The Feature Positive Effect in Legal Decision Making:

Processing and Evaluating Present and Absent Forensic Evidence

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The Feature Positive Effect in Legal Decision Making:
Processing and Evaluating Present and Absent Forensic Evidence

Het feature positive effect in de juridische besluitvorming:
het verwerken en evalueren van aanwezig en afwezig forensisch bewijsmateriaal

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Chapter 1

General Introduction

On the 29th of May 2001 Kees B. was found guilty for the rape and murder of Nienke Kleiss, a ten year old Dutch girl. There was virtually no forensic evidence that he had committed this crime, but he had confessed, and so the police was convinced of his guilt. The fact that he retracted his confession soon after his crucial interrogation was not heavily weighted by the police. After four years of imprisonment, Kees B. was released, because Wik H. admitted he was the one who killed Nienke (van Koppen, 2003). Indeed, DNA of Wik H. was found at the crime scene. How come Kees B. was found guilty while, besides a striking lack of evidence, DNA found at the crime scene did not match his DNA? And why does one conclude so easily that someone is guilty once his DNA is found at the crime scene? Put shortly, how come one ignores evidence of absence so easily, whereas one gives so much weight to physically present evidence?

The phenomenon described above (i.e., ignoring absent information while putting a lot of weight on present information) has been named the 'feature positive-effect' (FPE; Jenkins & Sainsbury, 1969), and it is the topic of this dissertation. The FPE originates from literature on Pavlovian conditioning. It was found that pigeons learn associations more quickly when the presence of a stimulus predicts (e.g., blue light is on) the presence of another stimulus (e.g., food can be obtained) rather than when the absence of a stimulus (e.g., blue light is off) predicts the presence of another stimulus. This difficulty with absent information relative to present information has also been described in other domains (e.g., omission bias).

The fact that people seem to treat present and absent information differently is not necessarily a bad thing. However, as the example above illustrates, underweighting absent forensic evidence can have severe consequences. Sometimes, the underweighting of absent evidence is irrational and thus constitutes a bias. Unlike other biases that can influence the process of legal decision making, such as the confirmation bias (Nickerson, 1998), the FPE is relatively unknown and unstudied. However, given its possible severe consequences, studying this effect is important.

The present studies

The purpose of this dissertation is fourfold. The first goal is to provide an overview of the literature on the FPE and related phenomena. A second aim is to explore whether the FPE is relevant to legal decision making. The third objective is to study

the processing of present and absent information in more detail. This is essential for a better understanding of how and why the FPE occurs. A final aim of this research project is to study whether the FPE can be reduced. This is important because with a reduced FPE also the severe consequences of the FPE might be reduced.

This dissertation describes a series of six studies (Chapters 2 to 7) that can be assigned to one of the goals mentioned above. Chapter 2 is an introductory chapter in which an overview of the literature on the FPE will be presented. Chapter 3 describes an experimental study on the FPE in undergraduate law students. Chapters 4, 5, and 6 aim at a better understanding of how and why the FPE occurs. The focus in these chapters is on the cognitive aspects of processing present and absent information. Finally, Chapter 7 investigates whether the FPE can be reduced by the use of a simple intervention. The research purposes of each chapter will be described below.

In **Chapter 2** an overview of the literature regarding the FPE is given. The origins of the FPE as well as various manifestations of this effect are discussed. Furthermore, consequences of the FPE in the field of forensic and clinical psychology are mentioned. Also, the question why non-information is underweighted, is discussed.

Chapter 3 describes an experimental study on the FPE in undergraduate law students. It is examined whether these students show a FPE during decision making for presented evidence in a fictitious case. In this study, the FPE is investigated in a between-subjects design.

Chapter 4 experimentally studies in detail the processing of present and absent information in undergraduate psychology students. Eye movements are recorded to examine the encoding of present and absent information. Furthermore, the retrieval of this information as well as the use of it during decision making is investigated. The study described in this chapter is a first attempt to try to uncover the mechanisms behind the FPE.

The experimental studies in **Chapter 5** replicate and extend the findings of Chapter 4 in more detail. It is researched whether differences in depth of processing can account for the FPE. Also, it is studied whether processing absent information requires more working memory capacity than processing present information. As a result, present information is easier to recall. This might evoke a FPE.

In **Chapter 6** the focus lies on the online processing of present and absent information in undergraduates. In contrast to Chapter 4 and 5, the impact of a single piece of evidence is examined instead of the influence of all evidence at once. This design gives us more insight in the contribution of different pieces of present and absent evidence to the final verdict.

It is hypothesized that people are not aware of the fact that they apply double standards for present and absent information. Therefore, **Chapter 7** examines whether making people aware of the FPE reduces the effect.

Finally, **Chapter 8** provides a summary of the main findings. Implications of these findings are discussed and avenues for future research are suggested.

Chapter 2

Perspectives on the Feature Positive Effect

Introduction

In this review of the literature on the feature positive effect I will first describe the discovery of the FPE in conditioning research and then outline various manifestations of this effect. Next, consequences of the FPE will be discussed. In addition, I will mention some phenomena that are related to the FPE. Finally, possible causes of the FPE will be discussed. It is argued that the underweighting of non-information is sometimes irrational, and thus constitutes a bias.

Discovery of the FPE in conditioning research

In 1948, Skinner published a small but classic descriptive study on operant conditioning in pigeons. In the pertinent study, eight pigeons in a permanent state of hunger (i.e., at 75% of their normal well-fed weight) were placed in a box in which a food dispenser delivered food regardless of the behavior of the pigeon. After two deliveries (interstimulus interval of 15 seconds), six of the eight pigeons had developed distinct stereotype behaviors not displayed before. For example, one pigeon turned counter-clockwise, while another made limbo dance-like movements. These behaviors were reliably observed by two independent observers. According to Skinner, these pigeons had somehow detected a contingency between the random behavior at the time and the delivery of food. Hence, that behavior increased in frequency. A second delivery strengthened the perceived causal relationship between the behavior and the food delivery. This way, the pigeons had developed superstitious behavior. Skinner drew analogies with human rituals. Interestingly, he also noted how much non-reinforcements were needed to unlearn the contingency: "More than 10,000 responses were recorded before 'extinction' had reached the point at which few if any responses were made during a 10 or 15 min. interval" (1948, p. 170). This means that two instances of presence of food equal 10,000 absences, even though both presence and absence are theoretically equally diagnostic in this case. In fact, given that there was no causal relation between the pigeon's behavior and the delivery of food, it can even be argued that the absence of reinforcement was more veridical and diagnostic. Curiously, the pigeons underweighted the non-reinforcement of their rituals. Another experiment also nicely illustrated the discrepancy in perceived importance between information resulting from positive and negative experimental outcomes (Wason, 1960). Human subjects were presented with a series of numbers (e.g., 2, 4, 6) and asked to uncover the relational rule of these numbers.

They produced a series of numbers themselves, indicated why they wanted to test these particular numbers, and then they were told whether their series confirmed or disconfirmed the rule. In other words, participants were presented with positive as well as negative experimental results that both were needed in order to uncover the rule. Not only did participants rarely produce a series of numbers that disconfirmed the rule, they also considered positive experimental results as more diagnostic than negative ones. This result might be explained by a confirmation bias, which will be discussed later on. However, the results of the studies described above do indicate that absence is generally considered less seriously than is presence. Therefore, these results can be seen as manifestations of the FPE *avant la lettre*.

A few years after Wason's study, Jenkins and Sainsbury (1969, 1970, as cited in Newman, Wolff, & Hearst, 1980) were probably the first who described the FPE. They discovered that pigeons could learn discriminations based on the presence/absence of a feature more easily when that feature appeared on a positive trial than when the feature appeared on a negative trial. The FPE was also found in rats (Crowell & Bernhardt, 1979; Reberg & LeClerc, 1977) and monkeys (Pace, McCoy, & Nallan, 1980). Newman et al. (1980) investigated the FPE in human beings. They set up some experiments and indeed found that humans tend to experience difficulty in using 'non-occurrence' as a cue. They demonstrated the existence of the FPE in six different experiments. These experiments were all performed by college students and differed in type of stimulus material, mode of presentation, kind of feedback delivered, length of post-feedback interval, type of response, details of instruction to the subject, and size and nature of the set of irrelevant elements. Despite the different conditions, a rather strong FPE was found in every single experiment. By and large, Newman et al. (1980) presented participants with a series of cards with two trigrams on it. Participants were asked to indicate which trigram was the 'good' one. Results showed that participants were unable to discover the rule that the absence of a particular letter indicates which trigram is the 'good' one, while they discovered quit easily the rule that the presence of a particular letter indicates the 'good' trigram.

Manifestations in other domains

After the discovery of the FPE in research on conditioning, the issue has been dormant. Although not explicitly mentioned, the results of a variety of studies could be explained by a FPE. I will now discuss some of these studies.

FPE in perception literature

Change detection

The FPE not only manifests itself in conditioning situations, there also is some evidence of a FPE in perception. Back in 1981, Healy investigated people's ability to detect additions and deletions in typographical errors. In her experiment, people had to read two prose passages and encircle all spelling errors they came across. The spelling errors were manipulated so that the misspelled letter either missed a feature of the right letter (e.g., 'c' instead of 'e') or added a feature to it (e.g., 'o' instead of 'c'). People tend to overlook typographical errors in letters with missing features more than in letters with added features. In another study, people's ability to detect additions and deletions was tested in two experiments. In both experiments, participants decided whether a target stimulus (e.g., the line drawing of a car) was the same as a previously seen study stimulus (Agostinelli, Sherman, Fazio, & Hearst, 1986). However, in the first experiment participants were not informed about the fact that they had to perform a subsequent recognition task. Because of this, the authors hypothesized that participants would use the target stimulus as subject of comparison. As a result, they would be more likely to *detect* a change when it involved an addition of features than a deletion and this is exactly what was found. *Identification* of a change (i.e., knowing what has changed) was also more accurate for additions than for deletions. In the second experiment, participants were aware of the fact that a recognition task would follow after the presentation of all study stimuli. This time, participants were more likely to detect deletions than additions. An explanation for this finding was given by the authors. Whenever people were aware of the fact that they had to compare stimuli, the first stimulus presented was the focus of attention and it was compared to the test stimulus, as was the case in the second experiment. In the first experiment, the test stimulus was the focus of attention and it was compared to the memory of the stimulus that was shown before.

The FPE might already occur in young children. Sainsbury (1971) showed that children between the ages of four and five years learn to discriminate between

two displays more quickly on positive than on negative trials. Also, in indicating whether a difference between two pictures is either caused by an addition or a deletion, children (aged 5-8) show a FPE (Miranda, Jackson, Bentley, Gash, & Nallan, 1992). They studied a picture for 20 s and then a second picture was presented. The children were instructed to identify the difference (i.e., an addition or a deletion) between both pictures as fast as possible. Results show that in this task children as well as adults (Nallan et al., 1994) identified more additions than deletions. Additions were also detected faster than deletions.

Visual search

Several studies on visual search show that people use more time to decide whether a certain item is present than when it is absent. In one such study, participants had to scan 50 strings of letters from the top down (Neisser, 1963). They had to detect either the string that contained a target letter or the string that did not contain that letter. People needed less time to decide that the target letter was present as compared to absent. Another study showed exactly the same. People had to look for a target letter (pink N) in a visual display full of distracters (green Ns and pink Os). They were asked to determine as quickly as possible if the display contained the required number of targets (one or two). In a positive display, the required number of targets was present, whereas in a negative display this was not the case. Reaction time was measured and the results showed that people tend to look much longer for a target when this target is absent than when it is present (Ward & McClelland, 1989). At first sight, these results seem logical, given that in case of presence, at some point, the stimulus will be found and the search can be terminated. However, the differential search endeavor cannot be construed completely as an artifact. First of all, in the study by Ward and McClelland, subjects were told that the target might be absent. Second, in this experiment, there was a lot of variation in the number of targets that had to be searched for and the targets that were actually present. This variation prevented participants from assuming that a specific number of targets would be present. Taken together, there is consistent evidence that it is more difficult to process perceptual information that is absent relative to information that is present.

FPE and self perception

In one study, the FPE was investigated in combination with self-perception of attitudes (Fazio, Sherman, & Herr, 1982). The authors were interested in whether individuals demonstrate attitudes less extreme from the non-occurrence of a behavior than from occurrence of a behavior. For example, applauding at a play would lead to the conclusion that you have a positive feeling about the play. The question is whether someone who is not applauding would be seen as someone with a negative attitude towards that play. Maybe even more important, would those two pieces of evidence be used equally in the inference of someone's attitude? Fazio et al. (1982) showed their subjects cartoons which they formerly rated as being neutral. Subjects had to decide whether these cartoons were 'very funny' or 'very unfunny'. The first group of people had to press a button if they thought the cartoon was 'very funny'. If they decided the cartoon was 'very unfunny' they did not have to do anything. So a positive judgment was combined with active behavior and a negative judgment with non-behavior. A second group of subjects needed to respond to the cartoons the other way around. In this group, funniness was combined with non-behavior while unfunniness became associated with an active behavior. Besides the two groups mentioned above, two other groups were included in this experiment. Subjects in these groups had to respond to the funny as well as the unfunny cartoons. In one group, the responses for the funny and unfunny cartoons were the same (pressing a button). In the other group, responses consisted of pressing a button of blowing a whistle. Half of the subjects in this last group had to press a button when presented a funny cartoon and blow a whistle when seeing an unfunny cartoon. For the other subjects in this group the ways of responding were reversed. The results showed that a feature positive effect exists in the self-perception process. The attitudinal inferences from judgmental behaviors were more extreme than from judgmental non-behaviors.

FPE and (legal) decision making

As the study by Neisser (1963) showed, people use more time to decide whether a target letter is absent as compared to present. More recently, several researchers investigated the FPE in relation to a specific field regarding decision making, namely legal decision making. There is reason to argue that the FPE may affect legal decision making. For example, in police investigations line-up identifications of suspects are

considered to be highly informative, whereas non-identifications are not. Brandon and Davies (1973) already noticed that witnesses who failed to identify the suspect or who wrongly identified a man were not called into court, whereas witnesses who identified the suspect were. I will discuss this skewness in the use of identifications vs. non-identifications in more detail later on.

Recently, Eerland and Rassin (2012a) examined whether the FPE occurred during the evaluation of incriminating and exonerating (non)evidence. Participants read a case file about a fistfight. This case file included the official police report, several eyewitness testimonies, reports of the interrogations of the suspect, and reports of a photo line-up. In the control condition, participants received no further information. In four experimental conditions, participants received information about additional investigations that had been conducted. These investigations were either incriminating in nature (e.g., clothes of the victim and his girlfriend were checked for fingerprints of the suspect) or exonerating (e.g., it was investigated whether the incriminating testimony of an eyewitness was prompted by an ulterior motive). Furthermore, the investigations were successful in one condition (i.e., fingerprints or the ulterior motive were found) and unsuccessful in another condition (i.e., fingerprints or the ulterior motive were not found). After participants read all the information that was presented to them they had to decide on the suspect's guilt. Reading about successful investigations had a higher impact on the guilt rate (compared to the guilt rate given by participants in the control condition) than reading about unsuccessful investigations. These results support the notion of a FPE during the evaluation of forensic evidence.

Consequences of the FPE

The fact that people attach more meaning to present as opposed to absent information is not necessarily a bad thing. Sometimes, presence is in fact more important or diagnostic than absence. However, some manifestations of the FPE, like the underweighting of absent evidence, might constitute a bias. Take for example the fact that line-up identifications of suspects are considered to be far more informative than non-identifications (i.e., no-choice responses or choices of foils). This may sound plausible because there might be multiple causes for non-identification. Perhaps a witness is unable to identify the perpetrator due to memory failure. However, in some cases, a non-identification is even more diagnostic of innocence as is an identi-

fication of guilt. Wells and Lindsay (1980) used existing data from a study by Loftus (1976) to provide support for this idea. In a culprit present line-up, the suspect was identified by 84% of the witnesses, whereas 16% was unable to identify the suspect. In a culprit absent line-up, 60% of the witnesses identified the suspect, who in fact was innocent and 40% made a non-identification. Of all identifications, 58% (84 out of 144) were correct and thus indicated that the suspect was guilty, whereas 71% of the non-identifications indicated that the suspect was innocent. From these results, it can be concluded that non-identifications are more diagnostic of innocence than identifications are of guilt. More recently, a meta-analysis on 94 experiments also provided support for the diagnostic power of identifications for guilt as well as the diagnostic power of non-identifications for innocence (Clark, Howell, & Davey, 2008; see also Rassin, in press).

