expect that the manager is more likely to discontinue the course of action when the messenger is considered to be a Collaborative Partner instead of an Opponent.

This results in the following hypothesis:

H1. *Decision Makers are **less** likely to continue a course of action (respond deaf to a Risk Warning), when the Messenger is seen as a Collaborative Partner*

5.2.2. Main Effect of Decision Makers' Perceived Control

Several laboratory experiments in the field of Illusion of Control Theory confirmed that high Perceived Control is of influence on decision-makers' tendency to overestimate probabilities of success compared to objectively assessed probabilities[31]. According to March and Shapira this promoted risk seeking behavior. In the context of escalating IS-projects, Du et al. (2007) found that high perceived control promoted the tendency to continue a risky project.

This results in the following hypothesis:

H2. *Decision Makers with high perceived control are more likely to continue a course of action (respond Deaf to a Risk Warning)*

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[31] We refer to table 2-5 in chapter 2 where we describe experiments including the factors that are related to perceived control.

5.2.3. Moderating Effects

As we explained in Chapter 3, moderation effects in applied fields often refer to so-called quasi moderators. Two factors show a direct effect on a dependent variable and appear to interact on each others effect on that dependent variable. The theoretical perspective that is chosen determines which effect is considered to be moderating the other effect. If we take Stewardship Theory as a starting point, we assess whether the effect of the messenger's Collaborative Partnership relation on the continuation decision is changed (moderated) by the decision maker's Perceived Control. If we take Illusion of Control Theory as a starting point we would assess whether the effect of the decision maker's Perceived Control on the continuation decision is changed by a Collaborative Partnership with the messenger. Both are perspectives on the same interaction and both could be helpful in interpreting the interaction. Therefore we do not exclude either one of the positions in our analysis, both in the development of our hypotheses as well as in the analysis of the results[32].

Research on Stewardship Theory suggests that a partnership relation could interact with psychological heuristics (Davis et al., 1997) in its effect on decision making behavior. We take the psychological heuristics as confirmed in Illusion of Control Theory as a starting point for the development of our hypotheses on interaction. In this Chapter we provided an overview of Illusion of Control experiments and also listed conditions that appeared to moderate the results of these experiments. Some of the moderating influences that were found in these experiments could apply to the proposed interaction between a decision maker's Perceived Control and the relationship with the messenger.

Given the negative nature of the auditor's feedback, it is relevant that an emphasis on failure could reduce or eliminate illusion of control and might even turn overestimation of probability to success into an overestimation of probability to fail, as was found by Matute (1994) in an experiment. Other experiments confirmed that positive or negative framing of feedback information could interact with Perceived Control on risk taking behavior (Brockner et al., 1983; Forlani, 2002; Shapira, 1995). This interaction could apply on the effectiveness of auditors to reduce illusion of control. But it does not explain differences in the Deaf Effect between auditors who are seen as Collaborative Partner vs Opponent to management.

In an experiment, Langer and Roth (1975) had found that an intrusion of reality could eliminate illusion of control. Reminding people to objective probabilities could induce a rational analysis with reduction or elimination of illusion of control as a consequence. So the obtrusive message of the auditor could attenuate or mitigate the influence of Perceived Control on the Deaf Effect. This does not explain differences in Deaf Effect between auditors who are seen as Collaborative Partner vs Opponent to management.

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[32] As we described in chapter 3, the statistical techniques test on interaction- effects and perform identical tests for either choice of predictor vs moderator

The expected interaction appears to show if Perceived Control is studied in the context of competition with Opponents. Subjects tend to be motivated to challenge Opponents, if they consider to participate in a game that they associate with high perceived control (well-trained, skilled, high involved – all factors from Illusion of Control experiments). This mechanism is known as competitive arousal (Ku et al., 2005) and could promote risk taking behavior. We expect that a decision maker with a high perceived control would show competitive arousal if the Risk Warning comes from an Opponent. He/she might feel triggered to compete with the messenger and show a stronger tendency to continue a course of action. This competitive arousal might not play a role when the messenger is seen as Collaborative Partner.

In the low perceived control conditions the decision maker would assume that the effect of his/her decision on the results are mainly based on chance, or even worse, when having a negative outcome history in mind. In these condition it is likely that the decision maker will follow the Risk Warning of the messenger. Any Risk Warning based upon an assessment of a credible messenger – either Partner or Opponent – would likely be considered helpful and followed. In a situation of low perceived control, the attention of the decision maker (Ocasio, 1997; Simon, 1997), could be focused on helplessness which might make him/her less sensitive for the relationship with the messenger. This results in the following hypothesis:

H3. Decision Makers with low Perceived Control are less likely to let their continuation-decision be influenced by seeing a risk messenger as a Collaborative Partner or as an Opponent.
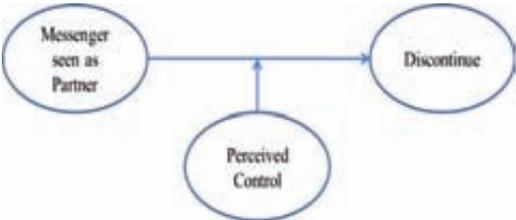
5.2.4.   Mediating Effects

In addition to the analysis of moderating effects, we strive to contribute to insight into the Deaf Effect, by exploring mediating effects as well. In that sense we extend on the mediation analysis as performed by Cuellar et al. (2006) by further testing whether or not Message Relevance could also be affecting the constructs and relations in our model. We will also study two other candidate mediators, which could help in further understanding how factors are of influence on the Deaf Effect.

Mediating role of Message Relevance

The very few experimental studies on the Deaf Effect (Cuellar, 2009; Cuellar et al., 2006; Cuellar et al., 2007) follow the Heuristic-Analytic Theory of Evans (Evans, 2006; Evans, 1996) in order to explain its causes. The dual model of information processing (heuristic and analytic) is shared with other researchers on biases and heuristics, such as System 1 and 2 cognitive processes (Kahneman, 2003; Stanovich & West, 2002), the Heuristic-

Systematic Model (Chaiken, 1980) and the Elaboration Likelihood Model (Petty & Cacioppo, 1986). These models differ on their assumptions on how the heuristic and reasoning processing co-operate and interact. The H-A theory (Evans, 2006; Evans, 1996) assumes that the Heuristic processing acts like a filter to select the relevant parts out of all the information that people are exposed to. This relevant information is being transferred for further rational processing and decision making in the Analytic processing. Other theories assume more interaction between the two systems (Kahneman, 2003; Stanovich & West, 2002) in which the systems complement each other. Consistent with Evans's H-A theory Cuellar found confirmation that Message Relevance was a mediator on some (but not all) of the determinants of the Deaf Effect (Cuellar, 2009; Cuellar et al., 2006; Cuellar et al., 2007). From a case-study (Cuellar, 2009) he concluded that decision maker's heuristics and biases (such as Illusion of Control) could also be of influence on the Relevance a decision maker might assign to a Risk Warning.

As we described earlier related to hypothesis 1 we expect that the decision makers would report more *Message Relevance* when the Risk Warning comes from a Collaborative Partner instead of an Opponent. We also expect that *Message Relevance* mediates the effect of the messenger's Collaborative Partnership on the decision to continue a course of action.

The proposed position of *Message Relevance* as mediator between *Perceived Control* and *Continue* could follow two lines of reasoning. Both lines of reasoning propose that high *Perceived Control* would cause the Deaf Effect. And both lines also assume that the Deaf Effect for a warning would be explained by low relevance assigned to the message. It would not be reasonable to assume that the Deaf Effect would be caused by assigning high relevance to the message. The two lines of reasoning now focus on different expectations of the causal relationship between *Perceived Control* and *Message Relevance*. One could consider that there is a negative relationship: low perceived control makes the message more relevant. And Illusion of Control would cause the message to be considered less relevant. So in that line of reasoning the influence of *Perceived Control* on *Continue* would (partially) be explained by its influence on *Message Relevance* and for the rest (partially) explained by a direct effect of *Perceived Control* on *Continue*. But we also suggest a second – more plausible - line of reasoning on Message Relevance. People with high Perceived Control consider that they are in the position to take action to achieve desired results. People with low Perceived Control don't see a relationship between their action and the results. They may consider the outcome depending on chance and may consider themselves to be helpless. This line of reasoning suggests that people with high perceived control will assign more relevance to the auditor's message, because they think they are in the position to take action, to follow the warning or reject it. The people in the low perceived condition may just blindly follow the auditor's warning – regardless they see the auditor as Partner or Opponent – not because they assign much relevance to the message. Why would they assign relevance to a message if they consider that their actions don't influence the results, so why would it make sense to be informed to decide. In the second line of reasoning *Message Relevance* acts like a suppressor variable (Iacobucci, 2008),p40 in the relationship between *Perceived Control* and the decision to continue a course of action. Without this suppressor the effect of *Perceived Control* on *Continue* would have been stronger than it is with the suppressor. *Message Relevance* acts like a

pain-relief medicine to cope with the effects of "injury" on "pain". The more injury the more medicine you take. The more medicine the less pain. The relationship still holds that more injury causes more pain, but there is an intervention to suppress the effect of injury on pain. A more relevant message will suppress the influence of *Perceived Control* on the decision to continue a course of action.

Following the second line of reasoning, we propose the following hypotheses with regard to *Message Relevance* as mediator in the Deaf Effect:

H4a. *Decision Makers assign more Relevance to a Risk Warning when the Messenger is seen as a Collaborative Partner*

Messenger seen as Partner → pos → Message Relevance

H4b. *Message Relevance mediates the influence of the Messenger's Collaborative Partnership on the decision to continue a course of action*

Messenger seen as Partner → Message Relevance → Discontinue

H4c. *Decision Makers assign more relevance to a message when they assume a strong relationship between their actions and the results (high perceived control)*

Perceived Control → pos → Message Relevance

H4d. *Message Relevance suppresses the influence of Perceived Control on the tendency to continue (reject a Risk Warning)*

Perceived Control → Message Relevance → Continue

Mediating Role of Perceived Risk

In order to allow for effective contribution of risk-assessment devices on managers' decision making, Keil et al. (2000c) studied how information from a risk-assessment was of influence on the decision that managers made in experimental conditions. Of course an analogous line of reasoning can be followed when the "risk-assessment device" would be an internal auditor who provides an obtrusive Risk Warning based on his/her professional risk-assessment. They confirmed that two relationships were holding: a) risk assessment devices have the intended effect on manager's risk perception and b) changes in risk perception translate to changes in decision making. Risk Perception has been defined as a "decision maker's assessment of the risk inherent in a situation" (Sitkin & Pablo, 1992; Sitkin & Weingart, 1995; Sjöberg, 2000b). Consistent with Keil et al. (2000c) and with various studies from Risk Research (Sitkin & Pablo, 1992; Sitkin & Weingart, 1995;

Slovic et al., 1982) we propose that Risk Perception would be a reasonable mediator on managers' decisions based on the Risk Warning they received.

We propose that a decision maker's *Perceived Risk* would be influenced the most when the Risk Warning is received from a Collaborative Partner. The underlying assumption from Stewardship Theory is that the messenger and the decision maker are both aligned with the organization goals and thus with each other. This suggests that *Perceived Risk* will tend to be aligned with the risk as presented by the Collaborative Partner who provided the Risk Warning.

In the field of escalating IS-projects, Du et al. (2007) found in an experiment that *Perceived Control* had a negative effect on decision maker's *Perceived Risk*.

This results in the following hypotheses with regard to *Perceived Risk* as mediator in the Deaf Effect:

H5a. *Decision Makers perceive a higher level of risk, when the messenger of a Risk Warning is seen as a Collaborative Partner.*
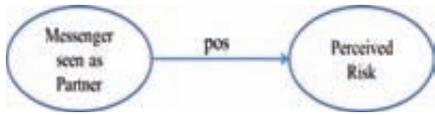
H5b. *Perceived Risk mediates the influence of the messenger's Collaborative Partnership on the decision to continue a course of action*

H5c. *Decision Makers with high Perceived Control tend to perceive risks to be low*

H5d. *Perceived Risk mediates the influence of Perceived Control on the decision to continue a course of action*

Mediating role of Estimated Probability to Succeed

The first mediation would apply to the influence of the source of the Risk Warning (coming from a Partner or an Opponent) on the decision to continue a project (reject or follow the Risk Warning). We propose that the Risk Warning (with a given 1/3 chance to succeed) coming from a Collaborative Partner would influence decision makers to report a lower Estimated Probability to Succeed the project than when it comes from an Opponent. The underlying assumption is that they consider the Collaborative Partner to share the same goals.

As presented earlier in this chapter, in a sequence of experiments on Illusion of Control Theory, or phrased as the "Perceived Control heuristic" as proposed by Thompson et al. (1998) – respondents showed to take risk-seeking decisions based on a biased Estimation of Probabilities to Succeed (Gilovich et al., 2000; Langer & Roth, 1975; Snow et al., 2007; Thompson et al., 1998). Therefore we propose that *Estimated Probability to Succeed* would act as mediator in our model, tightly related to the Perceived Control construct.
Based upon the list of Illusion of Control experiments we expect that the decision maker with a high perceived control would estimate probability to succeed higher.

H6a. *Decision makers estimate the probability to succeed lower when the meesenger of a Risk Warning is seen as a Collaborative Partner.*

H6b. *Decision Maker's Estimated Probability to Succeed mediates the influence of the messenger's Collaborative Partnership on the decision to continue a course of action.*
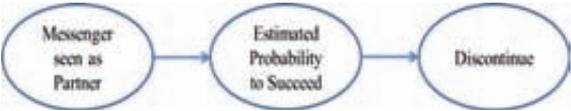
H6c. *Decision Makers with high Perceived Control tend to estimate the Probability to Succeed higher*
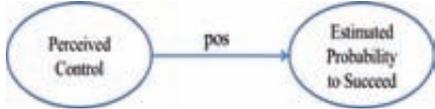
H6d. *Estimated Probability to Succeed mediates the influence Perceived Control on the decision to continue a course of action*

5.3.   Research Method

In this substudy we will follow the empirical research strategy of a laboratory experiment. *Laboratory experiments* take place in a setting especially created by the researcher for the investigation of the phenomenon. With this research method, the researcher has control over the independent variable(s) and the random assignment of research participants to various treatment and non-treatment conditions (Boudreau et al., 2001). This strategy allows us to maximize precision of measurement of a universal behavioral systems (heuristics). It allows us to test theories in an applied context by ruling out rival explanations.

To answer a "why" question our research design requires (1) temporal precedence, (2) statistically significant correlations and (3) control over alternative explanations (Blumberg et al., 2008), p213. In order to meet these requirements of internal validity (eliminate explanations other than our hypotheses), we applied a 2x2 factorial between-subject experimental design. There are two different treatments (factors) that group our observations (Treatment of Perceived Control and the messenger's Collaborative Partnership). Each treatment has two levels (Low and High Perceived Control; the

messenger seen as a Collaborative Partner or as an Opponent). The four different treatment conditions were randomly assigned to participants, double-blind. In this way participants' personal characteristics - either unknown or known to be relevant - could still affect their answers, but are transformed into random background noise. As a consequence they could no longer serve as a rival explanation for between group differences. If these personal characteristics (such as pre-conceptions) would have a strong effect on respondents' answers, this would result in a very high level of background noise. The experimental design should be sufficiently powerful (signal to noise ratio) to assess statistically significant correlations between the independent variables and the dependent variable (*Continue*). Respondent characteristics that could be relevant (such as age, working experience, gender, risk-propensity, nationality) were measured as control variables.

5.4.   Procedures & Respondents

The respondents who participated in this study were involved in parttime post-graduate courses Management Accounting and Control at a Dutch university. None of the participants were involved in pilot-testing of our study. The students participated on a voluntary basis at the first 20 minutes of their courses. In a double blind condition they received envelopes containing one out of four experimental scenarios at random. From the 140 returned envelopes we found 6 forms not to be sufficiently usable since the main question (decision) was not answered in an unambiguous way (missing, scratched or multiple answers).

Size (N)	Description	Age	Working Experience	Gender	Nationality
134	Part-time students involved in management control course at Dutch university	28.8 years (std dev 5.7 yrs)	5.0 years (std dev 5.1 yrs)	62% Male 38% Female	98% Dutch 2% Other

Table 5-3 Descriptives of the respondents

The classroom conditions provided us control over the execution of the experiment. These part-time post-graduate students were preferred over undergraduate students, for this particular study because of their relevant working-experience. Chang and Ho (2004) ran an experiment comparing student and manager escalation behavior when project completion and market information was manipulated. They concluded that in an escalation situation, students responded similarly to practitioners in the escalation decision where working experience was not a factor. Since our manipulation of Perceived Control is related to subjects' working experience, we think it would have been less defendable that undergraduate student subjects could stand as surrogates for managers for the study as described in this Chapter. Please note that we arrive at a different conclusion on the manipulations of Gain/Loss framing in Chapter 4. To a certain extent our choice of subjects with working-experience served the external validity of the study. The main reason however was to achieve the desired level of construct validity and internal validity in the study. Undergraduate students might not have been sensitive for the treatment of Perceived Control since they might not have been able to recognize the treatment conditions as

presented in the scenario and thus could have harmed treatment validity of our study. The use of respondents with relevant working experience also brought consequences of heterogeneity and disturbing factors from their personal working background we have to control in our study.

We followed a sequence of steps, according to Blumberg et al. (2008), to develop and test our research design. The first three pretests covered a 2x2x2 factorial design, which we decided to split into the two 2x2 experiments of chapter 4 and 5. The original idea would require too much statistical power to test for moderating effects in a 2x2x2 design. The three pretests had provided insight into and improvements for the scenario, the manipulations and measurement model. Two separate final pretests were done for the 2x2 experiments of chapter 4 and 5.

The four cycles of development and testing of our experiment scenario and measurements were necessary to improve the signal to noise ratio (strengthen the signal and attenuate noise). This was needed to successfully handle disturbing influence of respondents' experiences and strong pre-occupations - such as "auditors are Collaborative Partners or not", "IS-projects come with high control". During pretesting with experienced subjects, we first found the effect of this preconception so strong that respondents simply failed to recall treatments that were opposite to their beliefs. By personalizing the auditor as mr. Smith, throughout the scenario and the measurements, we succeeded to decouple from respondents' pre-occupations on auditors' Collaborativeness. In order to develop and test our experiment, we also asked participants for a textual explanation for their answers. Several times we found described that experienced respondents had found themselves in a situation as described in the scenario. Although this supports the realism and relevance of the scenario, we found that experienced participants included elements of their own experience in the scenario. They filled in the blanks and anchored our scenario to other instances from their own practical experience, which of course resulted in a higher level of noise in the experiment that could harm statistical power of our study. Therefore we had to strengthen the treatments we used in our study and reduce noise. This finally resulted in the procedures, treatments and measurements as we describe in the next sections.

5.5.   Treatments

Respondents were asked to consider themselves in the position of Project Owner of a strategic IS-project within an insurance-company. For the purpose of this study we developed and tested a scenario that was derived from earlier studies in the field of escalating IS-projects which considered the typical elements we included in our study. The scenario was slightly adapted from the scenario we used in Chapter 4. The treatments for the Loss and Gain scenario were removed and replaced by the following treatments for Low and High Perceived Control, that were slightly adapted from a similar study by Du et al. (2007) on the influence of Perceived Control on the decision to continue an IS-project. In similar wordings as in the scenario of Chapter 4 the auditor, Mr. Smith, provided a Risk Warning:

Mr. Smith reports that he has found serious weaknesses in the design and execution of the testing activities on the data exchange with other information systems.
*He estimates there is a **2/3 probability** that exchange of data would show reliability problems in the first month of operations. As a consequence, he reports that the project should be redirected and should not be continued as planned.*

Taking into consideration that the interfaces with other information systems are key for the success of the PENSION-VIEW project, you realize that:

[High Perceived Control]

*Fortunately, all these information systems are maintained and supported by your own organization. The owners of these Information Systems reside at your location and they directly report to you. The specialists on these information systems also reside at your location and are highly accessible to you. There are clear controls in place for reporting and decision making. For all these reasons, you consider yourself to have a **VERY HIGH LEVEL OF CONTROL** over the outcome of this IS-project.*

[Low Perceived Control]

*Unfortunately, all these information systems' maintenance and support has been outsourced to an offshore location in China. The owners of these Information Systems are located at other departments at various locations. They do not report to you. The specialists on these information systems are located at the offshore location in China and are not at all accessible to you. There are no clear controls in place for reporting and decision making. For all these reasons, you consider yourself to have a **VERY LOW LEVEL OF CONTROL** over the outcome of this IS-project.*

The description of the involvement of the auditor in the Information Systems Project and the auditor's role in the position of bad news reporter, was adapted from the Deaf Effect studies of Cuellar (Cuellar et al., 2006; Cuellar et al., 2007). The treatment of the relationship between Bad News Messenger and Decision maker was phrased as follows for the low stewardship relationship (similar as chapter 4):

*Mr. Smith has a long history of working **AGAINST** IS project teams with the goal of exposing project failings, thus embarrassing project owners. He is seen as policeman who does not add any value to the development process. Thus, Mr. Smith is treated as an **OPPONENT WHO IS NOT TO BE TRUSTED**.*

This treatment addresses the elements of "long history" (Davis et al., 1997), exposure of failings (Davis et al., 1997), being seen as a "policeman" (Chambers et al., 1988; Keil & Robey, 2001), acting as an Opponent (Davis et al., 1997) with low mutual trust (Davis et al., 1997. The high stewardship relation treatment contained the opposite elements of being seen as a "collaborative partner" (Davis et al., 1997; Sundaramurthy & Lewis, 2003), expressing a high level of mutual trust (Davis et al., 1997) and a contribution to management performance. This treatment was phrased as follows:

*Mr. Smith has a long history of working **COLLABORATIVELY** with IS project teams with the goal of helping to identify and manage project risks, thus enabling project owners to be successful. He is seen as adding value to the process. Thus, Mr. Smith is treated as a **TRUSTED PARTNER**.*

5.6. Measurement Model

In order to analyze relations between the constructs at the conceptual level of our model, we first translate these constructs into operational variables. These operational variables should serve proper measurement and support statistical analysis of relations at operational level. In order to transfer statistical results at operational level to conceptual level, the internal validity, construct validity and statistical conclusion validity of the model should be safeguarded and assessed first (Shadish et al., 2002). We will follow two different paths for statistical analysis of the operational model (multiple regression and PLS), both with assumptions and tests on validity-issues. Both paths require that variables at operational level have been defined and measured properly. Thus, we assess validity first before building further with our analysis and conclusions. As presented by Straub et al. (2004) validity of the instrumentation (manipulation and measurements) should form a basis for achieving internal validity (ruling out rival hypotheses) and statistical conclusion validity. In the table 5-4 we provide an overview of how we translated constructs to variables (called items).

Contruct	Type	Content	Measurement	Source of items
Continue	Endogenous, Dependent Variable	Decision to continue or redirect the project	One 8-point semantic differential scale item and 1-item 7 point Likert scale for validation purposes	Adapted from Cuellar (2006, 2007, 2009) on this scenario, altered during pretesting
MsgRelev	Endogenous Independent	Perceived Relevance of the Bad New Reporter's Message	Three 7-point Likert scale items	Adapted from Cuellar (2006, 2007, 2009) on this scenario
Collab	Exogenous Independent	Bad News Reporter seen as trusted collaborative partner or as non-trusted competitive opponent	One 7-point Likert scale item Two 7-point semantic differential scale items	Developed for this context and tested during 4 pretest-cycles, based upon Schoorman et al
PercContr	Exogenous	Respondents' Perceived Control	1-item percentage scale Two 7-point Likert scale items	% item consistent with Du (2007)
RiskProp	Exogenous (control)	Risk Propensity of Decision maker	Four 7-point Likert scale items	Consistent with Sitkin & Weingart (1995)
RiskPerc	Endogenous Independent	Perception of Risk by Decision maker	Four 7-point semantic differential scales and One 7-point Likert scale	Consistent with Sitkin & Weingart (1995)
ProbSucc	Endogenous Independent	Estimated Probability to Succeed	One percentage scale item	Consistent with Arkes (2000), Garland (1990)
Gender, Nationality	Exogenous, Control	Respondents' gender and nationality	Translated into dichotomous dummy variables	
Age, Working Experience	Exogenous, Control	Respondents' age and years of working experience	1-item	
BeliefCollab	Exogenous, Control	Respondent's belief that auditors are collaborative	1-item 7-point Likert scale	Used during scenario development and testing
BeliefControl	Exogenous, Control	Respondent's belief that IS-projects are controllable	1-item 7-point scale	Used during scenario development and testing
BeliefFavor	Exogenous, Control	Respondent's belief that IS-projects are favorable	1-item 7-point scale	Used during scenario development and testing

Table 5-4 Measurement of Constructs

Content Validity

Content validity of this study refers to the essential question of whether our instrumentation (e.g. questionnaire items) pull in a representative manner that could be used to measure the content of a given construct (Cronbach, 1971). In table 5-4 we show that we adopted most definitions and measurement scales of our constructs from earlier studies. Only the measurements of the *Collab* construct were developed for this study, given our specific research scope of internal audit warnings and the relationship between auditor and management (Project Owner), according to Stewardship Theory principles. We took care of content validity by (1) incorporating the attributes of main articles on Stewardship-based relations (Davis et al., 1997; Sundaramurthy & Lewis, 2003) in general, as well as in relation to internal auditing specifically (Kasima et al., 2011), (2) consulting scholarly and practitioner experts and (3) following a 4-step development and testing process with open questions to testing-subjects to explain their answers.

Manipulation Validity

As part of our between-subject experiment design, we intentionally exposed subjects to different treatments in order to control that independent variables (*PercContr* and *Collab*) sufficient vary across treatment-groups. Therefore, we test manipulation validity (Straub et al., 2004) in order to assess whether or not the treatments are effective as intended. During the development and testing of our manipulations we followed an iterative path of measuring and strengthening the manipulations that we used in our scenario (and reducing background noise, for example from respondents' preoccupations). In table 5-5a we present the mean values of the independent variables *Collab* and *PercContr* for each of the four treatment conditions. As expected from our pretests, we find the independent variable *Collab* to be different in the Treat Collab Low and High conditions, without minor movement on the treat PercControl High and Low conditions. And we find the independent variable *PercContr* to be different on the Treat PercControl Low and High conditions, without changing as the result of the Collab treatment conditions. This indicates that the treatments are effective in size and direction.

	Treat PercControl Low		Treat PercControl High			
Treat Collab Low	Collab	3.85 (1.25)	Collab	3.91 (1.08)	Collab	3.88 (1.16)
	PercContr	2.94 (1.35)	PercContr	5.31 (0.78)	PercContr	4.13 (1.62)
	N=33		N=33		N=66	
Treat Collab High	Collab	5.38 (0.73)	Collab	5.52 (0.79)	Collab	5.45 (0.76)
	PercContr	2.94 (1.12)	PercContr	4.78 (1.20)	PercContr	3.86 (1.48)
	N=34		N=34		N=68	
	Collab	4.63 (1.27)	Collab	4.73 (1.24)		
	PercContr	2.94 (1.23)	PercContr	5.04 (1.04)		
	N=67		N=67			

Table 5-5a Mean Values of Collab and PercContr per treatment condition

Table 5-5b shows the results of an MANOVA in which the treatment conditions are entered as Independent variables and the *Collab* variable and *PercContr* variable are considered to be the dependent variables. The table shows that the Collab treatments are highly significant (at .000) on their own *Collab* variable and that TreatPercContr is not significant (.544) at that variable. The table also shows that the PerContr treatments are highly significant (at .000) on its own *PercContr* variable and that TreatCollab is not significant (.174) at that variable. No significant interaction effects are found in the treatments (at .187 and .800). We consider the R^2 of .464 and .381 to be acceptable as a result of the iterative testing and improving the treatment-conditions (and reducing background noise) in the scenario that was performed.

Independent variable	Dependent variable PercContr[a]		Dependent Variable Collab[b]	
	Type III Sum of Squares	F-Value (Sig)	Type III Sum of Squares	F-Value (Sig)
Main Effect TreatPercContr	148.179	114.751 (.000)	.361	.371 (.544)
Main Effect TreatCollab	2.416	1.871 (.174)	82.240	84.506 (.000)
Interaction Effect TreatPercControl * TreatCollab	2.268	1.757 (.187)	.063	.064 (.800)

a) R^2 is .464 and b). R^2 is .381

Table 5-5b Manipulation Test 2x2 MANOVA

We consider our manipulation tests to have sufficiently covered the testing techniques for manipulation validity as proposed by Straub et al. (2004).

Reliability

Before we will test the hypotheses, we first consider reliability and convergent as well as discriminant validity of how we measured our constructs. In table 5-6a we present the construct reliability Cronbach's alpha scores that measure the internal consistency with a given construct's items (weighing them all equally). Hair et al. (1998) suggest that a Cronbach's alpha score slightly lower than 0.7 might still be acceptable for exploratory research. Nunnally (1967) recommends a threshold value of only 0.6 for exploratory research. In the column at the right end we present the Cronbach alpha scores we obtained in chapter 4, using students instead of subjects with working experience. Based on the table 5-6 we conclude that the reliability of our measurements of the constructs meet the thresholds.

Contruct	Items	Cronbach alpha	Cronbach alpha Chapter 4
Continue	2	0.913	0.944
MsgRelev	3	0.876	0.858
PercRisk	4	0.849	0.869
Collab	3	0.898	0.922
PercContr	3	0.959	n.a.
RiskProp	4	0.840	0.731

Table 5-6a Reliability of Measurements

Convergent and Discriminant Validity

Our validation of the instruments we used for data gathering, proceeds with assessing the convergent and discriminant validity (Shadish et al., 2002) of how we measured the constructs in our study (construct validity). This is done in order to assess that our measurement-variables that are supposed to tap into the same construct indeed stick together and are not sticking too much to measurements that were supposed to tap into other constructs. For that purpose, we performed a Principal Components Analysis, which is an exploratory factor analysis of clustering measurements into factors. It does not take into account any available information on which measurements were intended to tap into which constructs. Using Varimax rotation and a fixed number of factors that was equal to the number of variables, we found the results as presented in table 5-6b.

	Component							
	1	2	3	4	5	6	7	8
Continue1	.256	.218	.198	-.235	-.187	**.810**	.027	-.017
Continue2	.292	.262	.094	-.168	-.146	**.816**	.136	-.126
MsgRelev1	.060	-.079	-.011	.360	**.832**	-.064	-.028	.068
MsgRelev2	.044	-.076	-.043	.271	**.863**	-.021	-.031	-.033
MsgRelev3	.070	-.109	-.100	.213	**.806**	-.218	-.067	-.010
PercRisk1	.003	**.790**	.093	-.114	-.137	.256	-.077	-.037
PercRisk2	.209	**.793**	-.004	-.059	-.156	.127	-.057	-.037
PercRisk3	.437	**.703**	.147	-.189	.101	.067	-.045	.146
PercRisk4	.192	**.854**	.149	-.074	-.049	.015	.097	-.109
Collab1	.005	-.058	-.046	**.802**	.339	-.180	.014	.051
Collab2	-.042	-.117	.030	**.867**	.266	-.108	.042	-.024
Collab3	-.051	-.171	-.060	**.873**	.248	-.068	-.091	-.010
PercContr1	**.923**	.207	.065	-.026	.075	.170	-.018	-.052
PercContr2	**.934**	.172	.048	-.048	.040	.151	-.041	-.039
PercContr3a	**.915**	.171	.078	.018	.043	.086	.005	.017
Gender	-.053	-.052	.043	-.028	-.096	.098	**.959**	.108
WorkExp	-.041	-.071	-.023	.007	.011	-.086	.106	**.976**
RiskProp1	.208	.068	**.803**	.090	.007	.074	.152	.042
RiskProp2	.124	.118	**.848**	-.038	.042	-.177	.159	-.083
RiskProp3	-.018	.124	**.774**	-.014	-.127	.277	-.124	.076
RiskProp4	-.073	.022	**.828**	-.115	-.087	.117	-.117	-.059

Extraction Method: Principal Component Analysis;
Rotation Method: Varimax with Kaiser Normalization.

Table 5-6b Construct Validity (without ProbSucc)

We excluded *ProbSucc* from our description and analysis, since it showed very weak discriminant validity with *PercContr*. It shared with *PercContr* a heavy loading on Component 1 of .529 while it loaded with .647 only marginally more on component 9. Analysis of causal paths was performed both with *ProbSucc* included and excluded. In the causal path analysis it blended heavily with *PercContr* and appeared to be no signficant mediator. In many experiments *ProbSucc* was used as an indicator of Illusion of Control (Perceived Control exceeding objective levels of control) and blends to much with the defnition of Illusion of Control to use it as a separate construct any longer.

Items should correlate higher with their own "construct" (factor) than they correlate with others (Shadish et al., 2002). We find convergent and discriminant validity to be confirmed in Table 5-6b. In the PLS-section we will further extend these validity tests with particular confirmatory tests for convergent and discriminant validity as supported by the PLS-modeling.

Finally, validity testing as described in this section is strengthened in two ways. First, we performed similar tests with an equal measurement model in a different experimental setting as described in Chapter 4. We also replicated measurements and validity tests during the 4 steps of pretesting with approximately 200 test-subjects. Second, we followed two distinctive and well-established approaches for further analyzing our data and hypothesis testing. For these reasons, we performed both regression analysis and PLS-analysis to arrive at our conclusions on main-effects, mediating effects and moderating effects.

5.7.   Results from Regression Analysis

In order to structure the results we first test the proposed main and moderating effects on the decision to continue or redirect the project (the dependent variable *Continue*). These cover the first three hypotheses. Next, we analyze the proposed mediating role of message-relevance (*MsgRelev*) which covers hypotheses 4a to 4d. In a similar way, we analyze the proposed mediating role of perceived-risk (*PercRisk*) which covers hypotheses 5a to 5d. And we conclude with a similar analysis of the proposed mediation role of Estimated-Probability-to-Succeed (*ProbSucc*) which covers hypotheses 6a to 6d.

5.7.1.   Regression Analysis on Main and Moderating Effects

In order to test whether moderation effects could be found, we followed procedures according to Sharma et al. (1981) and we further used the operational guidance on multiple-regression of interaction effects as presented by Jaccard and Turrisi (2003) and Aiken and West (1991). In Table 5-7 you find the results of the moderated regression analyses with *Continue* as the dependent variable. The presentation of moderation effects is adopted from Tanriverdi (2006).

Variable(s) Entered	Model 1 Controls	Model 2 Main Effect	Model 3 Main Effect	Model 4[c] Interaction
Gender	.133	.152*	.129	.113
WorkExp	-.169*	-.139	-.127	-.144*
RiskProp	.261**	.197*	.172*	.174*
PercContr		.390***	.369***	.362***
Collab			-.345***	-.337***
Collab x PercContr[b]				-.135*
R^2	.115	.262	.379	.396
F	5.496**	11.159***	15.237***	13.551***
ΔR^2		.147	.117	.017
ΔF		25.027***	23.558***	3.561*

a. significant at .030 with T-value is -1.887 for dataset N=134
b. component variables are standardized for moderation analyses
c. Durbin-Watson is 2.268
+p<.1, *p<0.05, **p<0.01, ***p<0.001
Dependent variable is Continue

Table 5-7 Moderated Regression Analysis on Continue

For interpretation of the model, we first take into account the subjects of our study and the control variables. We found *WorkExp* and *RiskProp* to be significant. The relevance of an individual's years of working experience and the individual's Risk Propensity was confirmed to be consistent with earlier studies (Cuellar et al., 2006; Cuellar et al., 2007). These variables were controlled for in Model 1.

Since in our field of research, earlier experimental research has been done on Perceived Control (*PercContr*), model 2 consists of the control variables of model 1, extended with *PercContr*. Model 2 confirms a significant positive influence of *PercContr* on the decision to continue as was expected from earlier studies and hypothesized here as hypothesis 2. From model 3 we conclude that *Collab* has a significant negative effect on *Continue*, which confirms hypothesis 1.

In hypothesis 3 we proposed that the negative influence of *Collab* on *Continue* would be weaker in the Low Perceived Control domain and stronger in the High Perceived Control Domain. Therefore, we expect to find a significant negative regression coefficient for the interaction variable *Collab x PercContr* in model 4. We found hypothesis 3 confirmed in table 5-5. According to the procedures of Sharma et al. (1981), that we described in chapter 3, we conclude that *PercContr* is a quasi-moderator on the relationship between *Collab* and *Continue* (dependent variable), since it not only acts as a moderator but has a direct effect on *Continue* as well.

For interpretation purposes we present the regression plots (without confounding variables) in figure 5-1 below. The figure shows the regression lines for various values of Perceived Control. Consistent with Aiken and West (1991), p13 these lines were calculated for the mean scores of the moderator (Perceived Control) and a useful number of standard deviations added or subtracted. The regression lines are not parallel, but don't intersect within the range of treatment and measurement conditions we used in our experiment.

Since the order of the five regression lines remains unchanged, this type of interaction is called "ordinal" (Jaccard & Turrisi, 2003), p78.
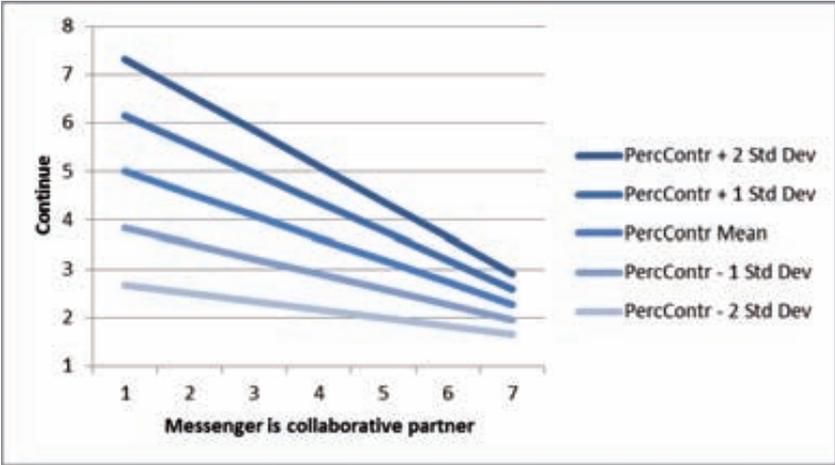
Figure 5-1 Regression plots with Perceived Control as moderator

We see confirmed that the regression line in the Low Perceived Control conditions is more flat than in the High Perceived Control conditions. As hypothesized, in the High Perceived Control conditions, decision makers might show competitive arousal when the message comes from an Opponent and they are more likely to continue the project and respond Deaf Effect to the Risk Warning. In the Low Perceived Control conditions they consider themselves to be more helpless and are more likely follow any advice, regardless whether the message comes from a Collaborative Partner or an Opponent. These hypotheses are confirmed in the subgroup regressions in figure 5-1 and in our moderated regression analysis.

5.7.2. Regression Analysis on Mediating Effects

In order to test whether mediation effects could be found, we followed the procedures according to Baron and Kenny (1986). First, we should perform three regressions: 1) The predictor variable to the mediator[33], 2) the predictor variable to the outcome variable and 3) the predictor and mediator together to the outcome variable. Next, we should establish that conditions for mediation are met: which requires that the predictor variable should affect the mediator in the 1st regression, that the predictor variable should affect the outcome variable in the second regression and that the mediator should affect the outcome variable in the 3rd regression. If these conditions hold in the predicted direction, then the

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[33] Throughout this thesis we consistently use the phrase "regression of X_1 and X_2 to Y", in which Y is considered to be the dependent or outcome variable that is observed and X_1 and X_2 are considered to be the independent or predictor variables who are manipulated. Formally correct this should be phrases as "regression of Y on X_1 and X_2".

effect of the predictor on the outcome must be less in the 3rd regression than in the second. Sobel's test (Sobel, 1982) is used in order to assess the approximate significance of the indirect effect of the predictor variable on the outcome variable via the mediator.

We start our mediation analysis with *MsgRelev* as a proposed mediator between *Collab* and *Continue* (hypothesis 4b). The first out of three regressions shows that the predictor (*Collab*) has a significant regression coefficient (at .000) to the mediator (*MsgRelev*) with b (s.e.) of .567 (.065), beta[34] of .606, T of 8.692 and R^2 of .363, in the proposed positive direction. Thus we conclude that the 1st condition for mediation is confirmed, which has been labeled earlier as hypothesis 4a.

In the table 5-8a we describe the 2nd and 3rd regressions as required for mediation analysis according to Baron and Kenny (1986). Presentation of the results of these Causal steps Mediation results follows Wood et al (2008), using hierarchical regression and the *Sobel Z*[35] to test the approximate significance of the indirect effect via the mediator.