Jenkins and Schuller (2007) investigated the impact of negative forensic evidence (i.e., evidence of absence) in case of a drug-facilitated sexual assault. Participants were given a realistic transcript of a sexual assault case. In short, the transcript told the story of the complainant and the defendant meeting in a train after work. They recognized each other from high school and decided to go for a drink at a local bar. Eventually, the two returned to the complainant's apartment. Up to this point, the complainant and the defendant agreed on what happened. Their stories differ from then on. The complainant accused the defendant of drugging and sexually assaulting her. Reason for this allegation was that she had no memory for the events after her last beverage; she woke up and noticed that her pant zipper was broken, and she had a sticky, colorless fluid in her underwear. Investigation at the hospital confirmed that sexual intercourse had taken place, but the complainant had no other physical injury. The defendant stated that sexual intercourse occurred, but that the complainant seduced him and that intercourse was consensual. He also stated that the complainant accused him of drugging and sexually assaulting her because he refused to continue a relationship with her. Subjects were given forensic evidence after reading the transcript. One third of the subjects received only a negative report which stated that no evidence of drugs was found in the complainant's blood or urine. One third received the negative report and an expert testimony reading that a negative outcome of forensic tests does not completely rule out drugging. The other subjects received no additional evidence at all. Half of the participants received a transcript that said that the complainant had been drinking alcohol. The other half

received a transcript in which the complainant consumed only cola. In both conditions, the defendant had been drinking three beers. Participants indicated whether they thought the defendant was guilty or not. Furthermore, they estimated the probability that the defendant was guilty, from 0 to 100 percent. Results of this study indicate that participants who received only the negative forensic report found the defendant less likely to be guilty than participants who received the report and expert testimony and participant who received no evidence at all. It thus seems that the expert testimony negated the influence of the negative report on the decisions made by the participants (Jenkins & Schuller, 2007).

Besides the fact that FPE might constitute a bias with serious consequences in the field of (legal) decision making, FPE might also underlie some mental disorders. A certain skewness in the processing of positive and negative information, as is the core of the FPE, might also play a role in psychopathology. In one study, the FPE was investigated in students with different degrees of hypochondriacal concerns (Rassin, Muris, Franken, & van Straten, 2008). Hypochondriasis is characterized by an excessive focus on bodily complaints (DSM-IV-TR; American Psychiatric Association, APA, 2000), whereas negative diagnostic information is perceived as irrelevant (Abramowitz, 2005). Therefore, it was hypothesized that the FPE and hypochondriacal concerns would correlate positively. To measure the FPE, a smiley test was developed based on the task Ward and McClelland (1989) used in their experiment. The idea behind this test was that people take more time to process negative as compared to positive information (see Neisser, 1963; Ward & McClelland, 1989). Participants decided as quickly as possible whether or not a specific number of targets (i.e., unhappy smiley) was present in a visual display filled with distracters (i.e., happy smileys). There were five different kinds of trials that differed with regard to the number of targets participants had to look for (i.e., one or two) and whether this number of targets was present (i.e., positive trial) or not (i.e., negative trial). The Whiteley Index (WI; Pilowsky, 1967) was used to measure hypochondriacal concerns. It was found that participants who had more hypochondriacal concerns were also more susceptible to the FPE.

Not only hypochondriasis but also other mental disorders might be associated with the FPE. For example, hypochondriasis is similar to anxiety disorders because both involve worry in a specific context. Also, anxiety disorders as well as hypochondriasis are maintained by avoidant behavior (Abramowitz & Moore, 2007). As a re-

sult, the FPE might be associated with anxiety disorders. To date, this has not been investigated.

FPE-related phenomena

Although the FPE is not a well-studied topic, several better studied phenomena may well be related to the FPE. I will discuss some of these in this section.

Omission bias

Several researchers have reported results suggesting that an unfortunate outcome is perceived as worse if the outcome is caused by action compared to when it is caused by inaction (e.g. Baron, 1992; Kahneman & Tversky, 1982). The following example can elucidate this. John holds shares in company A. He considers selling these shares and buying into company B. Eventually he decides to keep his shares in A. Later, he finds out that he would have been better off by €1000 if he had changed to company B. Eric is in the same situation, but he decides to sell his shares in A, and to buy shares in company B. Later, he finds out that he would have been better off by €1000 if he had kept with company A. Both John and Eric "loose" €1000. Yet, Eric is expected to feel worse, because he attributes his loss to his action (i.e., changing from A to B), whereas John attributes his "not winning" to his inaction (i.e., not changing from A to B). This underweighting of inaction, compared to action, as the cause of misfortune has been termed "omission bias" (e.g., Spranca, Minsk, & Baron, 1991). Notably, the omission bias has also been observed in the attribution of positive outcomes (Landman, 1987).

Status quo bias

Ritov and Baron (1992) explicitly distinguish the omission bias from the status quo bias. The latter refers to the preference of the current state and the reluctance to change, even if change implies improvement. The authors succeeded in making this distinction by subjecting twenty participants to four versions of five case vignettes. The four versions differed with respect to the occurrence of change (cf. status quo bias) and with respect to action vs. inaction (cf. omission bias). One of the vignettes was about Ruth, who took a taxi to the airport. Because of the heavy traffic, the idea arose to take a shortcut. Unfortunately, on the shortcut route, an accident had happened. Therefore, Ruth was delayed either way, and missed her flight. In one version,

Ruth thought of the short cut, but decided not to ask the driver to change his route. In the second version, Ruth did ask the taxi driver to take the shortcut. In the third version, the taxi driver himself offered to take the shortcut, and Ruth did not object. In the fourth version, the driver proposed to take the shortcut, but Ruth decided that they should stick to the standard route. Phrased in technical terms, version 1 implies no change and omission, version 2 implies change and commission. Version 3 implies change and omission, whereas the fourth version implies no change and commission. Participants were given all four versions, and were instructed to rank how bad Ruth would feel at the end of the story. Participants estimated that Ruth would feel worst if she had refused the driver's offer to take a shortcut (i.e., no change and action). Second came the version in which Ruth had asked the driver to take the shortcut (i.e., change and action). Third was the version in which the taxi driver proposed to take the shortcut, while Ruth did not object (i.e., change and no action). The least bad feelings were expected in the version in which Ruth thought of the shortcut, but decided not to ask the driver (i.e., no change and no action). This pattern of results was the same in all five case vignettes and illustrates that the omission and status quo biases can be unraveled. In addition, the omission bias seemed to be stronger, because the versions in which Ruth was inactive were rated higher (i.e., elicited fewer adverse feelings) than those in which she displayed active behavior, in spite of the fact that she missed her plane in any case.

Loss aversion

While the studies by Ritov and Baron (1992) suggest that the omission bias cannot be completely explained by the status quo bias, Baron and Ritov (1994) argued that loss aversion cannot entirely account for the omission bias either. The authors subjected 62 participants to various versions of case vignettes. In one version, John thought about changing his shares in company A into shares in company B, but ultimately did not. He earns €6000, but would have earned €10000 if he had changed his shares. In the second version, John did change his shares and finds out that he would have earned €10000 (instead of €6000) if had stayed with company A. In version 3, John stays with company A, earns €10000, and finds out he would have earned only €6000 if he had changed to B. In the final version, John changes to B, earns €10000, and finds out that he would have earned only €6000 if he had kept his shares in A. In the two first versions, John "looses" €4000, whereas in the latter two

he wins €4000. On average, more participants (i.e., 67.7%) estimated that John would feel worse in the second version compared to the first. When comparing the versions in which John was better off (numbers 3 and 4), only 38.7% of the participants estimated that John would better in the fourth compared to the third version. This suggests that the omission bias in case of loss is stronger (i.e., 17.7% different from 50) than the commission bias in case of gain (i.e., 11.3% different from 50). Based on these findings, Ritov and Baron (1992) conclude that the effect of the omission bias exceeds that of loss aversion.

Confirmation bias

When people gather information they tend to use strategies to select certain information. Most likely, they search and ask for information that is consistent with their own hypothesis, existing beliefs, and expectations (e.g., Skov & Sherman, 1986; Slowiaczek, Klayman, Sherman, & Skov, 1992). The selective search for and interpretation of this kind of information is called confirmation bias. This phenomenon has been recognized for a long time and has been well studied (see for an overview Nickerson, 1998). In a famous study regarding the confirmation bias, political preferences and attitudes were studied during the US Senate Watergate hearings of 1973 (Sweeney & Gruber, 1984). Three groups of voters, Richard Nixon supporters, McGovern supporters, and undecideds, participated in this study. A panel survey was conducted before, halfway, and just before the end of the Watergate hearings. The authors hypothesized that Nixon voters probably would not like the Watergate investigation, whereas McGovern supporters would. As the confirmation bias predicts, Nixon supporters reported to be less interested in and to pay less attention to information regarding Watergate than McGovern supporters and undecideds. On the one hand, it seems as if Nixon supporters negated the investigation so that they could keep their positive opinion about President Nixon. McGoverns supporters, on the other hand, focused on the Watergate investigation because they were eager to proof that Nixon was not the right man to be president of the US. Both strategies are illustrations of the confirmation bias.

In the forensic field the confirmation bias had also been called 'tunnel vision' (Rassin, 2007). 'Tunnel vision' refers to the fact that police investigators try to find evidence that a certain suspect is guilty rather than trying to come up with

exonerating evidence. This strategy contributes to wrongful convictions, like in the case of Kees B. (Posthumus, 2005).

Some manifestations of the FPE are reminiscent of the confirmation bias. An important difference between the two is that the confirmation bias refers to the fact that people tend to confirm hypotheses instead of evaluating them critically (Nickerson, 1998), whereas the FPE emerges when people attach more meaning to present than to absent information regardless of their own hypothesis (Eerland & Rassin, 2012a).

Why non-information is underweighted

So far, we have seen many examples of situations in which non-information is underweighted. It became clear that this underweighting of non-information might constitute a bias and lead to severe consequences. Furthermore, FPE related phenomena were discussed. However, the question remains why people tend to underweight non-information. One could argue that the FPE is (partly) caused by the fact that people have difficulty processing negations (Clark & Chase, 1972). Studies on the processing of negated information show that this information is less accessible than affirmative information because negated information is more difficult to process (Clark & Chase, 1972). In an attempt to figure out why negated information is more difficult to process, Kaup and Zwaan (2003) tested two different explanations. According to the first explanation, people form a propositional representation of the information that is presented to them in order to understand language. Whenever there is a negation operator present in a sentence, information that is under the scope of this operator is less active in the comprehender's memory than information that is not under the scope of this operator. According to the second explanation people form a situation model. They represent the actual state of affairs that is described by a sentence (Morrow, Greenspan, & Bower, 1987; Zwaan & Radvansky, 1998). Information that is represented becomes more accessible than information that is not. Take for example the sentence *Mary wished she had baked bread but not cookies*. In the propositional representation the word *bread* will be more accessible than the word *cookies*. This is because *not* is associated with *cookies* in this sentence. In the situation model account the actual situation in which Mary baked cookies and not bread is represented. Therefore the word *cookies* is more accessible than the word *bread*. The researchers found support for both views.

Shortly after the information is presented to people (< 500 ms), the propositional representation is activated. After a delay of 1500 ms, the accessibility of information was influenced by the actual state the information described as predicted by the situation-model theory. Taken together, how does this information relate to the FPE? In most manifestations of the FPE described above, people took their time to evaluate information and come to conclusions (see Eerland & Rassin, 2012a; Jenkins & Schuller, 2007; Wells & Lindsay, 1980). This makes that present information is part of the situation model, whereas absent information is not, and therefore present information is more accessible.

Because it is well known that negations are treated differently than affirmations, it is interesting to explore the FPE in information that is absent but not because the sentence describing the information contains negations. Eerland, Post, Rassin, Bouwmeester, and Zwaan (2012) investigated where the skewness in importance between present and absent information originates in information processing. Crucially, the information did not contain words like 'not' to indicate that something is not the case. In their experiment, participants read a short case file about a man who was suspected of the physical abuse of another man. After participants read the case file, sentences that described additional investigations were presented to them. The outcome of these investigations was either positive (i.e., it was found what was searched for) or negative (i.e., it was not found what was searched for). Eye-movements were recorded while participants read about the additional investigations. After reading all these sentences, participants were asked to decide upon the suspect's guilt and to indicate what information they remembered and what information they used to decide on the suspect's guilt. Results regarding the eye-movements showed that people had more difficulty processing absent than present information. Furthermore, people recalled more present than absent investigations. Also, present investigations were used more often than absent ones. Taken together, these results show that the discrepancy in importance between present and absent information exists during encoding, persists during recall, and influences what information is thought to be informative in the decision making process.

Besides the suggestion that difficulty in processing negated information might contribute to FPE, it is also suggested that the ability to retrieve information from our memory could provide an explanation for FPE. One could easily argue that

information that is more difficult to encode will also be more difficult to retrieve. However, in a recent study (Eerland & Rassin, 2012b) it was found that people recall present information more often than absent information even when both kinds of information are encoded to the same extent. Furthermore, no evidence was found for the idea that processing absent information provided more working memory capacity than processing present information. In other words, the FPE cannot be explained by differences in encoding as well as differences in cognitive load required to process present and absent information alone.

In an attempt to investigate the ability to retrieve information for memory as possible explanation for the FPE, Reyes, Thompson, and Bower (1980) examined the influence of memory on evaluative judgments. More specifically, they investigated whether information that is easily retrieved from memory has a greater impact on evaluative judgments than information that is more difficult to retrieve from memory, a phenomenon better known as the availability heuristic (Tversky & Kahneman, 1973). There are numerous of factors that can influence the availability of information in memory. One such factor is vividness (Reyes et al., 1980). The better information can be visualized, the better it will be remembered, and the easier it becomes to retrieve that information from memory. With the growing accessibility of this information, also the impact this information will have on judgmental decisions will grow. This might not only be caused by the fact that vivid information is easier to retrieve from memory, but also because people perceive vivid information as more important than non-vivid information (Koehler, 1991). Put it shortly, vivid information will have a greater impact on evaluative judgments than non-vivid information. The relation between vividness and presence of information was also examined in a recent study by Vandeberg, Eerland, and Zwaan (in press). It was found that the presence or absence of an object influences the perceptual vividness of that object in memory. Reading about an object that was absent made the mental image of that object less vivid, whereas reading about a present object made this image more vivid. Given that vivid information is easier to retrieve from memory and perceived as more important than non-vivid information, these findings could provide an useful explanation for the occurrence of the FPE.

Chapter 3

Biased Evaluation of Incriminating and Exonerating (non)Evidence

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Abstract

Recent evidence suggests that convictions in criminal procedures are susceptible to biased decision making. In this study, the potential detrimental effects of confirmation bias and the feature positive effect (FPE) were explored. The former states that decision-makers will be more impressed by incriminating than by exonerating evidence. The latter states that they assign more weight to finding evidence than to the failure to secure it, even though the absence of evidence can be as diagnostic as its presence. Law students read a case file about a fistfight. The evidence was manipulated such that the effect of confirmation bias and FPE on guilt estimation and conviction rate could be assessed. Findings partly confirmed the presence of both confirmation bias and a FPE.

Introduction

Rational theory of decision making states that people examine information in an unbiased manner, and ultimately reach a well-balanced conclusion (see Evans, 2007). Unfortunately, however, various heuristics and biases hinder individuals in their pursuit of rational decision making (Tversky & Kahneman, 1986). A well-known example is confirmation bias, which refers to the tendency to confirm hypotheses instead of evaluating them critically. The tenacity of this bias is characterized as follows by Nickerson: "if one were to attempt to identify a single problematic aspect of human reasoning that deserves attention above all others, the confirmation bias would have to be among the candidates for consideration" (Nickerson, 1998, p. 175).

There currently is some evidence that confirmation bias plays a role in legal decision making. That is, judges and jurors may be biased against the suspect, and this bias may fuel conviction rates. For example, police officers who are convinced that a suspect is lying, cannot easily be brought to change their mind (Meissner & Kassin, 2002). Similarly, jury members tend to interpret information in the light of their previously held convictions, rather than completely objectively (Carlson & Russo, 2001). Likewise, police officers find evidence more reliable if it is incriminating compared to when it is exonerating (Ask, Rebelius, & Granhag, 2008). In conclusion, the whole criminal procedure may promote tunnel vision against the suspect (Findley & Scott, 2006). For example, the law in some cases prohibits the defence to incriminate third parties, and thus, the possibility to introduce alternative scenarios is limited.

A less known, but possibly equally crucial bias is the feature positive effect (FPE; Jenkins & Sainsbury, 1969). This effect was first discovered in research on conditioning. The FPE boils down to the fact that organisms learn associations more quickly if these pertain to the presence of two stimuli (e.g., if the blue light is on, the pigeon can obtain food by picking a certain peg, regardless of any other lights in the Skinner box), compared to when the to-be-learned association is one between the absence of one stimulus and the presence of another (e.g., if the blue light is out, the pigeon can obtain food, regardless of the status of any other lights). In short, if a stimulus is predicted by the presence of another stimulus (blue light on), organisms master this association more rapidly than if the stimulus is predicted by the absence of that same stimulus (blue light off). The FPE is neither exclusive to laboratory

settings, nor to animals. As to the latter, Newman, Wolff, and Hearst (1980) subjected undergraduate students to six experiments in which they were presented with a series of cards. Each card had four symbols. Students needed to guess whether a card was 'good' or 'not good' and had to use the given feedback to find the rule that predicts the 'goodness' of a card. Results showed that participants were unable to discover the rule that the absence of a particular symbol (e.g., a triangle) indicated which card was the 'good' one, whereas they readily discovered the rule when the presence of that particular symbol indicated a 'good' card. Across the experiments, there were differences in type of stimulus material, mode of presentation, kind of feedback delivered, length of post-feedback interval, type of response, details of instruction to the subject, and size and nature of the set of irrelevant elements. Nonetheless, a rather strong FPE was found in each of these experiments.

There is reason to argue that the FPE may affect legal decision making, in that, for example, line-up identifications of suspects are generally considered to be highly informative, whereas non-identifications are not (Wells & Lindsay, 1980). One explanation for this is that non-identifications are considered less diagnostic because there are multiple causes for a non-identification. Besides the logical conclusion that a non-identification is caused by the fact that the suspect is not the perpetrator, a non-identification might also be caused by memory failure or anxiety. However, similar alternative explanations can be put forth to account for positive identifications. In fact, using Bayesian statistical analysis, Wells and Lindsay convincingly argue that a non-identification is similarly diagnostic of the suspect's innocence as is an identification of his guilt. In their words: "there is no justifiable logic for approaching a line-up procedure with a set for considering an identification of the suspect to be informative while considering a non-identification to be uninformative" (p. 777; see also Clark, Howell, & Davey, 2008). Also more recently the effect of FPE on legal decision making has been studied (Jenkins & Schuller, 2007). In this study, participants read a case file about a drug-facilitated sexual assault. Some participants received a version in which a forensic report was included stating that no residues of drugs were found in the victim's blood. Others received a version with the same report, and an expert witness testimony saying that the negative forensic finding does not necessarily imply that the victim was not drugged. In the control condition, neither forensic report nor expert testimony was presented. Participants indicated among other things, the estimated guilt of the suspect as well

as whether they would convict the suspect or not. Results showed that receiving only the negative report led to lower guilt and conviction rates compared to the control group. However, additional inclusion of the expert testimony increased guilt estimates even compared to the control group, suggesting that the negative finding was quite easily compensated.

Confirmation bias and the FPE are related, but not identical. Particularly, confirmation bias refers to the tendency to confirm a favored hypothesis and thus to ignore disconfirming information. The FPE, on the other hand, refers to the notion that people have difficulty evaluating the diagnosticity of the absence of information, regardless to which hypothesis the lacking information would have contributed. In the present study, we sought to examine the effects of confirmation bias and the FPE on the willingness to convict the suspect in a fictitious case. Undergraduate law students[1] read a case file pertaining to a fistfight. There was some evidence that the suspect had been involved in this fight. In addition, two variables were manipulated, creating four experimental groups. Some participants received a version of the case file in which extra evidence was presented. Others received a version stating that the police had tried to find extra evidence, but failed to do so. In a third version, the police had found extra information that in fact exonerated the suspect. In the final version, the police had done their best to find exonerating information, but could not find any.

If there were a confirmation bias, the search for extra incriminating evidence should have more impact than searching for exonerating information, regardless of whether the information was found or not. We assume that in this context, the suspect's guilt is the primary hypothesis, since the legal decision making process is aimed to answer a question of guilt and not a question of innocence (Findley & Scott, 2006). The FPE predicts that finding extra incriminating evidence or exonerating information should have a stronger impact than not finding extra incriminating evidence or exonerating information.

Method

Participants

One hundred and eighty-eight undergraduate law students (of which 128 women) participated in the current study. Their age ranged from 20 to 58 years, with a mean

[1] In the Netherlands, law is studied both at an undergraduate and graduate level.

of 24.0 years (*SD* = 4.14). Participants received the case file during lectures and were randomly assigned to one of five conditions. In return for their participation they received extra course credits.

Measures and procedure

The case file was about a young man who was suspected of physically abusing another man. The stimulus material was based on de Keijser and van Koppen (2007). This case file included the official police report, several eyewitness testimonies, reports of the interrogations of the suspect, and reports of a photo line-up (approximately 22 pages in length). There were five different conditions: one control condition and four experimental conditions. Participants in the control condition received no further information. In the other four conditions, additional investigative endeavors by the police were mentioned, at the end of the file. In two conditions these additional investigations (clothes of the victim and his girlfriend were checked for fingerprints of the suspect, the victim was confronted with pictures of the suspect, and an additional investigation of the neighborhood in order to find more witnesses of the incident was carried out) were guilt confirming or incriminating. Additional investigations that had been conducted in the other two experimental conditions had an exonerating character. This means that these investigations were carried out in order to tackle incriminating evidence or to provide support for alternative scenarios. Here, it was investigated whether the protocol for the confrontation procedure contained flaws and whether the incriminating testimony of an eyewitness was prompted by an ulterior motive. Furthermore, the investigators had critically evaluated the behavior of the victim at the time of the incident, given that the victim was unable to recall any information about what happened. The guilt confirming investigations were successful in one condition and unsuccessful in the other. The same holds for the additional exonerating investigations. These investigations were also successful in one condition and unsuccessful in another.

After reading the case file and the results of the three additional investigations, participants were asked to rate on a scale from 10 to 100% (with increments of 10) the likelihood of the suspect's guilt. Finally, participants had to indicate whether or not they would convict the suspect (*yes/no*).

Results

Table 1 displays the mean guilt estimates and the conviction rates in each condition. The data were analyzed with a 2 (confirmation vs. exoneration) x 2 (successful vs. failed) ANOVA. The dependent variable was the guilt estimate expressed as difference from the mean guilt estimate in the control condition. Of primary interest in this analysis was the divergence from the mean in the control group (that is, the impact of the additional information on the guilt estimate), regardless of whether the divergence was positive of negative. This analysis yielded a significant main effect of confirmation bias (F[1, 148] = 9.68, p < .05), a nearly significant main effect of the FPE (F[1, 148] = 3.24, p = .07), and a significant interaction effect (F[1, 148] = 21.64, p < .01, see Figure 1). These effects are primarily caused by the significant impact of guilt confirming information on guilt estimates (see superscripts shown in Table 1).

Table 1

Descriptive statistics regarding guilt estimates and conviction rates by condition (N = 188).

		Guilt estimates		Conviction rates
	n	*M*	*SD*	
Control group	36	68.33[a]	19.78	58.33[a, b]
Guilt-confirmation	41	83.66[b]	13.18	82.93[c]
Failed guilt-confirmation	38	66.84[a]	20.68	42.11[a, .b]
Exoneration	38	63.42[a]	16.15	31.58[b]
Failed exoneration	35	70.86[a]	12.92	45.71[a, b]

Note. Guilt estimates were given in percentages ranging from 10-100%. Conviction rates display the percentage of participants in a particular condition that would convict the suspect. Means in the same column that do not share superscripts differ at p < .05.

As Table 1 shows, convictions rates differed between the experimental conditions (χ^2[4, 188] = 24.68, p < .01). Participants in the control group were significantly less likely to convict the suspect than participants in the guilt-confirming condition (χ^2[1] = 5.68, p < .05). Participants in the control group were more likely to convict the suspect than were participants in the exonerating condition (χ^2[1] = 5.36, p < .05). Participants in the guilt-confirming condition were significantly more likely to convict the suspect than participants in the failed guilt-confirming condition (χ^2[1] =

16.13, $p < .01$), the exonerating condition ($\chi^2[1] = 21.38$, $p < .01$) and the failed exonerating condition ($\chi^2 [1] = 11.617$, $p < .01$).

A *t*-test for independent means showed that the guilt estimate of the 52.7% of participants who said they would convict the suspect was significant higher (M = 82.0, SD = 10.5) than that of participants who would not convict the suspect (M = 58.4, SD = 16.7; $t[145] = 11.44$, $p < .01$).

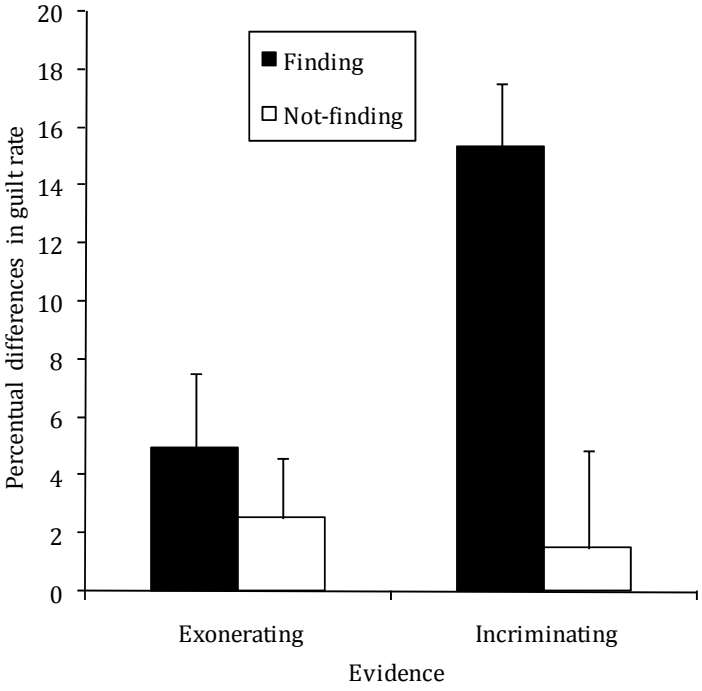

Figure 1

Mean absolute differences (+ *SE*) in guilt estimates of each condition as compared to the mean guilt rate in the control group.

Discussion

Human decision making is affected by various heuristics, which sometimes results in bias (Tversky & Kahneman, 1986). This study investigated the influence of confirmation bias and the FPE on the willingness to convict a suspect in a fictitious case. Our results support the idea of a confirmation bias. This means that, whereas participants were already more convinced of the guilt of the suspect than of his innocence, presenting them with more incriminating evidence made the guilt rate

increase more than did the presentation of more exonerating evidence decrease the suspect's guilt. This finding is in line with previous studies (e.g., Ask et al., 2008). However, recently, Snook and Cullen (2008) argued that tunnel vision is not necessarily detrimental. In the words of these authors: "policy recommendations to eliminate wrongful convictions by eradicating mental viruses are not based on any hard facts … Perhaps tunnel vision is used in every case, but only a very small percentage of these result in wrongful convictions" (p. 92). However, these authors define tunnel vision not only as confirmation bias, but as a compilation of confirmation bias, and decision making heuristics such as satisficing (Simon, 1955) and elimination by aspect. And whereas Snook and Cullen are right in arguing that the sensitivity and selectivity of tunnel vision for wrongful convictions is unknown, it can well be argued that confirmation bias in itself is undesired.

The data also suggest a striking asymmetry between the perceived diagnosticity of finding vs. not finding evidence. That is, finding evidence, whether incriminating or exonerating, had more impact on guilt estimates than did not finding the same evidence. Hence, if the police try to find the suspect's fingerprints at the crime scene, actually finding them is more incriminating than not finding them is considered exonerating. This manifestation of the FPE represents a serious anti-suspect bias (see for a similar asymmetry in attribution of personality characteristics, Rothbart & Park, 1986).

The data with regard to the conviction rates seem to indicate quite rational decision making. That is, finding more incriminating evidence made the conviction rates increase, whereas this rate decreased when more exonerating evidence was found. These data provide no evidence for a confirmation bias or a FPE, whereas the data with respect to the guilt estimates did. Perhaps then, guilt estimates are more susceptible to bias than are actual conviction rates. It may well be that the two variables are only loosely coupled. In the light of this, it should be noted that there is no standard on how great the chance of guilt must be in order to convict the suspect. It is the judge's or juries prerogative to decide when reasonable doubt is excluded. From personal communications, we know that Dutch judges rarely use percentages as an aid to reach conclusions about the suspect's guilt at all. A case in point is that in the current study no fewer than 60% of the participants who would convict the suspect estimated the chance of guilt to be 80% or less. Such percentages can hardly

be reconciled with safeguards against false convictions (see also MacCoun & Kerr, 1988; Tindale, Davis, Vollrath, Nagao, & Hinsz, 1990).

There are several limitations to the present study. First, it cannot be excluded that the incriminating and exonerating information in the stimulus materials differed in more ways than intended. For example, participants might have felt that the incriminating evidence was intrinsically stronger than the exonerating information. From a logical stance, it can be argued that proving one's guilt is difficult, but proving ones innocence is virtually impossible. One can only emphasize alternative scenario's that exclude the suspect's guilt. For instance, is establishing an unjust motive for giving an incriminating witness testimony equally strong exonerating evidence, as finding the suspect's fingerprints is incriminating? However, it should be noted that a pilot study established the equality of strength between incriminating and exonerating information used in the present study (Rassin, Eerland, & Kuijpers, 2010).

Another limitation is the use of a control group as the gold standard for guilt estimation. We chose for this between-subjects design, but it may well be argued that a within-subject design, in which participants estimate the suspect's guilt at various times and with different information, is well-fit to test our hypotheses.

One could easily argue that the use of law students as participants in this study is another limitation. Law students are trained in working on legal issues and might therefore be (to some extent) immune to biases in decision making. However, as mentioned before, the participants in this study were undergraduate law students. We assume that they do not have enough experience or skills yet to be able to ignore the cognitive biases investigated in this study. It is even questionable whether it is possible at all to ignore the confirmation bias and the FPE (see Eerland & Rassin, 2012c). On the other hand, by relying on a sample of undergraduate law students, our data can be argued to say something about both professional and lay legal decision making. Thus, the data may well combine the best of both worlds.

An interesting topic for future research would be the effect of crime severity on the evaluation of the evidence. According to the so-called conviction paradox a more serious crime would increase participants' willingness to convict the suspect (de Keijser & van Koppen, 2007). On the other hand, it is also possible that the impact on the guilt and conviction rates would decrease by making the crime more serious. This is because people are aware of the fact that serious crimes lead to

serious penalties. Another fruitful research topic is the way in which convictions develop (e.g., the influence of evidence order; Kerstholt & Jackson, 1998). Meanwhile, the present finding yields further support for the idea that legal decision making is not free from flaws that unduly promote conviction rates.