Predictors	b(s.e)	Beta	T	F	df	ΔR^2	Total R^2	Sobel Z
				Model 1				
Collab	-.061 (.013)***	-.382	-4.711	22.191***	130	.146	.146	
				Model 2				
MsgRelev	-.028 (.017)	-.164	-1.622	12.550***	129	.017	.163	-1.618[a)]
Collab	-.045 (.016)**	-.282	-2.786					

Dependent Variable: Continue
 N=134, Durbin-Watson is 1.748, , a) signif at 0.052
+*p< .10* *p< .05* **p<.01* *** p<.001*
Table 5-8a Mediated Regression Analysis of Collab to Continue

Based on this table we conclude that the conditions for mediation are fulfilled. The effect of *Collab* in model 2 appears to be less than in model 1. Furthermore the Sobel Z statistic showed a close to significant mediation at 0.052. As a consequence, hypothesis 4b was confirmed[36].

Next we focus on hypothesis 4d with *MsgRelev* as a proposed suppressor (vs mediator) on the relation between *PercContr* and *Continue*. The first out of three regressions shows the predictor (*PercContr*) has not a significant regression coefficient (at .299) to the mediator (*MsgRelev*) with b (s.e.) of .069 (.066), beta of .091, T of 1.042 and R^2 of .008. Thus we

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[34] With b (s.e.) we refer to the unstandardized regression coefficients and their standard errors. With *beta* we refer to the standardized regression coefficients that are corrected for the standard deviation

[35] We used the Sobel Z calculator that is available on www. danielsoper.com. The following algorithm is applied by this calculator: $Z = ab / [(b^2 \text{ x s.e.}_a{}^2) + (a^2 \text{ x s.e.}_b{}^2)]$ where *a* is the regression coefficient for the relationship between the independent variable and the mediator and *b* is the regression coefficient for the relationship between the mediator and the dependent variable.

[36] Since the regression coefficient of Collab in table 5-8a model 2 is significantly different from zero, there is a significant direct effect, so we find partial mediation.

conclude that the 1st condition for mediation is not confirmed, which has been labeled earlier as hypothesis 4c. In table 5-8b we describe the 2nd and 3rd regressions, needed for mediated regression analysis.

Predictors	b(s.e)	Beta	T	F	Df	ΔR^2	Total R^2	Sobel Z
			Model 1					
PercContr	.054 (.010)***	.423	5.329	28.400***	130	.179	.179	
			Model 2					
MsgRelev	-.064 (.012)***	-.377	-5.173	30.392***	129	.141	.320	-1.025
PercContr	.059 (.009)***	.458	6.280					

Dependent Variable: Continue
N=134, Durbin-Watson is 1.956
*+p< .10 *p< .05 **p<.01 *** p<.001*

Table 5-8b Mediated Regression Analysis of PercContr to Continue

Based on this table we conclude that the conditions for mediation are not fulfilled. The effect of *PercContr* in model 2 appears to be not less than in model 1. Furthermore the Sobel Z statistic showed no significant mediation. As a consequence, *PercContr* was not confirmed to act as mediator. It passed the 1st test of the proposed suppressor role according to Iacobucci (2008), p39, since the t-value of *PercContr* in model 2 was larger than this value in model 1. We will perform the other test for suppression later. Sofar, this test confirms hypothesis 4d.

We proceed with analysis of *PercRisk* as a proposed mediator. We first focus on *PercRisk* as a proposed mediator between *Collab* and *Continue* (hypothesis 5b). The first out of three regressions shows the predictor (*Collab*) has a significant regression coefficient (at .001) to the mediator (*PercRisk*) with b (s.e.) of .261 (.074), beta of .297, T of 3.548 and R^2 of .088, in the proposed positive direction. Thus we conclude that the 1st condition for mediation is confirmed, which has been labeled earlier as hypothesis 5a. In table 5-8c we describe the 2nd and 3rd regressions, needed for mediated regression analysis.

Predictors	b(s.e)	Beta	T	F	Df	ΔR^2	Total R^2	Sobel Z
			Model 1					
Collab	-.061 (.013)***	-.382	-4.711	22.191***	130	.146	.146	
			Model 2					
PercRisk	-.072 (.014)***	-.396	-5.087	26.160***	129	.143	.289	-2.908***
Collab	-.042 (.012)**	-.264	-3.398					

Dependent Variable: Continue
N=134, Durbin Watson is 1.949
*+p< .10 *p< .05 **p<.01 *** p<.001*

Table 5-8c Mediated Regression Analysis of Collab to Continue

Based on this table we conclude that the conditions for mediation are fulfilled. The effect of *Collab* in model 2 appears to be less than in model 1. Furthermore the Sobel Z statistic showed a significant mediation. As a consequence, hypothesis 5b was confirmed[37].

We proceed with hypothesis 5d with *PercRisk* as a proposed mediator on the relation between *PercContr* and *Continue*. The first out of three regressions shows the predictor (*PercContr*) has a significant regression coefficient (at .000) to the mediator (*PercRisk*) with b (s.e.) of -.297 (.057), beta of -.418, T of -5.241 and R^2 of .174, in the proposed negative direction. Thus we conclude that the 1st condition for mediation is confirmed, which has been labeled earlier as hypothesis 5c. In table 5-8d we describe the 2nd and 3rd regressions, needed for mediated regression analysis.

Predictors	b(s.e)	Beta	T	F	df	ΔR^2	Total R^2	Sobel Z
			Model 1					
PercContr	.054 (.010)***	.423	5.329	28.400***	130	.179	.179	
			Model 2					
PercRisk	-.065 (.015)***	-.360	-4.400	25.886***	129	.107	.286	3.331***
PercContr	.035 (.011)**	.273	3.335					

Dependent Variable: Continue
N=134, Durbin-Watson is 2.021
*+p< .10 *p< .05 **p<.01 *** p<.001*

Table 5-8d Mediated Regression Analysis of PercContr to Continue

Based on this table we conclude that the first condition for mediation was fulfilled. Second, the effect of *PercContr* in model 2 was less than in model 1. Furthermore the Sobel Z statistic showed a significant mediation. As a consequence, hypothesis 5d was confirmed[38].

We proceed with analysis of *ProbSucc* as a proposed mediator. We first focus on *ProbSucc* as a proposed mediator on the relation between *Collab* and *Continue* (hypothesis 6b). The first out of three regressions shows the predictor (*Collab*) has no significant regression coefficient (at .212) to the mediator (*ProbSucc*) with b (s.e.) of -.1.791 (1.428), beta of -.109, T of -1.254 and R^2 of .012, in the proposed negative direction. Thus we conclude that the 1st condition for mediation is not confirmed, which has been labeled earlier as hypothesis 6a. In table 5-8e we describe the 2nd and 3rd regressions as required for mediation analysis.

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[37] Since the regression coefficient of Collab in table 5-8c model 2 is significantly different from zero, there is a significant direct effect, so we find partial mediation.
[38] Since the regression coefficient of PercContr in table 5-8d model 2 is significantly different from zero, there is a significant direct effect, so we find partial mediation.

Predictors	b(s.e)	Beta	T	F	df	ΔR^2	Total R^2	Sobel Z
				Model 1				
Collab	-.060 (.013)***	-.383	-4.742	22.488***	131	.147	.147	
				Model 2				
ProbSucc	.004 (.001)***	.367	4.898	25.210***	130	.132	.279	-1.196
Collab	-.054 (.012)***	-.343	-4.577					

Dependent Variable: Continue
N=134, Durbin Watson is 1.959
*+p< .10 *p< .05 **p<.01 *** p<.001*

Table 5-8e Mediated Regression Analysis of Collab to Continue

Based on this table we conclude that the conditions for mediation are not fulfilled. The effect of *Collab* in model 2 is slightly less than in model 1. Furthermore the Sobel Z statistic did not show a significant mediation. As a consequence, hypothesis 6b was not confirmed.

We complete this section on mediated regression analysis with hypothesis 6d proposing *ProbSucc* as a mediator on the relation between *PercContr* and *Continue*. The first out of three regressions shows the predictor (*PercContr*) has a significant regression coefficient (at .000) to the mediator (*ProbSucc*) with b (s.e.) of 8.033 (.936), beta of .600, T of 8.580 and R^2 of .360, in the proposed positive direction. Thus we conclude that the 1st condition for mediation is confirmed, which has been labeled earlier as hypothesis 6c. In table 5-8f we describe the 2nd and 3rd regressions, needed for mediated regression analysis.

Predictors	b(s.e)	Beta	T	F	df	ΔR^2	Total R^2	Sobel Z
				Model 1				
PercContr	.057 (.010)***	.441	5.631	31.705***	131	.195	.195	
				Model 2				
ProbSucc	.002 (.001)*	.218	2.256	18.892***	130	.030	.225	1.947*
PercContr	.040 (.012)***	.311	3.222					

Dependent Variable: Continue
N=134, Durbin-Watson is 1.858
*+p< .10 *p< .05 **p<.01 *** p<.001*

Table 5-8f Mediated Regression Analysis of PercContr to Continue

Based on this table we conclude that the conditions for mediation are fulfilled. The effect of *PercContr* in model 2 is less than in model 1. Furthermore the Sobel Z statistic showed a significant mediation. As a consequence, hypothesis 6d was confirmed[39].

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[39] Since the regression coefficient of *PercContr* in table 5-8a model 2 is significantly different from zero, there is a significant direct effect, so we find partial mediation. Since *PercContr* and *ProbSucc* showed problems in discriminant validity, the conclusion on hypothesis 6d can be disputed. *ProbSucc* will be further excluded from the PLS-analysis, since it could bias the measured results of other relationships in the model.

5.8. Results from Partial Least Squares Analysis

Next to the more traditional Regression Analysis to assess our hypotheses on main effects, mediating effects and moderating effects, we followed an additional path of Partial Least Squares in order to obtain method triangulation. Compared to the regression analysis, PLS has the advantage that it assesses the measurement model within the context of the structural model, rather than testing in two separate analyses (Gefen et al., 2000). Additionally, PLS is able to identify path loadings across the entire model in a single run as opposed to multiple runs required using regression techniques. This results in a more rigorous analysis than using factor analysis and regression alone (Gefen, et al. 2000, p. 24). As regression analysis does, PLS seeks to show rejection of a null hypothesis of independent variables having no effect on the dependent variable while accounting for a significant amount of the variance in the dependent variable (Gefen, et al. 2000, p.27). PLS techniques perform the analysis by iterating between confirmatory factor analysis and path analysis until the change in variance explained is not significant. It then uses bootstrapping to estimate the significance of the paths. "Neither of these PLS significance estimation methods require parametric assumptions" (Gefen et al., 2000). In our use of PLS, we performed the PLS calculation to generate the basic PLS values and then used bootstrapping to compute the T-statistics for significance.

PLS has previously been applied in exploratory studies on the Mum Effect and the Deaf Effect on escalating IS-projects (Cuellar et al., 2006; Cuellar et al., 2007; Smith et al., 2001) and is appropriate for testing theories in the early stages of development. On the Deaf Effect it has, to our knowledge, no precedence in testing interaction effects with moderation analysis. As proposed by Chin et al. (1996), PLS could provide additional strengths to the more traditional moderated regression analysis (Chin et al., 1996). In this study we used smartPLS (Ringle et al., 2005) version 2.0. which included the product indicator approach for moderating effects as proposed by Chin et al. (1996). Our measurement model meets their criteria for moderation analysis, since it does not contain any formative constructs, which would have required alternative approach to assess and test for moderating effects .

5.8.1. PLS Measurement Model Assessment

In the parallel section on regression analysis we performed Principal Components factor analysis in order to assess reliability, convergent and discriminant validity, through SPSS. In the context of the PLS-analysis we followed the steps as performed by earlier studies on the Mum Effect and the Deaf Effect on escalating IS-projects (Cuellar et al., 2006; Cuellar et al., 2007; Smith et al., 2001). Following these predecessors, we assessed the strength of the measurement model through tests of convergent and discriminant validity as well. Therefore we conducted the tests as described by Chin (1998) and Fornell and Larcker (1981).

Convergent validity.

Two different assessments were made for convergent validity: (1) individual item reliability, and (2) construct reliability. Individual item reliability was assessed by examining the item-to-construct loadings for each construct that was measured with multiple indicators. In order for the shared variance between each item and its associated construct to exceed the error variance, the standardized loadings should be greater than 0.70. During early stages of scale development, even loadings of 0.5 and 0.6 may still be acceptable for an item if other indicators within the same block of measures have high loadings (Chin, 1998). As seen in table 5-9 none of the constructs include any questionable indicators.

Construct	Item	Item-to-Construct Loading
Collaborative Risk Warner	Collab1	0.900
	Collab2	0.914
	Collab3	0.923
Continue	Continue1	0.961
	Continue2	0.961
Message Relevance	MsgRelev1	0.916
	MsgRelev2	0.898
	MsgRelev3	0.874
Perceived Control	PercContr1	0.974
	PercContr2	0.975
	PercContr3	0.946
Perceived Risk	PercRisk1	0.800
	PercRisk2	0.828
	PercRisk3	0.845
	PercRisk4	0.870
Risk Propensity	RiskProp1	0.829
	RiskProp2	0.804
	RiskProp3	0.851
	RiskProp4	0.803

Table 5-9 Item to Own Construct Correlation vs Correlations with Other Constructs

We also considered the construct reliability for each block of measures, as shown in table 5-10. Compared to the construct reliability analysis as presented earlier in table 5-6a we extend on the Cronbach alpha calculations with composite reliability scores and AVE scores.

	AVE	Composite Reliability	Cronbachs Alpha
Collab	0.833	0.937	0.900
Continue	0.924	0.960	0.918
MsgRelev	0.804	0.924	0.878
PercControl	0.931	0.976	0.963
PercRisk	0.699	0.902	0.857
RiskProp	0.676	0.893	0.843

Table 5-10 Construct Reliability

Composite reliability scores and Cronbach's alpha scores both measure the internal consistency with a given construct's items. Unlike the more traditional Cronbach's alpha, the composite reliability score does not assume that all indicators are equally weighted. Therefore alpha tends to be a lower bound estimate of reliability, whereas the composite reliability score is a better approximation under the assumption that the parameter estimates are accurate" (Chin, 1998), p.320. Hair et al. (1998) suggest that a Cronbach's alpha score slightly lower than 0.7 might still be acceptable for exploratory research and Nunnally (1967) recommends a threshold value of only 0.6 for exploratory research. Table 5-8 shows that the construct reliability in our model exceeds these thresholds and has been established satisfactorily. Fornell and Larcker (1981) view Average Variance Extracted (AVE) as a measure of construct reliability. The guideline threshold for AVE is 0.5, which means that 50 percent or more variance of the indicators is accounted for (Chin, 1998). As table 5-10 indicates, all of the constructs in our measurement model exceeded the established criterion for AVE.

Discriminant validity

In our section on regression analysis, we performed a Principal Components Factor Analysis in order to test for discriminant validity. In this PLS-section we conduct two other tests for discriminant validity. First, we calculated each indicator's loading on its own construct as well as its cross-loading on all other constructs. Results are presented in table 5-11.

Construct	Item	Collab	Continue	Gender	Msg Relev	Perc Contr	Perc Risk	Risk Prop	Work Exp
Collab	Collab1	**0.90**	-0.39	-0.06	0.58	-0.04	0.21	-0.11	0.07
	Collab2	**0.91**	-0.36	-0.02	0.54	-0.07	0.26	-0.03	0.01
	Collab3	**0.92**	-0.37	-0.11	0.53	-0.10	0.31	-0.11	0.00
Continue	Continue1	-0.41	**1.00**	0.08	-0.36	0.39	-0.44	0.33	-0.11
Gender	Gender	-0.07	0.08	**1.00**	-0.14	-0.06	0.05	0.06	0.18
MsgRelev	MsgRelev1	0.60	-0.30	-0.11	**0.91**	0.07	0.16	-0.08	0.06
	MsgRelev2	0.52	-0.29	-0.11	**0.89**	0.07	0.15	-0.09	-0.01
	MsgRelev3	0.49	-0.37	-0.17	**0.87**	0.04	0.20	-0.17	0.03
PercContr	PercContr1	-0.08	0.40	-0.05	0.08	**0.97**	-0.47	0.17	-0.11
	PercContr2	-0.10	0.39	-0.07	0.04	**0.97**	-0.44	0.14	-0.09
	PercContr3	-0.04	0.34	-0.05	0.07	**0.94**	-0.42	0.16	-0.05
PercRisk	PercRisk1	0.29	-0.41	0.06	0.26	-0.22	**0.79**	-0.21	0.11
	PercRisk2	0.24	-0.36	0.06	0.21	-0.36	**0.82**	-0.13	0.11
	PercRisk3	0.23	-0.39	0.07	0.04	-0.55	**0.84**	-0.24	-0.01
	PercRisk4	0.20	-0.31	-0.01	0.16	-0.36	**0.86**	-0.24	0.15
RiskProp	RiskProp1	0.01	0.27	0.13	-0.01	0.25	-0.20	**0.82**	0.01
	RiskProp2	-0.03	0.14	0.10	-0.01	0.15	-0.21	**0.80**	-0.05
	RiskProp3	-0.13	0.36	0.01	-0.19	0.10	-0.25	**0.85**	-0.02
	RiskProp4	-0.15	0.25	-0.01	-0.18	0.02	-0.14	**0.80**	-0.08
WorkExp	WorkExp	0.03	-0.11	0.18	0.03	-0.09	0.09	-0.04	**1.00**

Table 5-11 Item to Own Construct Correlation vs Correlations with Other Constructs

In the last eight columns of this table, the loadings for each indicator on its own construct are higher than the cross loadings for other constructs' indicators. Moreover, going across the rows, each indicator has a higher loading with its own construct than a cross-loading with any other construct. This provides good evidence of discriminant validity (Chin, 1998), p321.

As a second test of discriminant validity, we considered whether the AVEs of the latent constructs were greater than the square of the correlations among the latent constructs. When this is true, more variance is shared between the latent construct and its block of indicators than with another construct (Chin, 1998). As can be seen by reading across the rows of table 5-12, our measures passed this test, thus providing additional evidence of discriminant validity.

Construct	Average Variance Extracted (AVE)	Collab	Continue	Gender	Msg Relev	Perc Contr	Perc Risk	Risk Prop	Work Exp
Collab	0.83	-	0.17	0.01	0.37	0.01	0.08	0.01	0.00
Continue	1.00	0.17	-	0.01	0.13	0.16	0.20	0.11	0.01
Gender	1.00	0.01	0.01	-	0.02	0.00	0.00	0.00	0.03
MsgRelev	0.80	0.37	0.13	0.02	-	0.01	0.04	0.02	0.00
PercControl	0.93	0.01	0.16	0.00	0.01	-	0.00	0.03	0.01
PercRisk	0.69	0.08	0.20	0.00	0.04	0.00	-	0.06	0.01
RiskProp	0.67	0.01	0.11	0.00	0.02	0.03	0.06	-	0.00
WorkExp	1.00	0.00	0.01	0.03	0.00	0.01	0.01	0.00	-

*Note: Figures in the last 8 columns represent **squared** correlations among constructs*

Table 5-12 AVEs vs Square of Correlations Among Latent Constructs

5.8.2. PLS Structural Model Assessment

With an adequate measurement model in place, we tested our hypotheses by examining the structural model. The explanatory power of a structural model can be evaluated by looking at the R^2 value (variance accounted for) in the final dependent construct. As presented in figure 5-2, the explanatory power of this structural model is satisfactory with R^2 for the final dependent construct *Continue* of .463 and the intermediate variables showed R^2 of 0.383 for *MsgRelev* and .302 for *PercRisk*. These R^2 values are sufficiently high to make interpretation of path coefficients meaningful. After computing path estimates in the structural model, using the entire sample, the smartPLS bootstrapping method was used to obtain the corresponding t-values, with 134 cases. These results are presented in figure 5-3.
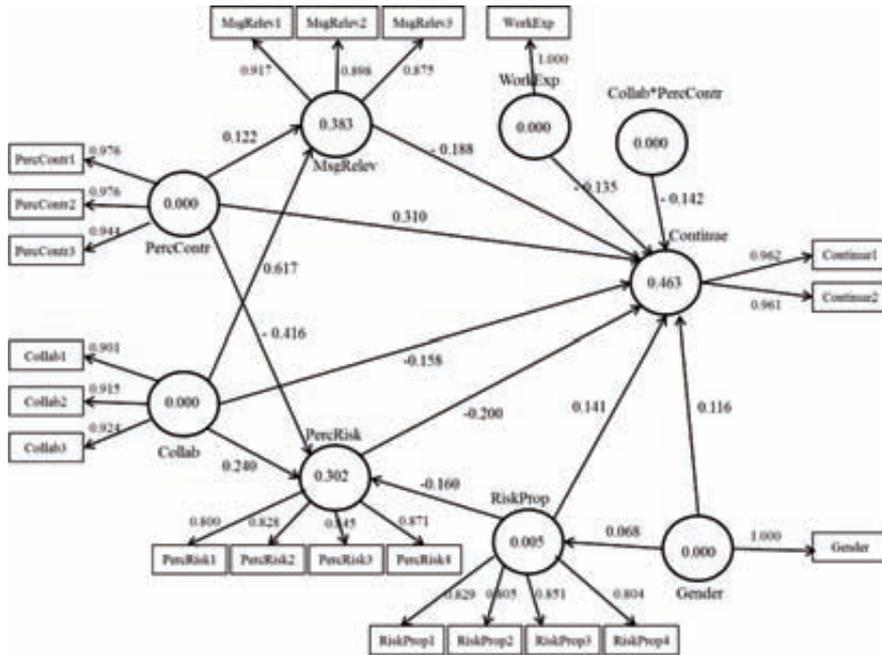
**Figure 5-2 PLS Path-coefficients Moderation&Mediation on Continue**
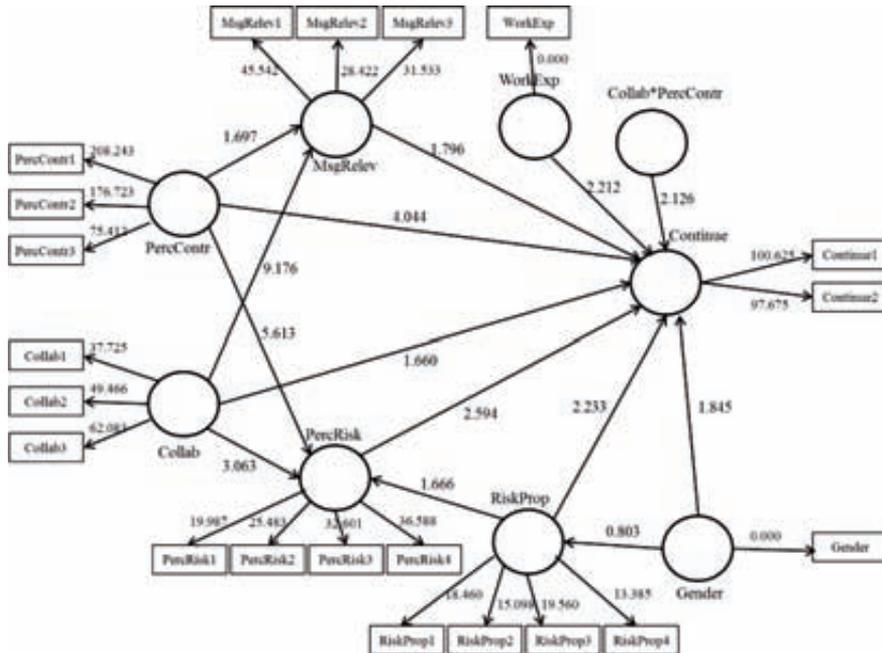
Figure 5-3 PLS Bootstrapping t-values Moderation&Mediation on Continue

Path coefficients and t-values for this model are listed in table 5-11. Support for each hypothesis could be determined by examining the sign (positive or negative) and the statistical significance of the t-value for its corresponding path.

	Original Sample (O)	Sample Mean (M)	Standard Error (STERR)	t-statistics (|O/STERR|)
Collab → Continue	-0.158	-0.159	0.095	1.664*
Collab → MsgRelev	0.616	0.616	0.062	9.825***
Collab → PercRisk	0.240	0.230	0.080	2.966***
Collab * PercControl → Continue	-0.146	-0.141	0.071	2.053*
Gender → Continue	0.116	0.116	0.067	1.723*
Gender → RiskProp	0.068	0.069	0.098	0.694
MsgRelev → Continue	-0.185	-0.179	0.104	1.775*
PercControl → Continue	0.321	0.315	0.098	3.275***
PercControl → MsgRelev	0.121	0.114	0.069	1.735*
PercControl → PercRisk	-0.415	-0.428	0.074	5.550***
PercRisk → Continue	-0.210	-0.217	0.088	2.370**
RiskProp → Continue	0.141	0.138	0.064	2.190*
RiskProp → PercRisk	-0.159	-0.182	0.099	1.607
WorkExp → Continue	-0.135	-0.131	0.060	2.252*

Table 5-13 Path Coefficients from Bootstrapping (Mean, Standard Error, t-Values)

This table shows that the direct effect of *Collab* on *Continue* in this model could be rejected to be zero, having a t of 1.664. This means that on top of the indirect paths as described in the model (with mediation of *MsgRelev*, *PercRisk*) a significant direct effect remains. The table also shows that the moderator effect (with t of 2.053) as proposed in hypothesis 3 is significant, taking into account all the alternative paths of our model.

In table 5-14a we present the results of our mediation analysis in PLS according to the guidelines as described by Iacobucci (2008). We group both the direct and indirect (mediated) path coefficients of *Collab* and *PercContr* on *Continue*. The indirect path coefficients are calculated by multiplying the coefficients from independent variable to mediator with the coefficient from mediator to dependent variable (Iacobucci, p25). The resulting path coefficients all share the basis that they include all the effects within the PLS-model as a whole. Therefore they can be compared in size and proportion. For each indirect path we present the calculated Sobel z[40] statistics (which represents the effect size of the mediating path compared to the direct path).

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[40] We used the Sobel Z calculator that is available on www. danielsoper.com. The following algorithm is applied by this calculator: $Z = ab / [(b^2 \times \text{s.e.}_a{}^2) + (a^2 \times \text{s.e.}_b{}^2)]$ where a is the regression coefficient for the relationship between the independent variable and the mediator and b is the regression coefficient for the relationship between the mediator and the dependent variable.

		Sobel z from regression	Path coefficients	Proportion of Effect	Conclusion
		Sobel z from PLS			

	Effect				
Collab to *Continue*	Direct		- 0.158	49.2%	
	Via MsgRelev	-1.751*	-1.618*	- 0.113	35.2%	Hypothesis 4b confirmed
	Via PercRisk	-1.867*	-2.908***	- 0.050	15.6%	Hypothesis 5b confirmed
	Total		- 0.322	100%	
PercContr to *Continue*	Direct		0.321	83.2%	
	Via MsgRelev	-1.189	-1.025	- 0.022	- 5.7%	Hypothesis 4d confirmed
	Via PercRisk	2.204*	3.331***	0.087	22.5%	Hypothesis 5d confirmed
	Total		0.386	100%	

Table 5-14a Overall results of our mediation analysis

In table 5-14a we find that the mediation effects were consistent across regression analysis and PLS. Hypthesis 4d on the proposed suppressor role of *MsgRelev* on *PercContr* requires some additional explanation based upon suppressor tests as proposed by Iacobucci (2008), p39. The first test for suppression was found confirmed in table 5-8b in which the t-value of *PercContr* in model 2 was larger than this value in model 1[41]. So when we control for the influence of *MsgRelev*, the direct relation between *PercContr* and *Continue* increases[42]. A second proof for suppression was found in the PLS model, in which the direct path coefficient of *PercContr* on *Continue* was positive and the indirect path via *MsgRelev* was negative, also providing evidence for suppression. Since suppression also theoretically makes sense, we confirmed hypothesis 4d.

For comparison purpose we present the Sobel z statistics of regression of chapter 4 in table 5-14b.

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[41] For mediation, the t-value of *PercContr* in model 2, should have been lower than the t-value in model 1.

[42] Interpret in our injury – medicine – pain example as: if we take into account the influence of the medicine, we find that the effect of injury on pain would be much stronger, since it was suppressed by the medicine

	Effect	Sobel z from PLS	Sobel z from regression	Path coefficients	Proportion of Effect	Conclusion
Collab to *Continue*	Direct			- 0.052	13.8%	
	Via MsgRelev	- 4.635***	- 5.411***	- 0.218	57.8%	Hypothesis 4b confirmed
	Via PercRisk	- 2.480**	- 3.443***	- 0.056	14.9%	Hypothesis 5b confirmed
	Via ProbSucc	- 2.571**	- 3.159***	- 0.051	13.5%	Hypothesis 6b confirmed
	Total			- 0.377	100%	
GainFrame to *Continue*	Direct			- 0.262	75.3%	
	Via MsgRelev	- 2.352**	- 1.846*	- 0.046	13.2%	Hypothesis 4d confirmed
	Via PercRisk	- 0.694	- 0.998	- 0.008	2.3%	Hypoth 5d not confirmed
	Via ProbSucc	- 2.219*	- 2.452***	- 0.032	9.2%	Hypothesis 6d confirmed
	Total			- 0.348	100%	

Table 5-14b Overall results of our mediation analysis in chapter 4

5.9.   Other Relevant Results from the Experiment

In addition to the hypothesis testing we performed in this chapter, the results of the experiment provided us with two additional sources of information that are of help in answering the research questions of this chapter.

5.9.1.   Open Questions

We asked respondents throughout the development and testing stages of our experiment, to describe why they decided to continue or redirect. We eliminated this question in the final execution of the experiment since it appeared to take too much time of respondents. The open question provided us with the following findings from approximately 200 participants who joined the test-stages: (1) The history with the messenger as a Collaborative Partner or as an Opponent, dominated the arguments to continue – and was sometimes rationalized further; (2) Some respondents extended quite easily on their reasoning from considering the internal auditor as a Collaborative Partner to, as a next step, considering the auditor to be a credible source; These are distinct constructs but may have a causal or correlational relationship; (3) Arguments related to Perceived Control sometimes were followed by respondents' own experiences with similar projects. Given the experimental design, of course this doesn't cause differences between treatment groups.

5.9.2.   Estimated vs Given Probabilities to Succeed

We asked all respondents to estimate the probability to succeed the project (and meet the business case). Since the auditor provided a Risk Warning that included the assessed chance of succeeding (1/3) and failing (2/3), we can compare these estimated probabilities across the four treatment groups with the information they had received. This could help in

understanding whether the Deaf Effect could apply to the probability part of the Risk Warning. The estimations across the four treatment groups are presented in Table 5-15 below[43].

	Treat Collab Low	Treat Collab High
Treat PercContr High	60.2% (19.7) N=33	50.1% (15.9) N=34
Treat PercContr Low	37.9% (21.3) N=32	40.0% (18.4) N=34

Table 5-15 Subjects' Estimated Probability to Succeed with given probability of 1/3

Subjects who received the low perceived control treatments estimated their probability to succeed slightly higher than the chance the auditor had provided in the Risk Warning. Remember that these subjects had working experience from the field, which could explain this bias. For example their idea that they regularly estimate probabilities to fail lower than the auditors estimate them. In this low perceived control position it hardly made any difference whether the auditor was seen as Collaborative Partner or Opponent. The high control treatment subjects estimated probabilities to succeed much higher. The interesting finding here is that their estimations to succeed further rose when they considered the messenger to be an Opponent (where this did not make a difference in the low perceived control treatment). This comfirms the expected effect of competitive arousal to the messenger in these conditions. This effect was attenuated in the low perceived control treatment conditions.

5.10   Discussion and Implications

5.10.1.   Contribution of this study

Our model explained a substantial amount of the variance (46.3.9%) in the subjects' decision to continue a course of action and thus respond with the Deaf Effect to the internal auditors' Risk Warning. Compared to the 53.9% explained variance with student subjects in chapter 4, we think this is relatively high given the use of respondents with working experience here, which inevitably brings noise and requires stronger treatments. Cuellar's studies, that were centered around source-credibility, provided even more with 62.8% and 62.5% of explained variance (Cuellar, 2009; Cuellar et al., 2006). The main difference is that we excluded this influential Credibility factor – operationalized as "crywolf"- from our model.   The warning was provided by a source that meets professional standards of credibility. Before turning to a discussion of the study's

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[43] Please note that for this purpose we used the treatment variables instead of the independent variables that we used in our causal model and hypothesis testing.

limitations and implications for both future research and practice, it will be helpful to consider the following contributions of this study in light of these results.

First, this study introduced and tested the effects of two variables – (1) messenger's Collaborative Partnership and (2) decsision maker's perceived control – on the decision to continue a course of action despite the availability of a clear and obtrusive Risk Warning. Both constructs had not been tested in the context of the Deaf Effect earlier. Both provided a substantive and almost equal contribution in causing Deaf Effect. Nevertheless they differed in the mediating constructs through which they affected the decision to continue the course of action. The question of whether the messenger is seen as a Collaborative Partner or as an Opponent highly influenced the Message Relevance (*MsgRelev*) that people assigned to this warning and it influenced subjects' Perceived Risk (*RiskPerc*). The construct on the relationship with the messenger was derived from Stewardship Theory. We contribute to research on Stewardship Theory by testing it at a micro inter-personal level between the internal auditor and senior management, where most studies consider Stewardship Theory at organizational corporate governance level. Our results were consistent with expectations according to Stewardship Theory and were consistent with the findings in chapter 4. The decision maker's perceived control had an effect on the continuation decision in a way that was expected from Illusion of Control Theory, with Perceived Risk as a strong mediator. The mediating role of Message Relevance was particular. It partially mediated the influence of the messenger's Collaborative Partnership on the decision to continue the course of action. This was consistent with the Heuristic-Analytic Theory and with the results of chapter 4. Message Relevance appeared to act as suppressor variable for the effect of Perceived Control on the decision to continue the course of action.

Second, this study provides some amount of quantitative empirical support for the theoretical distinction between internal auditors choosing either the path of Collaborative partnership or choosing the path of behaving as an Opponent in bringing their Risk Warning to decision makers. This distinction was suggested by other authors (Chambers et al., 1988; Keil & Robey, 2001) and buttressed primarily with qualitative, anecdotal evidence. In addition, this study contributes by providing empirical support that this distinction might be contingent to conditions of the decision maker's Perceived Control.

Third, this study is one of the first attempts in examining the Deaf Effect with mediation analysis that provides insight into the proportional effects of direct and indirect paths. Together with moderation analysis, this provides a richer view on the causes of Deaf Effect in the context of IS-projects and the role of various constructs. By combining different statistical methods of moderation and mediation analysis we contributed to statistical conclusion validity. By combining exploratory and confirmatory factor analysis for convergent and discriminant validity, and by performing various tests on measurement reliability we contributed to construct validity for further research on these constructs in the context of the Deaf Effect. And by sharing main parts of our design across two different experiments we also contributed to the external validity and nomological validity of research on the Deaf Effect based on the constructs and theories that we studied.

5.10.2.   Main Findings

The following summary provides an overview of the findings of this empirical study on main effects and moderation effects: (1) Decision makers with low Perceived Control are more likely to discontinue the course of action after a Risk Warning. Decision makers with high Perceived Control are more likely to continue the course of action and repond with Deaf Effect to the Risk Warning; (2) The decision makers are less likely to continue the course of action after the Risk Warning, when the messenger is seen as a Collaborative Partner. The decision makers are more likely to continue the course of action after the Risk Warning, when the messenger is seen as an Opponent; (3) Decision maker's high level of Perceived Control amplifies the influence of the relationship with the messenger (seen as a Collaborative Partner or as an Opponent) on the decision to continue a course of action; and (4) Decision makers' Estimated Probability to Succeed is highest for decision makers with high Perceived Control who see the messenger as an Opponent.

With respect to mediation effects, this empirical study provided the following findings: (1) The decision makers assign less relevance to the Risk Warning if the messenger is seen as an Opponent. They assign more relevance to the Risk Warning when the messenger is seen as a Collaborative Partner; (2) The effect of decision makers' Perceived Control on the decision to continue is partially mediated by Perceived Risk, however the effect is mainly direct; (3) Message Relevance is a suppressor for the effect of decision makers' Perceived Control on the decision to continue a course of action. It acts like a 'coping' variable, without this variable the influence of Perceived Control even would have been stronger.

5.10.3.   Limitations of The Study

As is the case with all experiments, we should be cautious when generalizing the results of this study for several reasons. First, the experiment conducted in this study took a necessarily narrow focus in order to achieve a high degree of control over extraneous variables. There are, without doubt, other organizational and political factors that may also affect managers' Deaf Effect responses to Risk Warnings. In Chapter 7 we will explore such factors following a multi-casestudy approach. Some factors may not lend themselves to experiments. Furthermore, this experiment does not provide insight into any feedback loops between the messenger and the decision maker in which the Deaf Effect might evolve. Second, in our study we focus on the Deaf Effect at inter-personal level: with the auditor as provider of an objective assessment and with the decision maker's view on the messenger (as a Collaborative Partner or as an Opponent) as a determinant. Of course, this inter-personal view, is only one level in the corporate governance framework implementation based upon Stewardship Theory principles. We did not study any effects at a department-level or at an organizational level. Third, our measures of the *Collab* construct in the context of Internal Auditor – Project Owner relationship were self-developed given our particular level (inter personal) and context. Although they were derived from literature, tested and improved in the preparations of this study and shared with experts, they ask for more refinement and testing. Finally, as is customary to many experiments of this type, we have measured our constructs by self-report of student participants. Combined with the obtrusive nature of an experiment this may restrict external validity of the results. It is possible that people's reaction to the treatment

scenarios might differ from an on-the job reaction. It is also possible that self-reported measurements on Message Relevance, when asked to rate them on 7-point Likert scale, might not show entirely consistent results with measuring Message Relevance when subjects were involved in an eye movement tracking experiment. For this reason, the latter was proposed by Ball et al. (2003) in order to measure Message Relevance in Heuristic Analytic theory experiments in psychology. This might also count for applied experiments as we performed here.

5.10.4.   Suggestions for Further Study

We think that further experimental research on Perceived Control in the field of the Deaf Effect in Escalating IS-projects could prove very interesting. This could follow two paths. First, within-subject experimental designs – such as of Jani (2005) - could provide more refined insight in cumulated effects of Perceived Control on Deaf Effect. A second path could be found in replications in this context of the various psychology experiments on Illusion of Control Theory. Factors such as decision maker's *freedom of choice*, *predicted outcome*, *need for the outcome*, *familiarity*, *competition* and *actor/observer positions* have been tested in card-playing psychological experiments. In the field of stop/continue decisions in escalating IS-projects, these conditions could be induced by Decision Makers' organizational environment, such as: freedom of choice, responsibility, clear goals and plans, incentives, scarce resources, use of standards, reliability of information. By knowing the influence of Perceived Control on the Deaf Effect, it could be interesting to investigate organizational conditions that could be of influence on Perceived Control and thus on the Deaf Effect.

Finally, the *Stewardship Theory* component of our study could be further elaborated in the context of the Deaf Effect for auditor warnings in IS-projects. From methodological perspective, it appears to be interesting to follow a path of multi-level constructs to take into account both the organizational level and the individual level of the decision maker in order to obtain a deeper understanding of the Deaf Effect in IS-projects, with the IS-study of Burton-Jones and Gallivan (2007) as an example of how this could be approached. Furthermore it would be interesting to isolate constructs – such as *Trust* - that are closely related to Stewardship Theory, on their causal relation with the Deaf Effect.

5.10.5.   Implications for Internal Auditors

Although not new of course, this study reminds the internal audit profession that the effectiveness of their service – reporting on risks and controls – includes the concepts of human information processing and bounded rationality.

One guidance on effective communication that could be derived from our study is related to the decision maker's perceived control. A decision maker with a perceived control too high could become deaf to Risk Warnings and could become too much risk seeking. As we could learn from Illusion of Control experiments, Perceived Control can be influenced by many factors. A positive outcome history with earlier projects could be one of the dominant factors of high perceived control. The internal auditors could be alert on indicators that – often experienced – managers could be prone to invulnerability effect.

Compare with the over-confident car-driver who doesn't use seatbelts, uses a mobile phone or violates traffic rules. Similar indicators could be found as thresholds in business environment and could be helpful for auditors to notify tendencies to invulnerability effect through high perceived control. Furthermore, the internal auditor should realize that a decision maker with high Perceived Control could be promoted to respond Deaf when he sees the messenger as an Opponent. This means that the internal auditor him or herself is more than just an observer of the project and of the decision making. The internal auditor's reported observations could fuel escalation of commitment and the Deaf Effect even further when the internal auditor is seen as an Opponent who is exposing management failure. The auditor should take this into consideration for his communication to management and aim for a communication strategy that brings perceived control to a realistic level.

A second guidance on effective communication of auditor warnings, applies to how to make use of the advantage of Collaborative Partnership in a particular situation. If the internal auditor might not directly be seen as a Collaborative Partner him/herself, the audit executive – with a strategic Collaborative Partnership history with the manager – could be more effective in sharing concerns with executive management. Another scenario would be to share the factual concerns with a person or with persons that the decision maker sees as Collaborative Partner(s) and who are less incapsulated in the course of action (the project).