Author note

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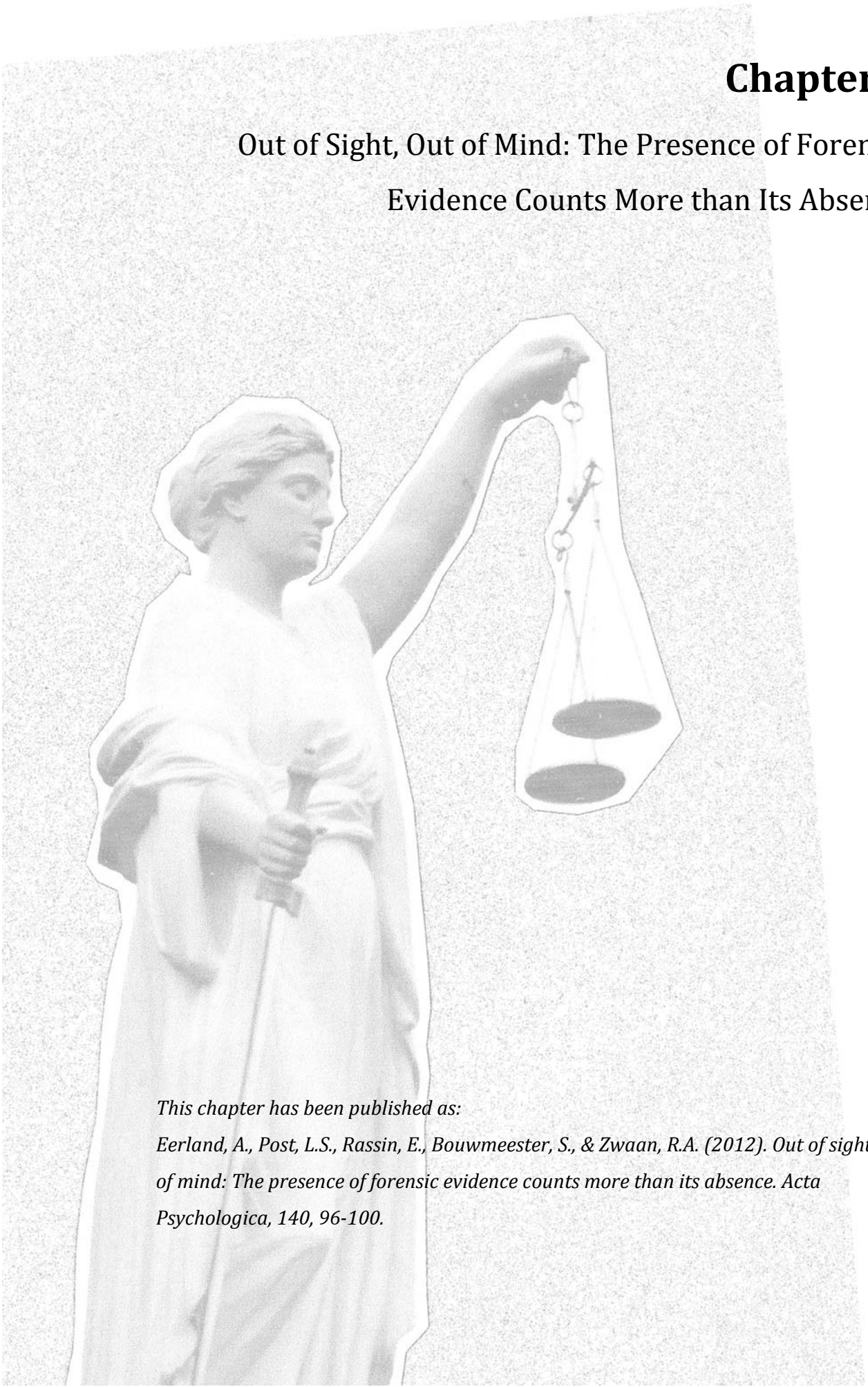
Chapter 4

Out of Sight, Out of Mind: The Presence of Forensic Evidence Counts More than Its Absence



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Abstract

Recent evidence suggests that decision makers in criminal procedures are susceptible to biases. We previously found support for the presence of a feature positive effect (FPE, i.e., people attach more meaning to present than to absent information) in legal decision making. In this study, we tried to uncover the mechanisms behind the FPE. Taking a cue from the literature on situation models in language comprehension, we investigated whether a FPE manifests itself in the memorization and use of forensic evidence. Students read a case file about a fistfight as well as additional evidence. The forensic evidence was manipulated such that a FPE on guilt estimation and conviction rate could be assessed. While subjects read additional forensic evidence, their eye movements were recorded to explore the presence of FPE in online processing. Afterwards, subjects were asked to decide on the suspect's guilt. They had to recall all information they remembered from the case file and indicate which parts of information they considered relevant to this decision. The results provided evidence for the occurrence of FPE in memorization and use of information and can be explained by the theoretical construct of situation models.

Introduction

It is well known that decision makers are influenced by various biases (Tversky & Kahneman, 1974). The feature positive effect (FPE; Jenkins & Sainsbury, 1969) is a relatively unknown bias that might influence the process of rational decision making. The occurrence of this effect suggests that people have more difficulty processing absent (i.e., negative) information than present (i.e., positive) information. FPE originates from research on conditioning where it was found that pigeons learn associations more quickly when the presence of one stimulus is predicted by the presence of another stimulus (e.g., the presence of a blue light indicates that food can be obtained by picking a particular peg) than when the presence of one stimulus is predicted by the absence of another (e.g., food can be obtained when the blue light is off).

Although FPE was first discovered in animal research on conditioning, it is neither exclusive to animals nor to research on conditioning. In one study on implicit rule learning, undergraduate students were presented with a series of cards. Each card displayed four symbols. Students were asked to indicate whether a particular card was 'good' or 'not good'. The students had to use the feedback they received upon their judgment to discover the rule that predicted the 'goodness' of a card. Students were fast at detecting the rule that the presence of a symbol indicated which card was 'good', but they were virtually unable to detect the rule that the absence of a particular symbol indicated which card was 'good' (Newman, Wolff, & Hearst, 1980).

Heuristics are useful for decision making (Tversky & Kahneman, 1974). However, heuristics that are not properly used might engender biases, like FPE, and can have a detrimental effect on the process of decision making. Relevant to the topic of this article, FPE might play a role in legal decision making (e.g., Jenkins & Schuller, 2007). According to FPE, the weight of absent evidence might be underestimated, potentially leading to serious consequences. For example, line-up identifications of suspects are considered far more informative than non-identifications (Wells & Lindsay, 1980). More generally, if the outcome of an investigation (e.g., DNA-analysis) is incriminating for the prime suspect (i.e., DNA of the suspect was found on the victim), this is considered more reliable than when the outcome of that same investigation is not incriminating (i.e., DNA of the suspect was not found on the victim; Ask, Rebelius, & Granhag, 2008).

Such a biased evaluation of evidence presented in a particular case might lead to wrongful convictions (O'Brien, 2009). In the Netherlands, a suspect was convicted by judges up to the High Court for the rape and murder of a ten year old girl. No DNA of the suspect was found at the crime scene, yet the judges ignored this non-evidence, or absent evidence, and convicted the suspect based on his confession (which was made during a lengthy interrogation and withdrawn soon hereafter; van Koppen, 2003). After a few years of imprisonment, the suspect was released because the real perpetrator, whose DNA had been found at the crime scene, confessed to the crime. This is an illustration of tunnel vision in the forensic context (see Findley & Scott, 2006) and exemplifies how the significance of non-evidence is underestimated. It led to the wrongful conviction of an innocent man. The gravity of wrongful convictions makes it important to investigate FPE in more detail in a forensic context.

In a previous study, we examined FPE in legal decision making (Eerland & Rassin, 2012a). Undergraduate students read a case file about a fistfight. Then they received information pertaining to additional investigations that had been conducted. These investigations described that evidence was found or not. Absence was manipulated between subjects. After reading the case file and the additional information subjects had to decide on the suspect's guilt. Present evidence had a greater impact on guilt ratings than did absent evidence. This result provides support for notions of FPE.

Given that present and absent information - that are equally diagnostic according to pilot subjects (Rassin, Eerland, & Kuijpers, 2010) - are not considered equally important during decision making, the question how this discrepancy in perceived importance can be explained remains unanswered. Part of the explanation might be provided by studies on language comprehension, specifically with regard to the understanding of negated information (i.e., information that is not present). Current theories hold that language comprehension does not merely involve constructing a mental representation of the text itself. Rather, it is tantamount to forming a mental representation of the situation that is described by the text, a mental model or situation model (e.g., Johnson-Laird, 1983; Morrow, Greenspan, & Bower, 1987; van Dijk & Kintsch, 1983; Zwaan & Radvansky, 1998). The notion of a situation model has implications for how we understand negation. Perhaps the

decisive factor is not the presence of a negation operator (e.g., the word "not") but rather whether or not something is present in the described situation.

Kaup and Zwaan (2003) investigated this question. They contrasted predictions from a text-based view with those from a situation-model view. According to the text-based view, all that matters is whether or not there is a negation operator. Information that is under the scope of the negation operator is less active in the comprehender's memory than the information that is not under the scope of the negation operator. The situation-model account, alternatively, predicts that information that refers to things in the described situation becomes more accessible than information that refers to things that are not present, regardless of whether a negation operator is used. After all, present things are in the referential situation and therefore part of the situation model whereas absent things are not. These views lead to different predictions for sentences such as *Mary wished she had baked bread but not cookies*. Here, the text-based view predicts that *bread* should be more accessible than *cookies*, given that the latter are under the scope of the negation operator. The situation-model view predicts the reverse pattern. In the described situation, Mary did bake cookies (so they are part of the situation model), whereas she did not bake bread (so it is not part of the situation model). Therefore the concept *cookies* should be more active in the comprehender's memory than the concept *bread*. Kaup and Zwaan found evidence for both views. Relatively early on (after 500 ms) the negated concept was less activated than the non-negated concept, supporting the text-based view. After a delay of 1500 ms, however, the negated (but present) concept was more accessible than the non-negated (but absent) concept, as predicted by the situation-model theory. These results suggest that what matters in the long-term memory representation is whether or not something is present in the described situation, with the effect of the negation operator being more transient in nature. These findings allow us to explain the findings of Eerland and Rassin (2012a). Absent information was not part of the situation model, whereas present information was. Therefore, present information was more accessible in the participants' memory representations and therefore had a greater impact on ratings of the suspect's guilt than did absent information.

The results of Kaup and Zwaan (2003) suggest that the situation model is a more enduring mental representation than a text representation, a finding that is consistent with other studies (e.g., Kintsch, Welsch, Schmalhofer, & Zimny, 1990).

However, Kaup and Zwaan only examined the accessibility of present and absent information immediately after reading a sentence. Although the shift from a text-based to a situational representation that they found is suggestive, we do not know yet if this difference in short-term accessibility translates to differences in long-term memory, which are especially important in the context of legal-decision making. We also do not know whether present and absent information are perceived as equally important in the decision-making process. Therefore, in the current study we investigated the storage and long-term retrieval of present and absent information (i.e., forensic evidence) and the use of it during decision making. We used free recall tests to do so.

Information might be selectively stored in and retrieved from memory because people sometimes develop a selective online processing strategy while they read (Kaakinen, Hyönä, & Keenan, 2002). As a result, relevant information is better recalled than less relevant information. Given that, according to the FPE, people consider present information to be more relevant than absent information it might be that present information is better recalled than absent information. To examine whether possible differences in retrieval and use of present and absent information are (partly) caused by differences during online reading, we recorded eye movements during reading. This allowed us to determine the amount of time people spent processing the information we presented to them.

Our main prediction is as follows. Based on the FPE, we expected that present information (or evidence) should be remembered better and be used more often than absent information when people are deciding on a suspect's guilt. Consider the following two sentences.

'Fingerprints of the suspect <u>were present</u> on the victim.'
'Fingerprints of the suspect <u>were absent</u> on the victim'.

The first sentence describes a situation in which fingerprints are present, whereas the second sentence describes a situation in which fingerprints are not present. The predictions are that (1) the second sentence will be read more slowly than the first (absent information is more difficult to process than present information), (2) the first sentence will be recalled more often than the second sentence, and (3)

information from the first sentence will be deemed more important than information from the second sentence.

Method

Participants

Sixty-three undergraduate psychology students (45 women) participated in this study. The age of the participants ranged from 18 to 30, with a mean age of 20.44 years (*SD* = 2.48). Participants were randomly assigned to one of two conditions. There were no age (t[57] = .26, p = .80) or gender (χ^2[1] = .07, p = .80) differences between these conditions. The students received course credit in return for their participation.

Measures and procedure

Participants first read a paper case file adopted from de Keijser and van Koppen (2007), that was the same as the case file used in a previous study (Eerland & Rassin, 2012a). The case was about a man being accused of physically abusing another man. It included the official police report, several eyewitness testimonies, reports of the interrogations of the suspect, and reports of a photo line-up[2]. After reading the case file, participants recalled all information they remembered, as to make sure that they had read the case file carefully.

During the next phase of the experiment participants read sentences from a computer screen. The sentences used in this study were constructed such that every sentence had the same structure, the same number of words, and approximately the same length. The sentences contained information about additional investigations regarding the case file. In total, 64 sentences were constructed, 32 describing investigations that were intended as incriminating (e.g., it was investigated whether fingerprints of the suspect could be found on the victim) and 32 with an exonerating nature (e.g., it was investigated whether the physical injury of the victim could be caused by something other than the alleged abuse). These sentences consisted of 16 pairs, each with a present (e.g., fingerprints of the suspect were present on the victim) and an absent variant (e.g., fingerprints of the suspect were absent on the

[2] In order to manipulate subjects' opinion about the suspect half of the participants received a file that contained incriminating evidence against the suspect, whereas the other participants received a more ambiguous case file. Because this manipulation failed we treated both groups as a single group.

victim). Half of the 'incriminating' sentences were present, as were half of the 'exonerating' ones[3].

Each participant read 32 sentences describing additional investigations that had been done, eight present 'incriminating' sentences, eight absent 'incriminating' sentences, eight present 'exonerating' sentences, and eight absent 'exonerating' sentences. Two sets of 32 sentences were created with sentence variant counterbalanced across sets such that each participant saw one of the two variants of a sentence. Participants were randomly assigned to one of two sets. We made sure that sentences within one set did not contradict one another[4].

Both variants were identical except for one critical part. An example[5] of two variants regarding investigations that were intended as incriminating, with the critical part being underlined is:

Present variant: 'Fingerprints of the suspect <u>were present</u> on the victim.'
Absent variant: 'Fingerprints of the suspect <u>were absent</u> on the victim.'

Because the critical part of each sentence was the only segment that differed between the two variants of the same sentence, we expected differences in attention for the information to emerge during the reading of the critical segments; in addition, there might be spillover effects on the subsequent, and final, segment. We divided every sentence in three 'areas of interest' with the critical part always being the second area of interest. All information before the critical part formed the first area of interest. The third area of interest consisted of the rest of the sentence (i.e., the information displayed after the critical part). During online reading the eye tracker

[3] The distinction between investigations that were intended as incriminating and those that were intended as exonerating was made to be able to use these sentences in another study.

[4] Before using the sets of sentences that were created, a pilot study was conducted. While creating the sentences we had noticed that not all sentences were equally convincing. The goal of this pilot study was to investigate whether the incriminating and exonerating evidence presented was perceived as equally strong in both sets. Thirty-two undergraduate psychology students who did not participate in the main experiment rated the strength of each sentence on a scale from 1 to 10. Results showed that the two sets did not differ in strength of both incriminating (t[14] = .11, p = .92) and exonerating (t[14] = .10. p = .92) sentences.

[5] All sentences that we used in this study were in Dutch.

recorded the time participants spent looking at all three areas of interest. The positions of the eyes were registered and stored every 20 milliseconds (ms). A Tobii 2150 eye-tracker device was used to track the position and movement of the eyes.

In the final phase of the experiment, subjects rated the suspect's likelihood of guilt on a scale from 10 to 100% (with increments of 10) and whether they would convict the suspect or not (*yes/no*). They also recalled all information they remembered from the sentences. Finally, we asked participants to recall all information they had used to decide on the suspect's guilt. We were interested both in what information participants remembered and used in order to differentiate between information being stored in memory and information they considered important to decide on the suspect's guilt.

Results

Four participants were excluded from the sample due to lack of comprehension during the sentence reading task (one participant) or because the number of sentences they recalled was below two standard deviations from the mean (three participants). We will first discuss the results regarding the recall and use of information. Then we will discuss the results with respect to the eye tracking data.

Recall

After having read the sentences containing additional information about the case file, participants recalled these sentences. Sentences were considered correctly recalled when the goal and presence of an investigation both were mentioned by the participants. Because scoring these data was straightforward, two independent raters produced complete agreement. The proportion of recalled additional information as percentage of the total amount of presented information by type and presence of investigation is displayed by Table 1.

We performed a 2*2 repeated measures ANOVA on the recalled sentences to investigate possible main and interaction effects of the type of investigation that was performed (incriminating vs. exonerating) and presence of that investigation (present vs. absent). As predicted by the FPE, there was a significant main effect of presence, with investigations describing present evidence being recalled more often than those that described absent evidence ($F[1,58] = 31.68$, $p < .001$, $\eta^2 = .35$). The type of investigation by presence interaction also was significant ($F[1,58] = 22.72$, p

< .001, η^2 = .28). The fact that of all recalled investigations that were intended as exonerating a significantly larger part was present (t[58] = 7.59, p < .001, r = .71) provides evidence for FPE. However, there was no significant difference in the number of recalled present and absent investigations that were intended as incriminating (t[58] = .23, p = .82).

Table 1

Comparison of the proportion of recalled and used additional information (*SD*) as percentage of the total amount of presented information by type of investigation and absence.

	Recalled information (N = 59)		Used information (N = 58)	
Incriminating				
Present	29.4 (16.4)		21.3 (14.6)	*
Absent	28.8 (15.6)		12.9 (16.6)	
Exonerating				
Present	39.2 (17.1)	*	19.6 (20.3)	*
Absent	19.7 (16.6)		8.2 (11.8)	

Note. * p < .01

Use of Information

Participants were not only asked to write down all information they remembered from the additional information, we also wanted to know what information they used to decide on the suspect's guilt. Descriptive statistics regarding the proportion of used additional sentences by type and presence of investigation are displayed in Table 1. One participant reported having used no additional information to decide on the suspect's guilt. Therefore this participant was excluded from analyses regarding the used additional information.

We performed a 2*2 repeated measures ANOVA regarding the used additional information to investigate possible main and interaction effects of the type of investigation that was performed (incriminating vs. exonerating) and presence (present vs. absent). In accordance with the FPE, present information was used more often to decide on the suspect's guilt than absent information (F[1,57] = 44.23, p < .001, η^2 = .44).

Used vs. recalled information

In exploratory analyses we examined the ratio between used and recalled information. Directly after participants indicated what information they remembered from the additional sentences, they indicated what information they had used. It is theoretically possible that information that is remembered is not used in the decision making process. It is furthermore possible that this putative tendency to ignore information is stronger for absent than for present evidence. To examine these questions, we investigated whether the ratio of the number of used vs. recalled sentences (which is an index of ignoring information) differed among the different kinds of information used in this study. Overall, absent information was more often ignored in the process of decision making than present information ($t[56] = 4.76$, $p < .001$, $r = .54$), which provides further evidence for the FPE. Not only is absent evidence remembered less well than present evidence, but even if it is remembered, it is ignored more during decision making than present information.

Eye tracking data

We recorded eye movements to examine whether participants developed a selective online processing strategy that might (partly) explain the differences we found in memorization and use of different kinds of information. We used total viewing durations as processing measure because these are commonly used in eye tracking research (Rayner, Sereno, Morris, Schmauder, & Clifton, 1989). The total viewing duration is the total amount of time a subject looks at a certain area of interest; this includes regressions back to an earlier area. It is a late measure of processing. Because of extreme short or long reading times the eye tracking data of seven participants were dropped. Table 2 shows the descriptive statistics for reading times for the total viewing duration by type of investigation, presence, and area of interest.

We examined whether there was a difference in processing of present and absent information. The dependent variable was the total viewing time of a participant to an area of interest on a sentence. The independent variables were presence (present vs. absent), the type of investigation (incriminating vs. exonerating), and the area of interest (1-3). In order to correct for participant and sentence dependencies we used a mixed model analysis in which we included a random intercept for both participants and sentences and a random slope for the main effects of the independent variables *presence* and *type of investigation*. The

random intercepts remove error variance from the model that is due to variation in viewing times of the participants. The random slopes remove error variance that is due to individual variance within a level of the independent variable. The program Latent Gold 4.0 (Vermunt & Magidson, 2007) was used to estimate the parameters. Both the random intercept for participants and the random intercept for sentences were significant ($p < .001$). This indicates that participants differed in their viewing times and that individual items differed in their viewing times. The random slopes for the individual * presence interaction and individual * type of investigation were not significant (both p's > .2). This indicates that the individual viewing times did not differ for different values of the independent variables presence and type of investigation. For the total viewing duration there was a main effect for presence (Wald [1] = 4.03, $p = .045$, Cohen's $f^2 = .24$)[6]. Corrected for all other effects in the model, participants spend 24.29 ms less reading the sentences that described present as compared to absent information. As we expected, this result indicates that for participants it was easier to process the presence of evidence than the absence of evidence. This effect was most pronounced in the second area of interest (presence advantage of 60 ms) as we predicted. The effect in the third area of interest (51 ms) is likely to be caused by a spillover effect. Given that we used total viewing durations as processing measure, the effect in the first area of interest (33 ms) might be due to regressions.

Table 2

Comparison of the raw mean reading times (*SD*) in milliseconds for the total viewing duration by type of investigation, absence, and area of interest ($N = 52$).

	Area of interest		
	1	2	3
Incriminating			
Present	1338 (214)	1070 (157)	987 (321)
Absent	1320 (203)	1157 (229)	1000 (247)
Exonerating			
Present	1001 (398)	1301 (190)	875 (292)
Absent	1084 (443)	1334 (222)	964 (323)

[6] $f^2 = \sqrt{(df_{effect} / N)(F_{effect} - 1)}$ (Cohen, 1988). By convention, f^2 effect sizes of 0.02, 0.15, and 0.35 are termed *small*, *medium*, and *large*, respectively. For F_{effect} we used the value of Wald.

Furthermore, we found a main effect for area of interest (Wald [2] = 121.66, $p < .001$, Cohen's $f^2 = 2.15$) and type of investigation (Wald [1] = 5.81, $p = .016$, $f^2 = .30$). Also, the interaction between type of investigation and area of interest was significant (Wald [2] = 121.66, $p < .001$, $f^2 = 2.15$). Given that the length of the areas of interest differed within sentences and that the exonerating and incriminating investigations could not be compared to each other these results are not informative. Table 3 shows the descriptive statistics for the estimated reading times for the total viewing duration by type of investigation, presence, and area of interest.

Table 3

Comparison of the estimated mean reading times in milliseconds for the total viewing duration by type of investigation, presence, and area of interest ($N = 52$).

	Area of interest		
	1	2	3
Incriminating			
Present	1328	1109	974
Absent	1309	1149	989
Exonerating			
Present	990	1287	858
Absent	1070	1320	953

Discussion

The results regarding the recalled and used additional information provide strong evidence for the FPE in legal decision making and underscore the relevance of situation-model theory to account for these findings. We predicted that present information should be remembered and used more often to decide on the suspect's guilt than absent information. This is exactly what we found. The exploratory analysis of the ratio between the number of used and recalled sentences provided further support for the FPE by showing that absent information, even if it was remembered, was more often ignored than present information.

Our results show that the discrepancy in importance between absent and present information (1) exists during recall, and (2) influences the decision-making process. Present information is not only better remembered and used more often in decision making, absent information is also more often ignored than is present

information. Given that participants read sentences, which they had to recall after a delay of more than 1500 ms, our results are consistent with the findings of Kaup and Zwaan (2003); present information is part of the situation model, whereas absent information is not.

As we mentioned earlier, people might develop a selective online processing strategy while they read sentences (Kaakinen et al., 2002). To examine whether different kinds of information were processed in different ways we recorded eye movements during online reading. Overall, people spent less time reading about present information than about information that is absent. Given that longer reading times indicate a difficulty in interpretation of information (see Rayner, 1998), it is suggested that present information is easier to understand and to integrate in existing knowledge structures than is absent information. This result provides evidence for the FPE and could provide an explanation for the discrepancy in importance between present and absent information that was found in a former study (Eerland & Rassin, 2012a). One could easily argue that there might be multiple causes for not finding evidence in a criminal case as compared to finding evidence. This might even be seen as a reason for the FPE to occur. However, Bayesian statistical analysis suggests that absent evidence (e.g., a non-identification) is similarly diagnostic as present evidence (e.g., an identification; Wells & Lindsay, 1980).

Our results might have important implications for legal decision making. We found that the FPE already occurs during encoding of information. The fact that present and absent information are treated differently during online reading suggests that people developed an online processing strategy. We do not know, however, whether people are aware of the fact that they use this strategy. It might therefore be a good idea to make people aware of the FPE and the diagnostic value of absent information to see whether this would decrease the FPE.

The fact that we could not compare the processing of presence and absence of the exact same evidence within participants can be considered a limitation of the current study. However, this failure is an inevitable consequence of the research design. Another limitation is that we do not know the contribution of each piece of evidence to the guilt rate and whether this contribution correlates with the chance that a specific piece of evidence is remembered and/or used. This might be an interesting topic for future research.

In conclusion, our findings provide evidence for the occurrence of FPE and the use of situation models in memorization and use of forensic evidence. The eye tracking data showed us that people process present and absent information differently, which makes this study the first attempt to try to uncover the mechanisms behind FPE. More research (e.g., on the encoding of different kinds of information) is needed to advance our understanding of the origin of the FPE, its consequences and possible solutions. The present research suggests that situation-model theory might be a good framework for tackling this question.

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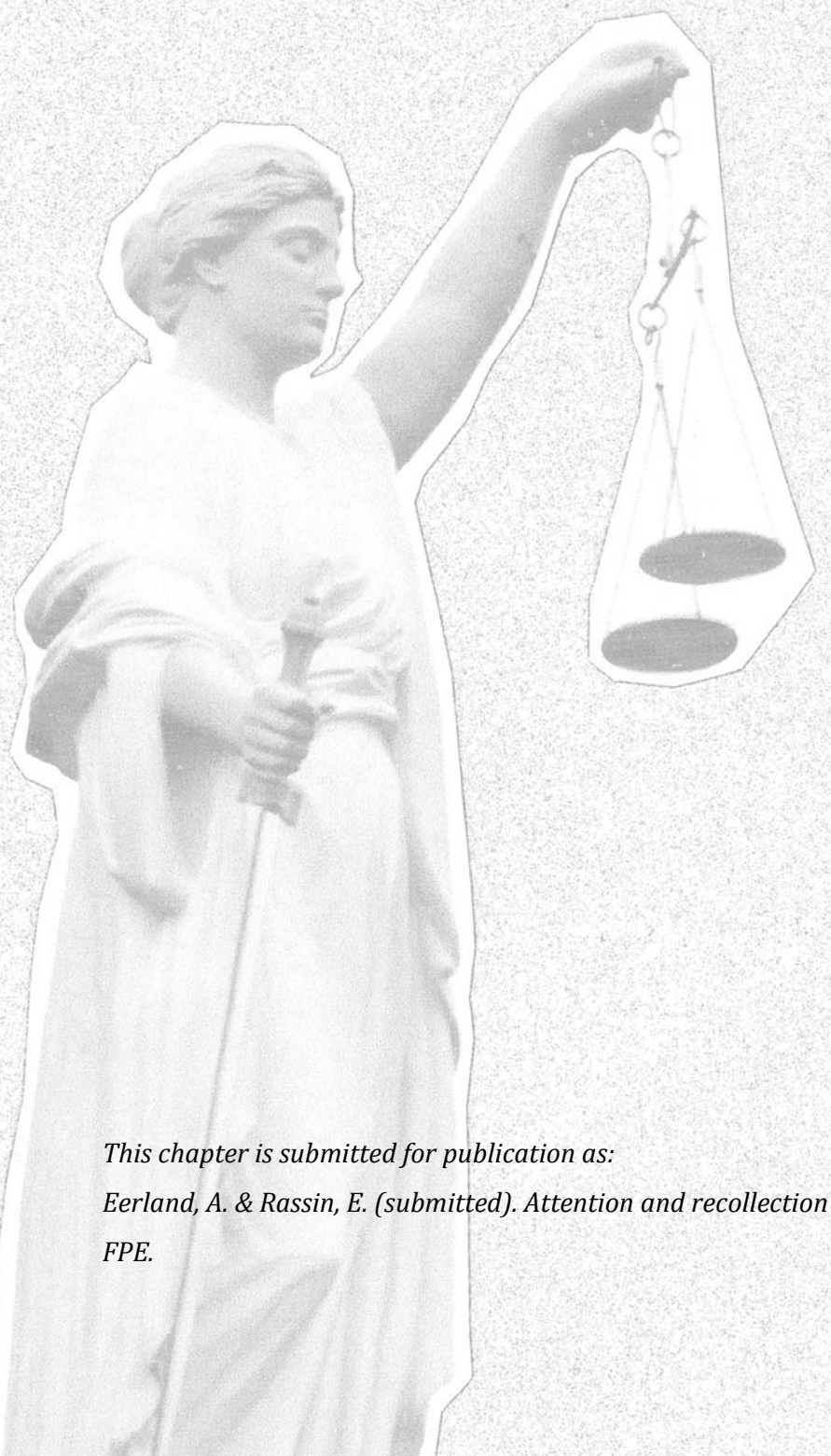
Chapter 5

Attention and Recollection as Possible Causes of the FPE



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Abstract

The feature positive effect (FPE) refers to attaching more meaning to present than to absent information. In a previous study, we found that this effect manifests itself during recall of information. We examined whether differences in recall between present and absent information are due to differences in depth of processing (Experiment 1) and whether processing absent information requires more working memory capacity than processing present information (Experiment 2). Our results show that neither depth of processing nor cognitive load evokes the FPE. Implications of these findings are discussed.

Introduction

The feature positive effect (FPE; Jenkins & Sainsbury, 1969; Newman, Wolff, & Hearst, 1980) refers to attaching more meaning to positive or present information than to negative or absent information. For example, in legal decision making, finding DNA of the suspect is considered more diagnostic than is not finding DNA. Admittedly, the diagnostic value of securing one's DNA probably is greater than not finding DNA. However, the underweighing of negative evidence has also been documented in cases where positive and negative evidence are equally diagnostic (see Rassin, in press). Misunderstanding negative evidence may have serious consequences, such as wrongful convictions (e.g., Huff, Rattner, Sagarin, & MacNamara, 1986; O'Brien, 2009). Therefore, it is important to examine when and why the FPE occurs. In a first attempt to uncover the mechanisms behind the FPE, it was investigated whether people encode, recall, and use present and absent information differently (Eerland, Post, Rassin, Bouwmeester, & Zwaan, 2012). Participants read a case file about a young man being accused of the physical abuse of another man. Then participants were presented with sentences describing additional investigations that had been done regarding the physical abuse. These sentences were either about information that was present (e.g., fingerprints of the suspect were present on clothes of the victim) or absent (e.g., fingerprints of the suspect were absent on clothes of the victim). Eye movements during presentation and free recall later on were measured. Results showed that people spent less time reading about present information than about information that is absent and also that present information was recalled more often than absent information.

One likely explanation of the FPE is that negative information is less well remembered than positive information because it is recorded less well in the first place (Atkinson & Shiffrin, 1971). In addition, from studies on the processing of information we also know that people have more difficulty processing negated than affirmative information (Clark & Chase, 1972). This might be explained by the situation model theory. That is, according to the situation model theory, people form mental representations of a described situation in order to comprehend language (e.g., Johnson-Laird, 1983; Morrow, Greenspan, & Bower, 1987; van Dijk & Kintsch, 1983; Zwaan & Radvansky, 1998) and when we try to understand negated information we cannot prevent initially imagining the situation that is negated (Kaup, Zwaan, & Lüdtke, 2007). For example, in order to understand a sentence like

The door is not open people first represent a situation in which the door is open (Fauconnier, 1985) and then make a representation of the actual state of affairs. Both representations (e.g., *The door is open*, but also *The door is not open*) are active during the processing of negated information, which delivers more cognitive load than keeping only one mental representation activated, as is the case with processing positive information.

The goal of the present research is to investigate depth of processing and working memory capacity as explanations for the FPE. If the processing of absent information is more superficial than the processing of present information, this could account for the occurrence of a FPE during recall. Information that is less well processed will be less likely to be recalled afterwards. Regarding our second experiment, we hypothesized that processing absent information requires more working memory capacity than processing present information. This is because the processing of absent information requires two mental representations to be active, whereas only one mental representation is activated when present information is processed.

Experiment 1

In this experiment, we investigated whether differences in depth of processing between present and absent information can account for the FPE during recall. We hypothesized that the FPE is fuelled by shallow processing of absent compared to present information.

Method

Participants

Fifty-six undergraduate students (43 women) participated in this experiment. Their age ranged from 18 to 37 with a mean of 20.8 years (SD = 3.7). Participants were randomly assigned to one of two conditions. There were no age ($t[54] < 1.0$) or gender ($\chi^2[1] < 1.0$) differences between the groups. The students received course credits in return for their participation.

Measures and procedure

First, participants read a short story about a man being accused of the physical abuse of another man. This story was based on a case file by de Keijser and van Koppen

(2007). After reading this story, participants read 32 sentences from a computer screen describing investigations that had been done regarding this physical abuse. Half of these sentences described information that was present (e.g., fingerprints of the suspect were found on clothes of the victim, the suspect stated that the perpetrator was present in the photo-confrontation), whereas the other sentences described information that was absent (e.g., fingerprints of the suspect were not found on clothes of the victim, the suspect stated that the perpetrator was absent in the photo-confrontation). We made sure that participants read sentences that did not contradict one another. Participants pressed the space bar to make the next sentence appear on the screen. In the control condition, all 32 sentences were presented once to the participants. In the experimental condition, all 32 sentences appeared three times. Furthermore, in the latter condition participants were instructed to read all sentences out loud. This was done to make sure that all sentences were read and thus processed properly. After participants read all sentences, they underwent an immediate free recall test.