5.10.6 Implications for managers and organizations

The main implications of our study at management and organization level go beyond the effective contribution of an internal auditors to the organization's IS-projects. Regardless the role of the internal auditor, the organization itself and the managers involved are not served by irrational decision making in IS-projects due to exceeded thresholds on perceived control. Heuristics are part of manager's experience and are very useful to the performance of managers and their valuable contribution to the organization. Strategic IS-projects often are so complex, intangible and relevant that the organization's most experienced staff will be assigned to such projects. Nevertheless there could be some pitfalls connected to these heuristics which should be circumvented within the organization. Organizational conditions should not allow or even promote Perceived control to exceed a threshold. As we saw in the Illusion of Control experiments, freedom of choice, high involvement, long experience, need for the outcome could elevate perceived control to much higher levels than warranted by the actual level of control. So the organization should guard that thresholds on these – and similar – organizational factors are not exceeded without notice. With interventions such as job-rotation, adapted incentive schemes, peer reviews and with clear standards, the organization could balance manager's perceived control to remain at sane levels.

CHAPTER 6. ACTOR-OBSERVER DIFFERENCE UPON IS-RISK WARNINGS: AN EXPERIMENT ON ILLUSION OF CONTROL THEORY

6.1. Introduction

In Chapter 5 we examined the influence of decision makers' Perceived Control on the Deaf Effect for a Risk Warning from the internal auditor. We found that this influence was partially mediated by decision maker's Perceived Risk upon that warning. In this chapter we will focus on Perceived Risk.

From earlier laboratory experiments we learned that decision maker's personal characteristics such as working experience, age, gender and risk propensity affected the Deaf Effect(Cuellar, 2009; Cuellar et al., 2006; Cuellar et al., 2007). This working experience was measured as a number of working years. This number of years appears to reflect that people have developed heuristics over time that may be of influence on the Deaf Effect. Despite the equal number of working years, people in different roles may have developed different heuristics. These heuristics could account for different perceptions of risk across managers and internal auditors based on identical information on IS-risks. Therefore, we aim to gain further insight into these differences across managers and internal auditors in their perception of risks which could be related to their perceived control heuristics.

Surveys from the field shed more light on whether experienced managers indeed could show risk behaviour tendencies that could be related to Perceived Control. Perceived Control was addressed in a large scale study on risk-taking obtaining responses from 656 executives (March & Shapira, 1987; Shapira, 1995) from American and Israeli executives from private-sector and public-sector firms. The findings of this study on Perceived Control are supported by another large survey and interviews performed across 509 executives across US and Canada (MacCrimmon & Wehrung, 1986). That survey suggests that managers don't accept the idea that the risks they face are inherent in their situation. Rather, they believe that risks can be reduced by using skill to control the dangers (March & Shapira, 1987), p1410. Seventy-five percent of the managers saw risks as controllable. Managers see themselves as taking risks, but only after modifying and working on the dangers so that they can be confident of success. Prior to a decision, they look for risk controlling strategies (MacCrimmon & Wehrung, 1986; March & Shapira, 1987). The highest ranked modes of dealing with risks according to Shapira (1995) p76, were (1) to collect more Information, (2) to check different sspects, (3) actively work on the problem and (4) to delay the decision. Shapira suggested that managers consider these as ways to exert skill and enhance perceived control over the risks.

A survey across 210 British and Scottish Managers and accountants (Helliar et al., 2002) showed that, managers and auditors exhibit many of the biases that have been documented for executives in other studies (March & Shapira, 1987; Sitkin & Pablo, 1992). This survey also provided insight into several differences between managers and auditors in their Perception of Risk, which we will describe later as an introduction to our hypotheses. At

this point, we conclude that it appears to be useful for our study on the Deaf Effect to obtain further insight in differences in Risk Perception across managers and internal auditors, based upon different heuristics that could be related to their working experience in either role.

Two perspectives are taken to analyze these differences. First, we are interested in whether working experience as an auditor – with their heuristics as observer - or as a manager – with their heuristics as actor - leads to different perceptions of identical information on IS-risks. Second, we are interested in whether employees with different Risk Propensity, would show different Perceived Risk after receiving a Risk Warning. We will explain and elaborate these perspectives in the next section.

6.2.   Research Questions and Hypotheses

In order to refine our Research Questions we first clarify that the proposed contribution of this study will be to understand *How* Risk Perception could differ between managers and internal auditors on reported IS-risks. The assumptions and scope that we will take into account are:

- The unit of analysis is the employee who receives a Risk Warning on IS-risks;

- The Messenger acts in the role of internal auditor who meets the professional standards of the Institute of Internal Auditing (IIA, 2004). These standards address the criterion of a Bad News Messenger who is acting as a credible source - i.e. who has the expertise and could be relied upon to make true assertions (Cuellar et al., 2006). Furthermore, they assure that the internal auditor would operate from an Auditing Function which is independent from management authority (Keil & Robey, 2001);

- The dependent variable is Perceived Risk. As we found in previous chapters, this variable played a role in explaining the Deaf Effect for Risk warnings.

This brings us to the following table with the research questions which we aim to answer in this chapter:

	Research Question	Type of Question
6	Do managers and internal auditors have different perceptions of risk after receiving a Risk Warning, which can be related to their working experience?	Why/How
	6.1 Are these differences consistent with expected heuristics from Illusion of Control Theory – the actor/observer heuristic in particular?	Why/How
	6.2 Are these differences related to Risk Propensity?	Why/How

Table 6-1 Contribution of this empirical study

The suggested actor/observer difference is derived from an applied study on Illusion of Control in car driving behavior. Horswill and McKenna (1999) used an experiment to assess the effect of perceived control on risk taking in a dynamic every day task. Using established and validated video simulation techniques, the risk-taking preferences of 96 drivers were measured for a range of driving activities (speed choice, following distance, gap acceptance and overtaking). Their Perceived Control manipulation was as follows: half of the participants were told to imagine they were driving the vehicle, and the other half were told to imagine they were passengers. Those who were told to imagine they were driving chose significantly faster speeds than did those who were told to imagine they were passengers. People who assumed to be sitting at the driver-seat showed significantly more risk seeking behaviour than people assumed to be sitting at the passenger seat. So, the role of actor versus observer moderated the behaviour that participants showed based on the information they saw on video.

We consider the auditors to be in the position of observer. They have developed heuristics from sitting at the passenger-seat within their organisation and they provide Risk Warnings to management with the objective that these managers take action. We consider management to be in the position of actor. They have developed heuristics from sitting in the drivers-seat and taking action. According to Illusion of Control Theory, the manager (actor) would show more risk seeking behaviour and show lower Perceived Risk than the observer, the auditor.

This actor/observer effect was confirmed in a sequence of simple Illusion of Control experiments in which participants were asked to estimate their probabilities to win in a lottery under various experimental conditions. Participants who were allowed to choose their own lottery tickets required more compensation to be induced to exchange their tickets than those who did not choose their ticket (Langer, 1975). In a second "lottery ticket exchange" study, the same result was found even when the exchange ticket had a higher probability of winning than did the original ticket. Similarly, choice and involvement (choice of symbols and shuffling the symbol deck) led to stronger beliefs in the success of one's performance at extrasensory perception (Ayeroff & Abelson, 1976). In a coin toss experiment, participants who were the performers rated themselves better at the task and predicted they would have more successes than observers did (Langer & Roth, 1975).

Based on these experiments, we expect that managers will show a lower Perceived Risk than internal auditors based on identical information. We find support in the survey across 210 British and Scottish Managers and accountants (Helliar et al., 2002) that showed similarities and differences between managers and auditors. It showed that both managers and auditors focus on the (positive/negative) framing of a decision with an emphasis on the magnitude of negative outcomes and with a insensitivity to probability estimates. Results showed for both auditors and managers that relevant information, more control, greater expertise, ability to consult colleagues, time to consider a decision, and the potential of positive outcomes play a significant role in the perception of risk. Furthermore, decision maker's personal characteristics and organisational characteristics (culture, reward structure and favourable economic circumstances) play a significant role for both auditors' and managers' perceptions of risk but didn't differ between the two groups. Results also

suggest that the probability of a loss to occur drives auditors' risk perception to a higher level than it does to managers. The same applies to the magnitude of any potential loss resulting from a decision. Thus, information on higher probability and impact would drive auditors to significantly higher levels of perceived risk than it does to managers.

Based on these studies, we expect that managers and auditors' Perceived Risk is dominated by information on Impact. They differ in the level of Perceived Risk and their different heuristics related to Probability of Loss. To once again make the comparison with car-driving, for managers their perceived control is likely to increase over years. This may drive them to underestimate probability that risk could occur to them personally (Sjöberg, 2000a), much in the same way as it does to experienced car-drivers (Horswill & McKenna, 1999). The experienced car-driver, sitting at the steering-wheel, does not assume that is his or her car-accidents are cheaper to repair than those of others – i.e. the impact of risk. Instead, they assume that the probability that a car-accident happens to them personally is lower than for others.

As reported by March and Shapira (1987) p1411, only two of the 50 executives interviewed said that they accept risk estimates as given to them. Most managers believe that they can do better than is expected. Managerial confidence in the possibilities for post-decision reduction in risk comes from an interpretation of their managerial experience. Thus, managers accept risks, in part, because they do not expect that they will have to bear them. They perceive that risk-information does not apply to them personally.They especially tend to think that they can beat the probability estimations. Their experience and confirmations of beating the odds may further boost managers' confidence and perceived control while making decision on risks (Shapira, 1995), p82. Experienced managers appeared to be the least sensitive for given probability-information, while being confident that these probabilities did not apply to them personally (Shapira, 1995), p74.

These considerations provide us with the following hypotheses for our study.

H1a. *Probability Information in a Risk Warning affects the Risk Perception of the receiver of that Risk Warning*
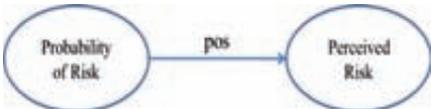
H1b. *Impact Information in a Risk Warning affects the Risk Perception of the receiver of that Risk Warning*


H1c. *Impact Information in a Risk Warning affects the Risk Perception more strongly than Probability Information.*

H2a. *Employees with a role of acting on IS-risks show a lower Risk Perception than employees with a role of observing IS-risks when they receive a Risk Warning.*

H2b. Employees with a role of acting on IS-risks are less affected by Probability information in a Risk Warning than employees with a role of observing IS-risks.
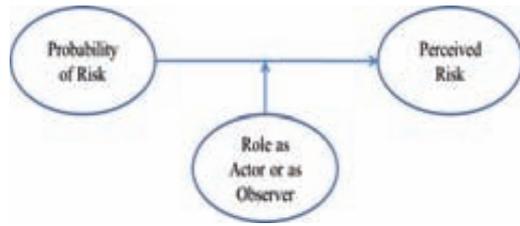
In addition to the actor/observer perspective we also propose employee's Risk Propensity to be related to his/her working experience. The suggested influence of Risk propensity on Perceived Risk is indicated as follows. When someone is more risk averse, this may result in this person's risk tolerances being more easily exceeded and in perceiving risks in a particular situation more highly than someone who is less risk averse. A person's attitude towards risk is considered a general personality-trait (refered to as risk-attitude) or could be domain-specific, called risk propensity (Nicholson, Soane, Fenton-O'Creevy, & Willman, 2005). Sitkin and Weingart (1995) propose that both risk perception and risk propensity play a role in human decision making. There appears to be strong support for the existence of a relatively stable individual tendency to take or avoid risks. MacCrimmon and Wehrung (1985) for example, found consistent responses of people on different measures of willingness to take risks. These findings suggest the possibility to rate someone's behavior on a scale from risk seeking to risk averse. Some authors have even defined risk propensity as a personality trait, implying that it is stable over time and across circumstances (Fischhoff, Lichtenstein, Slovic, Derby, & Keeney, 1981). Subsequently, various measures have been designed to assess risk propensity as a stable personality trait by applying measures similar to personality assessment instruments. We refer to Harrison, Young, Butow, Salkeld, and Solomon (2005) for an overview of measurement instruments that assume that person's risk propensity is stable across domains.

In a study by Weber, Blais, and Betz (2002), support for risk propensity as a stable trait was not found across different domains. These results suggest that people could show consistent risk averse behavior within certain domains and can show completely opposite behavior in other domains. For example, an individual's behavior of abundant smoking and drinking suggests a risk-seeking risk propensity in the domain of personal health. This however does not automatically imply that the same individual is risk seeking in other domains such as career and prestige. On the contrary, the individual could very well behave in a very risk-averse manner in such domains. From this perspective, risk propensity is defined as a domain specific behavioral tendency rather than as a pure personality trait (Sitkin & Pablo, 1992). An individual's risk propensity is largely shaped by the characteristics of time and situation. Certain situations could demand certain attitudes toward risk or previous experiences in a certain domain could have changed one's attitude. The behavioral tendency within specific domains however, has been found to be stable (Weber et al., 2002). To assess risk propensity across and within specific domains, various instruments have been developed as well. The before mentioned overview by Harrison et al. (2005) also includes instruments that bare the assumption that Risk Propensity is domain specific.

In order to understand an individual's general tendency toward either taking or avoiding risk, one should investigate the underlying factors. Sitkin and Pablo (1992) have conducted

a comprehensive examination of different streams of literature on risk and decision-making. This study resulted in the proposition of a model in which the causal relations that account for risk behavior are explained. Risk propensity was found to be the most important determinant of risk behavior. Further examination revealed three underlying factors that shape risk propensity: risk preference, inertia and outcome history. *Risk preference* is proposed as a shaping factor of risk propensity (Sitkin & Pablo, 1992) and refers to the stable individual risk disposition to prefer or dislike risks. *Inertia* refers to the notion that individuals exhibit routine ways of handling risky situations. This individual orientation appears to be persistent over time, forming a relatively stable pattern (Kogan & Wallach, 1964; Slovic, 1972). Consistent with this pattern, it is expected that people who behaved risk aversely in the past will often continue this behavior, even with a stimulus that asks for a shift to more risk seeking behavior. This persistent behavioral tendency appears to shape risk propensity for a large part (Sitkin & Pablo, 1992). *Outcome history* of previous risky situations is an aspect omitted in many theories. Prospect Theory, for example, does not include historical events at all in the decision making process[44]. The outcome of previous risky decisions however, has been shown to influence an individual's risk propensity. Osborn & Jackson (1988) found that decision makers seek risks in the domain of gains if prior risk-seeking actions were successful. The same pattern can be applied to risk-averse decision strategies if prior risk-averse actions were successful. Sitkin and Weingart (1995) reached the same conclusions after finding a significant influence of outcome history on risk propensity. Outcome history appears to influence one's risk propensity by altering risk behavior.

Adopting the position that Risk Propensity would be domain specific and be shaped by former experiences and behavior, we propose that differences in Risk Propensity across employees will be related to differences in Perceived Risk as well. While referring to the constructs and relations according to the model as presented by Sitkin and Pablo (1992) and refined by Sitkin and Weingart (1995), many experimental studies in the domain of Information Systems (Du et al., 2007; Keil et al., 2000b; Keil et al., 2000c) and escalation behavior (Wong, 2005), confirmed that people with a high level of Risk Propensity (high tolerance) will likely show a low level of Perceived Risk in this domain. This results in hypothesis H3a:

H3a. *Employees with a Low Risk Propensity on IS-risks show a higher Risk Perception than employees with a high Risk Propensity on IS-risks when they receive a Risk Warning*

In the next section we will discuss the research strategy and design used in order to test the hypotheses as described.

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[44] This claim is made by Sitkin and Pablo (1992). Although one could argue whether Outcome History might be embedded in the Reference Point as defined in Prospect Theory, *Outcome History* is not defined as a distinct construct in Prospect Theory.

6.3.   Research Method

In this substudy we will follow a strategy of experimental research in order to create settings that are helpful to answer our research questions. As reported earlier in this chapter, the actor/observer effect has already been tested and confirmed in various Illusion of Control game-playing experiments in laboratory conditions. Greenberg and Tomlinson (2004) show that laboratory experiments are widely regarded for the opportunities they provide to control variables of interest and answer *Why* questions. They also show that laboratory experiments are criticized on their artificial settings that would lack context realism and which limits their usefulness in studying organizational phenomena. Our research question however typically refers to such organizational phenomenon and requires that we have respondents with actor/observer heuristics from their working experience as internal auditors or as managers. In order to trigger those heuristics by realistic warnings, we would have to bring those respondents in experimental settings as close as possible to their realistic working conditions. So from that perspective we would prefer the empirical research strategy of a field experiment (Boudreau et al., 2001). Field experiments involve the experimental manipulation of one or more variables within a naturally occurring system and a subsequent measurement of the impact of the manipulation on one or more dependent variables (Boudreau et al., 2001). Field experiments are conducted in natural settings, and are not subject to the same criticisms of artificiality and lack of generalizability. However, because it's difficult, if not impossible, to control the impact of variables in a field experiment, they tend to lack the same high degree of control found in most lab experiments (Greenberg & Tomlinson, 2004). In order to stress context realism we involved in our study managers and internal auditors from one particular dutch financial organization and provided them with experimental manipulations and measurements that were as close to realistic as we could reasonably get, by (1) using hypothetical audit-findings which were adapted from existing audit-findings (2) using their own and operational reporting standards, definitions and measurement scales. However, it would not have been realistic nor ethical to perform a true field experiment and report nine hypothetical (relatively high risk) audit-findings in the organisation's real risk-procedures and to distribute those hypothetical findings to managers and internal auditors throughout the organization as part of real operational reporting procedures. Therefore we had to reach one notch down on the context-realism axis of this study by choosing a research strategy that could be best described as a"situated experiment" (Greenberg & Tomlinson, 2004). This is an experiment that is executed in organizational field conditions and that maximizes the benefits of those realistic conditions while taking care of principles of experimental validity as known from laboratory experiments.

One of the major threats to validity in our experiment, would be the lack of control over confounding variables. Structural variance in personal and situational characteristics could provide rival explanations for our hypotheses in the case that statistiscal conclusions

appear to confirm these hypotheses. This regular threat to internal validity[45] is often mitigated in laboratory experiments by applying a between-subject design with random assignment of treatment conditions (Shadish et al., 2002) to groups of participants. Given the nature of our research question – to assess interaction effects - this would have required a number of participants that was considered too high to be realistic for a study in field conditions[46]. Therefore, we have applied two major design principles in this study. We strongly mitigated the heterogeneity of respondents on situational factors (culture, type of organization, size of organization) by chosing respondents from one single organization. Although this partially reduced the external validity of our study, it improved internal validity of our study and provided opportunities to compare between groups of respondents (internal auditors and IS managers) on standardized criteria. The second principle of our experimental design aimed to mitigate the structural influence of respondents' personal characteristics on our results. We applied a within-subject experimental design to provide all participants with a sequence of treatments and measurements. Repeated observations from indivuals allow us to control for personal differences - they become their own control group for these treatments – and can increase statistical power so that fewer participants could be used (Shadish et al., 2002), p109. Based on our objective to analyze differences between groups of employees (internal auditors and IS managers) who are provided with a sequence of within-subject treatments, we implemented our experiment as a mixed design (Field, 2009), p507. In order to deal with remaining validity threats and for further interpretation, our design included additional measurements of particular characteristics that could show to be relevant. Finally, we provided our respondents with post-experiment questions that should unhide problems as well as a question on their risk assessments in the field which could provide an additional perspective on interpreting the results of the experiment.

6.4.   Procedures & Respondents

As part of our research design we decided to select respondents from one organization in our study, as a few other studies did (Biggs, Messier, & Hansen, 1987; Curtis & Viator, 2000). This allowed us to strengthen the validity of our study, since all respondents were familiar with the risk reporting framework and the context of the treatments. It also mitigated the influence of confounding variables from the organizational context on the observations in our study. The shared HR-framework with standardized joblevels and titles, allowed us a better analysis of group-differences between employees in different roles, but with comparable working experience. We could take into account different dynamics in which people build up the working experience that is relevant to their role (Biggs et al., 1987; Curtis & Viator, 2000) and could therefore improve internal validity of our study.

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[45] We refer to section 3.3.3. on Research Design and Validity in which describe triangulation across the empirical studies in this thesis
[46] Assuming that we adopt the single measurement-scales from our organizational field context, it would require over 500 participants to assess significant interaction effects according to estimations presented by Chin (1996).

We involved 70 internal auditors and 32 IS-managers from a Dutch financial institution's main offices in our study. All employees were familiar with the organization's standards and procedures on risk-reporting, either from an internal auditing perspective or from a management perspective. Given the dominant role of Information Technology and Information Systems within the bank's strategy, infrastructure and operations, all employees had some familiarity with the implications of IS and IS-risks. These employees work in the bank's offices in Amsterdam/London and execute their tasks globally from regional hubs.

The respondents were invited by email and joined the study on a voluntary basis. The respondents' gender, experience, nationality and function level are described in tables 6-2a and 6-2b below. The request was directed[47] at employees that had been involved in internal audit reporting on IS risks over the previous years, either as an internal auditor (observing, assessing, discuss and reporting on IS-risks) or as an IS manager (receiving internal audit reports, discuss, response and take action on IS-risks).

Working Experience			Gender			Nationality			Function Level		
< 3 yrs	3	4%	Male	58	83%	Dutch	37	53%	1 Auditor	16	24%
3-5 yrs	23	33%	Female	12	17%	British	22	31%	2 Senior Auditor	31	44%
5-10 yrs	32	46%				Other	11	16%	3 Auditmanager (VP)	21	30%
10-15 yrs	12	17%							4 Head Audit (SVP)	1	1%
> 15 yrs	0	0%							5 Director Audit (EVP)	1	1%
Total	70	100%		70	100%		70	100%		70	100%

Table 6-2a Descriptives of the Internal Auditors

Working Experience			Gender			Nationality			Function Level		
< 3 yrs	0	0%	Male	28	88%	Dutch	9	28%	1.Projectmgr equiv	1	3%
3-5 yrs	1	3%	Female	4	12%	British	22	69%	2.Sr.Projectmgr equiv	10	31%
5-10 yrs	7	22%				Other	1	3%	3.Progmgr/IS-mgr (VP)	6	19%
10-15 yrs	10	31%							4.Progmgr/IS-head (SVP)	8	25%
> 15 yrs	13	41%							5.IS-Director (EVP)	7	22%
Unknown	1	3%									
Total	32	100%		32	100%		32	100%		32	100%

Table 6-2b Descriptives of the IS-managers

This table shows that the IS managers showed slightly more years of experience and higher function levels than the internal auditors did. This appears to be a reasonable representation of employees who are involved in the reporting of IS-risks by internal auditors. Internal auditors at all function levels execute audits, discuss findings with their

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[47] In chapter 4 and 5 we included the Collaborative Partner vs Opponent relationship between internal auditor as messenger and manager as receiver. We expect that the Collaborative Partners are better represented than Opponents in the group of IS managers that were willing to participate in this study on a voluntary basis.

senior staff and report to higher management within IS and business. Internal auditors and IS managers showed a different representation of Dutch and British participants.

6.5.   Treatments

Within the context of our mixed design experiment, we gave all respondents similar within-subject treatments. The within-subject treatments consisted of a sequence of nine audit-findings that were provided by an internal auditor. In order to create equal conditions, all participants – regardless their role in practice – were placed in the position where they received the audit warnings and were asked to assess a Riskrating based on the same information.

The treatments varied in the level of *Probabilty* and *Impact* that was assessed and presented for that finding by the internal auditor. In order to obtain independence of the individual treatments, we presented them as individual findings covering the domain of IS-risks as defined by CobiT[48]. The audit-findings (cases) were derived from earlier real audit-reports and adapted for the purpose of this study. They covered IS-risks, such as IS-backup's (DS11), IS-capacity planning (DS2), IS-helpdesk (DS10), IS-change management (AI6) and IS-continuity (DS4) from the domains Acquisition & Implementation (AI) and Delivery & Support (DS) according to the IS-governance framework CobiT. The findings covered the complete range of combinations of probability and impact levels (Low-Medium-High). We pre-tested and mitigated inconsistencies between "given" probability and impact and the description through feedback from IS-professionals (IS Audit director, IS-audit lecturer and IS-consultant). Those professionals involved in pre-testing were not invited to respond to this study. We refer to the appendix of this chapter for the details on our treatments and the information we provided to the respondents.

6.6.   Measurement Model

In order to analyze relations between the constructs at the conceptual level of our model, we first translated these constructs into operational variables. These operational variables should serve proper measurement and should support statistical analysis of relations at operational level. In order to transfer statistical results at operational level to conceptual level, the internal validity, construct validity and statistical conclusion validity of the model should be safeguarded and assessed first (Shadish et al., 2002). Variables at operational level should have been defined and measured properly so we assessed validity first before building further with our analysis and conclusions. As presented by Straub et al. (2004) validity of the instrumentation (manipulation and measurements) should form a

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[48] We prefered individual findings on a broader range of IS-risks over the alternative of providing findings on an IS-project or multiple IS-projects. The domain of IS-projects would have fit better the other empirical chapters, however would have blended the treatments. The treatments in this chapter are applicable to Deaf Effect for internal auditor warnings on IS-risks.

basis for achieving internal validity (ruling out rival hypotheses) and statistical conclusion validity.

In the table 6-3 we provide an overview of how we translated constructs to variables (called items). We refer to the appendix at the end of this chapter for a detailed description of the individual measurement items of the questionnaire that we used in our field-experiment. For reason of context-realism, we adopted most manipulation- and measurement instruments from the organization in which we performed this study.

Variables

Contruct	Type	Content	Measurement	Source of items
RiskRating $_{1\ to\ 9}$	Endogenous, Dependent Variables	Rated Risk Level according to organization standards	9 within-subject measurements with 1-item 3 level rational scale	the organization's risk assessment and reporting standards
Probability	Exogenous Independent	Probability-Level of Risk as assessed by the internal auditor	9 within-subject treatments With 1-item 3-level scale items	the organization's risk assessment and reporting standards
Impact	Exogenous Independent	Impact-Level of Risk as assessed by the internal auditor	9 within-subject treatments With 1-item 3-level scale items	the organization's risk assessment and reporting standards
RiskProp	Exogenous Independent	Domain related Risk Propensity	Six 5-point Likert scale items	Adapted from Risk Propensity Scale of Nicholson (2005)
VicePres	Exogenous Independent	Working experience rewarded Vice-President	Dichotomous VicePresident or not. Reported titles (VP-SVP-EVP) and jobfunctions	Jobfunctions, and titles (VP-SVP-EVP) were reported according to organizations HR-framework
AuditRole	Exogenous Independent	Role as Auditor (observer) or Manager (Actor)	Dichotomous Auditor or not	Jobfunction
Gender, Nationality	Exogenous, Control	Respondents' gender and nationality	Translated into dichotomous dummy variables	
Education	Exogenous, Control	Highest professional education	Self-report	
Working Experience	Exogenous, Control	Respondents' years of working experience	1-item	Not used, given various interpretations

Table 6-3 Measurement of Constructs

The nine measured *Riskrating* scores served as the final dependent variables in our model (thus required multivariate analysis). We preferred the term RiskRating over Risk Perception in this study. Risk Perception is defined as "Decision maker's assessment of the risk inherent in a situation" (Sitkin & Pablo, 1992; Sitkin & Weingart, 1995; Sjöberg, 2000b). This definition fits the constructs we consider to be our dependent variables. The issue however is, that Riskrating – in addition to the definition of Risk Perception – is

defined as a means of standardized communicating about risk perceptions within the organisation.

We measured respondents' Risk Propensity according to the Risk Propensity Scale as developed by Nicholson (Nicholson et al., 2005), which we adapted to the specific domain of our IS-risks. This instrument met our criterion that it would support the assumption that risk propensity could vary across domains instead of considering it as a stable personality trait. Second, it should show concistency with the broad domain of treatments and Riskratings that we covered in this study. This instrument appeared to fit better in this study than the RiskPropensity instrument that we used in chapters 4 and 5.

Measurement of working experience was self-reported. Working experience was not only expressed in years, but could also be derived from (self-reported) job-titles. We used the organization's HR-framework to assign function levels to these job-titles. There were 5 corresponding function levels within the area of internal auditing and IS-management. In our analysis we preferred this measure on working-experience over the reported "years of experience". This is because we found that the number of years was interpreted in various ways by respondents (depending on their career-path, including for example earlier IS-functions). Furthermore, an employee's function level is linked to that employee's knowledge and experience in the domain of his profession and corresponding responsibilities. The HR-framework also incorporates standardized HR-controls such as criteria and procedures for promotion or assignments to Vice President (VP), Senior Vice President (SVP) and Executive Vice President (EVP) positions. Therefore we think this "VP-level" allows for better comparison between respondents with different roles and career-paths than using the number of years with working experience.

Reliability

Before we will test the hypotheses, we first consider reliability and convergent- and discriminant validity of how we measured our constructs. In table 6-4, we present the construct reliability Cronbach's alpha scores that measure the internal consistency with a given construct's items (weighting them equally). Hair et al. (1998) suggest that a Cronbach's alpha score slightly lower than 0.7 might still be acceptable for exploratory research. Nunnally (1967) recommends a threshold value of only 0.6 for exploratory research.

Contruct	Items	Cronbach alpha	Remarks
RiskProp	6	0.832	
RiskProp	5	0.820	After removal RiskProp6.

Table 6-4 Reliability of Measurements

We measured *RiskPropensity* on a 6-item 5-point scale, adapted from Nicholsen (Nicholson et al., 2005) for measuring Risk Propensity in a specific domain of study. We found that RiskProp6 measurements showed problems in Convergent and Discriminant Validity of *RiskProp* since it blended with *Audit_role*. Therefore we removed RiskProp6

from our measurement model and recalculated Cronbach alpha. We conclude that the reliability of our measurements meets the thresholds.

Convergent and Discriminant Validity

Our validation of the instruments we used for data gathering, proceeds with assessing the convergent and discriminant validity (Shadish et al., 2002) of how we measured the constructs in our study (construct validity). This in order to assess that our measurement-variables that are supposed to tap into the same construct indeed stick together and are not sticking too much to measurements that were supposed to tap into distinct constructs. For that purpose, we performed a Principal Components Analysis, which is an exploratory factor analysis of clustering measurements into factors. It does not take into account any available information on which measurements were intended to tap into which constructs. Based on Varimax rotation, we found the results as presented in table 6-5.

	Component		
	1	2	3
RiskProp1	**.785**	.249	.207
RiskProp2	**.792**	.036	-.047
RiskProp3	**.682**	-.343	.079
RiskProp4	**.746**	-.328	-.046
RiskProp5	**.800**	.006	.013
Gender	.038	-.050	**.988**
Audit_Role	-.019	**.919**	-.046

Extraction Method: Principal Component Analysis., Rotation Method: Varimax with Kaiser Normalization.

Table 6-5 Construct Validity

Items should correlate higher with their own "construct" (factor) than they correlate with others (Shadish et al., 2002). We find convergent and discriminant validity to be confirmed in Table 6-5.

For the purpose of statistical validity in testing our hypotheses, we considered whether our nine measurements of $RiskRating_{prob,impact}$ could violate assumptions for parametric testing. The 3-level ratingscores are considered to be professional assignments based on an assessment of a situation. Risk-levels within the bank have been formally defined, trained and discussed in Professional Practice-sessions and assigned across audit-reports for years. The 3-level measurement Rating-scale in this context, meets major characteristics of interval data, with common understanding of "distances between level-1, level-2 and level-3 risk" as expressed in the scale. According to Blumberg et al. (2008) p444, this would allow us to apply parametric testing, since parametric tests in these conditions don't differ from non-parametric tests (rank-order) in significance and power, thus they will not likely result in different conclusions. Therefore, we will apply parametric testing of hypotheses in this study.

6.7. Results from Mixed Design ANOVA

We use Mixed Design ANOVA (Field, 2009), p506 for statistical testing of our hypotheses. This is an extension of the two-way repeated measures ANOVA which serves the analysis of within-subject treatments across multiple groups of respondents. The within-subject dependent variables $RiskRating_{prob, impact}$ were measured in the following sequence from 1st to 9th obervation $RiskRating_{3,3}$; $RiskRating_{3,1}$; $RiskRating_{3,2}$; $RiskRating_{2,1}$; $RiskRating_{1,1}$; $RiskRating_{2,3}$; $RiskRating_{1,3}$; $RiskRating_{2,2}$ and $RiskRating_{1,2}$. The between-subject factors that were measured are *Audit_Role* and *RiskPropensity*.

Since not all of the respondents had provided the RiskPropensity answers, we started our analysis with observations from 64 internal auditors and 32 IS-managers. Mixed Design ANOVA assumes numbers of observations across the treatment groups that are almost equal (Shaw & Mitchell-Olds, 1993). In order to control for effects of the groupsize-difference on our results, we decided to perform two separate analyses. The first analysis compares all internal auditors with all IS-managers and could be biased by group differences. For the second analysis we focus on the 21 internal auditors and 21 IS-managers whose experience has been rewarded with a VicePresident (VP) role. At the cost of losing statistical power from excluding more than half of the observations, we will have a more balanced set of observations of internal auditors and IS-managers, equal in size and consisting entirely of VicePresidents. Based on our hypotheses, these are the most interesting groups to compare, since they are expected to show the strongest heuristics[49].

We first tested whether or not our data met the assumptions for Mixed Design ANOVA. We did not find consistent recommendations for minimum sample size, so we used the recommendation that Tabachnick and Fidell (2001) made for MANOVA, which is similar to Mixed Design ANOVA in that both involve multiple dependent variables. The minimum sample size for these problems is 10+the number of dependent variables. In both conditions - the whole group and the VP group – we exceeded the requirement of 19 respondents. For all further tests of our hypotheses and assumptions, we will further analyse 1. the whole group and 2. the VP-groups.

ANOVA assumes that the scores under different conditions are independent. Since this assumption cannot be met in a repeated measures design,an additional assumption of sphericity is added, which means that the relationship between pairs of experimental conditions is similar. If this assumption is not met then the validity of the F-ratio might be harmed. Therefore, we performed the Mauchly's test, which tests the hypothesis that variances of the differences are equal between treatment levels (Field, 2009), p460. Mauchly's test - for the whole group - indicated that the assumption of sphericity had not been violated for the main effect of *Probability*, $\chi^2(2) = 5.94$, $p = 0.05$, and *Impact*, $\chi^2(2) = 0.82$, $p = 0.66$. So it is reasonable to conclude that the variances of the differences are

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[49] Other options to split up our data for mixed design ANOVA have been considered. Within the context of this PhD-thesis we found it appropriate to perform two separate analyses which provided us with a richer view on the data.

roughly equal and that F-ratios are valid without need for correction of the degrees of freedom. Mauchly's test – for the whole group - indicated that the assumption of sphericity had been violated for the interaction effect of *Probability*Impact*, $\chi^2(9) = 18.36$, $p = 0.031$. In order to obtain valid F-ratios we had to correct the degrees of freedom using Greenhouse-Geisser estimates of sphericity ($\varepsilon = .877$). Mauchly's test - for the VP-group - indicated that the assumption of sphericity had been violated for the main effect of *Probability*, $\chi^2(2) = 9.89$, $p = 0.00$. In order to obtain valid F-ratios we had to correct the degrees of freedom using Greenhouse-Geisser estimates of sphericity ($\varepsilon = .694$) Mauchly's test – for the VP-group – indicated that the assumption of sphericity had not been violated for the main effect of *Impact*, $\chi^2(2) = 1.93$, $p = 0.38$. and for the interaction effect of *Probability*Impact*, $\chi^2(9) = 9.23$, $p = 0.41$. So it is reasonable to conclude that the variances of the differences are roughly equal and these F-ratios are valid without need for correction of the degrees of freedom.

We compared the Within-Subject main effects based on post-hoc analysis of means with Bonferroni adjusted confidence intervals. For the whole group, we found a significant main effect of the given *Probability* level information on respondents' *RiskRating*, $F(2, 136) = 11.58$, significant at $p < 0.001$. We found this confirmed for the VP-group, where we found a significant main effect of the given *Probability* level information on respondents' *RiskRating*, $F(1.38, 24.97) = 4.28$, significant at $p < 0.03$. These results confirm hypothesis *H1a*. For the whole group, we also found a significant main effect of the given *Impact* level information on respondents' *RiskRating*, $F(2, 136) = 327.57$, significant at 0.000. We found this confirmed for the VP-group, where we found a significant main effect of the given *Impact* level information on respondents' *RiskRating*, $F(2, 36) = 183.08$, significant at $p < 0.01$. These results confirm hypothesis *H1b*.

We did not find a significant interaction effect of *Probability*Impact* levels information on respondents' *RiskRating*, $F(3.50, 238.52) = 1.19$, not significant at 0.26 for the whole group. We found this confirmed for the VP-group, where we found no significant interaction effect of *Probability* Impact* levels information on respondents' *RiskRating*, $F(4,72) = 1.12$, not significant at 0.23. We did not find confirmation of the interaction between the provided *Probability* and *Impact* levels.

For the whole group, we found a significant interaction effect of *Probability*AuditRole* on respondents' *RiskRating*, $F(2,136) = 3.70$, significant at 0.02. We found this confirmed for the VP-group, where we found a significant interaction effect of *Probability* AuditRole* on respondents' *RiskRating*, $F(2,36) = 3.96$, significant at 0.02. These results confirm hypothesis *H2b*.

There was no significant interaction effect of *Impact*AuditRole* , so the difference between the auditors and the IS managers showed in their sensitivity for *Probability* information in particular, as was expected from our literature review. For the whole group, we found a significant interaction effect of *Impact*RiskPropensity* on respondents' *RiskRating*, $F(30,136) = 1.90$, significant at 0.00. We found this confirmed for the VP-group, where we found a significant interaction effect of *Impact*RiskPropensity* on respondents' *RiskRating*, $F(28,36) = 1.81$, significant at 0.04. These results confirm hypothesis *H3b*.

There was no significant interaction effect of *Probability*RiskPropensity* across the auditors and the IS managers of our study.

The test of Between-Subjects Effects on the whole group , showed *AuditRole* to be 1-tailed significant at 0.047 with F=2.88 and 1 df. This could not be confimed for the VP-group which showed not significant at .45 with F=0.03 and df=1. These results provided ambiguous support for hypothesis *H2a*.

The test of Between-Subjects Effects on the whole group , showed *RiskPropensity* to be 1-tailed significant at 0.010 with F=2.10 and 15 df. This could not be confimed for the VP-group which showed not significant at 0.12 with F=1.44 and df=14. These results provided ambiguous support for our hypothesis *H3a*.