Results and discussion

We performed a 2*2 repeated measures ANOVA regarding the percentages of correctly recalled sentences to investigate possible main and interaction effects of the type of information (present vs. absent) and group (experimental vs. control). As predicted by the FPE, present information was more often recalled than absent information (F[1,54] = 6.12, p < .05; see Table 1). Also, participants in the experimental group recalled more information than participants in the control group (F[1,54] = 4.38, p < .05). Therefore we conclude that the manipulation of depth of encoding was effective. However, there was no type of information by group interaction (F[1,54] < 1.0). This means that, although participants in the experimental group recalled more information, absent information was recalled less often than present information even though we made sure that all information was properly encoded. Thus, depth of processing can be ruled out as a cause of FPE. Perhaps then, absent information might be recalled less often than present information because absent information is more difficult to remember. It is suggested that processing absent information requires more working memory capacity than present information. To investigate this idea, we conducted a second experiment.

Table 1

Proportion of correctly recalled sentences (*SD*) as percentage of the total number of presented sentences (Experiment 1).

	Control group (*n* = 28)	Experimental group (*n* = 28)
Present	38.4 (15.1)	45.1 (21.2)
Absent	31.0 (14.7)	40.9 (17.0)

Experiment 2

In this second experiment, we examined whether the FPE during recall occurs as a result of limited working memory capacity (Baddeley, 1992). We hypothesized that absent information is more difficult to process and therefore represents higher cognitive load as compared to present information. As a result, present information is recalled more easily than absent information. To investigate this hypothesis, participants performed a competitive task while processing present or absent information. It was expected that the processing of absent information suffers more than the processing of present information from this concurrent task.

Method

Participants

Forty-one undergraduate students (30 women) participated in this experiment. Their age ranged from 18 to 29 with a mean of 20.5 years (*SD* = 2.2). The students received course credits in return for their participation.

Measures and procedure

We used the same story and the same sentences as in Experiment 1. Participants first read the story and then performed a subsequent computer task. In this task 32 of the sentences describing investigations that had been done were presented one by one to the participant. Prior to the appearance of a sentence on the computer screen, participants saw a four digit sequence that was visible for 1 s. Then a sentence appeared on the screen. This could be one of the 32 sentences that were used in the first experiment or one of the 32 fillers that were created for this experiment. These filler items also contained words that one expects in a forensic context. An example of a filler item is *The fingerprints were being interrogated by the police*. Participants indicated whether the sentence was sensible (by pressing the *p* key) or non sensical

(by pressing the *q* key; response options were counterbalanced across participants). This sensibility judgment task was included to make sure that participants read all sentences carefully. Reaction times were measured. Then participants reproduced the four digit sequence in reversed order. They did so by typing these digits. The sequences participants reproduced were recorded as was the time they needed to do so. After participants completed the computer task, they recalled all information they remembered.

Results and discussion

Evidently, we only included trials on which both the sensibility judgment as well as the digit span task were correctly performed. Filler trials were not included for analysis.

There was no difference between judging sentences describing present information and judging sentences describing absent information with regard to the number of correct sequences participants produced (t[40] = .27, p = .79), or the time that was needed to produce these sequences (t[40] = .20, p = .85). These results seem to indicate that present and absent information are processed with the same ease. However, the processing of absent information requires more time than the processing of present information (t[40] = 2.49, p < .05; see Table 2).

Table 2

Mean number of correctly produced sequences, reaction times and processing times (*SD*) (Experiment 2, *N* = 41).

	Correct sequences	Reaction times	Processing times
Present	8.9 (3.4)	3.9 (1.5)	6.6 (3.2)
Absent	9.0 (3.8)	3.9 (1.6)	7.1 (3.2)

Note. Reaction and processing times are given in seconds.

Analyses of the free recall data[7] suggested that present information (M = 26.2, SD = 14.3) was more often recalled than absent information (M = 20.3, SD = 9.7; t[40] = 2.28, p < .05). Hence, as in Experiment 1 participants' performance displayed a FPE. However, the size of this effect (as calculated by the number of recalled present sentences/number of recalled absent sentences) did not correlate with performance

[7] Proportion of correctly recalled sentences as percentage of the total number of presented sentences.

on the digit span task (r = -.05, p = .74), indicating that the FPE was not related to, let alone caused by, concurrent cognitive load.

General discussion

In two experiments, we investigated why absent information is recalled less often than present information. We hypothesized that absent information might be processed more superficially than present information, which might cause a FPE. Therefore, no or a diminished FPE was expected when people processed both absent and present information thoroughly. However, this was not what we found in Experiment 1. Experiment 2 yielded data indicating that the FPE is also not caused by differential cognitive load imposed by the processing of positive vs. negative information. We therefore conclude that both depth of processing as well as cognitive load do not contribute to the development of a FPE. How can the FPE in both experiments then be explained?

Our results suggest that differences in the treatment of present and absent information originate later in information processing, because we found no influence of encoding of information and working memory capacity. According to the situation model theory, people form mental representations of a situation in order to understand language (e.g., Johnson-Laird, 1983; Morrow et al., 1987; van Dijk & Kintsch, 1983; Zwaan & Radvansky, 1998). However, we do not know whether this representation is the same for present and absent information. It might be that information that is absent is represented in a less vivid way than information that is present. Perhaps a mental representation of absent information also fades from memory more easily than one of present information. Addressing these issues is important for a deeper understanding of the origins of the FPE.

In sum, even though present and absent information are processed with the same ease and to the same extent, present information is still more likely to be recalled than is absent information. This means that the FPE must originate from some other cognitive process.

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Chapter 6

Online Processing of Present and Absent Forensic Evidence

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Abstract

Research suggests that cognitive biases influence legal decision making. The feature positive effect (FPE) is in essence a harmless effect indicating that people have more difficulty valuing absent as compared to present information. However, the FPE might result in a bias when the diagnostic value of absent evidence is underestimated. Previous studies on this topic found evidence for a FPE in legal decision making. Nevertheless, because of the design of these studies it was impossible to compare the impact of a single piece of present information to that of absent information. The present study taps into this problem. Participants read a story about a barkeeper who was physically abused. In this story, police investigations were reported. Sometimes evidence was found, while in other instances this was not the case. After each sentence that described the presence or absence of evidence, participants indicated the perceived likelihood of guilt of the suspect. Because we created two versions of the story, in which presence was manipulated for every piece of evidence, we were able to calculate the exact impact of every piece of evidence and to compare presence to absence. As the FPE predicts, present information had more impact on the perceived likelihood of guilt of the suspect than absent information. Practical implications of this finding are discussed.

Introduction

In contrast to what one might like to think, rational decision making is influenced by various heuristics and biases (Kahneman, 2011; Tversky & Kahneman, 1986). The use of heuristics can be helpful in decision making. For example, the availability heuristic (i.e., the ease with which certain information can be brought to mind) might be useful in assessing frequency or probability (Tversky & Kahneman, 1973). However, other heuristics and biases, like the confirmation bias, have a more negative impact on the decision making process (Nickerson, 1998). This is especially true when the decisions that are made have serious consequences, as in legal decision making (Carlson & Russo, 2001; Meissner & Kassin, 2002; Sweeney & Gruber, 1984). According to the confirmation bias, people tend to search and ask for information that is consistent with their own hypothesis, existing beliefs, and expectations (e.g., Skov & Sherman, 1986). One could easily see how this bias can be very unfortunate in this area.

Although people seem to prefer information that confirms their own idea rather than information that questions their idea, there also is some evidence that people value present information more than absent information. For example, in legal decision making line-up identifications of suspects are considered to be highly informative, whereas non-identifications are not (Wells & Lindsay, 1980). This underweighting of absent information has been named the feature positive effect (FPE; Jenkins & Sainsbury, 1969).

The FPE is not a well-studied topic in general. However, recently some studies investigated the FPE in the field of forensic psychology. In one such study, it was examined whether the FPE occurs in legal decision making (Eerland & Rassin, 2012a). Participants read a case file about the physical abuse of a man and decided on the suspect's guilt. Then they received information about three additional investigations that had been conducted. For example, the police searched for fingerprints of the suspect on clothes of the victim and his girlfriend. Some participants read that all evidence that was searched for was indeed found (i.e., present information), while others were presented with only absent information. Finally, participants decided on the suspect's guilt again. This design allowed for calculating the impact of (three pieces of) present and absent information. Although the results supported the notion of a FPE, this effect was only investigated between subjects. In other words, participants received only present or absent information. In

a second study, the FPE was studied within subjects (Eerland, Post, Rassin, Bouwmeester, & Zwaan, 2012). In other words, all participants received information about present as well as absent evidence. This information was presented to them in separate sentences and after they read a case file (to create a context). In total, participants read 32 sentences, 16 describing information that was present (e.g., fingerprints of the suspect were present on the victim) and 16 describing information that was absent (e.g., fingerprints of the suspect were absent on the victim). As in the study by Eerland and Rassin (2012a), participants rated the suspect's guilt after they received all additional information. An advantage of this design is that we could investigate the impact of present and absent information within subjects. However, this means that different kinds of evidence had to be compared to each other (e.g., the presence of a hair of the suspect on the victim had to be compared to the absence of fingerprints). Given this difficulty in assessing the impact of information that study focused on the processing of present and absent information. First, it was investigated whether present and absent information were treated differently during encoding. Second, memory for present and absent information was examined, and finally, the use of this material was explored during decision making.

A limitation of both studies mentioned above is that the impact of the additional information was only measured after the presentation of all evidence. Although in the second study participants were asked to recall all information they remembered and recall all information they used to decide on the suspect's guilt, this does not tell us anything about the individual impact of each piece of information. The present study taps into this problem. Another advantage of the current study is that the materials that were used are more natural. The sentences used in the study by Eerland et al. (in press) were created for the use of eye tracking. Therefore, these sentences might feel a bit unnatural. To address this issue, the information about present and absent evidence was included in a fluent story. Participants indicated the suspect's guilt after each piece of information. This allowed us to calculate the impact of every single piece of evidence. As predicted by the FPE, we expected present information to have more impact on the suspect's guilt than exactly the same information in an absent variant.

Method

Participants

Fifty-five undergraduate students (37 women) participated in this experiment. The age of the participants ranged from 17 to 29 years, with a mean age of 22.38 (*SD* = 3.00). Participants were randomly assigned to one of two conditions. There were no age (t[54] = .31, p = .76) or gender (χ^2[1] = .33, p = .57) differences between these conditions. The students received course credit in return for their participation.

Materials

For this study, we created a story based on a newspaper article. This story was about some friends who hanged out at a bar. At some point, one of these friends, Maarten, had an argument with the barkeeper. A second friend, Steven, tried to intervene in this argument but other friends were needed to make sure the situation did not escalate. Upon closing time, all friends went home. However, when the barkeeper wanted to leave for home an unfamiliar person attacked him. The following day, this story appeared in the local newspaper. Two friends (also friends of Maarten and Steven) decided to go to the police because they suspected Steven of having been involved in the physical abuse of the barkeeper. The police are investigating the case. Some expected evidence is found, whereas other is not.

We created two versions of this story. Both versions consisted of an introduction and 32 critical sentences describing evidence that was present or absent. The introduction was the same for both versions of the story. However, the versions differed regarding the critical sentences. Whenever a certain piece of evidence was present in one version, it was absent in the other version. This allowed us to compare the impact of a present piece of evidence (e.g., the suspect was on the security camera footage of the bar) to the impact of the exact same absent piece of evidence (e.g., the suspect was not on the security camera footage of the bar).

Measures and procedure

Participants read the story described above on a computer screen, sentence by sentence (54 sentences). After participants read a sentence, they pressed a key to make the next sentence appear. Reaction times were measured. After critical sentences (i.e., the sentences that described whether a piece of evidence was present or absent), participants were asked to indicate how guilty they thought the suspect

was. They were allowed to use any number between 0-100 in order to do so (higher scores reflect greater estimated likelihood). After indicating the suspect's guilt, participants pressed the *enter* key and the next sentence appeared.

Participants rated the suspect's likelihood of guilt after each of the 32 critical sentences. Half of these sentences described present information and the other half described absent information. Given that the sentences formed a story they could not be presented in random order. However, we made sure that a sentence describing present evidence was always followed by a sentence describing absent evidence and vice versa.

Finally, we asked participants to write down all information they remembered regarding this story (i.e., free recall) to make sure they had properly read the story.

Results

Two participants were excluded from analyses due to extreme long reaction times (> 2 *SD*). To calculate the impact of every single piece of evidence, we subtracted the perceived guilt rate given after participants read a certain sentence from the perceived guilt rate they gave after the previous sentence[8]. Two items were excluded because of extreme high impact (> 2 *SD*) on the perceived guilt of the suspect in either the present or absent variant. For the remaining data, we first checked whether the strength of present and absent information presented in the two versions of the story was the same. Results showed that the stories did not differ from each other regarding the impact of present ($t[51] = 1.93$, $p > .05$) and absent ($t[51] = .36$, $p > .05$) information. Subsequently, we performed an item analysis to see whether present information had more impact on the perception of the suspect's guilt than did absent information. We compared the impact of a present version of a particular sentence to the impact of an absent version of that same sentence and we did so for all critical sentences in the stories. As predicted by the FPE, present information ($M = 3.54$; $SD = 2.88$) had more impact on the perceived likelihood of the suspect's guilt than its absent equivalent ($M = 2.40$; $SD = 2.26$; $t[29] = 2.15$, $p < .05$, $r = .37$; see Figure 1).

[8] Absolute differences were calculated.

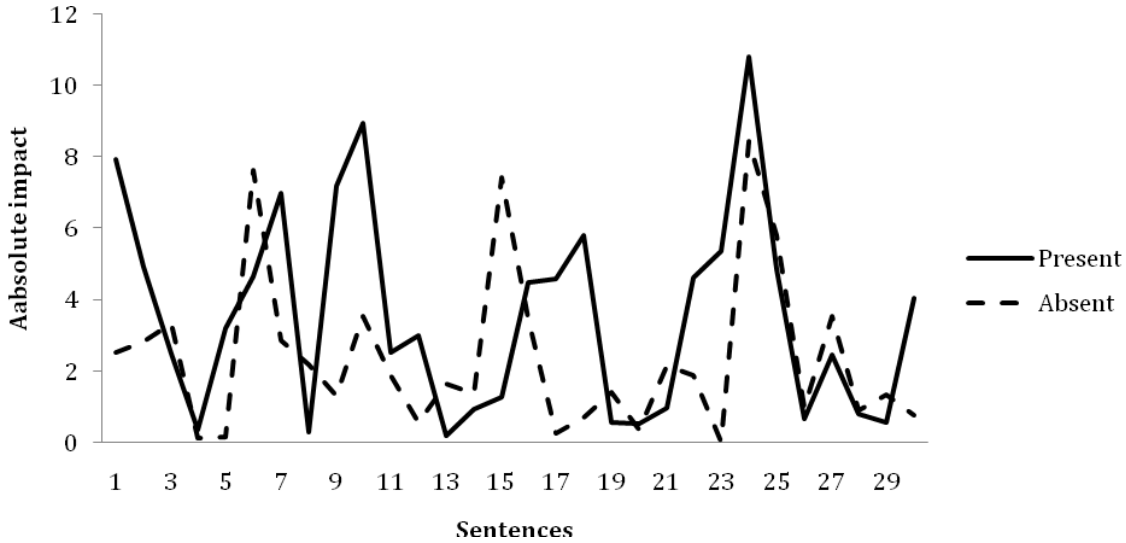

Figure 1

Mean absolute impact (%) of present and absent sentences on the suspect's likelihood of guilt.

Discussion

The aim of the present study was to investigate the impact of present and absent evidence on legal decision making. Our hypothesis that present information has more impact on the suspect's guilt than the same information in an absent variant was supported.

One limitation of this study is that one can argue that sometimes finding evidence is in fact more diagnostic, and thus more important, than not finding evidence. In that case, it would be illusory to perceive present and absent evidence as equally important. However, we also know of situations in which the presence of evidence is as diagnostic as the absence of evidence. For example, a non-identification is under some circumstances similarly diagnostic of the suspect's innocence as is an identification of his guilt (Wells & Lindsay, 1980). Yet, identifications are sometimes treated as more diagnostic than non-identifications (Brandon & Davies, 1973). Research has also shown that negative results, as finding no forensic evidence that a rape victim was drugged, are quite easily compensated for (Jenkins & Schuller, 2007).