For interpretation of our results we provide a visual presentation of the means across the treatment conditions. In figure 6-1 we present the interaction between the within-subject treatments and the between-subject differences for the whole group of respondents. In the plots on the left you find the moderation of between-subject *AuditRole* variable on the within-subject Probability-treatment effects. At the horizontal axis you find the three levels of *Probability*-treatments. The score at *Probability*=1 represents the estimated mean *RiskRating* scores of $RiskRating_{1,1}$, $RiskRating_{1,2}$ and $RiskRating_{1,3}$. So each mean is calculated from 3 observations for 64 internal auditors respectively from 3 times 36 observations of IS managers. In a similar manner, the figure shows the mean risk-scores for the three treatments with *Probability*=2 and the three treatments *Probability*=3. The lines distinguish these scores between the managers ("actors") and the auditors ("observers"). In the plots on the right at the horizontal axis you find the three levels of *Impact*-treatments. The score at *Impact*=1 represents the estimated mean *RiskRating* scores of $RiskRating_{1,1}$, $RiskRating_{2,1}$ and $RiskRating_{3,1}$. So each mean is calculated from 3 observations for 64 internal auditors and from 3 times 36 observations from IS managers. Similarly, the figure shows the mean risk-scores for the three treatments with *Impact*=2 and the three treatments *Impact*=3. In figure 6-2 we present similar plots for the VP-groups. Every mean in those plots was calculated from 3 observations for 21 internal auditors respectively from 3 times 21 observations from IS managers.
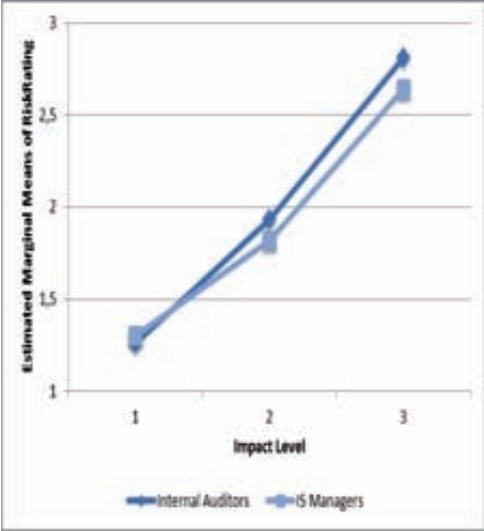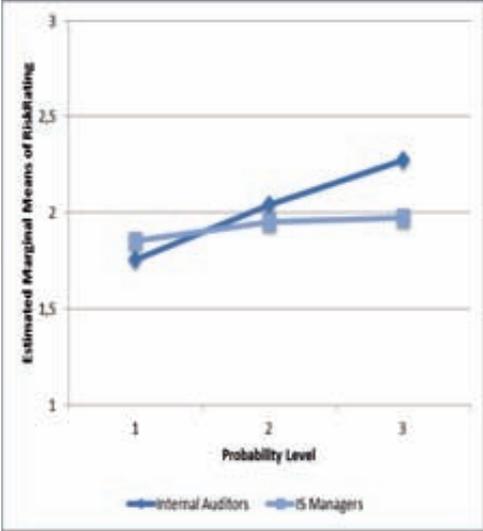
Figure 6-1 Interaction Plots for Whole Group
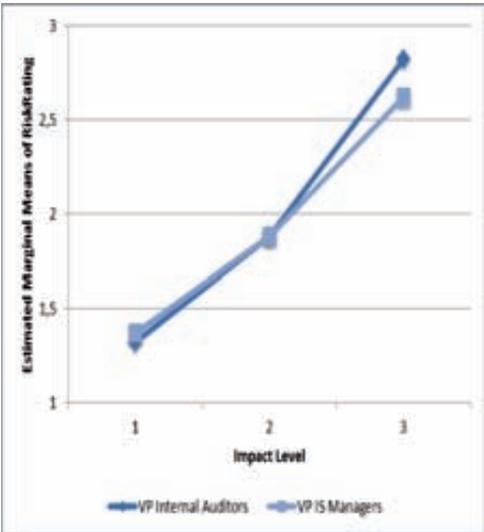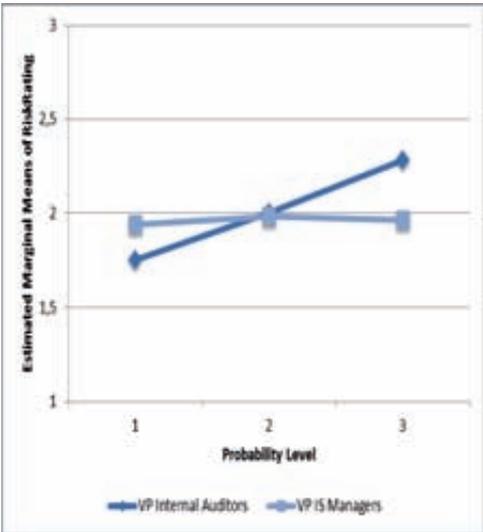
Figure 6-2 Interaction Plots for VP Group

Comparing the slopes[50] of the lines between the left and the right plots shows that *RiskRatings* are much more dominated by *Impact*-levels than by *Probability*-levels. Raising the *Impact* level from 1 to 3 resulted in an estimated increase of *RiskRating* with 1.55 resp 1.34 for the internal auditors resp managers in the group as a whole. These

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[50] The slopes between levels 1 and 2 and between levels 2 and 3 are not precisely equal, since this is not a regression slope, but a visual presentation of differences between calculated means.

results were similar for the VP-group with 1.50 for the internal auditors and 1.25 for the IS Managers. Raising the *Probability* level from 1 to 3 resulted in an estimated increase of *RiskRating* of 0.52 for the internal auditors and 0.53 for the VP internal auditors in particular. For the whole group of internal auditors the *Impact* level thus weighted 2.9 times as much as the *Probability* level in their *RiskRating*. With *Impact* Level showing 2.8 times the weight of *Probability* level, this was similar for the VP internal auditors. Next figures show the main difference between the internal auditors and the IS-managers. Raising the *Probability* level from 1 to 3 resulted in an estimated increase of *RiskRating* of 0.12 for the IS managers (0.52 for the internal auditors) and no more than 0.02 for the VP IS managers in particular (0.53 for the VP intrenal auditors). For the whole group of IS managers the *Probability* level only weigthed 1/11 times the *Impact* level in their *RiskRating* (compared to the 1/3 times for the internal auditors). For the VP group of IS managers the weight of *Probability* level almost disappeared with assigning less than 1/60 times the weight of *Impact L*evel in their *RiskRating* (compared to the stable 1/3 times for the VP internal auditors.

Comparing the slopes of the two lines in the left plots clearly shows the moderation effect of *AuditRole* (the between-subject difference between auditors and managers) on the direct effect of the *Probability* Level on *RiskRating* (the within-subject measurements). These lines are flat for the IS managers where they are much steeper for the internal auditors. This visually represents the moderation effect on probability, as was confirmed in the ANOVA testing of hypothesis *H2b*.

6.8.   Other Relevant Results from the Field Experiment

After they had finalised the cases, we asked respondents in open questions about any difficulties they might have encountered in assessing Risk ratings of the cases. We also invited them to provide us with other remarks that could be relevant for interpreting their answers. Tables 6-6a and 6-6b provide an overview of reported problems by the 70 internal auditors and 32 IS-managers in assessing risks based upon the risk-information provided in this study.

Difficulties in assessing risk level of cases	Internal auditors	%	IS-managers	%
Number of respondents with no problem	55	78%	24	75%
Number of respondents with remarks	15	22%	8	25%
Number of respondents with major problem	0	0%	0	0%

Table 6-6a Number of reported problems and remarks on assessing risk levels of cases

Based on this table 6-6a, we consider the finding that no respondents reported major problems as a contribution to manipulation validity of our study. As shown in table 6-6b, most remarks referred to the interest for more information compared to the auditor's finding and assigned levels of *Probability* and *Impact*.

Remarks made by Internal Auditors		Remarks made by IS-managers	
Exact business impact is unknown	13/70	More information on business impact	5/32
Lack of detailed circumstances	7/70	More detailed information	3/32
Lack of knowledge about mitigating controls	5/70		

Table 6-6b Reported problems and remarks on assessing risk levels of cases

We also asked the respondents to provide us with 3 to 5 most important criteria which they use in assessing Risk Ratings. Table 6-7 provides an overview of reported items by the 70 internal auditors and 32 IS-managers in assessing risks based upon the risk-information provided with audit-findings in general.

Out of 70 internal auditors: how many times they reported a criterium to be used when they assess a risk	Instances	Out of 32 IS-managers: how many times they reported a criterium to be used when they assess a risk	Instances
Probability	50	Probability	16
Impact	49	Type of system/Nature of Business	15
Professional Judgement/experience	22	Impact	14
Materiality	22	Impact on continuity of service	14
Regulatory Impact	20	Reputational Impact	11
Reputational Impact	18	Experience with similar risks	11
Value at Risk	17	Financial Impact	10
Mitigating Controls	14	Mitigating controls/solutions	9
Type of system / Nature of business	13	Value at risk/ cost-effectiveness	6
Impact on business continuity	10	Legal and compliance impact	5
Client satisfaction exposure	8	Client satisfaction exposure	4
Fraud Risk	2	Time characteristics of risk (direct/duration)	4

Table 6-7 Reported criteria used for assessing Risk Ratings

The qualitative answers provide us with richer insight into people's considerations in an assessment of risks and differences between internal auditors and IS managers. Table 6-7 shows that "type of system", "continuity of service", "value of risk/cost-effectiveness" and "time-characteristics of risk" (direct exposure, duration) are ranked higher by IS managers than by internal auditors. All these elements are closely associated with setting priorities in solving problems, which is considered a task of management more than a task of auditors.

Given the results of our statistical analysis, it is interesting that *Probability of Risk* is mentioned most by both groups of respondents. As we could see in the plots of figures 6-1 and 6-2, these respondents showed relatively insensitive to *Probability* information compared to the *Impact* information. We think there could be two main explanations for this suggested inconsistency. First, people are aware that probabilities play and should play a role in risk assessments, however probabilities are very hard to estimate, visualize and thus to perceive (Sjöberg, 2000c). *Impact* information is much more accessible from memories and easier to visualize and express. Therefore *Impact* might dominate heuristics and memories as it comes to terms. This appears to be confirmed since 22 out of 23 criteria in table 6-7 that were reported by our respondents are shades of *Impact*, next to the one single and comprehensive criterion "Probability".

6.9.   Discussion and Implications

6.9.1.   Contribution of this study

Our experiment situated in the field provided us with empirical evidence on differences in the risk perception of employees across roles within a company when provided with warnings on IS-risks by an independent internal auditor. We could assess whether these differences applied to specific parts of the Risk Warning as expected from literature. For our explanation of the Deaf Effect for IS-Risk warnings provided by internal auditors, this chapter suggests that this Deaf Effect could apply for specific parts of the warning more than for other parts, depending on the heuristics of the receiver. These heuristics are related to the work experience that has developed over years in a role as manager or internal auditor. We assessed the effect of the actor/observer control heuristic that was expected to come with their role and working experience. The IS-managers are assumed to have developed "actor" heuristics on IS-risks, since they are used to be responsible for taking action on IS-risks audit findings. The internal auditors are assumed to have developed "observer" heuristics on IS-risks. We also assessed the effect of employee's Risk Propensity on their Perceived Risk after a risk warning. This Risk Propensity is developed based on risk preferences, inertia and outcome history, which all could come with working experience over years.

More generally, beyond its contribution to understanding manager's Deaf Effect for internal auditors' warnings on IS-risks, this chapter specifically addresses an open research question in literature (Curtis, Jenkins, Bedard, & Deis, 2009; Weidenmier & Ramamoorti, 2006) of whether internal auditors differ from other actors when faced with evidence on IS-risks. In particular, this insight is relevant since collaboration with IS-managers is key for internal IS-auditors' effectiveness (Hunton & Wright, 1995). Both parties are involved in reporting and mitigating IS-risks within the company's corporate governance framework. Understanding of differences in the perception of risks could contribute to improved collaboration.

Finally, in our study we involved 70 internal auditors and 32 IS-managers from a Dutch/British financial institution. This allowed us to use a setting that was realistic to their working-practice and allowed for a direct comparison between respondents in their role of Internal Auditor or IS-manager, ceteris paribus. Choosing employees from one

organisation allowed us to use the shared HR-framework for a direct comparison between auditors on similar levels of experience/seniority, taking into account eventual different dynamics in which people build up the working experience that is relevant to their role (Biggs et al., 1987; Curtis & Viator, 2000).

6.9.2. Main Findings

The following summary provides an overview of the findings of this empirical study on main effects and moderation effects: (1) Both impact information and probability information in the message affect the Risk Perception of the receivers of a risk warning (hypotheses 1a and 1b); (2) The internal auditors in our study weigh the impact information approximately three times the probability information. This is the case for both the internal auditors as a whole group as well as more specifically for the most experienced group of internal auditors, who have a position of Vice President, Senior Vice President or Executive Vice President; (3) IS managers weigh the impact information approximately eleven times the probability information. With a ratio of one to sixty, this is even more extreme for the most experienced group of IS managers who have a position of Vice President, Senior Vice President or Executive Vice President; (4) This difference could be explained since the influence of probability information on Perceived Risk, is significantly moderated by the employee's role as a manager (actor) or as an auditor (observer), for the group as a whole, which is confirmed for the experienced respondents in particular (hypothesis 2b). As expected from earlier field studies, managers show to be insensitive to given probability information in a Risk Warning; (5) The difference in Perceived Risk between managers and internal auditors is confirmed for the group as a whole, but is not significant for the experienced respondents in particular (hypothesis 2a); The managers show lower levels of perceived risk than the auditors, yet for the most experience group this was not significant; and (6) The employee's Risk Propensity is significantly correlated with Perceived Risk for the group internal auditors and IS managers as a whole. This could however, not be confirmed for the experienced internal auditors and IS-manager in particular (hypothesis 3a).

6.9.3. Limitations of The Study

As is the case with all experiments, we should be cautious when generalizing the results of this study for several reasons. First, situated experiments are applied in a specific context, one financial institution in our case. This provided us with the opportunity to allow comparison across respondents in various roles, since they shared the organization's HR-framework. This also strongly mitigated variance in organizational conditions and had the advantage that respondents were familiar with procedures and measurements. These conditions however don't allow statistical generalization to other situations. Nevertheless, based on analytical generalization, we suggest that the results show a reasonable level of representativeness for other situations in which Information Systems are both of strategic and operational importance, and internal audit staff is equipped based upon international standards as was the case in this situation.

Second, we adopted several measurement instruments used in this particular organization, so these particular instruments could not be borrowed from scientific literature. Typical

concerns that might arise, such as 1-item measurement, have partially been taken care of in the experimental design, such as measuring a sequence of nine 1-item measurements. The contribution of this study weighted the heaviest towards context realism, while striving for precision of measurement at reachable level within the context.

6.9.4. Suggestions for Further Study

We suggest that the particular characteristics of a field or situated experiment (Greenberg & Tomlinson, 2004) deserve further application in this domain of study. Those experiments lean towards context realism and maximize precision of measurement. Experiments situated in realistic organizational settings, can provide triangulation with laboratory experiments – such as the Illusion of Control experiments - and with surveys from the field, such as the surveys across managers and auditors that we referred to in this chapter. In addition to the actor/observer effect, many other Illusion of Control laboratory experiments could serve to be replicated in realistic field settings, as 'situated experiments'(Greenberg & Tomlinson, 2004). More specifically, we suggest that the studies on the actor/observer effect would be open for further replication and refinement in an organizational context. For example, they could be applied to other roles within an organization that share these characteristics.

6.9.5. Implications for Internal Auditors

Although not new of course, this study reminds the internal audit profession that the effectiveness of their service – reporting on risks and controls – includes the concepts of human information processing and bounded rationality.

The actor/observer effect and differences in Risk Propensity across employees, may cause that they actually perceive risks differently from each other. This may show, for example, in discussions on reported audit findings. Given the dominant weight of Impact Information, it may be the most effective to focus attention and effort on discussing the Impact is side of the Risk Warning. Discussions on probabilities might be less effective and efficient, since 1. they are strongly biased depending on one's personal heuristics and 2. they appear to have a smaller weight in the ultimate Perceived Risk that would bring someone to take action or not. Recalling and using incidents when presenting auditing findings, Risk Warnings, might be most effective since they focus on the Impact part, to which people are most sensitive.

6.9.6 Implications for managers and organizations

The results of our study suggest that employees with different actor/observer heuristics and risk propensities, show different Perceived Risk upon receiving a Risk Warnings. This will likely lead them different decisions showing different levels of risk taking. Heuristics and bounded rationality come with an employee's experience and are very useful to the performance of the employees in their contribution to the organization. Eliminating heuristics would make no sense to the organization. Irrational decision making would not make sense either. Therefore, the most fruitful approach appears to be to make use of the strengths and to mitigate negative effects of these heuristics. For example, by arranging

organizational conditions to ensure that risk seeking behavior would not exceed thresholds that would violate the organization's risk appetite. Job rotation of employees across actor and observer roles might also contribute to improved collaboration and information exchange on risk taking. Observers do not necessarily have to be Internal Auditors of course. Managers could also share information and decisions with peer-managers that are not involved in the particular course of action, and thus might serve in a role of observer from distance. This however would also require organizational conditions that support collaborative partnership between these counterparts within an organization.

6.A.   APPENDIX   - Questionnaire Situated Experiment

Annex I – Case

The participants in the on-line questionnaire were asked to read the following case material. It consists of fifteen individual imaginary audit findings. They are shown here including their respective probability and impact indicators as they were presented to the participants. The participants were asked to provide the risk ratings themselves. The case was constructed by preparing a set of audit issues that correspond with the varying input of probability and impact, according to [Company name] risk framework.

Finding 1 – Lack of antivirus controls

Impact: High   Probability: High

To protect against the negative impact of malicious software like computer viruses an anti-virus strategy should be in place. This strategy should detail how the company's infrastructure and computer systems are to be protected by anti-virus software, firewalls or other measures. During the audit the following came to our attention: 1. No anti-virus strategy is in place; 2. About 40 percent of the workstations contains no virus scanner; and 3. The virus scanners on servers are of different suppliers, a long time out of date and not maintained. The risk posed by the lack of these controls is compounded by the fact that users have full access to their workstations and may install software that is not inspected, verified and controlled by the network administration team. The severity of this situation is exemplified by the frequent downtime of both servers and workstations due to the effects of viruses as reported by the network infrastructure team. The risk exists downtime increases and information is compromised if no further action is taken, leading to significant operational losses due to inoperable computer systems. Besides operational effects a reputational risk exists because of the deteriorated service levels.

Finding 2 – Insufficient helpdesk capacity

Impact: Low   Probability: High

Users of computer systems in large companies are frequently faced with problems they cannot solve themselves. This includes software problems, obtaining password resets or requesting new hardware or software. For this reason a helpdesk should be available to these users that can assist them quickly and efficiently with their requests. It was noted that the current helpdesk is understaffed. Average time waiting for is measured at 15 minutes and resolution of non-urgent requests on average takes three days rather than the one day mentioned in the service level agreement. The risk exists users are not assisted adequately or quickly enough with their problems because of this lack of resources. This may lead to frustration with system users and operational losses by unnecessary time spent on the phone with the helpdesk or waiting for resolution of a problem.

Finding 3 – Inadequate system capacity

Impact: Medium   Probability: High

Computer systems require resources. This may vary from processing capacity to storage capacity and from response time to network bandwidth. To ensure the right resources are available to all systems a capacity management plan should be in place for all systems. The storage capacity of the logistic

planning tool was found to be at its limit. More than 98 percent of the disk storage space was utilised and the system administrator reported weekly outages because of this. While the system has denoted as important rather than critical, continued malfunction of the system will lead to further interruptions in the planning process. This has led to increased delivery times and overstocked storage rooms. In a few instances service level agreements with clients have not been met and complaints may increase if these problems are not solved.

Finding 4 – Lack of backup facility for labeling system

Impact: Low   **Probability: Medium**

When employing computer systems in the daily workflow of a company, continued operation without disturbance is necessary for effective production. For this reason it is best practice to ensure that for an automated system a disaster recovery procedure is written and implemented. This would include the means to quickly restore a system in case of problems by creating back-ups of the system. It was noted that the mail labeling system is old and the hardware is at the end of its expected lifetime. This has already led to replacement of parts last year causing a temporary unavailability of the system. When the system is not available the mail room must return to manually producing the labels for posting which as in the past will require overtime of the employees finish their work until the system is restored. The risk exists mail is not delivered timely to customers.

Finding 5 – Lack of business continuity plan for audit department

Impact: Low   **Probability: Low**

To ensure continued operation in case of a disaster or emergency, businesses require a business continuity plan that will enable them to pick up normal operations as quickly as possible, should such a situation occur. It was noted that for the audit department such a plan was not available at the time of the audit. Neither was a call tree, containing the details of all staff available as a minimum communication plan. The risk exists that in case of an emergency or disaster the audit department will not be able to quickly resume normal operations and reports will not be delivered when they are due.

Finding 6 – Inadequate client acceptance policy

Impact: High   **Probability: Medium**

It is in the long term interest of a company to set up relationships with reputable and trustworthy clients. To this end a proper client acceptance policy should be in place to ensure that no dealings take place with criminal, financially unsound or otherwise unwanted clients. A client acceptance policy was not present at the time of our review. Neither were files available where important information on clients like chamber of commerce and lists of authorised signatories were stored. Although the client relationship managers of the company are very experienced and have taken anti-money laundering courses, the risk of attracting unwanted customers remains. This may lead to defaulted payments or reputational damage when the company is connected to criminal customers in the media or the loss of an operational license when regulatory bodies judge the client take-on process inadequate.

Finding 7 – Single point of failure in company network

Impact: High   Probability: Low

When company processes cross borders because of an international client base, reliable network connectivity is of the utmost importance. For this reason these network connections should be redundant, if one connection fails the other can take over so operational processes may continue uninterrupted. The current company network infrastructure is based on a star topology. This means that all network traffic comes through one location and all other geographic locations are connected to it. All these connections are redundant, this means two network lines, owned by different network operators, connect all remote locations to the central location. Despite the redundancy of the network there is still a single point of failure in the central location. If the network connection in this location is lost none of the other locations can communicate with each other. The risk therefore exists that productivity comes to a full standstill when problems arise in the central location.

Finding 8 – Inadequate change management process

Impact: Medium   Probability: Medium

To ensure that changes to the company's IT systems are implemented without problems a change management process should exist. This process should ensure that changes are well planned, the proper approvals are obtained and the impact on other systems is acceptable. It was noted that the current change management process is inadequate. The only evidence of control over changes in the IT systems was a list of changes to be performed in the coming period. It was not noted how large the change is, what impact the changes have, when they should occur and what the dependencies are. The systems in use are not highly complex but changes are implemented regularly. Additionally, the systems are not essential for continuous production, but will cause delays and ineffective processing when unavailable.

Finding 9 – Inadequate service level agreement

Impact: Medium   Probability: Low

To ensure that applications are serviced in line with requirements service level agreements should be drawn up between the service provider and the client. These agreements contain service windows, maximum time between failures, response times etc. It was noted that for several non essential but important systems that are hosted by an external service provider no service level agreement was available, but that support was given on a best effort basis. In the current situation, when problems should arise at the provider's side, it is up to them to prioritise what customer to service as a matter of priority. At present this will have to be accepted with no contractual means of ensuring that the required level of service is maintained. This risk is mitigated by the fact that the provider is recognised as a large professional party with a good reputation.

Annex II – Questionnaire

The text of the questionnaire was as follows:

'Dear participant,

You've been sent the questionnaire below as part of research conducted for the Erasmus University Rotterdam. All results will be treated confidentially and only generalised results will be published.

We would kindly ask you to complete the questionnaire by assigning the fictitious issues below a risk rating of high, medium or low and by also answering the first set of questions. A definition of risk is included with this questionnaire to assist with assigning these ratings. Please note that the fictional issues are shortened and explicitly written for the purpose of this research. Whenever the risk rating is not clear from the issue, please select the risk rating that is nearest to the probable actual rating. In any case, you must pick one.

When the questionnaire is completed you are asked to answer the following open questions:

- Please describe why you were able or unable to assess the risk in the issues.

- Please indicate what factors influence the risk rating you have assigned to the issues. Name at least five factors.

- Please provide any other comments you might have.'

Annex III - Risk definitions [Company Name]

Low Risk: Audit finding, the solution to which may lead to improvement in the quality and/or efficiency of the organisational entity or process being audited. Risks of damage to the organisation are limited. Routine management attention is warranted.

Medium Risk: Audit finding that may lead to: (1) financial losses; (2) loss of controls within the organisational entity or process being audited; (3) reputation damage; and/or (4) adverse regulatory impact. Timely management attention is warranted.

High Risk: Serious audit finding that may lead to: (1) substantial losses, possibly in conjunction with other weaknesses in the control framework of the organisational entity or process being audited; (2) serious violation of industry best practice; (3) serious reputation damage; and/or (4) significant adverse regulatory impact. Immediate management attention is required.

Annex IV – Likert Scale Risk Propensity

The risk propensity questionnaire presented to both auditors and auditees is as follows:

We are interested in everyday risk-taking. Please could you tell whether you would expose yourself to the following risks.
Please use the scales as follows: 1: never, 2: rarely, 3: quite often, 4: often, 5: very often

a)	Business Continuity Risks	e.g. back-up system, disaster recovery procedures, business continuity planning	1 2 3 4 5
b)	Change Management Risks	e.g. full change documentation, formal approval, impact analysis	1 2 3 4 5
c)	Configuration Management Risks	e.g. inventory of configuration items, versioned software releases, asset inventory	1 2 3 4 5
d)	Testing Risks	e.g. presence test, acceptance, development, production environment, user acceptance testing	1 2 3 4 5
e)	Security Risks	e.g. system access, encryption of data, integrity of data	1 2 3 4 5
f)	Service Level Risks	e.g. service level agreements, definition of performance indicators, performance measurement	1 2 3 4 5

CHAPTER 7. DEAF EFFECT IN ESCALATION OF IS-PROJECTS: AN EXPLORATORY MULTI-CASESTUDY ON CAUSES AND AUDITOR-MANAGER INTERACTION

7.1. Introduction

In the previous Chapters 4 and 5 we found confirmed that the relationship between the internal auditor – as a bad news messenger – and the decision maker is of influence on the Deaf Effect for a Risk Warning on a failing IS-project. It seems to make a difference whether the messenger is seen as a Collaborative Partner or as an Opponent. This is confirmed, for both students and people with relevant working experience, in two slightly different experimental settings. In the laboratory settings of these experiments, this relationship was manipulated by the history that was build up with the internal auditor who behaved as an Opponent – who exposes management failures, or as a Collaborative Partner – who contributes to management performance. This history reflects two different roles that are assigned to internal auditors, depending on the Corporate Governance framework within the organization. According to Corporate Governance principles from Agency Theory, the internal auditor has a monitoring role towards management on behalf of the organization. According to the Corporate Governance principles from Stewardship Theory, the internal auditors are expected to contribute to management performance as a business partner and consultant to management. Both roles are reflected in the definition of internal auditing that was issued by the Institute of Internal Auditing in 1999 that says (IIA, 2004):

"an independent objective assurance and consulting activity designed to add value and improve an organization's operations. It helps an organization accomplish its objectives by bringing a systematic, disciplined approach to evaluate and improve the effectiveness of the risk management, control and governance processes" .

Our experiments showed a main effect that respondent are more likely to follow the Risk Warning of a messenger who was seen as a Collaborative Partner. At the same time, we found that the strength of this effect varies across conditions. As suggested by Davis (Davis et al., 1997), the effectiveness of these relationships interact with the psychological conditions of the decision makers. In our experiments we found this confirmed for decision maker's perceived control. High perceived control increases the influence of the relationship with the messenger. If the message comes from an Opponent instead, it is more likely to be ignored. Decision makers with a low perceived control – apparently – are more likely to listen to the message from either a Collaborative Partner or an Opponent than decision makers with a high perceived control are. In the experiments we also found that the presentation of a Risk Warning – by either putting attention on Gains or Losses – is of influence. It has a main effect and it also demonstrates an attenuation of the influence of the messenger - decision maker relationship on the Deaf Effect. These experiments provide clear empirical support for the influence of the messenger-decision maker relationship on the Deaf Effect. The experiments also showed that this influence is sensitive to interaction effects with other factors. That makes it interesting for further study in field conditions and for identifying potential factors that can be of influence on the Deaf Effect as well. With this exploratory field study we aim to gain further insight in the Deaf

Effect and to elicit candidate factors and interactions, from people who experienced the Deaf Effect in the field. Although open for candidate factors, our study will remain focused on the Deaf Effect as dependent variable, and continuously keeps an eye on the independent variable Partner/Opponent relationship.

7.2. Research Questions

In order to refine our Research Questions we first clarify that the proposed contribution of this field-study will be to explore *Why and How the* Deaf Effect occurs in the field of escalating IS-projects. The assumptions and scope that we will take into account are:

- The *unit of analysis* is the Internal Auditor who encountered a Deaf Effect response in an IS-project;
- The Bad News Messenger acts in the role of *internal auditor* who meets the professional standards of the Institute of Internal Auditing (IIA, 2004). These standards address the criterion of a Bad News Messenger who is acting as a credible source - i.e. who has the expertise and could be relied upon to make true assertions (Cuellar et al., 2006). Furthermore, they assure that the internal auditor would operate from an Auditing Function which is independent from management authority (Keil & Robey, 2001);
- The dependent variable is the Deaf Effect – to continue the course of action despite the warning. We are interested in contingency factors related to the influence of the independent variable 'Partner/Opponent relationship' on the Deaf Effect.

This brings us to the following table with research questions we aim to answer in this chapter:

	Research Question	Type of Question
7	What other factors could be proposed to be of influence on the Deaf Effect, taking into account the influence of Partner/Opponent relationship on the Deaf Effect?	Why/How
7.1	What other factors are proposed to be of influence on the Deaf Effect?	Why/How
7.2	What other factors are proposed to interact with the Partner/Opponent relationship in its influence on Deaf Effect?	Why/How
7.3	What structures and attributes can we identify that can be of help for further explanatory studies on Deaf Effect that will include those factors?	How

Table 7-1 Research Questions of Empirical Study

Figure 7-1 provides a graphical representation of the scope of relations that we aim to explore.
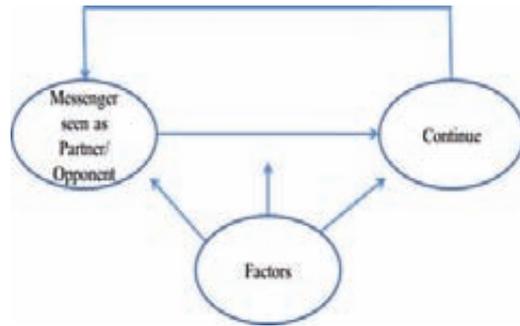
Figure 7-1 Scope of Empirical of Empirical Study Chapter 7

The factors that we consider to be within the scope to be explored could be of influence on the Deaf Effect (Continue) directly. They could also be of influence on whether the messenger is seen as a Collaborative Partner or as an Opponent. Factors might also moderate (attenuate, amplify or change) the influence of the Partnership/Opponent relation on the decision to continue a course of action.. We also include in our scope the feedback from the Continuation decision (representing Deaf Effect) on the Partner/Opponent relationship. In our considerathe decision to include or exclude potential factors from our scope, we use the criterion of whether a factor could be of influence on the Deaf Effect, since that is the dependent variable in our study.

7.3.   Research Method

In order to answer our Research Questions we will use a qualitative approach following a Case Study method. Yin (2009) describes, based on three criteria, when a case study method is appropriate as research method. The three criteria are: *form of research question*, *requiring control of behavioral events* and *focus on contemporary events*. In this study the exploration of 'why' and 'how' are the central questions, the study does not need control over behavioral events but it does focus on contemporary events. Based on the answers to these three criteria the case study could be used as a research method to answer the research questions (Yin, 2009), p8.

The topic of Deaf Effect is suitable to be studied with a Case Study method. We refer to the most frequently encountered definitions of case studies, which have mainly been focused on the types of topics to which case studies have been applied. Yin (2009), p17 provides as example "The essence of a case study, the central tendency among all types of case study, is that it tries to illuminate a decision or a set of decisions: why they were taken, how they were implemented, and with what results". Yin refers to decisions, individuals and events amongst suitable topics for a case study. So the Deaf Effect phenomenon fits into this list of suitable topics, since it refers to a decision at the individual level of a decision maker (in the role of Project Owner).

Since we aim to contribute to an understanding of the 'why' and 'how' of the Deaf Effect, an *explanatory Case Study* would have been the most preferred type of Case Study. Taking into account not only the form of the research question, but the substance as well however,

it is more realistic to obtain an *Exploratory Case Study* (Yin,2009), since the Deaf Effect phenomenon is still in the early stages of investigation (Cuellar, 2009; Cuellar et al., 2006). Even if we let our Case Study be guided by the influence of the Partner/Opponent Relation between Bad News Messenger and decision maker on the Deaf Effect, experiences from the field suggest that many factors could be of influence on this causal factor and could moderate its effect. In this dynamic and complex setting it is not realistic to allow testing of causal relations by ruling out rival explanations, as is proposed for explanatory case studies (Yin,2009). This would have resulted in interview-questions that would have been dominated by rejection of factors, while we aim to get a rich picture of 'could be' factors including the variety of attributes that could be of influence on the Deaf Effect. Therefore, we find it more appropriate to choose the method and principles of an exploratory case study, guided by attention on the Partner/Opponent relation and the influential factors that were identified in earlier experiments on the Deaf Effect.

We depart from the hypothesis that the decision makers are more likely to listen and follow the Risk Warning coming from a Collaborative Partner instead of one coming from an Opponent. Since such a Partnership relation might be sensitive to certain influences, we explore our case-data in search for conditions and patterns of this independent variable in the Deaf Effect situations reported. With this approach of induction we aim to deliver propositions and structures that could be helpful for further deductive research on Deaf Effect. Wallace (1971) used the metaphor of the "wheel of science" for this iterative research process of deduction and induction to study and explain a phenomenon – such as Deaf Effect in our case. Braster (2000), p29 suggests that Case Studies are applicable in both the deductive and the inductive approach. According to Braster, a Case Study fits well with an inductive approach and can very well take theoretical assumptions as a starting point. Therefore, we conclude that the exploratory Case Study as Research Method can serve our Research Questions. Finally, Braster (2000), p112 suggest that with this inductive approach the starting point of analysis is the collected data – realizing however that these data have been collected with assumptions and theories in mind. This means that analysis of the Case Study data could not follow strategies such as pattern matching, explanation building and time series analysis, which are deductive by nature[51]. Braster (2000), p113 proposes that Grounded Theory principles of iterative coding and analytical memo-writing (Charmaz, 2006; Glaser & Strauss, 2008; Saldana, 2009) are appropriate for exploring concepts and the development of theories based on case-study data. In our elaboration of this study we followed a Grounded Theory study of Flint, Woodruff, and Gardial (2002) that explored Customer' Desired Value Change in a Business-to-Business Context. This study showed high similarities with the form and substance of our research questions, and was based on interviews in the field with key-purchasing managers who had direct experience with the phenomenon being studied. In a similar manner, we aim to

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[51] Deductive strategies such as explanation building and timeseries might appear to be suitable, since they also allow iterative development based upon the case study data. We did not find them appropriate however, since they would drive the study to iterative refinement of hypotheses due to inconsistent results. Our aim is not to achieve refinements but to explore interactions. So we depart from the casestudy data instead of from the hypotheses.

explore the Deaf Effect based on interviews (cases) with internal auditors who had direct experience in the field.

7.4. Research Design and Quality

For the purpose of our study we adopted a multiple-case design, with a single unit of analysis per case. This is one out of four types of designs for a case study, as presented in table 7-2 (Yin, 2009).
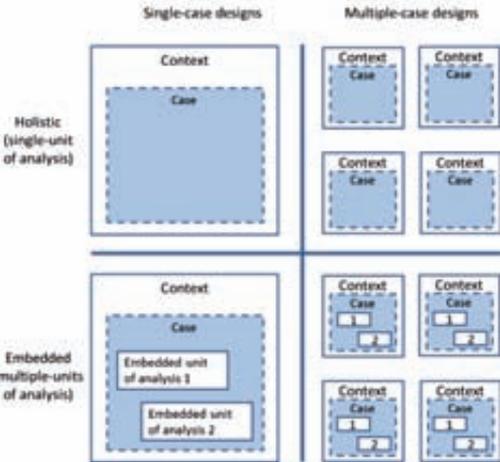

Figure 7-2 Basic types of designs for case studies (Yin, 2009)

A case can best be described as one particular Deaf Effect situation as reported and described in an interview. One of the reasons why a multiple-case study is more appropriate here than a single-case study, is that it helps to find more factors that could contribute to the Deaf Effect and because it gives more insight into the variety of these factors. Furthermore, evidence from multiple-case studies show a higher data reliability than evidence from one study. Therefore, the study is more robust and reliable than in the case of a single-case study (Yin, 2009). The multiple-case study is also more applicable in the case where a phenomenon is shown in multiple cases (Yin, 2009).

Because the study focuses on internal auditors who encountered the Deaf Effect in the context of a specific IS-project, a single-unit of analysis is used for each context. We did not interview multiple people that were involved in the same Deaf Effect situation. Based on these arguments, the case study design which will be used is the model shown in the upper-right corner of the model shown in table 7-2, a holistic multiple-case design.

In order to discuss the quality threats and controls that are embedded in the research design and execution, we will discuss criteria of validity according to Yin (2009), p41. We follow Braster (2000), p61 who refers to several authors that suggest that these criteria apply to all types of case studies – thus including exploratory case studies. Brastner also mentions that other researchers claim that different sets of quality criteria should be used for different types of research, such as trustworthiness criteria (Lincoln & Guba, 1985) that would only

apply to (interpretive) qualitative research opposed to (positivistic) quantitative research. We prefer the validity criteria as proposed by Braster (2000) and Yin (2009) to keep consistency with the other empirical chapters in this thesis. In table 7-2 we will describe how we embedded these criteria in our design and execution.

Validity	Controls in our Research Design and Execution	Applies to
Reliability	- Use case study protocol	Data collection
	- Develop case study database	Data analysis
	- Use native language	Data collection
	- Use few and open questions	Data collection
Construct validity	- We use interviews from multiple sources	Data collection
	- Use of verification questions	Data collection
	- Iterative Coding of Sensitizing Concepts	Data analysis
Internal validity	- Temporal descriptions	Data collection
	- Iterative Coding of actions and effects	Data analysis
	- Theoretical Replication Within-Subject	Data collection
	- Explorative Explanation Building	Data analysis
	- Arrive at Logic Models and Review	Data analysis
External validity	- Use replication logic in multiple-case studies	Data collection

Table 7-2 Quality Controls in our Exploratory Case Study Design

In the next two sections we will describe how we implemented data collection and data analysis in order to achieve validity as presented in table 7-2.

7.5   Data Collection

We used a case study protocol (Yin, 2009), p45 to enhance *Reliability* of our study so that it could be audited and repeated. The *case study protocol* describes our research objectives, respondents, our invitations to respondents, text for introduction of the interviews, the main questions and topics that could require attention while executing the interviews. The case study protocol was peer-reviewed before we started our interviews and was adhered to during the interviews.

Although our case study protocol and database are in English for review purposes, our interviews were held in the respondents' native language, Dutch. The recalled stories of Deaf Effect situations contained precise words on people's actions and reactions – which expressed subtle levels of anger, irritation or cynicism. It would have harmed reliability of the data collection if respondents and researcher would have used a non-native language to exchange information with two steps of translation that could cause misinterpretations.

Reliability was also served by the open nature of the questions (Braster, 2000), p75. which allowed the respondent a lot of room to pay attention to details that he/she found relevant in their contribution to Deaf Effect. We also encouraged respondents to explain why they held these beliefs and asked them whether there were relevant issues that had not been

mentioned yet. These open invitations contribute to reliability of the study to measure the elements that are relevant.

The interviews also contributed to *Construct Validity* since we obtained information from various respondents on different Deaf Effect situations. Interviews, however, bring some weaknesses and threats (Yin,2009), p102. First, they could bring bias due to poorly articulated questions. We mitigated this weakness by using a case study protocol with standard introduction of the purpose, topic and definitions that we used in our study. Furthermore, we recalled – if appropriate during the interviews– the definitions that we used. In order to mitigate response bias, we sometimes asked questions in various ways and we triggered individuals to explain seemingly inconsistencies in the story. Interviews might also bring inaccuracies due to poor recollection even given the fact that the respondents reported from autobiographical memories of personal experience. The announcement and introduction of the interview provided respondents the opportunity to choose a Deaf Effect situation they could easily recall. We have no reason to assume poor recollection given the level of detail that was provided by respondents, their answers on questions for more detail and their open remarks on details that they could not recall. The threat of reflexivity – giving the interviewer what he wants to hear – would not be likely given the open and exploratory nature of the questions instead of closed and confirmative questions. We might further consider that these senior internal auditors are used to "not always say what you want to hear".

We used interviews as our single source of evidence. We were not in the position to further enhance Construct Validity with data-triangulation with other sources of evidence such as documentation, or archival records. The Deaf Effect situations on Strategic IS-projects were highly confidential for the organizations that were involved, so asking for additional evidence would not be appropriate. Strict confidentiality was guaranteed in the invitation and the introduction of our interviews and allowed us to transcribe data form these interviews for further analysis.

Since the objective of our Case Study was to explore the explanation of the Deaf Effect, we did not aim for, nor achieved, Internal validity to arrive at a level of an Explanatory Case Study. This would have required extensive interrogation of respondents in order to rule out Rival Explanations (Yin, 2009), p42. This did not fit our purpose to collect and explore possible explanations and to encourage respondents to talk and explain freely.

We finally contributed to internal validity by asking the respondents a final question on a contrast situation, in which the same auditor found that the Project Owner – preferably the same - was eager to listen and follow the auditor's message to redirect or stop a project. We asked what was the most relevant factor that explained why the Deaf Effect situation occurred in the one instance and not in the other. This form of 'two tail' multi case study implementation (Yin, 2009) p59, provides additional insight into promising factors that could contribute to theory-building to explain the Deaf Effect.

With respect to *External Validity* of our study we are aware of the limited number of observations from 11 interviews in total. External validity in case studies assumes analytical generalization – where surveys for example assume statistical generalization

(Yin,2009), p44. So the question of External Validity is whether or not the observations from the Deaf Effect situations of our respondents would be representative in concepts and structures. We think that they are since our respondents (1) were role-prescribed Bad News Messengers, (2) reported to IS-Project Owners and (3) met professional and organizational criteria to act as a credible and independent source. They were obtained from information-oriented sampling across senior internal auditors in the Netherlands. Most of them were working in the field of financial services and transportation services. This is a domain that has delivered many single-case studies on Escalating IS-projects in the past (see table 2-3 for an overview of single case studies). A point of attention for external validity is that the influence of cultural factors might be little illuminated given the focus on Dutch situations. In table 7-3 we provide an anonymized insight into the background of our respondents[52]

Role and experience	Gender	Nationality	Age	Type of Organization	Company Size # employees
Head IT-Audit, >15yrs	Male	Dutch	50-55	Banking T	>10000
Head IT-Audit, >20yrs	Male	Dutch	40-45	Banking T	>10000
Director IT-control, >15yrs	Male	Dutch	40-45	Insurance U	>10000
Senior manager IT-portfolio control, >25yrs	Male	Dutch	50-55	Insurance U	>10000
Senior IT-audit manager/controller, >20yrs	Male	Dutch	40-45	Insurance V	>10000
Director Internal Audit, >25yrs	Male	Dutch	55-60	Insurance W	>10000
Senior IT-audit manager, >25yrs	Male	Dutch	55-60	Banking X	>10000
Senior audit manager, >20yrs	Male	Dutch	45-50	Banking Y	>10000
Director Internal Audit, >25yrs	Male	Dutch	55-60	Insurance Z	>10000
Chief Audit Executive, >20yrs	Male	Dutch	40-45	Transportation Q	4000
Senior Auditor, >10 yrs	Male	Dutch	40-45	Transportation Q	4000

Table 7-3 Anonymous Description of Respondents

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[52] We had performed a pilot interview in an early stage of our study which is not included. The sequence of respondents in this table is not related to the case-numbers that we will use later in this chapter.

7.6.   Data Analysis

We transcribed our interviews into 6-10 pages of text per interview. After a review of the interviews, we prepared our first analytic memo of patterns that emerged from those interviews. We discussed this memo with peer researchers. We followed a two cycle coding and analytic memo writing procedure according to guidelines for qualitative research by Saldana (2009). In the first coding cycle we identified any text-fragments that appeared to contain causes of Deaf Effect or that appeared to be related to the Partner/Opponent relationship between internal auditor and decision maker. Based on this initial coding we prepared a second analytic memo that we discussed with peer researchers. We coded and structured the factors that these internal auditors found relevant for explaining the Deaf Effect. We were especially interested in the relationship between messenger and decision maker. At several points in time we asked the respondents about this relationship, so that we could obtain a view on how it developed in that particular situation and what events and actions were of influence. This provided us with a rich insight into factors that would likely contribute to the Deaf Effect. At the same time, it also showed that multiple interactions and factors contributed to Deafness. Next to the description and clustering of factors that were proposed to have a – direct or indirect – causal effect on the Deaf Effect, we prepared an analytic story that describes how the Deaf Effect occurred after a Bad News Message. This analytic story was based on our interviews and guided our attention to the interaction strategies between the internal auditor (bad news messenger) and the Project Owner (decision maker). It also provided us with insight into the variety of factors that appeared to be of influence across the 11 cases. These cases appeared to provide sufficient variety and insight into factors (categories) to satisfy the criterion for theoretical sampling (Charmaz, 2006), p100. Based on these emerging patterns and clustering of factors, we refined our coding and further refined our analysis.

Of the four proposed general strategies to analyze qualitative data from case studies (Yin, 2009), p130, we determined that the *development of a case description* be the most appropriate for our exploratory study. Our approach follows the iterative *Analytic Memo Writing* procedure for qualitative (Grounded Theory) research as proposed by Charmaz (2006), p11, and Saldana (2009), p32. The iterative coding and analytic memo writing also contributed to the *Internal Validity* of our study since temporal patterns and perceived explanations – as provided by the respondents - were further structured and refined into clusters of factors that are proposed to be influential on Deaf Effect. From this iterative process we finally arrived at logic models that are proposed for further research.

In order to store and maintain the collected data, we developed a *case study database* (Yin, 2009), p45. This contributed to the *Reliability* of our study since it facilitates for it to be audited and repeated. In the *case study database* we stored (1) the original taped interviews, (2) the transcribed word documents, (3) the list of codes, (4) marked coding within the documents, (5) word-tables with key-characteristics, (6) multiple versions of analytic memos and (7) marked anecdotes that were used in the final analytic memo which is embedded in this Chapter. The database was stored and maintained in nVivo release 9 which is a recent implementation of Computer Assisted Qualitative Data Analysis Software (CAQDAS). This implementation contributes to reliability, transparency and

flexibility of our case study data, which allows for further elaboration and reviewing of the analysis of the texts from our interviews.

7.7. Results

7.7.1. Clustering of Factors that were reported to be of influence on Deaf

Participants' stories can be tied together through an understanding of the influence of the Bad News Message on the Deaf Effect as a sequence of events and conditions that developed over time. In figure 7-5 we present our structure using an analogy with a study that explored the phenomenon of Customers' Desired Value Change in a Business-to-Business Context (Flint et al., 2002). At the right end of this figure we present the Deaf Effect as the dependent variable of our study. In the second left block in this figure we describe the properties of the bad news message that respondents used in explaining Deaf effect in the occasion that they described. Consistent with Flint, we describe the variety in form and intensity of the Bad News Messages as shown in our interviews. In the bottom of this figure, we show the final Partner/Opponent relationship when Deaf Effect occurred at the right end and how it developed is shown by reading from left to right. At the left-end we describe the initial relationship before the bad news message was given. Initial states are described by Organization Conditions, Messenger Characteristics, Receiver Characteristics and Project Characteristics. These conditions may directly, or indirectly, be of influence on the Deaf Effect. Attributes of the Bad News Message could be of influence on the Deaf Effect directly, but can also be of influence on the Partner/Opponent relation. Consistent with Flint et al. (2002), we derived and clustered Action/Interaction Strategies that were reported by our respondents in order to explain the Deaf Effect.
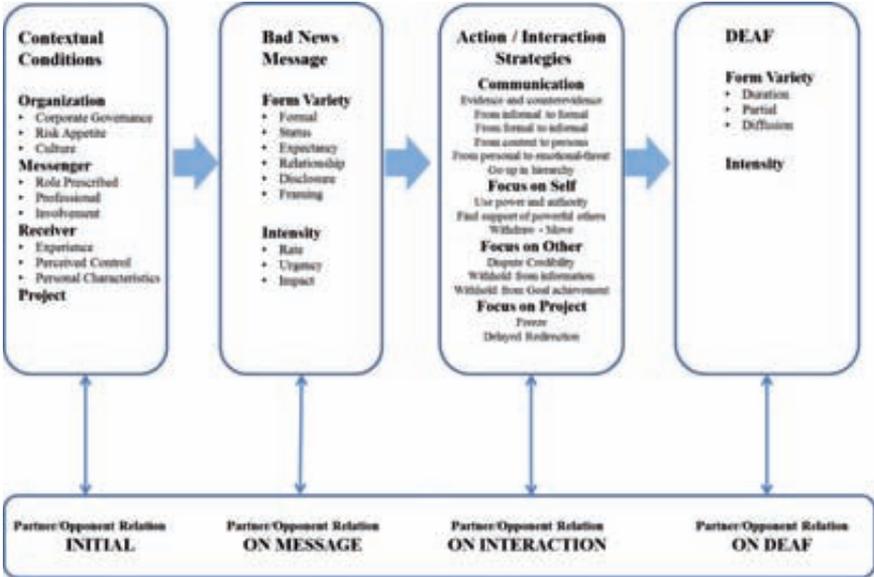

Figure 7-3 Model to structure the factors that are of influence on Deaf Effect

7.7.2. Reported Definitions and Indicators of Deaf

In the introduction of our interviews we recalled our definition of the Deaf Effect, according to Cuellar (2009) : "when a decision maker doesn't hear, ignores, overrules a report of bad news to continue a failing course of action". As the dependent variable in our study we noted the descriptions for Deaf Effect that the respondents used in their interviews. The following descriptions were used by the respondents while they described Deaf Effect situations. *Case #3: The executive did not agree with us which gave a lot of turbulence. At that point there was a Deaf Effect, as I interpreted, in the sense of that they did not want to accept our message.*

The respondents also described several indicators of the Deaf Effect, which told them that the decision maker (Project Owner) did not hear, ignored or overruled the bad news report. As described in *case #2: "I didn't get answers anymore, meetings were cancelled. The most typical was that he (the manager) didn't answer my phonecalls. So I asked my colleague to call him, and in two seconds he was on the phone. Yes and then you know they don't want to hear your message".* The Bad News Messenger in *case #4* described, as indicator for the Deaf Effect, that *"the manager had not prepared our meeting and had not read my note. And he asked me why I was bothering him with my details".*

From our interviews, we also obtained two additional descriptions in which the Deaf Effect was not as black-and-white as we used in our definition. The internal audit director in *case #3* referred to –what he called – *temporary deafness*. Just after the Bad News Message the manager showed deafness, but after a while this appeared to be recovered from, so the deafness was not permanent. Another internal director in *case #9* referred to *partial deafness* in which the manager appeared to listen to important parts of the message, and showed deafness for other parts.

7.7.3. Reported Interaction Strategies

We proceed with a backwards-oriented description starting from the Deaf Effect back to the events and factors that led to it.The first of these factors that we discuss are the interaction strategies that finally resulted in the Deaf Effect. In the tables 7-4a through 7-4d we present the interaction strategies that were mentioned in the interviews as being relevant in the explanation of the Deaf Effect. We clustered them into 4 groups of strategies. The first group refers to changes in the communication between messenger and decision maker. In the second group we present action/interaction strategies that are focused on making a change in the position of the actor (strengthening, withdrawing or other). The third group refers to actions/interaction strategies that are focused on the position of the other (strengthen, weaken or other). The fourth group consists of actions/interaction strategies that were focused on the project (freeze, redirect, change roles). The tables present the following information derived from the cases: who the person was that showed the interaction strategy, was it the Bad News Messenger, the decision maker or – in some cases - a higher authority who intervented? In each column

we present in how many out of 11 cases the actor had applied this strategy. In the last three columns we show in which cases this was associated with a shift in the partnership relation[53]. Within each table, the interaction strategies are listed in the most natural chronological sequence of appearance, according to our interviews, although there is no fixed sequence across all interviews.

Communication Strategies

	Bad News Messenger	**Decision Maker**	**Higher Authority**	**Associated with Shift in Relation**		
				More Partner	Neutral	More Opponent
Use of more evidence and arguments	6/11[54]	5/11		3,7[55]	9,10,12	4,8,11
Switch from informal to formal communication	7/11	2 /11			7,9	2,4, 8,11,12
Switch from Content to Form (Rating/Color)	5/11	2/11			8,9	2,4,11
Switch from Content to Persons	2/11	5 /11		8	2	4, 9,11,12
React emotionally	2/11	3 /11		8	2,4	11,12
Go up in hierarchy	11/11	2 /11		3,5	4,6,7	2,8,9,10,11,12
Switch from formal to informal communication	5/11	2 /11		3,5,8,9,10		4

Table 7-4a Action/Interaction strategies on Communication

Table 7-4a shows that both messengers and decision makers provided additional evidence and arguments to convince the other. In some cases this sharing of information was

[53] The association of an interaction strategy with a shift in the Partner/Opponent relationship is Neutral by default unless there are indications that it moved. These indications are interpreted by the researcher for each individual case from 1. The answer of the respondent on the question about the status of partner/opponent relationship at that point 2. The reaction of the counterpart that could indicate a shift (react with email in capitals; don't answer the phone), 3. The use of typical words by the respondents like "we-together-common-share" vs "he-they i-we against". These interpretations could be disputed for an individual case, but are intended to provide insight over all cases whether it would lean towards shifting in either direction.

[54] Refers to the *number of cases* out of a total of 11 interviews

[55] Refers to the individual *case numbers*

appreciated and was associated with mutual understanding and partnership (*case #3 and #7*). In some cases this repeating and stressing of evidence was associated with a worsened partnership relation. *In case #4 the Bad News Messenger had reported 25 concerns on the project and had arranged a 3 hour meeting to discuss those issues. A short while later only three issues appeared to be solved and the messenger arranged another urgent meeting with the responsible manager. This manager acted much more as an opponent in this meeting.* An overwhelming amount of evidence and arguments could also be used by the manager. *The internal auditor in case #11 reported that he was provided with piles of paper with so called evidence that should reject his opinion. "They had ordered someone to prepare lots of detailed information to counter act the smallest details in my audit note. Just to knock down my message with impressive details and calculations. But with my own financial background and the record of the project, it was more than obvious that the project's business case was no longer viable".*

In 7 out of 11 cases, the Bad News Messenger switched from informal – mostly oral communication - to formal communication – mostly reported with a rating. In most of these cases this switch was associated with a worsened partnership. The same applied to occurrences where the focus of a discussion moved away from the content and toward the formal side of the message, such as a *Rating* (as in *case #8* and *case #9*) or as reported in *case #11: "They shifted from the content of my message to the form and assumptions that I had used in my note".*

Several cases marked a clear point in which the decision maker switched the focus of the communication from content to personal factors. This could show in many forms, but all of them made it clear that the message - either due to content or form – was related to the self and other persons including the messenger. As reported in *case #2: <<The response of the director in that meeting was not about content anymore. He said "how can you know", "with whom did you talk", "that guy doesn't understand". He moved to persons and blaming instead of discussing content>>.* In *case # 4* the Bad News Messenger also phrased the words of the manager literally *<<"hey you, what do you think you are doing with you bothering me with your details". For me this showed the Deaf Effect. I had the feeling "hey you yourself, just read my concerns instead of refusing to understand". Yes, that pushes you into the direction of policeman and you get that feeling although you didn't want to>>.* In many cases the manager appeared to be triggered personally by the message, since he strongly associated himself with his project (*case #6*), he felt that his experience or reputation was neglected (*case #4*, *case #6*); he felt himself being put in an uncomfortable position of being criticized in the presence of his peers (*case #2*) or he felt criticized on his integrity to disclose information on the actual project status (*case #11*). The switch from content to personal factors/level could also be recognized in *case #8* when the Bad News Messenger described *<<he looked me in the eyes and said 'John you are really not helping me and you harm our organization'…. And I said 'Frank the way that you take your decisions, shows that you don't take this problem seriously'>>.* The switch from content to personal factors/level was made in a subtle way by the Bad News Messenger as well, for example as shown in *case #9* by the question *<<now be honest, would you give yourself a rating "satisfactory"?>>.* It appeared that the switch from content to personal factors/level was crucial in several deafness situations. Interpreting the Bad News Message as a personal criticism or not appeared to distinguish Deaf Effect

situations from highly comparable situations in which the manager showed no Deaf Effect and even showed to be eager to listen (*case#2, case #8*). In *case #11,* the internal manager said that *remarks on strategic issues - "does it make sense what you are doing and are you doing it well" - are often perceived as personal criticism and therefore it is much more easy to report deficiencies on operational issues such as controls and security.*

The switch from content to personal communication, was often followed by emotional reactions such as getting angry upon receiving the Bad News Messenger as reported in *cases #2, #4, #8, #11 and #12*. The interviews showed that in all cases of the Deaf Effect the Bad News Messenger decided to report to someone higher up in the hierarchy. In most situations this was clearly associated with a shift to a worsening the partnership relation. The Bad News Messenger in *case #2* explained that <<*he saw us clearly as policemen. Of course this was related to our intervention that has – how shall I call it - a policeman flavor. It is no joke when somebody goes to your boss and talks about what you do within your department and that things are not going well. You're not waiting for that kind of help.*>>

In six cases there was a clear switch in the communication from formal to informal communication – often in a small and trusted setting with executives from the audit department and business. In most of these cases this switch was associated with improved partnership. As reported by internal audit director in *case #3, "informal doesn't mean that you have dinner together informally, but it is more like walking into each other's rooms and be sure you keep on talking to each other".*

After these general communication strategies, table 7-4b shows the interaction strategies that are are focused on making a change in the position of the actor himself/herself (strengthening, withdraw or other).

Strategies with Focus on Self

	Bad News Messenger	Decision Maker	Higher Authority	Associated with Shift in Relation		
				More Partner	Neutral	More Opponent
Talk to my Projectmanager/supplier not to me		6/11			2,6,7	4,11,12
Introduce External Threat	2/11	3/11		9	2,10	12
Find support of powerful or trusted others	5/11	2 /11		3	4,5,6,9,11	
Use Power and Authority	8/11	1 /11			4,6,8	2,3,9,11,12
Withdraw	0/11					

Table 7-4b Action/Interaction strategies with Focus on Self

In six out of 11 cases decision makers showed that they did not want to hear the Bad News Message since they believed that it should be addressed to someone else. In most cases they referred to the Project Manager (*case #6*, *case #12*). This confirmed and motivated the Bad News Messenger to take position even more boldly that the Decision Maker should take responsibility. *In case #8 the Manager pointed at another department, "he said we auditors should point our arrows to that department in order to improve their service first. Now you are critizing and punishing the best in class"*.

In several cases the internal auditors introduced an external threat (regulatory) to strengthen their own position. The Decision Makers in *case #10 and #2* introduced external commercial and operational threats to strengthen their position: *"we must proceed for sake of continuity of service to our customers"*. Finally, the respondents reported the strategy to find support of powerful or trusted others. This appeared to be most often used for obtaining confirmation and gaining supporting for one's own position. This was not associated with a worsening partnership relation. Nevertheless, this last strategy could indicate a point of no return – to give up opinions without losing face towards those trusted and powerful others that showed their support.

Messengers in several cases used their authority and organizational power, mainly to report concerns in their regular procedures. In some cases this was associated with a worsened partnership – according to the Bad News Messenger's perspective of the situation.

In our cases we did not find any instance of a Bad News Messenger or Decision Maker that actually had decided to withdraw. In several cases however, the Bad News Messenger mentioned that he had considered to withdraw. *In case #6 the internal audit director had considered whether or not the Bad News Message - at this point in time - was worth the trouble and whether it would be more effective to save the "ammunition" for another – even more important – situation.* Since the interviews were focused on the Deaf Effect situations, it is reasonable that we didn't find reported these withdraw-situations, although it still could be an interaction scenario to withdraw in.

The above mentioned interaction strategies were focused on one's own position. Based on the interaction strategies above, the Bad News Messenger and Project Owners may have shifted more towards Opponents. Table 7-4c shows the action and interaction strategies that were focused on the other's position. Those strategies already assume that the other is considered an Opponent who should be stopped or redirected.

	Bad News Messenger	Decision Maker	Higher Authority	Associated with Shift in Relation		
				More Partner	Neutral	More Opponent
Don't share information	2/11				6	2
Withhold opponent from goal achievement	7/11				7,9	4,6,8,11,12
Dispute Credibility of other	5/11				8,9	2,11,12
Threat Opponent	2 /11					5,11

Table 7-4c Action/Interaction strategies with Focus on Other

A typical strategy was to frustrate the Bad News Messenger in making his or her message effective. The most often found form of this was to frustrate the finalization of the messenger's note or report according to procedures, sometimes in a subtle way. In *Case #7 the auditor mentioned that he had prepared a note with his remarks, which he discussed with the project manager first. Then he adapted the note since he wanted the project manager to subscribe his facts. So it took some time before he had a note that was subscribed by the project manager. Then he asked for a management response and saw this took a while again. At the time the project was ready to provide a management response, they claimed that the facts had changed and that the auditor should talk to several persons again. He concludes with "So they try to postpone and delay. That's what you see". The audit director in* **Case #9** *confirms these experiences. He contrasts that reports are quick and easily finished if he gives a Satisfactory Rating. However, if he gives an Unsatisfactory Rating it takes a lot of time for the report to be finished and the management response to be received.*

We also found other subtle ways to prevent the messenger from being effective. For example, by giving the messenger the impression that his message was taken very seriously, in which it took some time before the messenger realized that this wasn't actually the case. *The internal auditor in* **Case #11** *reported that the manager thanked him gratefully for the reported concerns and remarks. The auditor was told that they appreciated his contribution and that they would certainly take notice of it. "With hindsight now I realize this was just a smart way of preventing me from having influence on the direction of the project".* And further in **Case #11** *the Bad News Messenger tells that he was invited to talk to the Risk Director, who was very kind and listening to the auditor's concerns in his prestigious office. "It took me a while to understand that these meetings were another way to eliminate my message to have direct effect on the project".*

Also less subtle ways to delay and prevent the messenger from being effective in finalizing and reporting his message were found. *In case #4 the Bad News Messenger found that it took a lot of effort to arrange a meeting to discuss his concerns as described in a note. Then he found that the responsible manager had not prepared the meeting and had not read the note with concerns.*

Furthermore, several instances showed that the credibility of the Bad News Messenger was disputed in an obtrusive or more subtle way. The decision maker countered the bad news message by claiming that *the messenger had too much distance to be informed (case #3), missed important issues (case #8), looked too much at details (case #4)*. This was however not necessarily associated with a worsened partnership relation. *For example, in case #9 the manager said to the internal auditor: "I will try to explain it to you, but it is very complicated and I don't expect you auditors to understand this all".*

In two cases the Bad News Messengers reported that they had received personal threats regarding their job-security within the organization urging them to withdraw their bad news message. It was remarkable to notice that in one case the internal auditor had been operationally involved and appreciated within the project for a longer time. After his contribution appeared to threaten the manager's strategic goals, this appreciation turned into anger focused on the Bad News Messenger personally, finally resulting in personal threats. The operational involvement as insider and partner to the project even appeared to arouse that the anger was focused on the messenger personally[56].

In table 7-4d we present the action and interaction strategies that were focused on the project as well as what happened with the project. Just in a few cases, the decision maker had frozen or redirected the project in the end. In most cases an intervention of a higher authority had taken place, in terms of removing the manager from the project and to freeze or redirect the project. *The internal auditor in case #7 said that ultimately his concerns reached the level of the executive board. And "then things happened that we could not observe from our position. But it turned out that the manager was suddenly replaced" and was moved to a different project. The internal auditor in case #12 described that – after the auditor had reported his concerns to the executive board – the director was replaced and sent for early retirement, although the auditor did not know whether this was the only reason of course.* In several of the reported Deaf Effect situations, a higher authority – executive board – had finally stopped or redirected the project.

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[56] This conclusion could not be drawn from a single phrase in the interview, but it is plausible from the storyline of this interview that the assumed partnership led to this focus of anger on the bad news messenger personally. We use a metaphor to explain. We invite the reader to assume that he/she would be coach of a sports team, for example a soccerteam. Winning the current match could be of strategic value and could determine the future of you and your organization. Unfortunately - while close to winning - you loose this game, because – in the second half, just for finish - one player scores a hattrick against you. You might be strongly disappointed, emotionally, angry. But it is not likely that your anger will focus on the player that scored the goals – or even threat him or her. This might be different when this player belongs to your own team and was assumed that his goals would be alined with yours. In this situation it's much more plausible that your anger would be concentrated on this "teammember" personally, who persisted in harming your goals. You might feel betrayed.

	Bad News Messenger	Decision Maker	Higher Authority	Associated with Shift in Relation		
				More Partner	Neutral	More Opponent
Replace managers			6/11	3	2,4,7	11,12
Freeze & Redirect		3/11	4/11	3,4,5	2,7	12
Stop			3/11		6	11,12

Table 7-4d Action/Interaction Strategies with focus on project

7.7.4.   Reported Properties of the Bad News Message

In order to explore the Deaf Effect, we discussed the action/interaction strategies that started with the Bad News Message and finally resulted in the Deaf Effect. We also discussed that these interactions could turn Partners into Opponents. In table 7-5 we present the properties of the Bad News Messages that were mentioned by our respondents in their explanation of the Deaf Effect. The dimensional range of these properties was derived from the specific values that were mentioned in the interviews. In the right columns, we describe whether the interviews suggested association of the property with a worsened Partnership or directly with the Deaf Effect.

The Bad News Messengers mentioned whether their message was presented in an oral and informal form or as a formal (audit) report or letter. *Cases #2, #4, #8, #11 and # 12* suggested that an informal and oral presentation was more associated with partnership and that a written formal presentation was more asociated with the messenger and decision maker being seen as opponents. They also mentioned the *Status* of their bad news message – in this context often in written form – as a draft, concept or final version of the message. *Cases #8 and #4* suggested that discussion of an early draft version of a report was associated more with partnership than a fait accompli, which is less open for discussion and feedback. *Expectancy* also appeared to be a property of the Bad News Message that was relevant for the Deaf Effect. An unexpected Bad News Message was more associated with worse partnership relations. The same applied to a disclosure of the Bad News Message, for example to peers or the boss of the project owner, as we saw in *Case #2*. The positive or negative framing of the Bad News Message was also mentioned to be relevant for the Deaf Effect. The internal audit director in *case #9* reported that it was important to stress positive elements as well. The internal audit director in *case #3* said that the negative remarks should be embedded in a more balanced context. Too much attention on negative attributes apparantly was relevant for the Deaf Effect.

208

Properties of Bad News Message	Dimensional Range of Property	Association	
A. Form Variety		**Worsened Partnership**	**Cause Deaf Effect**
1. Formal	Oral informal – Written formal	Written formal	
2. Status	Draft – concept – final	Final	
3. Expectancy	Entirely Unexpected – Entirely Expected	Unexpected	
4. Disclosure	Confidential – Full disclosure	Full disclosure	
5. Framing	Gains/Losses		Losses
B. Intensity			
1. Rate	Unacceptable – Undesirable – Marginally Undesirable	Unacceptable	
2. Urgency	Evolutionary/gradual – Revolutionary/rapid	Revolutionary	
3. Impact	Operational-Attributes Only Structural – Attributes and Consequences Strategic – Endstates		Strategic

Table 7-5 Properties and Dimensional Ranges of Bad News Messages

The intensity of the Bad News Message could be expressed in terms of *Rating*. Especially the rating "unacceptable" appeared to be associated with an Opponent relationship. On the other hand, we learned from **cases #8 and #9** that Rating could reduce the Deaf Effect, since the message was unambiguous and received executive board attention. The expressed *Urgency* in the Bad News Message was associated with an Opponent relationship in **case #4**, probably since it is perceived to be obtrusive. As we discussed in the previous section, the impact of the Bad News Message was relevant as well. Apparently it makes a difference whether the message disputes the viability and end-state of the project – at strategic level –or that it disputes operational issues of the project. This was made visible in **case #11**. The auditor had built up a history with the project in which they followed his advices on internal controls and security. Apparently, this changed as soon as his remarks moved towards concerns on the strategic level of the project.

7.7.5. Reported Context

In this section we return to the context and initial conditions before the bad news message was given. Initial states are described by Organization conditions, Messenger characteristics, Receiver characteristics and Project characteristics. These conditions may, directly or indirectly, be of influence on the Deaf Effect. The interviews did not provide

sufficiently detailed information to describe properties and dimensional ranges as we did in the previous sections on the individual Deaf Effect cases. It also would require much more interviews to achieve theoretical saturation (Charmaz, 2006), p101.

In the interviews we found that several references were made to the *Corporate Governance* principles in the organisation. Also, the role of the internal audit department within the organisation was mentioned many times when people discussed the Deaf Effect situation. Several internal audit directors *(case #3 and #9)* referred to the role that was described in their internal audit charter. One of them had even used the metaphor of "policemen" in his internal audit charter.

We also found on several occassions that a reference was made to the *Retaliation Culture* within the organisation. In some cases, a high level of Retaliation (case #11 and #12) was mentioned as a cause of the Deaf Effect since managers would suffer heavy consequences if their project were to fail. In other cases, a low level of Retaliation was mentioned as a cause of the Deaf Effect (*case #5* and *#6*), which made managers perceive to be invulnerable.

Finally, the importance of a clear *Risk Appetite* at organization level was mentioned several times. The internal audit director in *case #3* described the process of several workshop meetings he had had with executive management. These workshops created a common understanding of internal audit and executive management on strategic risk taking within the organisation. He mentioned its contribution to avoid Deaf Effect situations. This was not only based on better understanding of the content, but also on a process in which executives and internal audit staff developed a partnership relation on strategic risks.

At messenger/organisation level, the *Authority* of the messenger was mentioned in several cases. It was referred to as an interaction strategy to use authority and to report the concerns within regular procedures. It was interesting to notice that this was not always associated with a shift to see the counterpart as an Opponent. Fair and open use of authority (as in case #4, #6 and #8) appeared to be neutral with regard to the Partner/Opponent relationship. This assumes that the messenger's role (as derived from corporate governance principle) could bring two distinct concepts: the Partner/Opponent relationship and the authority. Those might interact. If the 'policeman' has high authority you may listen, regardless of whether you consider him to be your Partner or Opponent (*case #12*). As Chambers et al. (1988) p72, underline: *"We tend to obey the police because they are the police"*. If the messenger's authority shrinks, then it makes a difference whether you consider him or her to be a Collaborative Partner or an Opponent. Therefore we propose *Messenger's Authority*, as described in Whistleblowing literature (Near & Miceli, 1995), to interact with the Partner/Opponent relationship.

At messenger level, the *Credibility* of the messenger, as proposed by Cuellar (2009) was not mentioned by our respondents, since they refered to their own situation and did not dispute their own credibility. In the interaction strategies, table 7-4c, we saw confirmed that messenger credibility was a relevant property of the Bad News Messenger.

At the receiver level, our respondents mainly refered to the project owner's *experience*, in terms of trackrecord with IS-projects and trackrecord with earlier internal audit engagements. An analysis of relevant *personal characteristics* of the receiver would require more psychology research skills to be executed. But elements of managers' perceived *invulnerability* and *narcism* appeared to be recognized from the interviews.

Finally, a typical combination of *Project Owner characteristics* and *Project Manager characteristics* is worth mentioning in relation to Deafness. We mentioned earlier that 6 out of 11 cases showed an interaction strategy of *"talk to my project manager, not to me"*. In these cases, the Project Owner showed very low involvement with the project, was poorly informed, not familiar with IS-projects and not really interested in the project and in criticism. They appeared to be not willing to hear the Bad News Messenger, maybe due to a lack of comprehension or exposure. In contrast to the Project Owners that were discussed, project managers mentioned in the interviews showed to be very experienced, powerful, involved and well informed. These Project Managers were often found to be in a dominant role in the interaction strategies that resulted in Deafness. So this typical combination of Project Owner and Projectmanager resulted in - what one of the respondents called informally after the interview– a 'double deaf' effect.

7.8. Storyline from the multi-case study: an analytical note

With the analytical note in this section we reflect on our interviews, departing from the experiments we described in Chapters 4 and 5. In our multi-case study we found that, with the exception of one case, all cases confirm that the messenger was seen as an Opponent at the point that the Deaf Effect showed. So, this condition preceded the Deaf Effect in a way that was consistent with our experiments. The Collaborative Partnership is also mentioned to distinguish Deaf Effect situations from contrasted situations. As a contrast we asked all respondents to recall another extreme opposite reaction in which the manager – probably the same - had showed extreme attention and urge to listen to the auditor's warning to redirect a project. The auditors mention that – in those opposite to deaf situations - the manager found the auditor's warning and the auditor's involvement to be aligned with the manager's personal goals and with the objectives that the manager had with regard to the project. The manager, in these cases, showed high intrinsic motivation to listen to the auditor and even claimed high urgency and priority to receiving the auditor's message. The manager scheduled meetings and even called during the weekend to be informed on the auditor's message The auditor in these cases was obviously seen as a Collaborative Partner to achieve the manager's goals, for example by creating the opportunity, evidence and justification for redirection of the project or a fresh project restart. In the opposite situation – where the Deaf Effect had occurred – these managers postponed meetings with the auditor and refused to answer the phone. They literally didn't want to hear the message and showed reluctance to share information with the auditor since there appeared to be no Collaborative Partnership (anymore).

The interviews provided us with a list of factors and events that were mentioned by the internal auditors in order to explain Deaf Effect in specific cases. We found that the Collaborative Partnership vs Opponent relationship between Internal Auditor and manager,

appeared to be of influence on the communication and could change over time or due to events, actions and interactions, finally resulting in the Deaf Effect. We grouped typical actions and interaction strategies that had been applied by the messengers and the decision makers. We also listed characteristics of the Risk Warnings that were mentioned by the internal auditors in their explanation of the Deaf Effect. Finally, we categorized conditions that were mentioned in the Deaf Effect cases into characteristics of the messenger, characteristics of the manager, characteristics of the organization and characteristics of the project. This structuring of factors showed us some patterns that can be interesting for further exploration of Deaf Effect.

We found that a history of Collaborative Partnership can turn out to be fragile after a Risk Warning has been given. The interviews provide examples of how a relation of Collaborative Partnership can turn into the opposite. In these cases the internal auditors had often been strongly involved in the project - based on their expertise on internal controls or IT-security – and had acted as advisors to the project mostly at an operational and tactical level. The auditors arrived at a role conflict when they found evidence or concerns that the project was no longer viable and should be redirected. With professional care, the auditors – in these cases – rechecked and reported arguments and their concerns on the strategic direction and viability of the project to senior management. At this point, the different perceptions and heuristics of the managers and auditors start playing a role at the level of bounded rationality. The managers literally perceive and observe risks differently from how they were reported by the internal auditor – as we found confirmed in our field-experiment with managers and auditors in chapter 6. At this point the Deaf Effect comes in – driven by bounded rationality and heuristics such as illusion of control and estimation of probabilities. At this point, managers still rationalize their decisions and suggest that the auditors should do more research. They strive to convince the auditors with "rational" arguments and are still willing to share information, so they don't see the auditors as Opponents (yet).

The turning-point comes when the manager feels to be criticized or attacked personally. The interviews mark this shift quite clearly as a change in arguments from factual to personal. Not all interviews show this step. It shows specifically in those interviews where the manager's personal beliefs, merits, self-esteem, self-efficacy or job security are at play and where the auditors warning could cause personal losses in that respect. At that point, the auditor is no longer considered as a Partner but turned into an Opponent. Most auditors, however, still considered themselves to be Partner of management and repeated the arguments louder and louder to overcome the Deaf Effect they experienced. The increased stressing of the Risk Warning appears to be counter effective in several occasions.

From this point we find several interaction strategies that were applied by the manager and by the internal auditor. In these Deaf Effect situations, it appears that these strategies fuel that counterparts consider each other as Opponents more and more. This starts with communication at a rational level (although with bounded rationality) which moves towards a personal level. Person related arguments can result in emotional and irrational reactions. Our interviews show several examples of managers who got angry and started to threaten or impress the auditor. Both parties consider themselves to be Opponents at this

point. We see that (1) Opponents seek support from other powerful people to stand behind them, (2) they further increase commitment to the positions they have taken, there is no way back without face-losing, (3) efforts shift towards harming the credibility of the Opponent and disturbing the goal-achievement of the Opponent, finally resulting in the Deaf Effect as reported in our interviews. In several cases this is followed by a powerful intervention of a higher authority within the organization.

Although the patterns and factors are not equal for all cases, the interviews suggest that: (1) The initial conditions – such as Perceived Control, Gain/Loss framing and a history as a Collaborative Partner or as an Opponent, as we tested in our experiments, set a direction either towards the Deaf Effect or towards listening to the Risk Warning at the level of bounded rationality; (2) Characteristics of the Risk Warning and the communication strategies that are applied by the messenger and the decision maker accelerate towards the Deaf Effect in these cases; (3) The Deaf Effect is not only related to the decision maker's commitment to finish the project, but appears to be related to the decision maker's commitment to eliminate the warning and the messenger as well; (4) Regardless of the content of the message, the internal auditor can unintentionally promote deaf effect by framing of the message and his/her interaction strategies in such a manner that it can divert attention from the content itself and towards conflict and persistence. The internal auditor is not just observing a situation as it is, in the contrary: he is part of the situation and thus of influence on the situation as well.

From our interviews we discovered that a history of Collaborative Partnership at executive level can be very powerful in avoiding or recovering Deaf Effect on strategic IS-projects. This strategic partnership appears to be more robust than project involvement at operational level. Finally, our interviews suggest that clear standards on an organization's risk appetite can play a role in reducing Deaf Effect and further escalation. These standards can create a common point of reference that is shared between the internal auditor and the manager. This, in turn, can reduce the dominance of bounded rationality, subjectivity and personal elements in the observations and discussions on whether certain risks are acceptable or not. Even when managers see auditors as "policemen" it would definitely be of help to share risk-norms as points of reference ("do we consider driving a car at 100km/hour or 130km/hour to be a norm of acceptable risk in driving-behavior, or do we leave room for the policeman to find 100km/hour to be too risky, while some experienced drivers may find 180km/hour not too risky at all for them personally").

7.9.   Propositions for further Research

7.9.1.   Proposed Quantitative Studies

The aim of this chapter was to explore factors that could be of influence on the Deaf Effect, and that could probably interact with the initial independent variable of our study, the Partner/Opponent relationship between messenger and Project Owner. We structured factors and proposed properties and property ranges that may be interesting for further study. This overview of factors could also be helpful in identifying confounding factors that should be controlled in future explanatory studies on the Deaf Effect.

For further analysis of direct effect and interactions on the Deaf Effect we suggest that the messenger's *Authority and the Organization's Risk appetite* deserve priority in factorial experimental studies. Also varieties of the Bad News Message properties can be promising for further experimentation. These could lend themselves for similar experimental designs to the ones that we applied in Chapters 4 and 5.

The associations between interaction strategies (such as shift from content to personal factors) and shifts in the Partner/Opponent relationship require further examination. The number of interviews and our measurents are sufficient to identify these interesting topics of study, however require further elaboration on precision of measurement and generalization. We suggest that a multi-country survey across a large number of internal auditors on the Deaf Effect can bring more validity and insight on these topics.

7.9.2. Proposed Qualitative Studies

In addition to the above mentioned propositions and structures, our study revealed an important role of interaction strategies between messenger and decision maker (Project Owner) on the Deaf Effect. The dynamics of these strategies between the two counterparts appear to fuel the Deaf Effect in many of our cases. It appears that decision maker's Deaf Effect, as a cause of Escalation of Commitment of IS-projects, can be better understood by logic of reinforcing circles between messenger and decision maker. As a starting point for such study we propose two models that contain such logic (Yin, 2009), p149 and partially fill them in based on the 11 interviews that we performed.

First proposed Logic Model – Behavioral Persistence (Simon)

The first Logic Model which we propose to further study interaction between internal auditor and manager (Project Owner) is based on the principles of behavioral persistence as described by (Simon, 1997), p105. This model appears to be simple and powerful in explaining behavior. Two principal sets of mechanisms may be distinguished that bring about the integration of behavior in a broader pattern: (1) those that cause behavior to persist in a particular direction once it has been turned in that direction, and (2) those that initiate behavior in a particular direction. Behavior-initiating mechanisms are largely external to the individual, although they usually imply his sensitivity to particular stimuli. They can be interpersonal and they can be invoked by someone other than the person they are intended to influence. In this model, the internal auditor persists in either the Collaborative Partner or Opponent relation that has been chosen initially. When we mechanically apply the causal relations of our experiments - this results in the chain of actions and reactions as depicted in figure 7-4 to be executed clockwise or counter clockwise. An event or a particular interaction strategy as presented in table 7-4a to 7-4d can change this relationship from Collaborative Partner towards Opponent or from Opponent to Collaborative Partner. This moves the dynamics in the model from the clockwise "Partner"- circle at the right-end towards the counter-clockwise "Opponent" circle at the left-end.
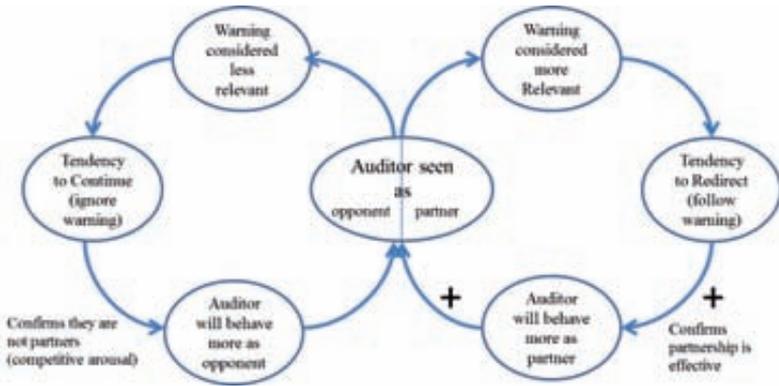
Figure 7-4 Exploration of Behavioral Persistence (Simon) as logic model for Deaf Effect

In our interviews we did not find the clockwise circle - from start to end - since we only included the Deaf Effect situations in our study. The left circle is confirmed *in case #12* – from start to end - and in the ultimate stages of most other cases. We did not measure message relevance in these cases directly. Although interesting, this model assumes mechanistic interaction between the Bad News Messenger and the decision maker which might be too rigid to make it feasible as a logic model. If we extend it with the possibility that events could change the relationship between messenger and decision maker, the model becomes more useful as a logic model, especially in situations in which the internal auditor arrived at a *Role Conflict*. We found in several cases that the internal auditor was highly involved and appreciated in the project as a Partner based on his expertise. In these cases of incremental increase of – operational- partnership, some auditors arrived at a *Role Conflict*. They reported that they suddenly realized that they had become too much encapsulated in the project and found their efforts to no longer be in line with their supposed contribution to organization goals. Especially in situations when they started to dispute the viability of the project – based on their insider information – this could redirect the interaction into a counter clockwise reinforcing circle of Opponents. Based on our interviews we conclude that the theoretical logic in this model of interaction can be helpful in further exploring Deaf Effect, although it may be too rigid to explain the Deaf Effect in field conditions.