Ideally, future research will shed light on the true diagnostic value of finding and not finding specific pieces of evidence. Once we appreciate these diagnostic values, conclusions can be drawn about when the FPE truly occurs and when the underweighting of absent evidence as compared to present evidence is justified.

Such research is a challenging task, but ultimately, it will contribute to the further sophistication of legal decision making.

Author note

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Chapter 7

Forewarned and Forearmed: Reducing the Feature Positive Effect in Legal Decision Making

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Abstract

Scientific research suggests that legal decision making is affected by cognitive biases, which may lead to severe miscarriages of justice. The feature positive effect (FPE) might result in such a bias when the diagnosticity of the absence of evidence is underestimated. In this study, we investigated whether the FPE can be reduced by making people aware of its existence. In two experiments, participants read a criminal case file. Afterwards, they had to decide on the primary suspect's guilt. In one condition, participants read an FPE relevant warning prior to the decision. In another condition, participants received a non-relevant warning. Results show that a simple warning (Experiment 1) made people more aware of absent evidence but had no effect on the appreciation of non-findings. However, a more elaborated warning (Experiment 2) did decrease guilt estimates. These studies showed that the FPE can be reduced, which is promising for jury decision making.

Introduction

In everyday life, people seem to have difficulty with proving that something is not as hypothesized. For example, we cannot exclude that the aliens are among us, that there are spirits protecting us, or that the government is engaged in various conspiracies. This impossibility to falsify is inherent to existentialistic statements (cf. Popper, 1959). It can easily be argued that a suspect of a crime is faced with a similar problem. That is, it is virtually impossible to prove that he did not commit the pertinent crime. At best, one can offer a solid alibi, which means that one was in a different place and therefore logically cannot have been at the crime scene at the same time. Also, the suspect might bring the attention to another suspect although the possibility to incriminate third parties is limited in many legal systems (see Findley & Scott, 2006).

Not only is it logically impossible to prove that one did not commit a crime, there is also reason to believe that fact finders attach too little exonerating weight to failures to find incriminating evidence. That is, if an eyewitness recognises the suspect in a line-up procedure, this identification is likely to be used as evidence against that suspect. By contrast, should the witness fail to recognise the suspect, this non-finding is generally not considered to indicate that the suspect is innocent. Thus, identifications are treated as more diagnostic than non-identifications (Brandon & Davies, 1973). However, research indicates that non-identifications and identifications of foils do in fact reduce the likelihood that the suspect is guilty (see Clark, Howell, & Davey, 2008). Back in 1980, Wells and Lindsay concluded that "there is no justifiable logic for approaching a line-up procedure with a set for considering an identification of the suspect to be informative while considering a non-identification to be uninformative" (p. 777). In essence, a non-identification is similarly diagnostic of the suspect's innocence as is an identification of his guilt.

As another illustration, finding the suspect's DNA seems to be considered more incriminating, than not finding his DNA is considered to indicate that he was not at the crime scene (see Ask, Rebelius, & Granhag, 2008). Here too, we tend to think that absence of evidence is not evidence of absence (see Jervis, 2006). Using this line of reasoning, judges up to the High Court have convicted a suspect (Kees Borsboom) for the rape and murder of a ten year old girl, in the Netherlands. Notably, there was no forensic evidence, and the defense emphasized that, in spite of a thorough crime scene investigation, no DNA (skin particles, hair, sweat, sperm, nor

any other fluids) of the suspect was found at the crime scene. The judges discarded this striking non-finding and relied on the suspect's confession, which had been obtained during a lengthy interrogation (van Koppen, 2003). Borsboom was convicted in 2001, but was released a few years later. By that time, the real perpetrator (whose DNA was found at the crime scene) confessed. In this case, it can be argued that the judges underestimated the significance of not finding the suspect's DNA at the crime scene.

In short, there is reason to believe that people have difficulty with the diagnostic power of non-findings. This is reminiscent of what has been called the feature positive effect (FPE). Jenkins and Sainsbury (1969) were probably the first to use the term FPE in research on conditioning. It was found that organisms learn associations between two stimuli more easily when one stimulus is predicted by the presence of another stimulus than if a stimulus is predicted by the absence of another stimulus. The FPE is not exclusive to research on conditioning. The core of the FPE in broader perspective is that people and animals have more difficulties dealing with absent (negative) information than they do with present (positive) information (Jenkins & Sainsbury, 1969; see also Wason, 1959).

In sum, negative information not only is more difficult to deal with, but it is also considered less important than positive information (Eerland & Rassin, 2012a). As in the case of Kees Borsboom, it is obvious that the FPE can lead to serious flaws in decision making. Because of the possible severe consequences of the FPE in the forensic field, it is important to investigate whether the influence of FPE on legal decision making can be reduced. Since people are usually not aware of the fact that they apply double standards for positive and negative evidence, we hypothesized that it could be helpful to inform people about the existence of FPE. In two experiments we tested this idea. In both studies participants read a case file about a suspect. After reading the case file, we asked participants to estimate the likelihood of the suspect's guilt. Some of the participants were informed about the existence of FPE, while others were not. We expected participants who were made aware of the FPE to be better at recognizing the diagnostic value of negative information than participants who received no information about FPE. Therefore, we hypothesized that the estimation of the likelihood of the suspect's guilt made by FPE aware participants would be lower than that of participants who were not informed about the FPE.

Experiment 1

In this experiment, we tested the effect of making participants aware of the FPE on the use of information in a case file, and on their subsequent judgment of the suspect's guilt.

Method

Participants

Sixty-six undergraduate students (60 women) participated in this study. Age of the participants ranged from 17 to 30 years with a mean of 19.6 years (*SD* = 2.1). Participants were randomly assigned to one of two conditions. There were no age ($t[64] = 1.92$, $p = .06$) or gender ($\chi^2[1] < 1.0$) differences between the two groups. In return for their participation the students received course credits.

Measures and procedure

Participants read a case file about a young man who was suspected of physically abusing another man. This case file was based on work of de Keijser and van Koppen (2007) and included the official police report, several eyewitness testimonies, reports of the interrogations of the suspect, a report of the forensic DNA analysis and reports of a photo line-up. The case file was adjusted to make sure that it contained not only positive (i.e., a positive photo-identification) but also negative information (i.e., a report on the forensic analyses concluded that no DNA of the victim was found on the clothes of the suspect) as to make sure that the FPE could be investigated properly. The case file was 22 pages in length.

Participants read this case file online. When they indicated they had finished the whole file (by pressing a button), three questions appeared on the computer screen. First, we asked participants to rate on a scale from 10 to 100% (with increments of 10) how likely they thought it was that the suspect was guilty. Second, we asked them whether they would convict the suspect (*yes/no*). Finally, participants had to write down the information they used to decide on the suspect's guilt. This last question served as a check to see whether people read the case file carefully but was also used to investigate the use of non-findings by the participants. The case file contained information about five pieces of absent evidence (e.g., no fingerprints were found). We were interested in whether these pieces of evidence

were reported more often by participants who received the FPE warning than by those in the non-relevant warning condition.

To examine whether the absent evidence presented in the case file was perceived as strong as the present evidence we conducted a pilot study. Twenty-two undergraduate students (19 women) who did not participated in the main experiment rated the strength of every piece of information (N = 11) used by the main participants. Their age ranged from 18 to 42 years (M = 21.9, SD = 6.0). According to these independent raters there were no differences in strength between present (n = 5) and absent (n = 6) evidence (t[9] = 0.85, p > .05).

Finally, in one condition participants read a warning about the existence of the FPE before they answered the three questions mentioned above. In this FPE warning condition participants read the following sentence: 'Please take notice of the fact that not finding evidence can be as diagnostic of innocence, as is finding evidence of guilt'. In the other condition participants received the following non-relevant warning: 'Please try to treat this case file as if it were a real one'.

Results and discussion

Due to technical problems, two participants were unable to report the information they used to answer the questions concerning the suspect's guilt. The total amount of used information mentioned by the remaining participants did not differ significantly between participants in the FPE warning condition (M = 4.61, SD = 1.97) and those in the non-relevant warning condition (M = 4.42, SD = 2.39; t[62] = .34, p > .05). We therefore assume that the case file was read equally well by participants in both conditions.

Table 1 shows the mean guilt estimates and the conviction rates for the participants in the FPE warning condition and those in the non-relevant warning condition. Both guilt estimate (t[64] < 1.0) and conviction rate (χ^2[1] < 1.0) did not differ between the two groups. However, the analysis regarding the use of non-findings yielded an interesting result. More participants in the FPE warning condition reported to have used at least one non-finding than participants in the non-relevant warning condition (χ^2[1] = 9.23, p < .01, odds ratio = 5.03). These results seem to indicate that participants who were aware of the FPE focused more on absent evidence than participants who received no FPE information. However, they failed to incorporate absent evidence in their final judgment.

Table 1

Mean guilt estimates (*SD*) and conviction rates by condition (Experiment 1; *N* = 66).

	FPE warning (*n* = 34)	Non-relevant warning (*n* = 32)
Guilt estimates	72.1 (22.9)	75.9 (16.6)
Conviction rates	70.6	62.5

Note. Guilt estimates were given in percentages ranging from 10-100%. Conviction rates display the percentage of participants per condition that would convict the suspect.

A reason for not finding the expected effect of the warning on guilt estimations might be that the warning used in this experiment was not elaborated enough. By comparison, a classic study on confirmation bias showed that the impact of this bias can be reduced by making an experiment more concrete (Johnson-Laird, Legrenzi, & Legrenzi, 1972). Participants who performed an altered Wason's selection task (1968) with a more real context (the original cards were replaced by objects from daily life) produced more correct answers than participants who were to perform the task with the original symbolic cards. This indicates that a more concrete context can enhance insight into logic reasoning. In the second experiment, we tested whether this might be true for the FPE.

Experiment 2

In this study, the information provided to the participants regarding the FPE was more elaborated compared to that in Experiment 1. It was hypothesized that such strengthened warning does affect guilt estimate and conviction rate.

Method

Participants

Sixty-nine undergraduate students (57 women) participated in this experiment. Their aged ranged from 18 to 24 with a mean of 20.4 years (*SD* = 1.9). Participants were randomly assigned to one of two conditions. There were no age ($t[67] = 0.59$, $p = .56$) or gender ($\chi^2[1] < 1.0$) differences between the groups. In return for their participation the students received course credits.

Measures and procedure

This time, participants read a summary of a case file about a man who was suspected of the murder of his estranged wife and male neighbor. This summary was based on the fictitious case file of Charles Wilson (Kassin & Neumann, 1997). We did so because the true diagnostic value of the evidence presented in this case was known. The only evidence against the suspect was that another neighbor saw the murderer and claimed that the perpetrator had the same height as the suspect. Furthermore, the suspect had recently hired, but then fired, a private detective to follow his wife. Participants in both conditions then received information about the interrogation by the police. During this interrogation, which lasted for several hours, the suspect was encouraged to confess the murder and the police showed empathy with the suspect (i.e., by telling him they understand that he did not realized what the gravity of the crime was at the time he committed the murders). Yet, the suspect denied to have committed the crime. As in the previous experiment, half of the participants received a FPE warning before they were asked to decide on the suspect's guilt. This time the warning was more elaborated: 'Please take notice of the fact that research showed that people tend to underweight evidence that is absent. For example, finding DNA of the suspect at the crime scene is considered more diagnostic of the suspect's guilt than is not finding DNA considered to indicate that the suspect did not commit the crime'. The other participants received the same non-relevant warning as we used in the first experiment.

After participants read this short case file, they answered two questions. We wanted participants to rate the suspect's likelihood of guilt on a scale from 10 to 100% (with increments of 10). Furthermore, we asked them whether they would convict the suspect (*yes/no*). We did not ask participants to indicate what information they used to decide on the suspect's guilt because the case file contained only a limited amount of information. Unlike the first experiment, this was a paper and pencil test.

Results and discussion

Table 2 shows the mean guilt estimates and the conviction rates for all participants. Participants who received the FPE warning displayed significant lower guilt estimations than participants who received a non relevant warning ($t[67] = 2.76$, $p <$

.01, r = .32). This result indicates that giving people more information about the FPE can actually influence the perceived guilt rate of the suspect.

We used a Fisher test to investigate whether the two groups differed with regard to conviction rate because of too few participants who indicated they would convict the suspect. This is not surprising considering the relatively low guilt estimations given by the participants. However, no significant differences between the groups were found (p = .17).

Table 2

Mean guilt estimates (*SD*) and conviction rates by condition (Experiment 2; N = 69).

	FPE warning (n = 37)	Non-relevant warning (n = 32)
Guilt estimates	38.5 (13.5)	45.6 (12.6)
Conviction rates	2.7	12.5

Note. Guilt estimates were given in percentages ranging from 10-100%. Conviction rates display the percentage of participants per condition that would convict the suspect.

General discussion

The goal of the present study was to test whether the FPE could be reduced by simply alerting decision makers to its existence. More specifically, we were interested in whether people's judgment of the suspect in a fictitious case file and their self-reported use of evidence would change as result of the FPE warning. Our findings provide support for this idea.

In the first experiment, we found that people who were aware of the FPE were more likely than people who were not to use absent evidence to decide on the suspect's guilt. Nonetheless, the fact that they used more negative evidence did not lead to lower guilt estimates. A more elaborated warning, as given in the second experiment, made that people did perceive the suspect as less likely to be guilty. This finding is in accordance with previous studies (e.g., Johnson-Laird et al., 1972). We did not find any differences between people who were aware of the FPE and those who were not regarding the conviction rates. However, this might be due to the fact that overall people tend to acquit the suspect rather than convict him.

It might be surprising that our results show that the FPE can be reduced. It is thought that the process of weighing information is hard, if not impossible, to be

influenced because it is in part unconscious. It has been shown before that unconscious processes are hard to influence. Ben-Zeev (2002) showed that the conjunction fallacy is persistent and that people are vulnerable to this bias even when the circumstances are optimal. The conjunction fallacy is a bias with respect to decision making. This bias occurs whenever two (or more) specific conditions ('Linda is a bank teller and is active in the feminist movement') are considered as more probable than one general condition ('Linda is a bank teller'; Tversky & Kahneman, 1983). In literature, more biases have been shown to be resistant to corrective intervention (Nickerson, 1998).

However, support for our finding that bias-like cognitions can be changed comes from the area of clinical psychology. Cognitive therapy is a well-known treatment for patients with a psychiatric disorder (e.g., depression). This therapy is based on the assumption that cognitions, even ones that seem automatic, can be altered (Beck, Rush, Shaw, & Emery, 1979). In therapy, different techniques are used to trace cognitions that reflect faulty appraisal and to change these cognitions into more realistic and rational thoughts (Beck, 1970). Cognitive therapy could never be as effective as it is (see Dobson, 1989, for an overview) if it were impossible to change patients' bias-like cognitions.

One could argue that the fact that we presented participants with a fictitious case file and that there were no consequences for the suspect based on the decision participants made are limitations of the present study. It might have influenced the way participants treated this case file (even though they were asked to treat the file as if it were a real one). However, in studies like this, it is impossible (if not unethical) to make the result of a participant's decision more important.

In sum, the present data suggest that simply warning participants against the FPE makes them more aware of the importance of negative evidence. A more elaborated warning even influences the perceived likelihood of guilt. These findings are of interest because they show us that the FPE and its severe consequences (e.g., wrongful convictions) can be reduced. This is promising in general, and particularly for legal decision making.

Chapter 8

Summary and Discussion

The process of (legal) decision making is thought to be a rational one. However, as we have seen, this process might be influenced by various biases and heuristics. One of the most studied biases regarding decision making is the confirmation bias, in which people tend to confirm hypotheses instead of critically evaluating them (Nickerson, 1998). A relatively unknown, but related phenomenon is the feature positive effect (FPE; Jenkins & Sainsbury, 1969). According to the FPE, people attach more meaning to present than to absent information. This is not necessarily a bad thing, but some manifestations of the FPE might constitute a bias (e.g., line-up identifications are considered far more informative than non-identifications). Given that the consequences of this bias might be severe in the context of (legal) decision making and the fact that the FPE was a relatively unstudied topic, more information about the FPE was needed. The research described in this dissertation tried to provide more insight in this phenomenon.