Second proposed Logic Model – Eskalazions Wasserfalle (Glasl)

Based on the analysis of our interviews, we consider that a second Logic Model can be fruitful to analyze and further theorize the interaction between internal auditor and manager in the situation of the Deaf Effect. This model refers to the communication between two parties. It explains the theoretical logic of Escalation of Conflict between those two parties. We recall that we, different from other studies on Escalating IS-projects, have a messenger (internal auditor) and decision maker (Project Owner) in scope. We think it is reasonable that the escalation of conflict between two parties - that includes escalation of commitment to the own choice – can be helpful in understanding the theoretical logic of the Deaf Effect. The action of one person can fuel (or reduce) the counterpart to show further commitment to the own opinion and choice and this can further

promote or reduce the Deaf Effect. In the final iteration of this qualitative study, we already grouped our observations - the action/interaction strategies - towards the characteristics of this model.

The Escalation of Conflict Waterfall (Glasl, 1982, 2011) provides a sequence of levels in which the interaction between two parties can turn from Partnership-based towards extreme versions of Opponent-based relationships. Each level shows typical characteristics of communication that have not been shown yet in the previous level. The model is based on the systems hierarchy of Boulding (1956). A conflict develops as follows: when people interact as Opponents at a high level in Boulding's hierarchy, and this interaction exceeds a threshold, then the conflict can flow to a lower level in Bouldings Hierarchy. In the first stage people are still acting as partners "Kooperation" but have different opinions. In stage two and three they turn into Opponents "Konkurrenz". The issues of conflict change and move to lower levels in the systems hierarchy of Boulding. This model from sociology applies the conflict escalation to relations on micro (inter-personal), meso (inter-organization) and macro (inter-society) level. In the table 7-5 we indicate the Escalation of Conflict stages with the Conflict Issues. In the third column, we describe the relation as either Partner or Opponent according to this model. In the most right column we indicate whether we recognize the escalation of conflict stages in our interviews.

Escalation Stage	Conflict issues	Partnership	Recognized in our cases?
1. "Hardening"	Objective issues Hardening standpoints	*as Partner >as Opponent*	Frequent
2. "Debates and polemics"	Objective issues and relative position, superiority Ability to influence	*as Partner > = < as Opponent*	Frequent
3. "Actions, not words"	Objective issues and self-image Freedom of action Prove one's own mastery Blocking the counterpart	*as Partner < as Opponent*	Frequent
4. "Images and coalitions"	Counterpart is the problem Win or lose Save reputation	As Partner << As Opponent	Frequent
5. "Loss of face"	Fundamental values Expose counterpart Rehabilitate dignity	As Partner << As Opponent	Some
6. "Strategies of threats"	Control of counterpart	As Partner << As Opponent	Few
7. "Limited destructive blows"	Hurt counterpart more than one's own group Nothing to gain Survival	As Partner << As Opponent	Few
8. "Fragmentation of the enemy"	Annihilate counterpart Survival	As Partner << As Opponent	No
9. "Together into the abyss"	Annihilation at any cost	As Partner << As Opponent	No

Table 7-5 Exploration of the Eskalazions Wasserfalle (Glasl) as logic model for Deaf Effect

We refer to appendix 7.A for a more elaborated version of this table. Based on our analysis of the interviews we conclude that the Escalation of Conflict Waterfall (Glasl, 1982, 2011) is be a promising model with theoretical logic of interaction between Bad News Messenger and Decision Maker that can further explain the Deaf Effect from the perspective of dynamics.

7.9.3.   Practical Consequences of this study and Epilog

A better understanding of the causes and dynamics of the Deaf Effect can be very relevant to professionals who aim to be effective in their communication of Risk Warnings to managers. The presence of two counterparts – the messenger and receiver – shows escalation of commitment to the own position at both sides. While the Project Owner's commitment may shift from achieving an organization goal (the business case of a project) towards (finishing) the project itself, this commitment can further shift towards the position taken against the Risk Warning and against the messenger. The messenger – an internal auditor in our cases – should also realize that stressing a message will not always be effective and can even promote the messenger to pass a point of no return that may bring more harm than it solves. So, understanding the dynamics of interactions– such as presented in this study and reflected in the two proposed logic models – can be helpful to internal auditors and other messengers in daily practice.

Another practical consequence of our study sheds light on the fragility of relationships with management. When it comes to "a moment of truth", a history of operational involvement and partnership with a project, might even work against the messenger when he blows the whistle on the viability of this project. As we saw in one of our cases, this could be interpreted as betrayal and could even fuel Deaf Effect. While a history of partnership at operational level might be not effective or might even be counter-effective, a partnership at strategic level might be more robust and helpful to avoid or reduce Deaf Effect. Two internal audit directors recalled the added value of a sequence of strategy sessions in which executive internal audit staff and executive business management openly discussed hypothetical and factual cases on strategic risk taking. They discussed openly on trust, image, personal considerations, tolerances and organizational interests. The purpose of these meetings was to sharpen understanding and interpretation of the organization's risk-appetite on strategic issues. The side effect of these meetings appeared to be that executive staff – both from audit and business – built up a relationship in which they shared their views, assumptions and insecurities on strategic risk taking. This not only resulted in a shared point of reference but also in a strategic partnership relation on risk taking that was valuable in avoiding and recovering Deaf Effects on strategic IS-projects as we studied.

7.A.   APPENDIX – Case Study Questions

We define the phenomenon of Deaf Effect as occurring "when a decision maker doesn't hear, ignores, overrules a report of bad news to continue a failing course of action" (Cuellar, 2009)
We invite you to tell us about a situation in which you as internal auditor provided information (written or oral report) to responsible management that continuation of a risky-course of action was not viable and redirection would be needed (in order to remain consistent with the organization's risk-appetite). We focus on IS-projects (in broad definition).

Please talk freely about factors or conditions that were of influence on the Deaf Effect. We will capture and transcript for methodological reasons. Of course we maintain full confidentiality on the information you share with us. We will exclude all names or identities from our transcription. Our study is not aimed on the content or persons within your case but on better understanding (causes, indicators and effects) of the Deaf Effect. In that aspect we hope it contributes to the internal audit profession. We are mainly interested in your observations and perceptions on the communication/interaction with your counterpart and the conditions (organizational and/or project) that have been of influence to your view. We are not aiming to study the organization or project itself. Our study consists of multiple case observations from internal auditors across various organizations. Talk freely. During this interview we keep in mind factors from literature and empirical studies that might be relevant and will raise them if your story suggests it might play a role here.

If time allows, we would gladly invite you to compare this Deaf Effect situation with another of your cases where this (or another) counterpart showed to be highly sensible for your audit-warnings. Which are the crucial differences compared to the former case, which might explain why deaf happened in the one situation and it didn't in the other.

Now, would you please take in your mind a situation in which you encountered a Deaf Effect of your audit-findings and share with us what sequences of events and causes you observed and perceived that describe and explain the Deaf Effect occurrence. Also please describe how you recognized and reacted on this situation. Ultimately please describe the consequences. We would suggest you to describe in chronological order…..

Factors that should be touched in the interview (with empirical studies on deaf in mind) are:

1. How did auditor and manager see their relationship (Opponent-policeman vs trusted partner; goal congruence, information symmetry); This should be recalled at several points in the story; Did they have a history?;

2. Did the manager have a history on IS-projects and did this have effect on deaf?

3. How would you describe the involvement of the manager with this IS-project? (well informed, need for outcome, clear plan, implementation mindset, competitive arousal, investment of time, early responsible, freedom of choice, domain-familiar, skilled, personal, prestige) and to what extent did this play a role on Deaf Effect; (these are all factors perceived control experiments)

4. In what phase of the project got the auditor involved and why. In what phase of the project did the Deaf Effect occur. Did it raise at once or was there a path incrementally leading to it; Was the level of Sunk Cost playing here?

5. How did the Deaf Effect show to you? For example: No reply, shirking, cancel meetings, counter-attack, exclude auditors from meetings or other;

6. What conditions or events played a role that fueled this Deaf Effect? (project-characteristics, organizational culture, retaliation, spotlights, other parties involved, organizational change/competition;

7. What were consequences of Deaf Effect on your own approach/position of Bad News Messenger?

   - Did you act less/more collaborative or more/less as policeman?

   - Do you think you SHOULD act less/more collaborative and more/less as policeman (Belief-update)

   - Do you think you WOULD act less collaborative and more as policeman next time

8. To your experience, are there any other factors that could cause deaf for your audit-warnings and didn't show up in this case (communication-channel, reporting standards, external regulations, external audits, sunk cost, optimism/pessimism, unclear risk-appetite, unclear policies)

9. If you compare this Deaf Effect situation with another of your cases where this (or another) counterpart showed to be very eager to listen to your audit-warnings. Which are the crucial differences compared to the former case, which might explain why deaf happened in the one situation and it didn't in the other.

7.B.   APPENDIX – Escalation of Conflict Waterfall

Stage	Conflict issues	Behavioural norms	In-group/out-group cognitions and attitudes	Treshold to next level
1. **"Hardening"** *as Partner >* *as Opponent*	**a.** Objective issues, **b.** Hardening standpoints	Straight argumentation	**a.** Awareness of mutual dependence, **b.** Nascent role expectations, **c.** Nascent in-/out-group formation, **d.** "skins" form around groups, **e.** Suspicions about hidden motives	Tactical tricks used in the argumentation
2. **"Debates and polemics"** *as Partner > = <* *as Opponent*	**a.** Objective issues and relative position, **b.** superiority, **c.** Ability to influence	**a.** Verbal confrontations, **b.** Tactical feints in argumentation, **c.** Debates	**a.** Affinity inwards, **b.** Fixation at standpoints, **c.** Ambivalence cooperation/ competition, **d.** Suspiciousness, **e.** Counterpart has "typical behaviour"	Action without consultation
3. **"Actions, not words"** *as Partner <* *as Opponent*	**a.** Objective issues and self-image, **b.** Freedom of action, **c.** Prove one's own mastery, **d.** Blocking the counterpart	**a.** Action without consultation, **b.** Accomplished facts, **c.** Symbolic behaviour (jargon), **d.** Decreased verbal communication - increased non-verbal communication, **e.** Extended social arena	**a.** Blocked empathy **b.** "Counterpart not capable of development" **c.** In-group conformity pressure	**a.** "Deniable punishment behaviour" **b.** Covert attacks directly aimed at identity of counterpart
4. **"Images and coalitions"**	**a.** Counterpart is the problem **b.** Win or lose Save reputation	**a.** "Deniable punishment behaviour", **b.** Exploi-tation of gaps in norms, **c.** Formation of coalitions, **d.** Attacks on core identity	**a.** Dual cognition (black/white) **b.** Coherent enemy image **c.** Attribution of collective characteristics to counterpart **d.** Self-image as only reacting to counterpart	Loss of face
5. **"Loss of face"**	**a.** Fundamental values, **b.** Expose counterpart, **c.** Rehabilitate dignity	**a.** Attacks on the public face of the counterpart, **b.** Restore prestige	**a.** Enemy "unmasked": perceived as morally corrupt **b.** Guilt symbiosis in-group	**a.** Ultimatum **b.** Strategic threats
6. **"Strategies of threats"**	Control of counterpart	**a.** Presentation of ultimata **b.** Panic-ruled actions **c.** Self-binding statements **d.** Extension of conflict	**a.** Own actions are only reactions, **b.** Perceived impotence –> rage **c.** Need for control	**a.** Execution of ultimata, **b.** Attacks on counterparts sanction potential
7. **"Limited destructive blows"**	**a.** Hurt counterpart more than one's own group, **b.** Nothing to gain **c.** Survival	**a.** Attacks at sanction potential, **b.** Threats + interrupted communi-cation	**a.** Counterpart prepared to do anything, **b.** Counterpart not human, **c.** Power-thinking dominates, **d.** Malice important motive	**a.** Attacks at core of enemy, **b.** Effort to shatter enemy
8. **"Fragmentation of the enemy"**	**a.** Annihilate counterpart **b.** Survival	**a.** Attack at vital functions **b.** Actions to shatter counterpart, **c.** Attack on cohesive function	**a.** Annihilation fantasies **b.** Fascination with mechanical annihilation mechanisms	**a.** Giving up self-preservation **b.** Total war
9. **"Together into the abyss"**	Annihilation at any cost	**a.** Total war with all means **b.** Limitless violence	**a.** Accept one's own destruction if counterpart is destroyed	–

Table 7A-1 Escalation of Conflict Stages according to Glasl[57]

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[57] This table is adapted from the translation by Th. Jordan (2000), University of Gothenburg

Across the escalation stages, this table describes the *Conflict Issue*s, which drift away from content to personal issues to elementary issues as job-security, as we saw in our cases. It also describes the *Behavioural Norms* across the escalation stages. As we saw in our cases, these can drift away from straight communication, to verbal confrontations, to actions without consultation, to decreased verbal communication towards and finally ending in personal threats in some of our cases. The table also describes the *In-Group/Out-group Cognitions and Attitudes* across the escalation stages. In our cases we saw a movement from the Counterpart being seen as a Partner, towards ambivalence, towards the counterpart being seen as an Opponent or even as an Enemy. In our cases we also saw action strategies that aimed to involve other parties as In-Group or to position them as Out-Group. Finally, the table describes the thresholds to the next lower level in the Escalation Waterfall. We also recognize several of these *Thresholds* in our cases, such as (1) *Tactical tricks in argumentation (2) Action without consultation*, (3) *Aim at identity of counterpart*, (4) *Deniable punishment behavior* and (5) *Setting Ultimatums*.

Next to the overview as presented in table 7A-1, Jordan (2000) has published several translated summaries of the Escalation Waterfall in English, such as a 5-pager and the following brief summary:

Glasl's escalation model is a very useful diagnostic tool for the conflict facilitator, but also valuable as a means for sensitizing people to the mechanisms of conflict escalation. Such sensitizing may lead to a greater awareness of the steps one should take care to avoid if one wants to prevent a conflict from escalating out of control. In a more academic perspective, the model also provides a theory of conflict escalation that emphasizes the situational pressures acting upon people involved in a conflict. Rather than seeking causes in the individuals, the model emphasizes how there is an internal logic to conflict relationships, stemming from the failure of "benign" ways of handling contradictory interests and standpoints. Conscious efforts are needed in order to resist the escalation mechanisms, which are seen as having a momentum of their own.

Both table 7A-1 and this summary underline the practical and the theoretical relevance of the model to further study of the Deaf Effect from the perspective of escalation of commitment: not only from the Project Owner's position, but from the messenger's position and the interaction between both of them as well.

CHAPTER 8. CONCLUSIONS

8.1.   Introduction

We conclude this thesis with a discussion on our study from different perspectives. In section 8.2 we present the main findings of our study from a theoretical perspective – in terms of causes and effects and interactions. Our contribution to the research on Escalating IS-projects respectively on Internal Auditing will be discussed in section 8.3 and 8.4. In section 8.5. we will discuss our study from the perspective of methodology and limitations. In the sections 8.6. and 8.7. we will discuss the practical implications of our study for internal auditors and for managers. The implications of the study for society are discussed in section 8.8, which will be followed by the researcher's epilog on the process and the product of this PhD-project.

8.2.   Main Findings

In the Chapters 4 to 7 we presented the findings of the individual empirical studies and we answered the research questions for each of them. In this concluding chapter we combine these findings in order fulfill the objective of our research that we phrased as follows:

"Contribute to the explanation of Why the Deaf Effect occurs in the field of escalating IS-projects", by examining main causal effects and interaction effects from following three perspectives:

(1) The "Collaborative Partner vs Opponent" <u>Relationship</u> between Internal Auditor (Bad News Messenger) and Project Owner (Decision Maker) – based on Stewardship Theory;

(2) Project Owner's <u>Perceived Control</u> heuristic which might bring biased processing of the auditor's risk warning (bounded rationality) – based on Illusion of Control Theory;

(3) The presentation of the risk warning either with the focus on <u>Gains</u> or with the focus on <u>Losses</u> – based on Prospect Theory.

With the focus on the Deaf Effect, our study takes the position that a manager – in the role of Project Owner – would ignore, overrule or not hear a Risk Warning that continuation of an IS-project is no longer viable and thus the project should be discontinued. This Risk Warning is provided by a credible source, who is assumed to make true assertions based on thorough investigation. Given their standards and requirements of proficiency, independency and due professional care, we used internal auditors as the messenger of the Risk Warning.

We recall the metaphor that we used in Chapter 1 for our study: the decision maker is sitting at the driver-seat, while the internal auditor provides a Risk Warning sitting at the passenger-seat. We study whether the driver's Deaf Effect for the Risk Warning is influenced by (a) whether he/she sees the messenger as a collaborative partner or as an opponent who exposes the driver's failures, (b) whether the driver perceives to be in control, and (c) whether the message is framed positive or negative.

The *relationship* between internal auditors and Project Owners is dominated by principles and assumptions of Agency Theory (incongruent goals and information asymmetry) or Stewardship Theory (congruent goals and information sharing) following the organization's corporate governance framework. According to Agency Theory, the internal auditors are supposed to monitor managers' risk-taking and expose any management failures and decisions that are not consistent with the organization's interests. Thus they will act as Opponents to management. According to Stewardship Theory, the internal auditors are supposed to contribute to management performance by challenging and improving decision making. They will act as Collaborative Partners to management. According to Stewardship Theory, managers (Project Owners) are more intrinsically motivated to listen to the risk warning when it comes from a Collaborative partner instead of an Opponent.

Our study focuses on decision maker's (Project Owner's) imperfections in the processing of (risk) information. The so-called *Bounded Rationality* acts on the level of decision maker's heuristics and biases that explain deviations from rational decision making. The Perceived Control heuristic has been subject to many experiments on biased risk-taking preferences according to Illusion of Control Theory. If a decision maker has a high level of Perceived Control, he/she is more likely to express risk-seeking behavior and thus we expect him/her to be more likely to respond with Deaf Effect to the internal auditor's Risk Warning. According to Prospect Theory, decision makers are more likely to make risk-seeking decisions when information is presented in terms of Losses. When the same information is presented in terms of Gains (due to a change in reference-point), decision makers are more likely to make risk-averse decisions. We expect that decision makers are more likely to respond with Deaf Effect to the internal auditor's Risk Warning if the warning is presented in terms of Losses instead of Gains.

In the 2x2 laboratory experiments we described in Chapters 4 and 5, we asked participants to place themselves in the position of Project Owner and decide about continuation of an IS-project after they received a Risk Warning from an internal auditor. In Chapter 4 we provided respondents with treatments of (1) the messenger seen as a Collaborative Partner or as an Opponent, and (2) the Risk Warning presented in terms of Gains or Losses. In Chapter 5 we provided respondents with treatments of (1) the messenger seen as a Collaborative Partner or as an Opponent, and (2) the Project Owner having a High or Low level of Perceived Control of the outcome of his/her IS-Project.

Both in Chapter 4 and Chapter 5 we find confirmed that decision makers are more likely to follow the Risk Warning if the messenger has a history as a Collaborative Partner. If the messenger has a history as an Opponent who exposes management failures, then the decision makers are more likely to respond with the Deaf Effect to the Risk Warning. These results are consistent with our expectations according to Stewardship Theory. In Chapter 4 (see table 4-7) we find confirmed that decision makers are more likely to respond with Deaf Effect if the Risk Warning is framed in terms of Losses instead of Gains. These results are consistent with expectations according to Prospect Theory. In Chapter 5 we find confirmed that decision makers are more likely to respond with Deaf Effect if they have a High level of Perceived Control (see table 5-7) over the project outcome. The results are consistent with expectations from Illusion of Control Theory.

Conclusion 1 – Main Effects

Based on the significant main effects of *Collab* (the messenger is a Collaborative Partner), *PercContr* (decision maker's Perceived Control) and *GainFrame* (the Risk Warning framed in terms of Gains or Losses) that were shown in Chapter 4 and 5, we conclude that all three theories – Stewardship Theory, Illusion of Control Theory and Prospect Theory - contribute to the explanation of the Project Owner's Deaf Effect for Risk Warnings.

With our next step we aim to get insight in the main effects of each theory compared to the others, before we will proceed with the analysis of interaction effects. Since our results are from two different experiments, we compare the main effects within each experiment and draw a conclusion on the ranking of the three theories in their explanation of the Deaf Effect. We follow a 'horserace between theories' approach, adapted from Keil et al. (2000a) who performed such a comparison of four theories (including Agency Theory and Prospect Theory) based on a survey on escalating IS-projects across IS-auditors. They compared theories on their contribution to the amount of variance explained (ΔR^2) in the dependent variable.

In table 4-7 model 4 we find that the ΔR^2 of *Collab* exceeds the ΔR^2 of *GainFrame* while taking into account the control variables. This is confirmed in the model 1 ΔR^2 values of *Collab* and *GainFrame* as presented in the tables 4-8a to 4-8f. These results suggest that Stewardship Theory (with *Collab* as the independent variable) provides a higher contribution to the explanation of the Deaf Effect than Prospect Theory (with *GainFrame* as the independent variable). In table 5-7 model 4 we find that the ΔR^2 of *PercContr* exceeds the ΔR^2 of *Collab* while taking into account the control variables. This is confirmed in the model 1 ΔR^2 values of *PercContr* and *Collab* as presented in the tables 5-8a to 5-8f. These results suggest that Illusion of Control Theory (with the independent variable *PercContr*) provides a higher contribution to the explanation of the Deaf Effect than Stewardship Theory (with the independent variable *Collab*).

It should be noted that the differences in ΔR^2 are limited in size and all three theories provide ΔR^2 in the range from 0.11 to 0.19 explained variance of the decision to *Continue* in our two experiments. The ranking of theories, however is consistent across all observations and appears to be consistent with expectations from the similar analysis made by Keil et al. (2000a) on their survey. The inside-out ranking also logically makes sense: it starts with characteristics of the decision maker, followed by the interaction with the messenger, finishing with the framing-action taken by the messenger.

Conclusion 2 - Ranking of Main Effects

Based on the combined findings on the amount of variance of *Continue* explained in Chapter 4 and 5 on the Main Effects of the individual factors *Collab*, *GainFrame* and *PercContr* we conclude that the theories can be ranked in their contribution to the explanation of the Deaf Effect in this study from Illusion of Control Theory highest, to Stewardship Theory mediate and Prospect Theory lowest.

With our research objective to explain Project Owners' Deaf Effect for internal auditors' Risk Warnings, ofcourse we aim to contribute to improved effectiveness of Risk Warnings. In order to assess whether the ranking of theories can be useful to the messenger to maximize the effectiveness of his/her warning, we also consider the predicted change in Deaf Effect due to changes in the independent variables *Collab*, *PercContr* and *GainFrame*.

The standardized regression coefficients in table 4-7 model 3 and 4 show that the *Continue* variable is more sensitive to changes in the *Collab* variable than to changes in the *GainFrame* variable, while taking into account the control variables. We find confirmed in the tables 4-8a to 4-8b that the standardardized regression coefficients of *Collab* are larger than these coefficients of *GainFrame*. In our PLS-analysis we also find this confirmed in the pathcoefficents in table 4-13 and in the total effects as presented in table 4-15. Taking into account the consistent results across the various measurements of the main effects, we therefore conclude that the Deaf Effect would be more sensitive to changes in *Collab* than to changes in *GainFrame*. The standardized regression coefficients in table 5-7 model 3 and 4 show that the *Continue* variable is more sensitive to changes in the *PercContr* variable than to changes in the *Collab* variable, while taking into account the control variables. We find confirmed in the tables 5-8a to 5-8b that the standardardized regression coefficients of *PercContr* are larger than these coefficients of *Collab*. In our PLS-analysis we also find this confirmed in the pathcoefficents in table 5-13 and in the total effects as presented in table 5-15. Taking into account the consistent results across the various measurements of the main effects, we therefore conclude that the Deaf Effect would be more sensitive to changes in *PercContr* than to changes in *Collab*.

Conclusion 3 - Ranking of Main Effects

Based on the combined findings in Chapter 4 and 5 on the regression coeffcients and PLS pathcoefficents of the individual factors *Collab*, *GainFrame* and *PercContr* we conclude that the predicted change of Project Owner's Deaf Effect can be ranked highest from a change in Project Owner's Perceived Control, to a change in the Collaborative Partnership relation ranked as mediate and a change in Gain/Loss framing ranked lowest. In order to maximize the effectiveness of the Risk Warning, it appears to be rational that the messenger follows this sequence under the assumption that all three factors provide equal opportunities and effort to be changed by the messenger.

In our experiments we also measured mediating factors that provide more insight into how the main effects of *Collab*, *PercContr* and *GainFrame* on the Deaf Effect took place. We find that the influence on the Deaf Effect is partially mediated by (1) decision makers' biased perceptions of risk, (2) assigning less or more relevance to risk information and (3) biased estimations of probabilities to succeed/fail. These are all typical effects of *bounded rationality* in the processing of risk information. We also find confirmed that the information processing biases strongly apply to the probability part of the Risk Warning. These results are consistent with Illusion of Control Theory and surveys that show that

managers assume that given probability information does not apply to them personally and that they can beat the odds.

Conclusion 4 – Mediation of Main Effects

Based on the analysis of mediation in Chapters 4 and 5 we find that the influence of *Collab*, *GainFrame* and *PercContr* on the Deaf Effect is partially mediated by the various mediating variables Message Relevance (*MsgRelev*), Perceived Risk (*PercRisk*) and Estimated Probability to Succeed (*ProbSucc*) that are known from experiments on imperfect processing of information and that refer to decision makers' bounded rationality.

The experiments that we described in Chapter 4 and 5 also provide us with information on interaction effects. These interaction effects are significant according to table 4-7 model 4 and table 5-7 model 4. Insight into the interaction effects allows us to make further refinements on the main effects that were presented earlier. The interaction effects are made visible in the sub-group regressions presented in the figures 4-1 and 5-1. These figures are presented below and the interaction effects are briefly discussed. For further explanation of these figures, we refer to the Chapters 4 and 5.
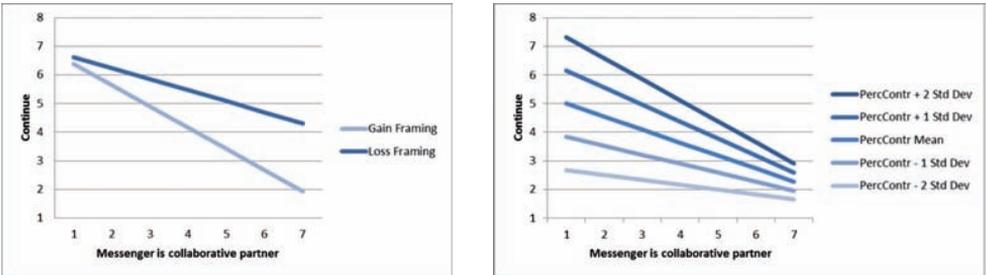
If no interaction effects had existed, all regression lines in these figures would have been parallel. In the left figure 4-1, we find that the influence of Collaborative Partnership on Deaf Effect is attenuated when the Risk Warning is presented in terms of Losses. We think this can be best interpreted by decision maker's limited information processing capabilities in which most of the attention of the decision maker is caught on losing and limited attention is left to focus on messenger characteristics. The left figure also shows that the influence of Gain/Loss Framing on Deaf Effect is very limited when the messenger is very strongly seen as an Opponent. At the lowest values of Collaborative Partnership, the regression lines for Gain and Losses are very nearby. In these conditions most attention appears to be caught by the strong messenger characteristic as an Opponent, which leaves limited room for attention to the characteristics of the Risk Warning. At the highest values of Collaborative Partnership, the influence of Gain/Loss framing on the Deaf Effect is the largest. We find the lowest likeliness of the Deaf Effect when the Risk Warning is framed in terms of Gains coming from a messenger who is seen as a Collaborative Partner. In this condition, the probability information of the Risk Warning appears to be processed unbiased: respondents estimated their probabilities to succeed equal to the probabilities as provided in the Risk Warning (see table 4-16).

In the right figure 5-1, we find that the influence of messenger's Collaborative Partnership on Deaf Effect is attenuated when the decision maker has a very low level of Perceived Control. The indifference for the messenger characteristics in the low Perceived Control conditions may be best interpreted as a decision maker who doesn't know what to do and who surrenders and listens to any messenger with a strong opinion. A history with the messenger as an Opponent, strongly elevates Deaf Effect if the decision maker has a high Perceived Control. This may be explained by decision maker's competitive arousal towards a messenger who is seen as an Opponent and who claims that the project should be stopped, while the decision maker may feel invulnerable and in the position to exert control over the project's outcome.

Conclusion 5 – Interaction Effects

In addition to the Main Effects of *Collab*, *GainFrame* and *PercContr* as we found earlier, Chapters 4 and 5 show the following interaction effects:

(1) The influence of Gain/Loss framing on the Deaf Effect is largest when the messenger is seen as Collaborative Partner. The influence of Gain/Loss framing on the Deaf Effect is attenuated when the messenger is strongly seen as an Opponent;

(2) When the messenger is strongly seen as an Opponent then the influence of the Project Owner's Perceived Control on the Deaf Effect is largest. The highest likelihood of Deaf Effect occurs when the Risk Warning is provided by a messenger who is strongly seen as an Opponent by a decision maker with a high level of Perceived Control. The influence of Perceived Control on the Deaf Effect is attenuated when the messenger is seen as a Collaborative Partner;

(3) The influence of the messenger's Collaborative Partnership on the Deaf Effect is attenuated when the message is framed in terms of Losses: the likelihood of the Deaf Effect is relatively high. The influence of the messenger's Collaborative Partnership is attenuated when the decision maker has a low level of Perceived Control: the likelihood of the Deaf Effect is relatively low.

After our laboratory experiments, we moved our study to the field. In a situated experiment we find that Perception of Risk – which had appeared to be a mediator for Deaf Effect in our laboratory experiment – differs across managers and internal auditors, as expected. We expect that managers have developed heuristics from working experience as actors – sitting at the driver's seat, while internal auditors have developed heuristics from working experience as observers – sitting at the passenger seat. In Chapter 6 we find confirmed that the managers perceive risks to be lower than internal auditors do, as is expected from Illusion of Control Theory experiments. We also find confirmed managers' insensitivity for probability information in a warning on IS-risks that was provided by an internal auditor. This is most visible for the group of managers who are very experienced and in the position of Vice President, Senior Vice President or Executive Vice President. Assuming that heuristics come with working experience, these results are consistent with our expectations. Although we did not measure the Deaf Effect in this situated experiment, managers' insensitivity for probability information in the auditor's risk warning suggests

that a manager's Deaf Effect would especially apply to the probability part of this warning. Risk Perception was confirmed earlier to be a mediator of Deaf Effect.

Conclusion 6 – Actor/Observer differences

Based on the situated experiment as we described in Chapter 6, we conclude that heuristics related to working experience as an actor or observer are of influence on the Perceived Risk after the Risk Warning has been received from an internal auditor. We also find confirmed that employees with heuristics as an actor are insensitive for probability information in a Risk Warning.

In the fourth part of our study we interviewed executive internal auditors who have experienced the Deaf Effect for their Risk Warnings on large IS-projects. We asked them to describe factors and events that explain the Deaf Effect in that case. Throughout these case descriptions we asked them to identify their relationship with the Project Owner as either Collaborative Partners or as Opponents. We find that all three factors that we involved in our experiments are mentioned in those interviews in order to explain the Deaf Effect in that situation. We also find that, with the exception of one case, all cases confirm that the messenger is seen as an Opponent at the point that the Deaf Effect shows. So, this condition precedes the Deaf Effect in a way that is consistent with our experiments.

The interviews provide us with a list of factors and events that are mentioned by the internal auditors in order to explain Deaf Effect in specific cases. We find that the Collaborative Partnership vs Opponent relationship between Internal Auditor and manager, appears to be of influence on the communication and can change over time or due to events, actions and interactions, finally resulting in Deaf Effect. We grouped typical actions and interaction strategies that had been applied by the messengers and the decision makers. We also listed characteristics of the Risk Warnings that were mentioned by the internal auditors in their explanation of Deaf Effect. Finally, we categorized conditions that were mentioned in the Deaf Effect cases into characteristics of the messenger, characteristics of the manager, characteristics of the organization and characteristics of the project. Below we present figure 7-3 with the clustering of the factors we found in our interviews. For the description and examples of these factors we refer to Chapter 7.

Contextual Conditions

Organization
- Corporate Governance
- Risk Appetite
- Culture

Messenger
- Role Prescribed
- Professional
- Involvement

Receiver
- Experience
- Perceived Control
- Personal Characteristics

Project

Bad News Message

Form Variety
- Formal
- Status
- Expectancy
- Relationship
- Disclosure
- Framing

Intensity
- Rate
- Urgency
- Impact

Action / Interaction Strategies
Communication
Evidence and counterevidence
From informal to formal
From formal to informal
From content to persons
From personal to emotional-threat
Go up in hierarchy
Focus on Self
Use power and authority
Find support of powerful others
Withdraw - Move
Focus on Other
Dispute Credibility
Withhold from information
Withhold from Goal achievement
Focus on Project
Freeze
Delayed Redirection

DEAF

Form Variety
- Duration
- Partial
- Diffusion

Intensity

| Partner/Opponent Relation **INITIAL** | Partner/Opponent Relation **ON MESSAGE** | Partner/Opponent Relation **ON INTERACTION** | Partner/Opponent Relation **ON DEAF** |

The interviews also suggest that:

(1) A history of Collaborative Partnership between Project Owner and internal auditor at the level of strategic risk-taking can prevent Deaf Effect from occurring. A history of Collaborative Partnership at operational or tactical level sometimes fuels the Deaf Effect for a Risk Warning at strategic level (continue/redirect the IS-project);

(2) The Project Owners perceive risks differently from the risks reported by the internal auditor – as we found earlier in our situated experiment with managers and auditors in chapter 6. Managers often consider their decisions to be rational and suggest that the auditors should do more research. They try to convince the auditors with arguments they consider to be rational themselves. In these conditions the managers do not particularly see the auditors as Opponents.

(3) A turning-point in the relationship between messenger and Project Owner shows when the latter feels to be criticized or attacked personally. The interviews mark this shift quite clearly as a change in arguments from factual to personal. It shows specifically in those interviews where the manager's personal beliefs, merits, self-esteem, self-efficacy or job security are at play and where the auditor's warning could cause personal losses in that respect. At that point, the auditor is no longer considered to be a Partner but turned into an Opponent. Most auditors, however, still considered themselves to be Partner of management and repeated the arguments louder and louder to overcome the Deaf Effect they experienced. The increased stressing of the Risk Warning appears to be counter effective in several occasions.

(4) From this point we find several interaction strategies that are applied by the manager and by the internal auditor. In these Deaf Effect situations, it appears that these strategies

accelerate that Project Owner and messenger: a. are considering each other more and more as Opponents or even as ennemies and b.escalate their commitment to the position they have taken regarding the Risk Warning. This may finally result in an escalation of conflict as described in Glasl's (2011) Escalation Waterfall.

(5) Finally, our interviews suggest that a clear risk appetite of the organization can be of help in order to prevent the Deaf Effect. The organisation's risk appetite can serve as a common point of reference that is shared between the internal auditor and the manager. This can reduce the dominance of bounded rationality, subjectivity and personal elements in the observations and discussions on whether certain risks would be acceptable or not. Even when managers would see auditors as "policemen" it would definitely be of help to have a risk-norm as a point of reference ("is 130km/hour the norm of acceptable risk in cardriving behavior, or do we leave room for the policeman to find 100km/hour to be too risky, while some experienced drivers might find 180km/hour not risky at all for them personally").

The interviews in our exploratory multi-case study provide us with factors and stages that can be helpful to further research on the Deaf Effect.

8.3.   Contribution to literature on Escalating IS Projects

In Chapter 2 we provided an overview of the literature on escalating IS-projects. In this section we will describe the contribution of our study to this literature, taking into account the research questions, the design and scope of our empirical sub-studies and the results of those sub-studies. We refer to the individual chapters for the further explanation of these contributions to literature on escalating IS-projects.

As presented in table 2-5 the literature in Escalating IS-projects shows a history of experimental studies that tested a sequence of factors and theories in order to explain the escalation phenomenon. These factors have been clustered in psychological, social, organizational and project factors. Our study contributes to this sequence of experiments as follows: (1) with its focus on the Deaf Effect our study proceeds on the few earlier experiments on this particular phenomenon that is relatively unexplored within literature on Escalating IS-projects; (2) in our experiments we examine the interaction effects of one unexplored organizational factor with two different psychological factors that have been involved in studies earlier; (3) the mediation analysis of this study combines multiple perspectives with its replication across two sub-studies and with applying multiple methods of analysis of the mediation paths; (4) we performed a situated experiment in order to test the Perceived Control heuristic in a realistic context; (5) we separately consider the probability and the impact information in a risk warning which suggest that the Deaf Effect could apply to particular components in the Risk Warnings; (6) we take the position of Project Owner as our unit of analysis, while most experimental studies have chosen the Project Manager's or supplier as the unit of analysis; and (7) our study provides an experimental scenario and further validated and refined measurement instruments that can be of use to future experiments.

With our multi-case study we contribute to literature on Escalating IS-projects as follows (1) we provide a structure that contains several factors which can be interesting for further causal examination of the Deaf Effect; (2) we describe the variety of properties of these factors as we found in our interviews which can be helpful to future research on the Deaf Effect; (3) we describe the association of interaction strategies with changes in the relationship as a Partner or as an Opponent; and (5) we suggest two logic models that can be helpful to further study on the interaction between messenger and Project Owner related to Deaf Effect.

From our multi-case study we also identify a pattern in which both the Project Owner and the messenger expressed an escalation of commitment related to the position they had taken with regard to the Risk Warning. This pattern appears to match the escalation of conflict model as described by Glasl (2011). The results suggest that the Deaf Effect may be associated with a typical instance of the so-called the goal substitution (Garland & Conlon, 1998). The goal-substitution effect refers to an entrapment paradigm, which argues that goals shift ''from an economic motive at the outset to some other motive later'' (Brockner et al. (1 979) p. 494). The goal substitution as defined by Garland refers to the completion effect in which the achievement of the project goals is substituted with the completion of the project as a goal itself. Our multi-case study suggests that these goals may also be substituted by the Project Owner's goal to eliminate the Risk Warning or even eliminate the messenger.

8.4.   Contribution to literature on Internal Audit

Although our study is mainly embedded in literature on Escalating IS-projects, it may contribute to literature on Internal Audit as well. In our study we used an internal auditor in the role of provider of the Risk Warning to which the IS-Project Owner responded with Deaf Effect. The Deaf Effect can be considered as a deficiency in the Internal Auditor's effectiveness, as was confirmed by the internal auditors that we involved in our multi-case study. We will discuss the suggested contribution of our study to literature on Internal Auditing from the following perspectives (1) the Collaborative Partnership relation between the internal auditor and Project Owner; (2) the relevance of escalating IS-projects to internal audit; (3) the Deaf Effect for internal audit warnings and (4) the communication of internal audit messages and the relevance of interaction strategies.

First, we focus on the *relationship* between internal auditor and IS-Project Owner. In academic research, most empirical work related to internal audit's relationship with other organizational parties deals with the relationship between internal audit and the audit committee (Raghunandan, Rama, & Scarbrough, 1998; Raghunandan, Read, & Rama, 2001) (Goodwin, 2003). Other authors examine the relationship between internal audit and senior management, with a focus on the relationship between the Chief Audit Executive and the CEO/CFO (Sarens & Beelde, 2006) (Lenz & Sarens, 2012). To our knowledge, the relationship between internal auditor and management, in the role of IS-Project Owner in this case, is relatively unexplored and can be relevant to internal audit research when we assume that failure of strategic IS-projects should be a concern to internal audit. We will discuss this assumed relevance later. Our study contributes to the Internal Audit research by focusing on the interpersonal relationship between the individual internal auditor, not

necessarily the Chief Audit Executive, and the IS-Project Owner. Further Internal Audit research could address whether this relationship is best described in terms of auditor-auditee or in terms of auditor-customer. As already reported in early work by (Chambers et al., 1988), p68, a misconception of this relationship and any changes in these roles could cause an expectation gap and interaction-problems between internal auditors and these managers. Failure to reach understanding could result in the perception that internal audit is simple an obstacle to achieving organizational objectives. This can run in ignored audit recommendations (Flesher & Zanzig, 2000).

Second, we focus on the contribution of our study, given its perspective of *escalating IS-projects*. The relevance of Information Systems to the internal audit research has been proposed by (Weidenmier & Ramamoorti, 2006), with their overview of research opportunities in Information Technology and Internal Auditing. Opportunities are found with regard to (1) Information Systems' usefulness to internal auditors, and (2) internal auditors' role and required skills to contribute to properly managed Information Systems. Escalated IS-projects were already reported to be a relevant topic to internal auditors in 2002 (Harrast & Bean). In a more recent study Gray, Gold, Jones, and Miller (2010) reported scholar results on internal auditors' contribution to IS-projects. So we think we can justify our assumption that the topic of escalating IS-projects is relevant to internal audit research. This could open research questions for further empirical studies on the competencies on IS, IS-projects and IS-project escalation that are required within internal audit functions to meet their challenges, proceeding on for example earlier studies on IS-audit competencies (Brazel & Agoglia, 2007) (Biggs et al., 1987) (Curtis & Viator, 2000). This could be followed with empirical research on the allocation of these competencies within the internal audit function and on the Collaboration between internal auditors on this topic. As reported by Hunton, Wright, and Wright. (2004), internal auditors who don't have those IS-competencies show much lower sensitivity to IS-risks in ERP implementations than their colleagues who do have those IS-competencies. If not properly managed we think this could result in a Deaf Effect for IS-related risks within the internal audit function. Weidenmier and Ramamoorti (2006) and Curtis et al. (2009) already stressed the need for research on cooperation between IS-auditors and general auditors in planning, executing and reporting of audit-engagements.

Third, we consider the contribution of our study from the *Deaf Effect* perspective. An improved understanding of the Deaf Effect in Escalating IS-projects could be of help to the empirical research on the added value and effectiveness of Internal Audit, which still is a relatively unexplored though relevant domain of research as reported by Sarens (2009). The Deaf Effect can be considered as a failure of internal audit's effectiveness which could even be followed later by the inevitable "where was internal audit?" question posed by Gramling and Hermanson (2009) referring to many disastrous business failures with the typical features of escalating commitment to a failing course of action. As recently reported by Lenz and Sarens (2012) the concept of Internal Audit effectiveness is prominently positioned in the IIA definition (IIARF, 2011) and debated in practice (Deloitte, 2010) (PWC, 2010), however, Internal Audit effectiveness is still a relatively unexplored area in academic research (Arena & Azzone, 2009) (Sarens, 2009) (Soh & Martinov-Bennie, 2011). It would go beyond the scope of this thesis to describe the

various approaches and definitions of internal audit effectiveness. Many studies relate internal audit effectiveness to the 'demand side perspective': meeting the expectations of the internal audit committee (Davies, 2009) (Arena & Azzone, 2009), meeting the reliance expectations of external auditors (Cohen & Sayag, 2010) or relate it to expectations and support by senior management (Sarens & Beelde, 2006) while referring to CEO/CFO. Other studies relate the internal audit effectiveness to the 'supply side perspective': to the skills and competencies of the individual internal auditors (Arena & Azzone, 2009) or relate it to the compatibility with the politics and culture of an organization (Sarens & Abdolmohammadi, 2011). In their recent study, Lenz and Sarens (2012) suggest that internal audit effectiveness could be related to 'moments of truth' in the interaction between the internal audit department and senior management (in a German context). Based on our interviews with executive internal auditors, we suggest that Deaf Effect events on strategic topics such as continuation of an escalating IS-project could serve as a 'moment of truth' providing a measurable exhibition of internal audit effectiveness.

Finally, we consider the contribution of our study to the internal audit literature from *communication* perspective. In our experiments we found that the negative framing of a message, in terms of losses compared to point of reference, could strongly be of influence to the Deaf Effect. In the multi-case study we also saw that communication strategies and interaction strategies could follow patterns with marked thresholds. These patterns were associated with changes in the relationship between internal auditor and Project Owner and were associated with the instances of the Deaf Effect in our study. We also found that attributes of communicating the message, for example formal or informal, were mentioned as relevant in order to explain the Deaf Effect events in our study. When attributes of communication are so strongly of influence on the achievement of the intended effect, change a course of action that harms the organization's interests, it warrants significant research attention to causal studies on communication effectiveness in the field of internal auditing. Proceeding on the study and report on internal audit communication and behavior by Dittenhofer, Ramamoorti, Ziegenfuss, and Evans (2010), our study could contribute with the schemes in chapter 7 containing several communication factors with variation of their properties that could be used in causal studies.

Our study did not aim to answer particular research questions that were derived from literature on internal auditing. Although departed from the angle of escalating IS-projects, we suggest that the results of our study could be helpful to research in the field of internal auditing as well.

8.5.   Methods and Limitations

In this section we will discuss the choices and consequences with regard to the methodology and assumptions that we applied to our study. We will first discuss how we implemented triangulation. We will proceed with a discussion of the limitations of this study.

Since the objective of this study was to contribute to knowledge on a relatively unexplored phenomenon, we found it would be appropriate to study the phenomenon from various

perspectives and to use a convergent research methodology, called triangulation (Webb et al., 1966). In accordance with basic principles of geometry, multiple viewpoints contribute to greater accuracy. Collecting different kinds of data bearing on the same phenomenon could improve research accuracy in a similar way. From a validation perspective, Shadish et al. (2002) posit the idea of multi operationism and argue that more than one method should be used in the validation process to ensure that variances reflect the trait and are not the artifact of the method. Jick (1979) suggests that triangulation, in addition to bringing validation and reliability, also enables researchers to capture a more complete, holistic, and contextual portrayal of the units under study. He promotes the idea that quantitative and qualitative research could be complementary. Jick (1979) also suggests that multi-methods could parallel theoretical triangulation and could contribute to synthesis or integration of theories that bear on a common problem. We will describe below how we applied triangulation in our research design and the execution of our study.

Theoretical triangulation is applied by considering interactions between organizational theory (Stewardship Theory of corporate governance) and two psychological decision making theories, namely Prospect Theory and Illusion of Control Theory. Both psychological theories have been extensively tested and confirmed in noise-free and simple-context experiments. By varying and controlling an organizational context factor, we learn more about the contingency of these theories applied in our research domain and we contribute slightly to understanding "behavior in context".

Triangulation in research methods is obtained by combining two laboratory experiments, a situated experiment and a multi-case study in order to obtain insight into why the Deaf Effect for risk warnings occurs (in the domain of escalating IS-projects). The laboratory experiments provide methodological strength in terms of precision of measurement and deduction by testing of a set of theoretically determined hypotheses. The situated experiment contributes to context realism and considers whether the Deaf Effect might more specifically apply to the probability part of a risk warning, as was expected from literature. The qualitative multi-case study provides richer insight into the conditions of deafness and feedback loops between the bad news messenger and the decision maker. It also provides us with an inductive contribution from the interviews, delivering some unexpected findings that are interesting to serve as propositions for further study.

Triangulation in the data collection and measurement of our experiments is obtained by replicating a major part of the treatment scenario and the measurement model across two groups of respondents: (1) undergraduate students of different nationalities and (2) dutch part-time students with relevant working experience. This contributes both to the construct validity as well as to the external validity of our study. In the other two empirical studies we collect data from subjects in the field.

Triangulation in statistical analysis is obtained in multiple ways. We analyze the interaction effects by using Moderated Regression Analysis as well as Subgroup Comparison of regressions (Aiken & West, 1991; Jaccard & Turrisi, 2003; Sharma et al., 1981) and moderated Partial Least Squares analysis (Chin et al., 1996). This mixed approach allows us to cross-validate the results, given the assumptions of these statistical methods. We analyze the mediating effects by using regression analysis and PLS as well.

In the mediated regression analysis we follow procedures of Baron and Kenny (1986) and we calculate Sobel-z statistics for estimating significance of mediating effects (Sobel, 1982). In the PLS analysis, we estimate path coefficients and significance of mediation (and suppression) according to procedures of Iacobucci (2008), with bootstrapping procedures and we calculate Sobel-z statistics. We cross-validate the results across these statistical methods for mediation analysis and compare the results across the experiments in chapter 4 and 5. These triangulations provide us with strengthened internal validity and statistical conclusion validity.

Triangulation in testing the construct validity in our study is performed by a combination of tests as proposed by Straub et al. (2004). We apply the tests that are typical for regression analysis (cronbach alpha, exploratory factor analysis) and for PLS (AVE's, composite reliability, confirmatory factor analysis). These triangulations provide us with strengthened construct validity across the experiments of our study.

In hindsight, we think triangulation brought us interesting parts of our study. Our research objective provided us with theoretical triangulation as a starting point for our study. The continuous search for opportunities to triangulate at the various levels and stages of our study provided us with improvements in the strength of our study. It also made us experience some of the underlying assumptions of different methods and how sensitive results sometimes can be to those assumptions. Of course, triangulation and redundancy also contributed to the complexity of our study, as predicted by Jick (1979), which might not make our research exemplary for a lean study.

In the empirical Chapters we describe the limitations of the individual sub-studies in full extend. Summarized, the following limitations apply to our study: (1) we measure the constructs in our studies with self-report by the participants. For particular constructs, such as *message relevance*, other methods of measurement, such as eye movement tracking are preferred over self-report; (2) self-report of both independent and dependent variables from a single source in our multi-case study can be subject to common methods variance bias (Hair et al., 1998). We think however this is not a major concern here, given the exploratory nature of this sub-study; (3) most participants with working experience that were involved in our study had the Dutch nationality. Also a relatively high part of the participants had their working experience from financial institutions. Given our focus on strategic IS-projects and internal auditors, this choice is defendable. Generalization of our research to other counties and to other business lines however should be done with care, especially by taking into account cultural differences that can be of influence on decision maker's heuristics and biases.

8.6.   Audit Implications

The main implications of our study for the professional practice of internal auditors are described form the perspectives (1) partnership on strategic level and (2) communication of Risk Warnings.

The importance of Strategic Level Partnership between internal auditors and senior managers

Our empirical study shows that a history of Collaborative Partnership between an internal auditor and a manager can reduce the Deaf Effect. We also learned from our interviews how easily this relationship can be harmed when personal and emotional arguments get involved. Collaborative Partnership of internal auditors at operational project level (as advisors on controls and security) appeared not to be effective in assuring a solid partnership relation with managers that can resist serious issues on strategic project level (continuation, redirection). Therefore, a solid partnership relation between internal auditors and executive management at strategic level should be established. Two Chief Audit Executives provided an interesting solution that appears to be consistent with the Stewardship principles of Collaborative Partnership. Executive staff of these internal audit departments had taken the initiative to organize a sequence of strategic sessions with executive business management to discuss strategic risk taking. The discussed how the risk-appetite of the organization could be made clear by using hypothetical cases. Personal struggles in decision making were shared and discussed between executive auditors and executive management. Participants got used to being challenged and showing vulnerability in their considerations on strategic risk taking. They also developed a common point of reference on the organization's risk appetite. This shared understanding and vulnerability of the executive audit staff and executive managers had helped them to overcome Deaf Effect situations.

Communication of Risk Warnings – Knowledge of bounded rationality

Although not new of course, this study reminds the internal audit professionals that the effectiveness of their service – reporting on risks and controls – includes the concepts of human information processing and bounded rationality. A reported audit-finding on risks only turns into "information" when the receiver comprehends the message and has given it a meaning related to his "mental model" that consists of knowledge, experiences, beliefs, preferences and heuristics. Although the auditors are not responsible for the decisions that are made based on their risk reporting, we consider it to be a requisite for effective audit communication to take into account the information processing biases of the receiver. Just like the provider of a medicine should take into account and guide proper usability of their products as well as the embedded bounded rationality of the users of their products and services. We think internal auditors should be skilled and trained to recognize and anticipate to elements of bounded rationality in order to make their risk warnings more effective. Knowledge of the elements of bounded rationality should not only apply to the receivers of their Risk Warnings, but should concern the internal auditors themselves in their role of senders of those Risk Warnings as well. We think this should be part of Professional Practice education of internal auditors and IS-auditors.

Communication of Risk Warnings – A recipe for maximization of Effectiveness?

Inevitably this research raises the question whether our results can help the messenger with a prescribed rational approach in order to maximize the effectiveness of a Risk Warning across the three factors we included in our study. In section 8.2, conclusion 3 we reported

that the predicted change of Project Owner's Deaf Effect can be ranked highest from a change in Project Owner's Perceived Control, to a change in the Collaborative Partnership relation ranked as mediate and a change in Gain/Loss framing ranked lowest[58]. In order to maximize the effectiveness of the Risk Warning, it appears to be rational that the messenger follows this sequence under the assumption that all three factors have equal levels of opportunity and effort to be changed by the messenger. Of course this assumption often does not hold. If possible anyway, it may take the messenger very much effort to change Project Owner's Perceived Control heuristic that has been built by the Project Owner's personal characteristics and experience. And it may be relatively easy to the messenger to frame his/her message in terms of gains or losses by changing the point of reference. The messenger is capable to change the relationship with the Project Owner by the messenger's own actions, but he/she has to deal with the Project Owner's pre-occupations and actions as well. We therefore think we cannot offer a decision-tree to be followed by the internal auditor in order to maximize effectiveness of the Risk Warning. However, we can certainly give some guidelines to internal auditors that contribute to the effectiveness of their Risk Warnings.

Communication of Risk Warnings –Take notice of manager's Perceived Control

We saw that the Deaf Effect for a Risk Warning is most likely when the Project Owner has a high perceived Control, the message is framed as losses and coming from a messenger who is seen as an Opponent. This expressed elements of Competitive Arousal. When the Project Owner has a relatively low level of Perceived Control he/she is less sensitive for the messenger characteristics and is much more likely to comply to the Risk Warning. We therefore think it is helpful to internal auditors to take into account the Project Owner's Perceived Control when they present a Risk Warning to a Project Owner. Indicators of High Perceived Control should be further developed for this specific context. However, we find in our interviews that some internal auditors simply ask the Project Owner whether and why he/she perceives a high level of control over the IS-project.

Communication of Risk Warnings – Presentation of the message

One guideline for effective communication that can be derived from our study is related to the Gain/Loss framing. A bad news message that is strongly framed in terms of losses or deficiencies may promote risk seeking behavior according Prospect Theory which is confirmed in our study. A broadly applied form of presentation of audit messages is setting norms (such as the business case in our experiment) and exclusively reporting deficiencies where the addressee falls short compared to these norms. As we learned from our interviews, deficiencies might even be presented more emphasized to convince the receiver of the message when the Project Owner might not pay sufficient attention to the message. This stressed negative framing may actually even cause more deafness. According to our study, a more balanced focus on achievements, opportunities and positive framing of the

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[58] When we add the interaction effects, it is likely that for Project Owners with Low Perceived Control the ranking of Gain/Loss framing and Collaborative Partnership will switch, given the Project Owners' insensitivity to the messenger characteristics in that condition.

message could reduce Deaf Effect. Framing the optional choices in a positive way (as achievements, assets and real options) – and thus assigning value to the stopping or redirection of the project – could reduce persistence in the risky course of action (continuing the project and showing deafness to the warning). Another way to reduce the effect of framing in terms of Losses, can be found by introducing a second point of reference next to the norm, for example by showing progress compared to the previous period.

Communication of Risk Warnings – Make use of Partnership relations

The next guideline for effective communication of auditor warnings, applies to how to make use of the advantage of a Collaborative Partnership in a particular situation. If the internal auditor might not directly be seen as a Collaborative Partner him/herself, then the audit executive – with a strategic Collaborative Partnership history with the manager as described in the previous section - may be more effective in sharing concerns with executive management. Another option would be to share the factual concerns with a person or with persons that the decision maker sees as Collaborative Partner(s) and who are less incapsulated in the course of action (the project) than the decision maker is. This should be done while strongly keeping in mind the shared goals, information transparency and a Collaborative Partnership with the manager. This should not be confused with getting people behind you as part of the conflict escalation model in which the opposition between the own objectives of the auditor and the objectives of the Project Owner would play a central role. In a few cases the internal auditor introduced the threat of an external opponent as an argument to be themselves considered as Collaborative Partners to management and have their own message accepted by management.

Communication of Risk Warnings – Recognize stages of conflict escalation

We think it would be helpful when internal auditors are skilled and trained to recognize the stages of conflict escalation and the turning points. This can prevent unintended effects of the auditor's own reaction to the Project Owner's actions. Especially the inclination to react on Deaf Effect with more stressed communication has shown to be ineffective in obtaining receptivity for the message. A beautiful anecdote of overcoming a deaf reaction came from one of the respondents. This Chief Audit Executive told about a major 300 million euro IS-project in 1995, the Project Owner found "too important" to be criticized by the internal audit department. The internal audit department had major concerns about the viability of this project, but wasn't in the position to be heard or receive any attention for their concerns at executive management level. To overcome this deafness they started whispering instead of shouting. They provided a sequence of positive and detailed remarks to management at several operational issues that appeared to be symptoms of underlying structural and strategic problems. These issues were reported in a Collaborative and positive way and appeared to unfreeze the high level of perceived control over this project at the top of the organization. These reported symptoms received more and more attention at executive management level and finally resulted in a request to the internal audit department to assess the design and viability of the IS-project in cooperation with the most respected and trusted IS-specialists from various parts of the organization, including the project itself. From this anecdote we learn that if you want to obtain the attention of

someone who shows deafness, it may sometimes be more effective to whisper than to shout your message.

Our results suggest that decision makers are less likely to comply to the Risk Warning if the messenger is seen as a 'policeman'. Our interviews also show that decision makers may be extrinsically motivated to comply to the warning, if the messenger has a very high authority: 'they listen to the police because they are the police'. This can attenuate the effects in our study. If the messenger however for any reason might lose some of the authority, the effects in our study will likely show up again.

8.7. Management and Organization Implications

The main implications of our study at management and organization level go beyond the effective contribution of an internal audit department that prevents the organization from taking strategic risks (with IS-projects) that would violate the organization's risk appetite. Regardless of the role of the internal auditor, the organization itself and the managers involved are not served by irrational decision making in the continuation of IS-projects that are no longer viable. We will discuss implications of our study from a bounded rationality perspective.

Recognize heuristics – Use heterogeneity

Heuristics are part of a manager's experience and are very useful to the performance of managers and their valuable contribution to the organization. Strategic IS-projects often are so complex, intangible and relevant that the organization's most experienced staff will be assigned to such projects. These valuable heuristics also bring their biases in the processing of riskinformation by these managers. We think it is important to avoid that such managers become surrounded by a homogenous group of IS-project staff who might show too much similarity on heuristics such as perceived control and positive/negative framing of the project. This could inflate these individual's heuristics even further at group level and bring about group polarization. So an heterogenous group of project staff can be very useful to prevent Deaf Effect at group level.

Risk Appetite of the organization – Discuss it

From our interviews we learned that a clear risk appetite at organization level can be very helpful in reducing IS-project Owner's Deaf Effect. First, it sets a standard that can be used as a point of reference for strategic risk taking at organization level. This reduces the influence of subjectivity and bounded rationality of the actors on their decision making. Second, it proved to be very useful that executive managers and executive auditors openly discuss the organisation's risk appetite and how to apply it. This created a Collaborative Partnership that was helpful in avoiding the Deaf Effect on strategic IS-projects, as reported by some Chief Audit Executives that we interviewed.

Create a safe environment – But not too safe

Our results suggest that the Deaf Effect can be reduced when actors in the organization see each other as Collaborative Partners and can criticize each other in terms of gains in order to contribute to a better performance. Such a 'safe environment' can be helpful to redirect projects when needed without responsible managers losing face and spending valuable resources on the continuation of failing projects. Although we did not investigate this, we expect that an environment 'too safe' could elevate decision maker's sense of invulnerability, perceived control and might thus promote risk-seeking behavior as well.

Redirection of projects – Use positive Framing

Stopping or redirecting IS-projects is often only considered on its negative consequences. In our study we find that negative framing of the options (continue and redirect) promotes risk-seeking behavior and manager's Deaf Effect for Risk Warnings. Positive framing reduces the Deaf Effect for Risk Warnings. The interesting paradox at organization level that follows is that "if stopping of IS-projects is seen as a reasonable option, representing value and opportunities, then the overall success-rate of the IS-projects may improve". This may require that an organization adopts a different perspective on the management of risks and the performance of their IS-project portfolio, for example based on Real Options Theory.

Reduce the complexity of IS-Projects

In section 2.3.1 we described the IS-project factors that cause escalation of commitment, such as: costs, difficulty, duration, large pay-off, unclear scope, changing requirements and other factors that refer to the complexity of IS-projects. Although we did not include these factors in our study on the Deaf Effect, we think it is obvious and also relevant to organizations that the reduction of the complexity of IS-Projects also reduces the dominance of bounded rationality in decision making on IS-projects. Smaller IS-projects not only provide more opportunities for redirection in a next step but reduce bounded rationality in decision making as well.

8.8. Social Implications

The social implications of this study are considered from three perspectives: (1) escalating IS-projects, (2) escalation of commitment and (3) the Deaf Effect for risk warnings.

Escalating IS-projects

Escalating IS-projects are a problem for private companies and for many governmental organizations as well. The Dutch governmental Algemene Rekenkamer (*Audit Cham*ber) issued a report on the relevance and problems of complex IS-projects in 2007. The Dutch parliament announced another investigation on failing IS-projects in 2012. Governmental projects especially show the high degrees of complexity, external political pressure, large budgets, short term orientation and large exposure that typically promote escalation of

commitment. So improved decision making on these projects can certainly make sense to society

Although IS-projects in particular are prone to escalation – given their complexity, costs, attention, strategic value, duration and intangibility – our conclusions may also apply to other projects that share similar characteristics. We expect that many prestigious strategic projects in other applied fields yield similar characteristics. This could for example apply to real estate projects, to projects on transportation infrastructure or to business mergers.

In this study we found that negative framing can promote risk seeking behavior and persistence in continuation of projects that are no longer viable. There may be a consequence of all the negative publicity on failing IS-projects: it brings a negative frame through which we observe such projects. Bounded rationality makes us even more sensitive for information on again another IS-project that failed and prevents us from noticing the positive contributions of many of these IS-projects.

Escalation of Commitment

Our study only focused on the Deaf Effect related to decision making in the field of escalating IS-projects. As we described in section 2.2., the phenomen 'escalation of commitment' has also been found and studied in other domains, such as professional sports (Staw & Hoang, 1995), lending and banking (Staw et al., 1997), political decision making (Ross & Staw, 1986) or even escalating of commitment to fraudulent activities (Drummond, 2002). The results of our study on the Deaf Effect may be useful to other domains of escalation of commitment where clear Risk Warnings are available like in our study.

Deaf Effect

The Deaf effect is not restricted to escalating IS-projects or escalating commitment of course. Our findings on the effective communication on risks could apply to other domains as well in which perceived control, gain/loss framing and the messenger-decisionmaker relationship is involved. This could apply to the business context of strategic decision-making on acquisitions or mergers. This could also apply to risk-communication in security or health related domains. Bringing your risk warning as an Opponent with strong negative framing might promote Deaf Effect for your warning. This could play a role in a broad range of applied domains. With regard to health-warnings this could for example explain the reported effect that people started to smoke even more since the introduction of the obtrusive personal warning on cigarette-boxes that smoking kills you.

8.9.   Suggested Research

For suggested further research we combine two perspectives. From the perspective of the methodology and techniques as applied in this study, we proceed on section 8.3. We take in consideration our literature review on escalating IS-projects as presented in tables 2-1 to 2-4 in which we took the methodological and design perspectives of case-studies, surveys and experiments in this stream of literature. From content perspective we proceed on

section 8.2 with our main findings and the implication for practice as we reported in 8.4 to 8.6.

We suggest that a *cross-cultural survey amongst internal auditors* provides an additional angle on Deaf Effect. This can proceed along the route of the influence of the corporate governance model (and internal audit function within this model) on Deaf Effect. Furthermore, it can proceed on the influential elements of organization culture (such as: power distance, time orientation, uncertainty avoidance). Next to this it can proceed on the proposed influence of organizational characteristics on managers' Deaf Effect, as derived from our multi-case study.

From a methodological perspective we also consider that *Systems Dynamics modeling* provides an interesting path to proceed on our study. The analysis of the interaction effects within our study could be enriched by considering temporal, incremental effects and feedback loops over time. Starting points could be found in the form and strength of the causal relations as we measured them in our experiments. Context variables and feedback loops could be derived from our multi-case study. Both escalation of commitment and the Deaf Effect in the interpersonal communication between messenger and decision maker are developing over time and are fueled by bounded rationality heuristics. Sterman (2000) provides methodological guidance for the development and testing of valid models of bounded rationality heuristics in decision making within contextual organizational conditions. We started a first tentative pilot implementation in Vensim on this road in the applied to domain of escalating IS-projects (Zuiderwijk, 2011), based upon SD-studies by Abdel-Hamid (Abdel-Hamid & Madnick, 1991; Abdel-Hamid & Tarek, 1988).

We also consider that *further applied experimental research on Perceived Control* in the field of Deaf Effect in Escalating IS-projects can prove very interesting. This could follow two paths. First, within-subject experimental designs – such as of Jani (2005) - can provide more refined insight into cumulated effects of Perceived Control on Deaf Effect. A second path can be replication in this applied domain of several psychological experiments on Illusion of Control Theory. Factors such as decision maker's *freedom of choice*, *predicted outcome*, *need for the outcome*, *familiarity*, *competition* and *actor/observer positions* have been tested in card-playing psychological experiments. In the field of stop/continue decisions in escalating IS-projects, these conditions can be induced by Decision Makers' organizational environment, including factors such as: freedom of choice, responsibility, clear goals and plans, incentives, scarce resources, use of standards, reliability of information. Knowing the influence of Perceived Control on Deaf Effect, it can be interesting to investigate organizational conditions that are of influence on Perceived Control and thus on Deaf Effect. The organizational factors that were mentioned in our interviews on Deaf Effect are candidates.

We think it is interesting to perform similar experiments as ours that include the interaction effects of Collaborative Partnership with (1) the messenger's Authority and (2) with the existence of a clear Risk Appetite at organization level.Based on our interviews we expect that such interaction effects exist and can further refine context variables that apply to our conclusions. The factors that we listed in figure 7-3 also provide opportunities for further experimentral research on the Deaf Effect.

Another interesting route for further study on the Deaf Effect follows the path of the various *types of Gain/Loss framing* as presented by Levin et al. (2002). This provides additional methodological variance in manipulation and measurement of Framing Effects and thus extends validity of the framing effects we found in our study. As proposed by Ball et al. (2003) measurement of mediating variables such as Message Relevance, might better be measured by eye-tracking experiments than by self-report (as we did in our study). Finally, it would be an interesting path to use the three framing types of Levin as a lens for narrative study in the field. The words that managers use in talking freely about their IS-project may unhide the type and level of their Gain/Loss framing of the project. We performed a tentative Grounded Theory study on this research-idea (Benschop, Nuijten, & Pijl, 2011). We suggest that managers who use frame-typical words, might be more receptive for risk-warnings that are presented by using the same frame-typical words.

Furthermore, an interesting path for future research could be to follow the influence of *management expectations* on the Deaf Effect. We learned from Prospect Theory experiments how much influence it can have on information processing when a point of reference is changed. It can be very interesting to improve the understanding of similar points of reference on the other factors that we included in our study. In the development of our study we found that the respondents' expectations on the collaborativeness of internal auditors was a strongly anchored point of reference. While we used it as a control-variable in our study, it could be the focus of future research as well.

Finally, the *Stewardship Theory* component of our study can be further elaborated in the context of Deaf Effect for auditor warnings in IS-projects. From a methodological perspective, it appears to be interesting to follow a path of multi-level constructs to take into account both the organizational level and the individual level of the decision maker in order to obtain a deeper understanding of Deaf Effects in IS-projects, with the IS-study of Burton-Jones and Gallivan (2007) as an example of how this could be approached. Furthermore, it would be interesting to isolate and test constructs – such as *Trust* - that are closely related to Stewardship Theory, on their isolated causal effect on deafness.

8.10. Epilog

In this study we made a small step in finding explanations of the Deaf Effect in the field of IS-projects. It took almost 250 pages of writing - and reading - to get a little bit acquainted with *Kikazaru*, the ape that covered his ears not to hear any evil. The story of this ape hopefully provides some knowledge that is of help in making projects more succesful and taking the gains or pains from pulling the plug when needed. Knowledge in itself however does not make that change come about. Remember that we have been talking about a 'decision maker' throughout this thesis. One who doesn't know and might not even be aware that he shows deafness, or who knows but doesn't want to hear. Knowing and decision making are not enough to make the difference, if it doesn't lead to action, which is described as the Knowing-Doing Gap by Pfeffer and Sutton (1999). It takes courage to make the step from hearing and knowing to actually taking action to redirect or stop a project when needed. So finally we should search for the fourth ape *Shizaru* who referred to *"not taking action"*. Hopefully we came a little bit closer.

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NEDERLANDSE SAMENVATTING

Hoofdstuk 1 Introductie

De drie aapjes op de titel pagina zijn afkomstig uit de Chinese Oudheid en heten *Mizaru* (bedekt zijn ogen), *Kikazaru* (bedekt zijn oren) en *Iwazaru* (bedekt zijn mond). In het Westen wordt aan hen de betekenis toegekend dat verantwoordelijken 'de andere kant opkijken' of 'zich doof houden' voor kritische signalen. Dit laatste wordt ook wel aangeduid met *Deaf Effect*. Deze studie richt zich op het Deaf Effect bij eindverantwoordelijken (projecteigenaren) van strategische informatiserings-projecten. Het Deaf Effect wordt gezien als één van de mogelijke oorzaken waardoor sommige projecten niet tijdig gestopt of bijgestuurd worden en 'voortdenderen' zonder het beoogde doel te bereiken. Dit komt niet alleen voor bij informatiserings-projecten. Deze blijken echter bij uitstek kenmerken te bevatten die het zogenaamde 'escalatie van commitment' aanwakkeren en zijn daardoor interessant om te onderzoeken. Daarnaast zijn informatiserings-projecten van strategisch belang voor vele organisaties en vragen zij veelal substantiele investeringen.

Er is sprake van Deaf Effect als een verantwoordelijke manager slecht nieuws niet hoort, het bericht negeert of het onschadelijk maakt. Er hoeft dus niet altijd sprake te zijn van opzet. Er kan ook sprake zijn van begrensde rationaliteit waardoor waarschuwingen niet de aandacht krijgen, zoals een goed boek alle aandacht kan vasthouden om vooral door te gaan met lezen en hinderlijke onderbrekingen van buitenaf te negeren.

In deze studie onderzoeken wij enkele factoren die, mogelijk in combinatie, van invloed kunnen zijn op het Deaf Effect. In ons onderzoek gaan wij er van uit dat slecht nieuws wordt verstrekt door iemand die verstand van de materie heeft, deugdelijk onderzoek heeft gedaan en zo objectief en onafhankelijk mogelijk kan rapporteren. Zoals andere onderzoekers hebben wij gekozen voor internal auditors omdat zij geacht worden aan deze voorwaarden te voldoen en dus een onderbouwde en geloofwaardige waarschuwing af te geven. Wij onderzoeken het Deaf Effect van de projecteigenaar. Dit is degene die verantwoordelijk is om te bewaken dat de organisatiedoelstellingen met het project ook daadwerkelijk worden gerealiseerd en de belangen van de organisatie worden veilig gesteld. De projecteigenaar wordt veelal beschouwd als de opdrachtgever van het project en is, bijvoorbeeld als divisiedirecteur, eindverantwoordelijk om go/nogo beslissingen te nemen op belangrijke momenten in een informatiserings-project.

Wij onderzoeken of de volgende drie factoren een oorzakelijk verband hebben met Deaf Effect: (1) wordt de boodschapper van de risico-waarschuwing gezien als meewerkend partner, die bijdraagt aan de resultaten, of wordt de boodschapper gezien als 'tegenstander' die de fouten van de projecteigenaar komt blootleggen. De internal auditor als 'tegenstander' wordt soms getypeerd als 'politieman' binnen de organisatie; (2) in welke mate heeft de projecteigenaar de beleving dat hij zijn project onder controle heeft en invloed kan uitoefenen op de uitkomst van het project. Het gaat hier om de beleving van de projecteigenaar en niet om het feitelijke niveau van projectbeheersing. Eerdere ervaringen van de projecteigenaar met soortgelijke projecten kunnen in hoge mate van invloed zijn op de beleving die de projecteigenaar heeft; en (3) wordt de risico-waarschuwing positief of

negatief gepresenteerd, in termen van winst of verlies ten opzichte van een referentiepunt. Het betreft hier dus het verschil in de presentatie (zogenaamde Framing) bij dezelfde inhoud van de boodschap (het glas is half vol of half leeg). De theorieën die worden gehanteerd in dit onderzoek zijn respectievelijk Stewardship Theorie, Illusion of Control Theorie en Prospect Theorie. Door middel van drie experimenten en een aantal interviews met internal auditors dragen wij bij aan de kennis over Deaf Effect in de context van informatiserings-projecten. Daarnaast kunnen de resultaten van deze studie een bijdrage leveren aan de literatuur over de effectiviteit van internal auditors.

Hoofdstuk 2 Literatuur Review

In dit hoofdstuk beschrijven wij eerst globaal de literatuur waarin theorieën en factoren worden getoetst ter verklaring van Escalation of Commitment, het fenomeen dat mensen geneigd zijn om te volharden in eerder gemaakte keuzes. Theorieën die daarbij naar voren komen zijn onder andere: *Self-Justification Theory* (je filtert onbewust de informatie die je keuze bevestigt) en *Self-Presentation Theory* (je wilt voor de omgeving geen gezichtsverlies lijden).

Vervolgens gaan wij dieper in op de factoren die van invloed zijn op escalatie van informatiserings-projecten. Deze factoren worden gerubriceerd naar psychologische factoren (zoals begrensde rationaliteit), sociale factoren (bijv. groepsinvloeden en cultuurverschillen), organisatorische factoren (bijv. politiek gevoeligheid, afrekencultuur, financiële middelen) en project factoren (zoals projectcomplexiteit, betrokken partijen).

Wij vervolgen de literatuurstudie met onderzoeken die van belang kunnen zijn voor het verklaren van Deaf Effect in de context van informatiserings-projecten. Daarin betrekken we zowel organisatie onderzoek als onderzoek naar hoe mensen informatie verwerken bij het nemen van beslissingen en de heuristieken die daarbij worden toegepast.

De heuristieken die een rol spelen in dit onderzoek worden beschreven aan de hand van experimenten uit de literatuur. Daarbij gaat het bijvoorbeeld om het overschatten van winstkansen bij het werpen van een dobbelsteen.

Tenslotte geven we in dit hoofdstuk een overzicht van de methodische invulling van studies in het onderzoeksgebied van escalerende informatiserings-projecten, zodat wij in onze empirische studies zoveel mogelijk gebruik kunnen maken van beproefde methoden en instrumenten alsmede de ervaringen van andere onderzoekers.

Hoofdstuk 3 Onderzoeksontwerp

In dit hoofdstuk beschrijven wij eerst de conceptuele structuur van ons onderzoek, namelijk welke begrippen en verbanden wij onderzoeken in ieder van de hoofdstukken: in feite de uiteenrafeling van onze onderzoeksvraag in deelvragen. Vervolgens geven wij een toelichting op het technische onderzoeksontwerp: welke methoden en technieken voor datacollectie en analyse hebben wij toegepast bij de beantwoording van deze onderzoeksvragen. De belangrijkste kenmerken van ons onderzoeksontwerp zijn opgenomen in tabel 3-5, welke onderstaand is weergegeven.

Conceptueel Onderzoeks Ontwerp	Hoofdstuk 4	Hoofdstuk 5	Hoofdstuk 6	Hoofdstuk 7
Onderzoeksvraag	Verklarend	Verklarend	Verklarend/ Beschrijvend	Verklarend/ Exploratief
Effecten	Hoofd Interactie Mediërend	Hoofd Interactie Mediërend	Hoofd Interactie	Hoofd Interactie
Afhankelijke Variabele	Continue	Continue	Risico Perceptie	Continue
Onafhankelijke Variabelen	Partner Winst/Verlies Frame	Partner Perceived Control	Kans Impact Rol	Partner Condities
Mediërende Variabelen	Relevantie Risico Perceptie	Relevantie Risico Perceptie		
Theorieën	Prospect Theory Stewardship Theory Heuristic Analytic Theory	Illusion of Control Theory Stewardship Theory Heuristic Analytic Theory	Illusion of Control Theory	Stewardship Theory Illusion of Control Theory Systems Theory

Technisch Onderzoeks Ontwerp	Hoofdstuk 4	Hoofdstuk 5	Hoofdstuk 6	Hoofdstuk 7
Onderzoeks Strategie	Laboratorium Experiment	Laboratorium Experiment	Situated Experiment	Case Studie
Methode	Between Group	Between Group	Mixed Design	Multi-Case Studie
Deelnemers	199 Studenten	134 Parttime- Studenten	70 Internal auditors 32 Managers	12 Internal Auditors
Data Analyse	Regressie PLS	Regressie PLS	Mixed Design ANOVA	
Data Validiteit	ANOVA, Cronbach Alpha, AVE, Exploratory & Confirmatory Factor Analysis	MANOVA, Cronbach Alpha, AVE, Exploratory & Confirmatory Factor Analysis	Cronbach Alpha, Exploratory Factor Analysis	Case Study Protocol Case Study Database Chains of Evidence
Hulpmiddelen	SPSS rel 19 smartPLS rel 2.0	SPSS rel 19 smartPLS rel 2.0	SPSS rel 19	nVivo rel 9

Table 3-5 Raamwerk Onderzoeks Ontwerp

Hoofdstuk 4 Experiment Prospect Theorie en Stewardship Theorie

In dit empirisch hoofdstuk beschrijven wij het ontwerp en de resultaten van het eerste experiment in deze studie. Omdat we een oorzakelijk verband willen onderzoeken kiezen we voor een experiment waarbij we omstandigheden zo goed mogelijk beheersen en een tweetal factoren beïnvloeden. De eerste factor die we in dit experiment manipuleren betreft de relatie met de boodschapper: wordt de boodschapper gezien als een partner (die komt helpen) of als een tegenstander (die fouten blootlegt en rapporteert). Deze factor hebben we *Collab* genoemd (Collaborative Partner). Volgens Stewardship Theorie zijn mensen eerder geneigd de waarschuwing op te volgen van een boodschapper die als partner wordt gezien. Als tweede factor manipuleren we in dit experiment of de risico-boodschap positief wordt gepresenteerd in termen van winnen of negatief wordt gepresenteerd in termen van verliezen. Deze presentatie wordt *Framing* genoemd en wordt gemanipuleerd door een ander referentiepunt te kiezen, op de volgende manier: Het project zou de organisatie 60 miljoen euro opleveren volgens de business case. In het Verlies frame wordt vervolgens gesproken dat het project nog 1/3 kans heeft om dit te halen en 2/3 kans dat het resultaat 60 milioen minder wordt dan de business case. In het Winst frame wordt dezelfde informatie alsvolgt gepresenteerd: het project heeft 1/3 kans om de 60 miljoen euro resultaat te halen en 2/3 kans dat er nul resultaat gehaald wordt. Volgens Prospect Theorie zijn mensen in de Verlies presentatie meer geneigd om risico-zoekende keuzes te maken. In ons experiment verwachten wij dus dat Deaf Effect meer optreedt als de boodschap wordt gepresenteerd in termen van verliezen. In dit experiment onderzoeken we of beide factoren afonderlijk van invloed zijn op Deaf Effect en of zij elkaars werking beïnvloeden (interactie-effect). Daarnaast meten we een aantal tussenliggende ('mediating) variabelen in dit experiment.

Voor dit experiment is een scenario opgesteld dat (samen met het experiment in hoofdstuk 5) in een 4-tal stappen is ontwikkeld en getest. Deelnemers (199 studenten uit Nederland en België) kregen aselect 1 van de 4 mogelijke scenario's voorgelegd, waarin de twee factoren werden gemanipuleerd (boodschapper als Partner of Tegenstander; boodschap als winst of als verlies gepresenteerd). In dit experiment is het gebruik van studenten aanvaardbaar omdat de framing-manipulatie als winnen/verliezen niet gerelateerd is aan werkervaring en omdat studenten een homogene groep vormen. De resultaten werden geanalyseerd met regressie-analyse en PLS en getest op validiteit. De hoofdconclusies uit dit hoofdstuk worden toegelicht aan de hand van de onderstaande figuur.
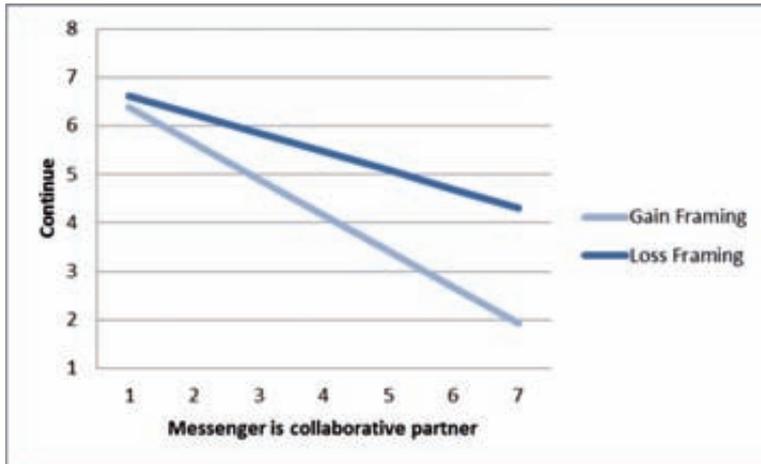
De variabele Continue (op de vertikale as) is gemeten op een schaal van 1 (zeker niet doorgaan met het project) tot 8 (zeker doorgaan met het project).

Uit de grafiek blijkt dat deelnemers minder geneigd zijn om door te gaan met het project als de risico-waarschuwing komt van een boodschapper die hoog scoort op 'partnerschap' dan wanneer de boodschapper wordt gezien als tegenstander (die laag scoort op 'partnerschap'). Beide regressielijnen dalen namelijk.

Ook blijkt uit de grafiek dat bij de presentatie van de risico boodschap als 'verliezen' (de donkere regressielijn), de deelnemers meer geneigd zijn om met het project door te gaan, dan wanneer de boodschap wordt gepresenteerd in termen van 'winsten' (de lichte regressielijn). De donkere lijn (Loss Framing) ligt namelijk in zijn geheel boven de lichte lijn (Gain Framing);

Tenslotte blijkt uit de grafiek dat er een interactie bestaat tussen de twee factoren, want de twee regressielijnen lopen niet parallel. De onderste regressielijn daalt sterker dan de bovenste regressielijn. Dus bij een boodschap die gepresenteerd is als 'winsten' wordt de beslissing om door te gaan met het project sterker beïnvloed door de relatie met de boodschapper als partner of tegenstander. De deelnemers die de boodschap in termen van 'verliezen' kregen gepresenteerd, laten hun beslissing om door te gaan met het project minder afhangen van de relatie met de boodschapper als partner of tegenstander. De grafiek laat ook zien dat het bij een boodschapper die zeer sterk wordt gezien als tegenstander, het niet veel verschil maakt of de boodschap als winst of verlies wordt gepresenteerd. Bij een boodschapper die zeer sterk wordt gezien als partner, maakt het juist een groot verschil of de boodschap wordt gepresenteerd als winst of als verlies.

Wij hebben de deelnemers gevraagd om een schatting te geven van de kans dat zij het doel van het project (60 miljoen resultaat) gaan behalen bij de gegeven risico-waarschuwing. De deelnemers die de boodschap kregen van een partner in termen van 'winsten' geven gemiddeld een schatting van de kans op succes van 33% hetgeen overeenkomt met de 1/3 die in de risico-waarschuwing is verstrekt. De deelnemers met een van de andere drie

scenario's geven beduidend hogere schattingen van hun kans op succes met 45%, 45% en 52%.

Uit analyse van tussenliggende ('mediërende') variabelen blijkt dat de invloed van de Winst/Verlies framing op de beslissing van de deelnemers om te stoppen of door te gaan met het project, grotendeels direct plaatsvindt en voor een gedeelte indirect via de "relevantie" die de ontvanger aan de boodschap toekent en via zijn inschatting van de kans op succes. De relatie met de boodschapper (als partner of tegenstander) is grotendeels indirect van invloed op de beslissing om te stoppen en door te gaan met het project en loopt voornamelijk via de "relevantie" die de ontvanger toekent aan de boodschap.

In dit hoofdstuk wordt tenslotte ingegaan op de consequenties van de onderzoeksresultaten vanuit diverse invalshoeken: de gehanteerde onderzoeksmethoden en instrumenten, vervolgonderzoek, de bruikbaarheid van de resultaten in de praktijk van internal auditors (de boodschappers in onze studie) en besluitvorming over informatiserings-projecten.

Hoofdstuk 5 Experiment Illusion of Control Theorie en Stewardship Theorie

Het experiment dat wij in dit empirisch hoofdstuk beschrijven heeft een groot deel gemeenschappelijk met het experiment in het vorige hoofdstuk. Het scenario en de meetinstrumenten zijn dezelfde. Daardoor kunnen de gevonden resultaten uit beide experimenten elkaar versterken. In dit experiment worden ook twee factoren gemanipuleerd om vervolgens daarvan het effect te meten op de beslissing van respondenten om al dan niet door te gaan met het project. Ook in dit experiment hanteren wij de relatie met de boodschapper als beïnvloedende factor *Collab*: wordt de boodschapper gezien als een partner (die komt helpen) of als een tegenstander (die fouten blootlegt en rapporteert). Volgens Stewardship Theorie zijn mensen eerder geneigd de waarschuwing op te volgen van een boodschapper die als partner wordt gezien. Als tweede factor manipuleren we de deelnemers in de mate waarin zij als projecteigenaar de beleving (perceptie) hebben dat zij het project onder controle hebben en invloed kunnen uitoefenen op de uitkomst van het project. Deze factor wordt aangeduid met Perceived Control (*PercCon*tr). Uit experimenten in Illusion of Control theorie blijkt dat mensen met een hoog niveau van Perceived Control geneigd zijn hun kansen op succes hoger in te schatten dan dat deze objectief zijn (bijvoorbeeld bij het gooien van een dobbelsteen). In experimenten omtrent verkeersgedrag blijkt dat chauffeurs met een hoge perceived control meer geneigd zijn tot het nemen van risico's. Risico-waarschuwingen achten zij niet van toepassing op zichzelf. Uit een survey (March&Shapira, 1987) blijkt dat ook managers geneigd zijn om gegeven risico-informatie niet op zichzelf te betrekken en tevens geneigd zijn om deze te willen verslaan ('beat the odds'). Uit eerdere 'escalerend IT-project' experimenten met Perceived Control blijkt dat een hoge perceived control inderdaad leidt tot meer risicozoekend gedrag.

In dit experiment onderzoeken wij of beide factoren afzonderlijk van invloed zijn op Deaf Effect en of zij elkaars werking beïnvloeden (interactie-effect). Daarnaast meten we een aantal tussenliggende ('mediating') variabelen in dit experiment. De 4 verschillende scenario's zijn aselect toegewezen aan 134 deeltijd werkstudenten met relevante werkervaring. Omdat Perceived Control gerelateerd is aan werkervaring hebben wij

gekozen voor deze groep deelnemers. De daarmee gepaard gaande heterogeniteit van de respondenten, was een van de uitdagingen bij het ontwikkelen en testen van het experiment-ontwerp. Het ontwikkelen en testen van het ontwerp (van beide experimenten) heeft in 4 stappen plaatsgevonden waarin ongeveer 200 deelnemers betrokken waren, voordat het experiment werd uitgevoerd met de groepen zoals beschreven in hoofdstuk 4 en in dit hoofdstuk.

De meetresultaten van de 134 deelnemers zijn geanalyseerd met regressie-analyse en PLS en zijn getest op validiteit. De hoofdconclusies uit dit hoofdstuk worden toegelicht aan de hand van de onderstaande figuur.
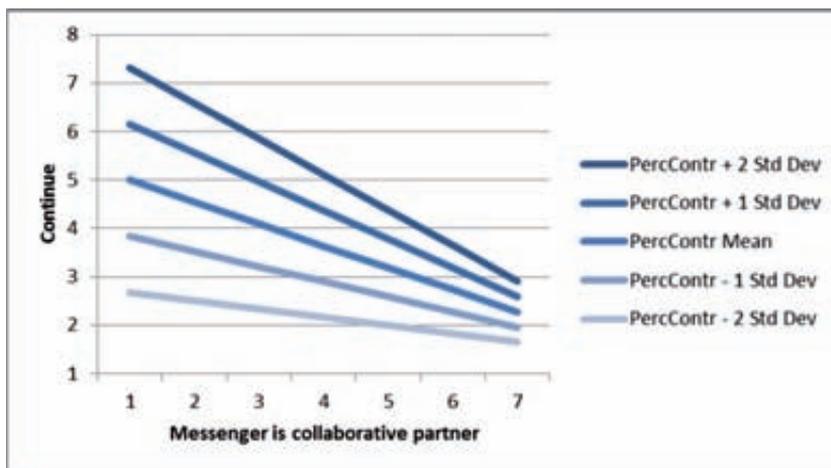
De variabele Continue (op de vertikale as) is gemeten op een schaal van 1 ('zeker niet doorgaan met het project') tot 8 ('zeker doorgaan met het project'). De middelste van de vijf regressielijnen heeft betrekking op de deelnemers die de gemiddelde score gaven op Perceived Control na de manipulaties in het scenario. De twee donkere lijnen daarboven hebben betrekking op de respondenten die 1 respectievelijk 2 standaarddeviaties hoger scoorden op hun Perceived Control. De onderste twee lichte lijnen betreffen deelnemers die juist een lagere Perceived Control rapporteerden (1 respectievelijk 2 standaarddeviaties onder het gemiddelde van de deelnemers).

Uit de grafiek blijkt dat deelnemers minder geneigd zijn om door te gaan met het project als de risico-waarschuwing kwam van een boodschapper die hoog scoort op 'partnerschap' dan wanneer de boodschapper werd gezien als tegenstander (die laag scoort op 'partnerschap'). Alle regressielijnen dalen namelijk.

Ook blijkt uit de grafiek dat bij een hoger niveau van Perceived Control de deelnemers meer geneigd zijn om met het project door te gaan, dan wanneer zij een lager niveau van Perceived Control hebben. De meest donkere lijn (respondenten met hoogste Perceived Control) ligt in zijn geheel boven de andere lijnen. De meest lichte lijn (respondenten met

de laagste Perceived Control), ligt in zijn geheel onder de andere lijnen. De tussenliggende lijnen zijn gerangschikt naar oplopende Perceived Control.

Tenslotte blijkt uit de grafiek dat er een interactie bestaat tussen de twee factoren, want de vijf regressielijnen lopen niet parallel. De bovenste regressielijn daalt het sterkste. De onderste regressie lijn daalt het minst sterk. De deelnemers met een zeer lage Perceived Control zijn geneigd om de risico-waarschuwing op te volgen en laten zich daarbij, in hun hulpeloosheid, minder leiden door de vraag of de boodschapper wordt gezien als partner of als tegenstander. De deelnemers met een zeer hoge Perceived Control zijn veel meer geneigd om het project voort te zetten en daarbij juist zeer gevoelig of de boodschapper gezien wordt als partner of als tegenstander. Als de boodschapper wordt gezien als tegenstander ('politieman') zijn de deelnemers extra geneigd om door te gaan met het project en als het ware de competitie aan te gaan met de boodschapper ('competitive arousal') en zich af te zetten tegen de boodschap.

Ook deze deelnemers hebben wij gevraagd om een schatting te geven van de kans dat zij het doel van het project (60 miljoen resultaat) gaan behalen bij de gegeven risico-waarschuwing, waarin de kans op succes van 1/3 was gegeven. Bij de groep deelnemers die het scenario kregen van een hoog perceived control met een boodschapper die een historie had als tegenstander, was de geschatte kans op succes gemiddeld 60%. De schatting van deze groep was daarmee beduidend hoger dan de 38%, 40% en 50% bij de deelnemers die een van de andere drie scenario's hadden ontvangen. Dit bevestigt de voorgaande conclusie dat juist in deze situatie sprake kan zijn 'competitive arousal' en Deaf Effect.

Uit analyse van tussenliggende ('mediërende') variabelen blijkt dat de invloed van de twee genoemde factoren op de beslissing van de deelnemers om te stoppen of door te gaan met het project, grotendeels direct plaatsvindt en in mindere mate indirect via de "relevantie" die de ontvanger aan de boodschap toekent en via de "risico perceptie" van de ontvanger na deze boodschap.

In dit hoofdstuk wordt tenslotte ingegaan op de consequenties van deze onderzoeksresultaten vanuit diverse invalshoeken: de gehanteerde onderzoeksmethoden en instrumenten, vervolgonderzoek, de bruikbaarheid van de resultaten in de praktijk van internal auditors (de boodschappers in onze studie) en besluitvorming over informatiserings-projecten.

Hoofdstuk 6 Experiment Actor/Observer effect in Illusion of Control Theorie

Het experiment in hoofdstuk 5 liet zien dat Perceived Control van invloed is op het Deaf Effect bij een risico-waarschuwing. Deze invloed loopt voor een deel via "risico-perceptie" die de ontvanger heeft na deze boodschap. Onder risico-perceptie wordt verstaan: de eigen perceptie van iemand over de mate waarin hij/zij risico loopt in een specifieke situatie. Dit wordt deels bepaald door de ervaringen die iemand heeft opgebouwd en deels door de situatie zelf, bijvoorbeeld door de informatie die iemand ter beschikking heeft. In dit hoofdstuk beschrijven we een experiment dat met 104 medewerkers van een Nederlands financiele instelling is uitgevoerd. Daarbij gaan we na of de rol die mensen in hun

werkomgeving hebben, als "actor" of "observer" van invloed is op hun risico-perceptie nadat ze en risico-waarschuwing hebben ontvangen. Ook deze verwachting is gebaseerd op experimenten uit de eerder genoemde Illusion of Control Theorie. Daarin blijkt dat deelnemers die *zelf* een actie uitvoeren (een dobbelsteen werpen of een speelkaart trekken) de kans op success hoger inschatten dan deelnemers die een ander observeren. Ook uit experimenteel onderzoek naar risico-inschattingen in het verkeer, blijkt dat mensen in de bijrijdersstoel (in de rol van 'observer') de risico's in een verkeerssituatie hoger inschatten dan wanneer zij aan het stuur zitten (in de rol als 'actor'). Het experiment in dit hoofdstuk heeft tot doel om na te gaan of na ontvangst van risico-waarschuwingen, dit actor/observer effect wordt bevestigd in de risico-perceptie van medewerkers die binnen de organisatie functioneren in een rol van 'actor' of in een rol van 'observer'. Voor de rol van 'actor' hebben wij gekozen voor IS-managers binnen het bedrijf, die aan het stuur zitten, en in de positie zitten om acties te nemen op basis van gerapporteerde IS-risico's. Voor de rol van 'observer' hebben wij gekozen voor internal auditors, die de bestuurder kunnen wijzen op IS-risico's, maar niet zelf aan het stuur zitten. Op basis van literatuur onderzoek wordt verwacht dat verschillen tussen beide groepen vooral betrekking hebben op de verwerking van de kans informatie. Door de Perceived Control heuristiek die managers als 'actor' hebben ontwikkeld, zijn zij eerder geneigd om kans-informatie niet op zichzelf van toepassing te verklaren en dus minder gevoelig te zijn voor deze informatie in een risico-waarschuwing.

Met het verstrekken van een negental risico-waarschuwingen met varierende kans informatie en impact informatie (laag, midden, hoog) beogen wij dit onderscheid zichtbaar te maken. Omdat heuristieken die verband houden met werkervaring zich in de loop der tijd ontwikkelen, hebben wij binnen de totale groep in het bijzonder de vergelijking gemaakt tussen de ervaren internal auditors (in een Vice President functies) en de ervaren IS managers (eveneens in een Vice President functie). Omdat deelnemers uit dezelfde organisatie werkzaam kwamen, was dit een bruikbaar vergelijkings-criterium. Ook hebben wij zo veel mogelijk gebruik gemaakt van de rapportagevormen en definities van deze organisatie om zo goed mogelijk aan te sluiten bij hun werkomgeving en de ervaring en heuristieken die zij daar in hun rol hebben opgebouwd. De meetresultaten van de 104 deelnemers (waarvan 42 in de VP-group) zijn geanalyseerd met behulp van Mixed Design ANOVA. De hoofdconclusies worden toegelicht aan de hand van de onderstaande figuur, die betrekking heeft op de 21 ervaren (VP) internal auditors en de 21 ervaren (VP) IS-managers .
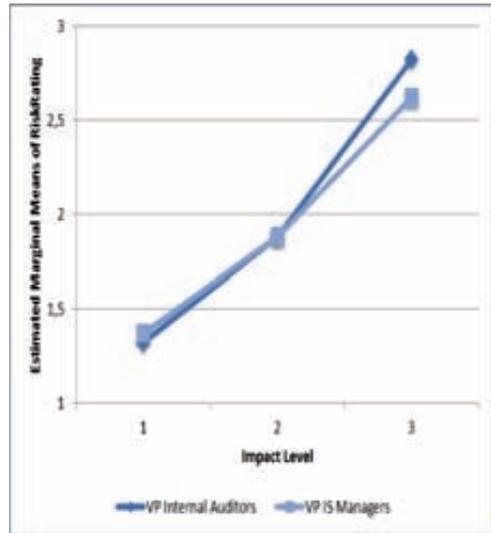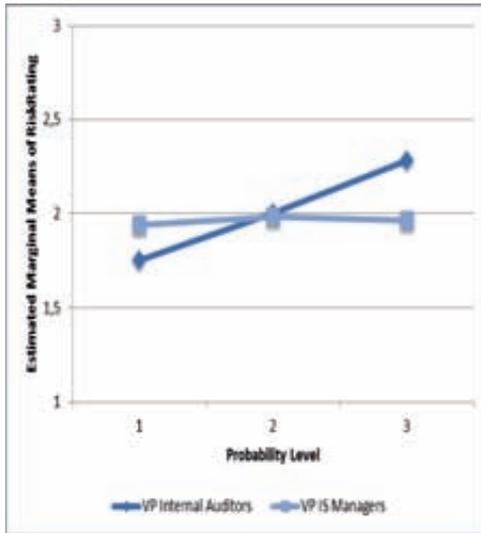
De grafiek links beschrijft de gemiddelde risico-perceptie van de deelnemers bij risico-waarschuwingen met respectievelijk een *kans*-niveau 1, 2 of 3 in de definities van dit bedrijf. De grafiek rechts beschrijft de gemiddelde risico-perceptie van de deelnemers bij risico-waarschuwingen met respectievelijk een gegeven *impact* niveau van 1, 2 of 3 in de definities van dit bedrijf. Ieder punt op de donkere lijnen in deze grafieken is het gemiddelde van 63 metingen van risico-perceptie binnen de groep van internal auditors. Ieder punt op de lichte lijnen in deze grafieken is het gemiddelde van 63 metingen van de risicoperceptie, maar nu bij de ervaren IS-managers.

In de linker grafiek is terug te zien dat de ervaren IS-managers ongevoelig zijn voor de kans-informatie in de risico-waarschuwing, want de lichte lijn stijgt nauwelijks. De donkere lijn in de linker grafiek geeft wel een stijging te zien. Daaruit is op te maken dat de ervaren internal auditors wél gevoelig zijn voor de kans-informatie in de risico-waarschuwingen. Bij een hogere kans-aanduiding geven ze ook een hogere risico-perceptie. De resultaten komen overeen met de verwachtingen uit eerder onderzoek dat managers nauwelijks gewicht toekennen aan kans-informatie die zij ontvangen.

In de rechter grafiek is terug te zien dat zowel de lichte als de donkere lijnen beduidend sterker stijgen dan in de linker grafiek. De risico-perceptie van zowel de ervaren 'actors' als de ervaren 'observer' wordt veel sterker beïnvloed door de impact-informatie dan door de kans-informatie. In hun gevoeligheid voor impact-informatie zijn de onderlinge verschillen tussen de ervaren 'actors' (de VP IS-manager) en de ervaren 'observers' de VP internal auditors) gering.

Uit de statistische analyses komt tevens naar voren dat, de gemiddelde risico-perceptie van de 'observers' (de internal auditors), gemiddeld hoger is dan de gemiddelde risico-perceptie van de 'actors' (de IS-managers) bij de 9 risico-waarschuwingen die zij allen kregen. De resultaten uit dit experiment zijn overeenkomstig de verwachtingen op basis

van het actor/observer effect. Hoewel we in dit hoofdstuk niet het Deaf Effect hebben gemeten zoals in de eerdere hoofdstukken, draagt het toch bij aan de onderzoeksvraag met een duidelijk indicatie dat het Deaf Effect voor risico-waarschuwingen zich waarschijnlijk toespitst op de hier geconstateerde ongevoeligheid voor de kans-informatie in de boodschap.

Hoofdstuk 7 Multi-Case Studie van Deaf Effect situaties bij IT projecten

In aanvulling op de experimenten zijn 11 interviews gehouden met senior internal auditors, waarin zij vertelden over een Deaf Effect situatie die zij in hun eigen praktijk hadden meegemaakt. Deze verkennende multi-casestudie had tot doel om een aantal factoren in beeld te krijgen en te structureren die mogelijk van invloed kunnen zijn op Deaf Effect. Daarbij is in het bijzonder de aandacht gevestigd op de relatie tussen boodschapper en de ontvanger. Op basis van iteratief coderen van de teksten en het schrijven van analytische memo's is onderstaand schema opgesteld waarin factoren zijn geclusterd die mogelijk van invloed zijn op Deaf Effect.
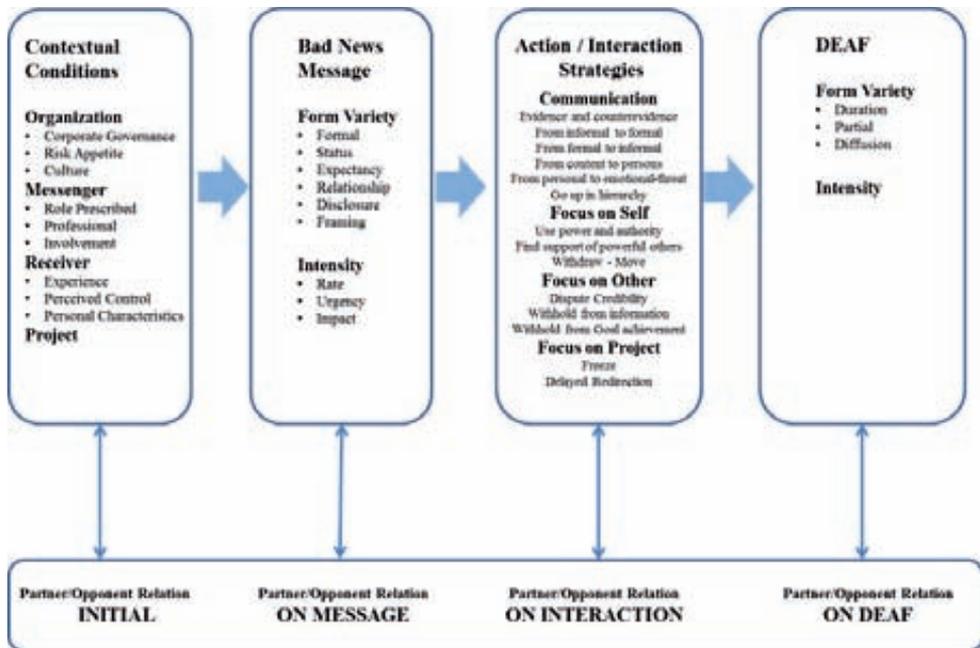
De factoren zijn toegelicht aan de hand van anekdotes uit de interviews en tevens is beschreven welke varianten werden aangetroffen in de verschillende interviews. In het schema wordt tevens zichtbaar gemaakt dat de relatie als Partner of als Tegenstander sterk kon veranderen voorafgaand aan de Deaf Effect situatie. Deze verandering kon inzichtelijk gemaakt worden aan de hand van gebeurtenissen die in de interviews werden genoemd. Naast de historie als Partner of als Tegenstander konden typische kenmerken van de risico-boodschap van invloed zijn op deze relatie. Naast het reeds eerder in de experimenten genoemde *Framing*, werden vorm- en intensiteitseigenschappen van de boodschap

veelvuldig genoemd als relevant voor het Deaf Effect (*formeel/ informeel, onverwacht/ verwacht, definitief/voorlopig, vertrouwelijk/wijdverspreid, rating, operationele/ strategische impact*). Deze factoren werden in een aantal interviews tevens in verband gebracht met een verandering in de relatie als Partner of als Tegenstander. Vervolgens werden de interviews gedomineerd door actie- en interactiestragieën die sterk van invloed worden geacht op het Deaf Effect. De eerste categorie heeft betrekking op duidelijk herkenbare veranderingen in de *communicatie* (bijv. van informeel naar formeel, van inhoud naar vorm, van inhoud naar personen). Ook die worden in verband gebracht met een verschuiving in de richting van partners danwel tegenstanders. Verder komen duidelijke strategieën naar voren die er op gericht bleken om de eigen positie te versterken (bijvoorbeeld *medestanders* zoeken of *autoriteit* gebruiken) danwel de positie van de andere partij te verzwakken (de *geloofwaardigheid* van de boodschapper aantasten, de acties van de andere partij *vertragen* of anderszins frustreren). Deze interactie strategieën bleken van grote invloed op de relatie als partners of als tegenstanders. De strategieën die van weerszijde werden toegepast bleken de situatie richting een Deaf Effect te drijven, ofwel lieten een interventie zien (omschakeling van formeel naar informeel bijvoorbeeld, ingrijpen van hogerhand) die juist het Deaf Deaf deed voorkomen.

Naast de genoemde factoren die van invloed werden geacht op Deaf Effect, leverden de interviews het inzicht dat (1) Deaf Effect zich laat beschrijven als een resultante van een reeks samenhangende factoren, gebeurtenissen en een wisselwerking tussen de boodschapper en de projecteigenaar; (2) deze gebeurtenissen en wisselwerking sterk geassocieerd worden met veranderingen in de relatie tussen beide partijen: deze gingen elkaar steeds nadrukkelijker als tegenstanders beschouwen in de beschreven Deaf Effect cases; (3) de respondenten als duidelijk herkenningspunt, en ook onderscheidend tussen Deaf Effect situaties en niet Deaf Effect situaties, noemden dat de boodschap en/of de communicatie zich verplaatste van inhoudelijk naar persoonlijk, bijvoorbeeld doordat de projecteigenaar zich aangetast voelde in zijn imago, zijn ervaring miskend achtte, of zich in hoge mate persoonlijk associeerde met het project en de kritiek daarop; (4) de opeenvolging van interacties zoals beschreven in de interviews een patroon lieten zien dat sterke gelijkenis vertoont met Glasl's model dat Escalatie van Conflicten beschrijft, waarin twee partijen (in dit geval de boodschapper en de projecteigenaar) een escalatie van commitment laten zien in hun eigen positie in dit conflict en elkaar stapsgewijs steeds nadrukkelijker als tegenstander gaan beschouwen; en (5) suggereerden de resultaten een interactie effect tussen enerzijds de relatie tussen boodschapper en projecteigenaar als partners of als tegenstanders en anderzijds de autoriteit van de boodschapper. Als de autoriteit van de boodschapper zeer hoog was, dan leek het minder van belang voor Deaf Effect of de boodschap afkomstig was van een partner of van een tegenstander. Wij luisteren naar de politie omdat deze autoriteit heeft. Mocht de autoriteit van de boodschapper echter verminderen, dan wordt Deaf Effect sterker beïnvloed of de boodschap afkomstig is van een partner of een tegenstander. Deze interactie werd gesuggereerd op basis van de interviews en leent zich voor nader onderzoek; en tenslotte (6) werd een vergelijkbaar interactie effect gesuggereerd ten aanzien van de risk appetite van de organisatie. Bij het ontbreken van een duidelijke risk-appetite wordt Deaf Effect sterk beïnvloed door de relatie met de boodschapper. Bij een zeer duidelijke risk-appetite van de organisatie bleek Deaf Effect juist minder onderhevig aan de relatie met de

boodschapper. Deze interactie werd gesuggereerd op basis van de interviews en leent zich tevens voor nader onderzoek.

Hoofdstuk 8 Conclusies

In dit hoofdstuk worden de resultaten van de vier empirische studies gecombineerd tot de beantwoording van de onderzoeksvraag. Daarbij geven wij een beschouwing van de gehanteerde randvoorwaarden en methoden, de bijdrage van dit onderzoek aan de wetenschappelijke literatuur over escalerende IT-projecten en de wetenschappelijke literatuur over internal auditing, alsmede de consequenties van de onderzoeksresultaten voor de praktijk.

De centrale onderzoeksvraag van dit onderzoek was erop gericht om inzicht te krijgen in mogelijke oorzaken van het Deaf Effect. Uit de onderzoeksresultaten blijkt het volgende:

(1) Ieder van de drie onderzochte theorieën, Stewardship Theorie, Prospect Theorie en Illusion of Control Theorie levert een bijdrage aan de verklaring van het Deaf Effect;

(2) Als we invloed van de drie theorieën vergelijken dan blijkt dat het Deaf Effect het sterkste wordt beïnvloed door de Perceived Control van de Project Eigenaar (Illusion of Control Theorie), in iets mindere mate door de relatie met de boodschapper als Partner of als Tegenstander (Stewardship Theorie) en in nog in iets mindere mate door de presentatie als winst/verlies die de boodschapper geeft aan de risico-waarschuwing (Prospect Theorie);

(3) Er treden interactie effecten op tussen de genoemde drie factoren, waarvan het meest in het oog springen:

- de presentatie als winst/verlies blijkt nauwelijks van invloed op het Deaf Effect als de boodschapper zeer sterk als tegenstander wordt gezien. Daarentegen is de presentatie van de boodschap van grote invloed als de boodschapper juist sterk als partner wordt gezien;

- de projecteigenaar met een hoge mate van Perceived Control is zeer sterk geneigd tot het Deaf Effect als de boodschap afkomstig is van iemand die hij/zij nadrukkelijk ziet als tegenstander. De projecteigenaar met een lage Perceived Control is minder geneigd tot Deaf Effect en is er nauwelijks gevoelig voor of de boodschapper wordt gezien als partner of als tegenstander;

- De kans-informatie in een risico-waarschuwing komt nagenoeg onvervormd over bij de projecteigenaar als de boodschap als winst wordt geformuleerd en afkomstig is van iemand die wordt gezien als meewerkend partner.

(4) Medewerkers met ruime werkervaring als 'actor' tonen na het ontvangen van een risico-waarschuwing gemiddeld een risico-perceptie die afwijkt van hun collega's die een vergelijkbare werkervaring hebben in een 'observer' rol. Het verschil blijkt vooral in de gevoeligheid voor kans-informatie in een risico-waarschuwing.

Bij de vertaling van de onderzoeksresultaten naar de praktijk van internal auditors wordt ingegaan op het belang van strategisch partnerschap tussen internal auditor en managers en de kwetsbaarheid van partnerschap op operationeel niveau. Tevens benadrukken wij dat het voor internal auditors van nut is om te beschikken over kennis van begrensde rationaliteit ter voorkoming van onbedoelde effecten bij de communicatie van risico-waarschuwingen. Vervolgens wordt ingegaan op het belang voor internal auditors om inzicht te hebben in de Perceived Control van de projecteigenaar. We geven enkele overwegingen bij de gangbare manier om risico-waarschuwingen met een negatieve framing te formuleren, namelijk als tekortkomingen ten opzichte van een norm. Tenslotte benadrukken wij het belang dat internal auditors kennis hebben van de conflict escalatiestappen zodat deze in de praktijk herkend kunnen worden.

Bij de vertaling van onze onderzoeksresultaten naar de management-praktijk wordt ingegaan op het nut van heuristieken (opgebouwd door ervaring) voor projecteignaren van strategische IS-projecten. Tevens wordt ingegaan op het belang om de bijwerkingen van deze heuristieken, zoals in dit onderzoek naar voren zijn gekomen, te beheersen, bijvoorbeeld door een heterogene samenstelling van de groep mensen die de projecteigenaar omringt. Daarnaast gaan wij in op het effect van framing bij de besluitvorming te stoppen of door te gaan met een project. Onze resultaten suggereren dat een organisatie er niet bij gebaat is als een dergelijke beslissing wordt gepresenteerd als het kiezen tussen twee verliezen. Als het stoppen/bijstellen van een project tevens wordt beschouwd als een redelijke optie, die van waarde kan zijn en mogelijkheden creeert, zou de projectenportefeuille wellicht meer succesvol kunnen worden. Dit vraagt echter een aangepaste zienswijze op de beheersing van risico's en prestaties van de projectenportfeuille. Tevens stellen wij voor dat het verminderen van de complexiteit van informatiseringsprojecten (en dus het verlagen van het ambitieniveau) de invloed van begrensde rationaliteit op de besluitvorming vermindert.

Bij de vertaling van onze onderzoeksresultaten naar het maatschappelijk belang wordt ingegaan op het belang van IS-projecten zowel voor bedrijven als voor de overheid. De negatieve aandacht die IS-projecten doorgaans krijgen werkt hun falen misschien wel in de hand. De onderzoeksresultaten zijn wellicht ook van nut op andere terreinen waar sprake is van escalatie van commitment, zoals politieke besluitvorming, sport alsmede frauduleus handelen.

ENGLISH SUMMARY

Despite the use of advanced project management methods, still many examples can be found of prestigious Information Systems (IS) projects that are no longer approaching their goals and to which continued investments are no longer justified. These so-called Escalating IS-projects seem to "take on a life of their own" and continue to absorb valuable resources without ever reaching the objectives, they are difficult to stop, yet are in need of redirection or termination. While it is true that those projects are eventually terminated or significantly redirected, they are often allowed to continue for too long before appropriate action is taken

Our study focuses on the so-called Deaf Effect of executive managers who are responsible for strategic IS-projects and who are often referred to as Project Owners. For reasons not well understood, these Project Owners may either consciously or unconsciously ignore, reject or not hear warnings, even when those who provided it were bold enough to transmit the message. Our study takes the position that a Project Owner would ignore, overrule or not hear a Risk Warning that continuation of an IS-project is no longer viable and thus the project should be discontinued. This Risk Warning is provided by a credible source, who is assumed to make true assertions based upon thorough investigation. Given their standards and requirements of proficiency, independency and due professional care, we used internal auditors as the messenger of the Risk Warning.

The objective of our research is phrased as follows:

"Contribute to the explanation of Why the Deaf Effect occurs in the field of escalating IS-projects", by examining main causal effects and interaction effects from following three perspectives:

(1) The "Collaborative Partner vs Opponent" Relationship between Internal Auditor (Bad News Messenger) and Project Owner (Decision Maker) – based on Stewardship Theory;

(2) Project Owner's Perceived Control heuristic which might bring biased processing of the auditor's risk warning (bounded rationality) – based on Illusion of Control Theory;

(3) The presentation of the risk warning either with the focus on Gains or with the focus on Losses – based on Prospect Theory.

For our study we use the metaphor of a decision maker who is sitting at the driver-seat, while the internal auditor provides a Risk Warning sitting at the passenger-seat. We examine whether the driver's Deaf Effect for the Risk Warning is influenced by (a) whether he/she sees the messenger as a collaborative partner or as an opponent who exposes the driver's failures, (b) whether the driver perceives to be in control, and (c) whether the message is framed positive or negative.

In two 2x2 laboratory experiments we asked participants to place themselves in the position of Project Owner and decide about continuation of an IS-project after they

received a Risk Warning from an internal auditor. In the first experiment we provided respondents with treatments of (1) the messenger seen as a Collaborative Partner or as an Opponent, and (2) the Risk Warning presented in terms of Gains or Losses. In the second experiment we provided respondents with treatments of (1) the messenger seen as a Collaborative Partner or as an Opponent, and (2) the Project Owner having a High or Low level of Perceived Control of the outcome of his/her IS-Project.

In both experiments we find confirmed that decision makers are more likely to follow the Risk Warning if the comes from a Collaborative Partner. If the message comes from an Opponent who exposes management failures, then the decision makers are more likely to respond with the Deaf Effect to the Risk Warning. Our first experiment also shows that decision makers are more likely to respond with Deaf Effect if the Risk Warning is framed in terms of Losses instead of Gains. These results are consistent with expectations according to Prospect Theory. Our second experiment confirms that decision makers are more likely to respond with Deaf Effect if they have a High level of Perceived Control over the project outcome. These results are consistent with expectations according to Illusion of Control Theory. For each experiment we also find significant interaction effects where one factor attenuates or amplifies the influence of the other on the Deaf Effect.

In our experiments we also measured mediating factors that provide more insight into how the Deaf Effect is influenced. We find that the influence on the Deaf Effect is partially mediated by (1) decision makers' biased perceptions of risk, (2) assigning less or more relevance to risk information and (3) biased estimations of probabilities to succeed/fail. These are all typical effects of *bounded rationality* in the decision maker's processing of risk information.

In a situated experiment that we performed in a Dutch/British organization, we assessed that employees with working experience as a manager – in the role of an actor sitting at the 'driver seat' – perceived risks differently than their colleagues with working experience as an internal auditor – sitting at the 'passenger seat'.

In the fourth – exploratory - part of our study we interviewed executive internal auditors who have experienced the Deaf Effect for their Risk Warnings on large IS-projects. We asked them to describe factors and events that explain the Deaf Effect in that case. We find that all three factors that we involved in our experiments are mentioned in those interviews. The interviews provided us with a list of factors and events that are mentioned by the internal auditors in order to explain Deaf Effect in those specific cases. We clustered those factors into conditions referring to characteristics of the messenger, characteristics of the manager, characteristics of the organization and characteristics of the project. Furthermore, we clustered factors that were related to the properties of the Risk Warning. Finally, we grouped typical actions and interaction strategies that had been applied by the messengers and the decision makers and that had promoted the Deaf Effect according to our interviews.

We conclude with a description of the contribution of our study to literature on Escalating IS-projects and Internal auditing, the practical implications of our study and our suggestions for further research.

ABOUT THE AUTHOR

Arno Nuijten was born on August 27, 1962 in Breda. After the Mencia de Mendoza lyceum in Breda he went to Fontys University of Applied Sciences where he obtained his bachelor degree in computer information systems in 1984. He started his professional career as a scientific programmer at the Econometrics subfaculty of Tilburg University. From 1984 until 1988, he did his master study in Information and Economics at Tilburg University on a part-time basis. His master thesis dealt with the topic of elicitation and modelling of the heuristics used by experts in their solution of complex problems. After his graduation, he worked nine years at Rabobank. Holding various positions in the domain of internal auditing and management of Information Systems, he was involved in several Information Systems projects. In 1991 he finished the post-graduate education on IS-auditing at TIAS business school. From his involvement in large IS-projects he developed his curiosity for bounded rationality of decision making in this domain.

Since 1997, Arno has been working on a freelance basis at several large companies. His engagements stretched from internal auditing, consultancy and training of professionals to holding senior positions as a project portfolio officer, a chief information security officer and a program manager. Participating in Worldbank programs, he was an advisor on IS-strategy and IS-control to the executive boards of several financial institutions in Ukraine, Latvia and Lithuania. On a part-time basis, Arno has been involved as a lecturer at Fontys, NIVRA/Nijenrode and Erasmus University where he also developed course materials on Information Systems and internal auditing. As a supervisor, Arno has supported approximately 70 students with their bachelor-, master- and executive master theses during these years. Based on his professional experience and curiosity for decision making biases, he became involved in a sequence of small and tentative research activities from 2000 until 2009. In this period Arno received his professional certifications in internal auditing, information systems auditing and meta-profile analysis (the latter refers to measuring people's behavioural preferences for coaching purposes). At the end of 2009 Arno decided to put his freelance activities on hold and take a sabbatical in order to start and make progress with his PhD-study. From early 2010 until midst 2012 he enjoyed the hospitality of Cass Business School (City University London), J. Mack Robinson College (Georgia State University, Atlanta) and Goethe Universität in Frankfurt as a visiting PhD-student.

Arno is married with Marty and has two children, Paul and Lonneke. In his free time he enjoys sports and he likes to work from time to time on construction and building activities regarding the own house or vintage audio processing such as high quality tube amplifiers.

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DEAF EFFECT FOR RISK WARNINGS
A CAUSAL EXAMINATION APPLIED TO INFORMATION SYSTEMS PROJECTS

Escalation of commitment to a chosen course of action is a phenomenon that shows for example when failing strategic Information Systems (IS) projects are continued for much too long. With this study we contribute to the explanation of why managers (Project Owners) respond with the Deaf Effect to Risk Warnings, even when these warnings are provided by a credible messenger, such as an internal auditor.

We examine whether the IS Project Owner's Perceived Control is of influence on the Deaf Effect. We also examine whether the Deaf Effect for the risk warning is affected by the relationship with the messenger: is the messenger seen as a collaborative partner who is of help or is the messenger seen as an opponent who is exposing the Project Owner's failures. Furthermore, we assess whether the Deaf Effect is affected by the presentation (framing) of the message in terms of Gains or in terms of Losses. Based on experiments we analyze the main effects and the interaction effects of those three factors to the Deaf Effect. In a multi-case study we explore other factors that can affect the Deaf Effect and could be interesting for further study. We discuss the contribution of our study to literature on escalating IS projects and to literature on internal auditing. Finally we discuss the implications of our study to the practice of IS Projects and Internal Auditing and to management practice in general.

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