Summary of main findings

The aims of this dissertation were (1) to provide an overview of the literature on the FPE and related phenomena, (2) to explore whether the FPE is relevant to legal decision making, (3) to study the processing of present and absent information in more detail, and (4) to study whether the FPE can be reduced. For all these purposes the main findings will be summarized below.

Overview of literature on the FPE

In **Chapter 2** several manifestations of the FPE were discussed. This effect was first discovered in research on conditioning and refers to the fact that people tend to underweight or ignore absent information, whereas they put a lot of weight on present information (Jenkins & Sainsbury, 1969). Although the FPE is not a well-studied topic, results of a variety of studies might be explained by this effect. In this chapter, manifestations of the FPE in research on visual perception (e.g., Agostinelli et al., 1986; Healy, 1981; Ward & McClelland, 1989), self-perception (Fazio et al., 1982), and decision making (e.g., Brandon & Davies, 1973) were discussed. In most cases, the underweighing of absent information does not cause any harm. However, evidence indicating that the FPE might have severe consequences, for example in the field of legal decision making, was provided. Also, the FPE might be associated with several mental disorders, like hypochondriasis (Rassin et al., 2008) and anxiety

disorders. We do not know yet why and how the FPE occurs. Studies on the processing of negated information suggest that absent information is more difficult to process (e.g., Clark & Chase, 1972). It might also be that absent information is more difficult to retrieve from memory and that this process contributes to a FPE in recall of information. Issues regarding the origin of the FPE were addressed in Chapter 4 to 6.

FPE in a forensic context

The research described in **Chapter 3** was conducted to find a FPE in a forensic context in undergraduate students and to investigate its potential detrimental effects on decision making. Participants read a fictitious case file, decided on the suspect's guilt, and were then presented with additional information regarding the police investigation. This information was either about present or absent evidence. Afterwards, participants again rated the perceived guilt of the suspect. Results show that additional present information had more impact on the guilt rates of the suspect than the same absent information. This finding supports the presence of a FPE in legal decision making.

Processing of present and absent information

After we found evidence for the existence of a FPE in legal decision making, we tried to uncover the mechanisms behind the FPE in **Chapter 4**. This time participants were presented with both present and absent information to investigate the FPE in three phases of information processing (i.e., encoding, recall, and use of information). Undergraduates read a case file and were presented with sentences about additional police investigations that had been conducted. The sentences described whether evidence was found or not and they appeared on a computer screen. Eye-movements of the participants were recorded during online reading. After reading the sentences, participants decided on the suspect's guilt. Furthermore, they recalled all information they remembered from the additional investigations and they reported the information they used to decide upon the suspect. We found that present information regarding the case file was more often recalled than absent information. Also, present information was used more often to decide on the suspect's guilt than absent information. Our final result shows that people spent less time reading sentences that described present information as compared to absent information.

This finding supports the idea of a FPE early in information processing. Given that longer reading times indicate a difficulty in interpretation of information (see Rayner, 1998), it is suggested that present information is easier to understand and to integrate in existing knowledge structures than is absent information.

The two experiments described in **Chapter 5** were performed to provide more insight in the results of Chapter 4. More specifically, we were interested in whether the previously found differences in recall between present and absent information are due to differences in depth of processing. Undergraduate students were presented with a case file and read about additional investigations afterward. Depth of processing was manipulated in one condition. In this condition, sentences describing an additional investigation were presented three times instead of just once. A free recall test was administered after all sentences were presented. Although participants in the experimental condition recalled more sentences, they also showed a FPE. In other words, absent information was still recalled less often than present information. We figured that perhaps absent information is just more difficult to remember (i.e., processing absent information requires more working memory capacity than processing present information) than present information. In a second experiment, we tested this idea. Again, participants read a case file and sentences describing additional information. However, this time participants performed a competitive task while they processed the present and absent information. The results suggest that present and absent information are processed with the same ease and are therefore not in accordance with our hypothesis. Although participants displayed a FPE in their performance, the size of this effect did not correlate with performance on the competitive task. We conclude that neither depth of processing nor cognitive load evokes the FPE, and that the FPE must originate later in information processing. According to the situation model theory, people form mental representations of a situation in order to understand language (e.g., Johnson-Laird, 1983; Morrow et al., 1987; van Dijk & Kintsch, 1983; Zwaan & Radvansky, 1998). However, we do not know whether this representation differs for present and absent information. There is reason to believe that present information might lead to a more vivid representation of the described situation than absent information.

In **Chapter 6** we investigated the impact of present and absent evidence on decision making once again. However, the design that we used in this experiment

allowed us to compare the impact of a single piece of present information to the exact same absent information. Participants read a story about the physical abuse of a barkeeper that was especially tailored for this experiment. The fluent story contained information regarding additional police investigations. Sometimes evidence was found, while in other instances this was not the case. Participants indicated the perceived likelihood of guilt of the suspect after the presentation of a sentence that contained present or absent information. Because we created two versions of this story, in which presence was manipulated for every piece of evidence, we were able to calculate the impact of every piece of evidence and to compare presence to absence. The results show that present evidence has more impact on the perceived chance of guilt of the suspect than absent evidence. This is in accordance with the FPE.

Reducing the FPE

In **Chapter 7** we focused on how the FPE can be diminished to minimize its severe consequences by informing people about the effect. This might be useful because people are mostly not aware of the fact that they apply double standards for present and absent information. In two experiments, participants read a criminal case file. Afterwards, they had to decide on the suspect's guilt. Participants in one condition received a FPE relevant warning prior to their decision (i.e., awareness of the existence of FPE was created). In another condition, participants received a non-relevant warning. The results of this study show that whenever people received a simple FPE warning they were more likely than people who received a non-relevant warning to use absent evidence to decide on the suspect's guilt. There were no differences between the groups regarding the guilt estimates. A more elaborated warning, however, made that people who were aware of FPE did perceive the suspect as less likely to be guilty than those in the non-relevant warning condition. It thus seems that the FPE can be reduced. Support for this finding comes from the area of clinical psychology, in which cognitive therapy is based on the assumption that cognitions, even automatic ones, can be altered (Beck, Rush, Shaw, & Emery, 1979). If it were impossible to change (automatic) cognitions then cognitive therapy could never be as effective as it is (see for an overview Dobson, 1989).

By summarizing the main findings of my studies, it became clear that the results regarding the difficulty of processing absent as compared to present information are not consistent throughout the different studies. The results of Chapter 4 provided evidence that absent information is more difficult to process than present information. We therefore concluded that the FPE already exists early in information processing. However, data of the second experiment described in Chapter 5 were not supportive of this conclusion. Although the measures we took differed between experiments (i.e., we measured reading times in Chapter 4 and reaction times in Chapter 5), both are known to indicate speed of processing information. It thus seems as if this difference cannot account for the inconsistency in findings regarding the difficulty of processing absent as compared to present information. What might be an explanation is the fact that people were asked to just read the sentences in Chapter 4 and to judge them in Chapter 5. This might have had an influence on the reading process. In other words, people might have developed a reading strategy because they knew they had to judge the sentences. Given that we were interested in whether present and absent information are treated differently during encoding, the findings of Chapter 4 seem to be more informative.

Practical implications

The suggestion that a warning might reduce the FPE in legal decision making is promising. However, the studies described in Chapter 7 are just a first attempt to try to decrease the FPE and more research on this topic is needed in order to make a fruitful contribution to the field of legal decision making. With an increase of people's awareness of the true diagnostic value of non-evidence, the number of wrongful convictions will hopefully decrease.

Strengths, limitations, and suggestions for future research

The studies presented in this dissertation contribute to the literature on the FPE, given that there hardly is any literature on this topic. The fact that most research conducted on the FPE is about conditioning, the present studies are among the first to study the FPE in the forensic field. Furthermore, these studies are the first to focus on the cognitive aspects of this effect. Knowledge about why and how the FPE occurs is needed to decrease the number of cases in which a FPE turns into a bias in decision making.

One could easily argue that the use of undergraduate students as participants in the experiments is a limitation of the presented research given that in the Netherlands, where all studies were conducted, professionals are involved in legal decision making. Although this is true and professionals were not included in any of our experiments, in several countries around the world legal decisions are made by a jury. This jury consists of fellow citizens of the suspect. In addition, there is little reason to argue that professional judges treat the question of guilt differently from lay people (Kalven & Zeisel, 1966).

Another limitation may be that for some experiments we used the same materials. We did so because it was difficult to come up with well-designed materials. Once we created a sufficient number of sentences that described present and absent evidence that could be used for our eye-tracking experiment, we decided to use these materials in later experiments as well. An advantage of this is that the results of the different experiments can be compared more easily. However, to enhance the generalizability of our research, we created new materials described in Chapter 6.

The studies presented in this dissertation are a first attempt to a better understanding of the PFE. Nevertheless, more research on the FPE is needed. For example, the FPE can be examined in more diverse samples. In fact, given that the FPE is associated with wrongful convictions and might be associated with psychopathology, it is crucial to examine the FPE more closely. Given that the link between FPE and psychopathology has only been investigated in hypochondriasis (Rassin et al., 2008), this might be a promising and much needed avenue for future research. As I suggested in Chapter 2, the FPE might as well be associated with other mental disorders, like anxiety disorders.

Another, and related, topic for future research might be the investigation of individual differences in the FPE. It seems plausible that some individuals are more likely to show this effect than others. If so, what are the characteristics that contribute to this difference? In this light, we are currently studying individual differences regarding the FPE in people with recovered memories of childhood sexual abuse (i.e., either spontaneously recovered memories or memories that were recovered during suggestive therapy; Wanmaker, Eerland, & Geraerts, 2012).

Finally, the quality of the mental representations of present and absent information could be examined. As we have seen, absent information seems to be

more difficult to retrieve from memory than present information. This result was neither due to encoding differences nor to differences in cognitive load during the processing of present and absent information. Recent developments lead to the hypothesis that perhaps absent information is represented in a less vivid way than present information. As a result, this information might be less likely to be recalled and to be perceived as less important. These are interesting and important issues that need to be addressed. If the mental representations of present and absent information are qualitatively different this could account for the FPE.

Conclusion

Although one would like to think about legal decision making as a rather rational process, various biases and heuristics are of influence (Tversky & Kahneman, 1986). The feature positive effect (FPE; Jenkins & Sainsbury, 1969) is of importance in this light. According to this effect, people attach more meaning to present than to absent information. In situations where the diagnostic value of absent information is underweighted, the FPE results in a bias. I provided evidence that this bias occurs in legal decision making. Research shows that the FPE already exists early in information processing. During the encoding of information, people show more difficulty in reading about absent information. This information is also less likely to be recalled later on and will also be used less often in the decision making process as compared to present information. People seem to be unaware of the fact that they underweight absent information, which suggests that this is an automatic process. However, by providing more information about the FPE its impact can be reduced. More research on FPE is crucial for a better understanding of this effect and how it can be tackled.

Samenvatting

(Summary in Dutch)

Men zou verwachten dat het nemen van een (juridische) beslissing een rationeel proces is. Desondanks worden talloze beslissingen beïnvloed door verschillende systematische fouten die biasen worden genoemd. Een van meest bestudeerde biasen met betrekking tot de besluitvorming is de confirmatie bias (Nickerson, 1998). Een relatief onbekend, maar hieraan gerelateerd fenomeen is het *feature positive effect* (FPE; Jenkins & Sainsbury, 1969). Het FPE stelt dat mensen meer waarde hechten aan aanwezige dan afwezige informatie. Dit is niet noodzakelijkerwijs slecht. Echter, sommige manifestaties van het FPE kunnen een bias vormen (bijvoorbeeld herkenningen door ooggetuigen worden als informatiever beschouwd dan niet-herkenningen). Aangezien de consequenties van deze bias ernstig kunnen zijn in de context van (juridische) besluitvorming en gezien het feit dat het FPE een relatief onbekend onderwerp was voor onderzoek, was er meer informatie over het FPE nodig. Het onderzoek dat beschreven staat in deze dissertatie is een poging om meer inzicht te krijgen in dit fenomeen.

Samenvatting van de belangrijkste bevindingen

De doelen van deze dissertatie waren (1) het geven van een overzicht van de literatuur met betrekking tot het FPE en hieraan gerelateerde fenomenen, (2) onderzoeken of het FPE een rol speelt in juridische besluitvorming, (3) het in meer detail bestuderen van de verwerking van aanwezige en afwezige informatie en (4) onderzoeken of het FPE kan worden verminderd. De belangrijkste bevindingen met betrekking tot deze doelen zullen hieronder worden samengevat.

Overzicht van de literatuur met betrekking tot het FPE

In **Hoofdstuk 2** werden verschillende manifestaties van het FPE besproken. Dit effect werd voor het eerst ontdekt in het onderzoek naar conditionering en verwijst naar het feit dat mensen de neiging hebben om afwezige informatie onder te waarderen of te negeren, terwijl aanwezige informatie zeer diagnostisch wordt gevonden (Jenkins & Sainsbury, 1969). Ondanks dat het FPE weinig bestudeerd is, kan het wel gezien worden als een verklaring voor de resultaten van een variëteit aan studies. In dit hoofdstuk kwamen manifestaties van het FPE aan bod in onderzoek naar visuele perceptie (e.g., Agostinelli et al., 1986; Healy, 1981; Ward & McClelland, 1989), zelfperceptie (Fazio et al., 1982) en besluitvorming (Brandon & Davies, 1973). In de meeste gevallen heeft het onderwaarderen van afwezige

informatie geen ernstige gevolgen. Echter, het lijkt erop dat het FPE wel ernstige gevolgen kan hebben in bijvoorbeeld het veld van de juridische besluitvorming. Ook werd er gesteld dat het FPE geassocieerd zou kunnen worden met verschillende mentale stoornissen, zoals hypochondrie (Rassin et al., 2008) en angststoornissen. We weten nog niet waarom en hoe het FPE ontstaat. Onderzoek naar de verwerking van ontkennende informatie suggereert dat afwezige informatie moeilijker te verwerken is (e.g., Clark & Chase, 1972). Het zou ook zo kunnen zijn dat aanwezige en afwezige informatie even gemakkelijk te verwerken is, maar dat afwezige informatie moeilijker op te halen is uit het geheugen. Dit zou kunnen zorgen voor een FPE in het ophalen van informatie. Kwesties met betrekking tot het ontstaan van het FPE werden besproken in de Hoofdstukken 4 tot en met 6.

Het FPE in een forensische context

Het onderzoek dat beschreven wordt in **Hoofdstuk 3** is uitgevoerd om te zien of we een FPE konden vinden in een forensische context en bij studenten. Verder wilden we de mogelijk nadelige effecten van het FPE op de besluitvorming onderzoeken. In dit onderzoek lazen proefpersonen een fictieve casus over een mishandeling. De casus was ongeveer 22 pagina's lang en bevatte informatie die men in een echt politiedossier zou aantreffen. Na het lezen van alle informatie namen de proefpersonen een besluit met betrekking tot de schuld van de verdachte. Ze moesten aangeven hoe schuldig ze de verdachte vonden op een schaal van 10-100%. Ook moesten zij aangeven of ze de verdachte zouden veroordelen of niet. Vervolgens werd er extra informatie aangeboden die te maken had met het uitgevoerde politieonderzoek. Deze informatie betrof ofwel drie soorten aanwezig ofwel drie soorten afwezig bewijs. Mensen in de controlegroep kregen geen extra informatie meer. De proefpersonen gaven na het lezen van de extra informatie weer aan hoe schuldig zij de verdachte vonden. Door te kijken naar het verschil in schuldpercentage voorafgaand aan en na het lezen van de extra informatie, kon worden onderzocht hoeveel impact deze informatie had op hoe schuldig men de verdachte vond. De resultaten toonden aan dat extra aanwezige informatie meer impact had op het schuldpercentage dan dezelfde afwezige informatie. Deze bevinding steunt het idee van een FPE in de juridische besluitvorming.

Het verwerken van aanwezige en afwezige informatie

Nadat we bewijs hadden gevonden voor het bestaan van een FPE in de juridische besluitvorming, probeerden we meer inzicht te krijgen in de mechanismen achter het FPE. Dit gebeurde in **Hoofdstuk 4**. Deze keer kregen proefpersonen echter zowel aanwezige als afwezige informatie te lezen en werd het FPE onderzocht in drie fasen van informatieverwerking (i.e., het encoderen, herinneren en gebruik van informatie). Studenten lazen een casus (dezelfde casus die we eerder in Hoofdstuk 3 hadden gebruikt) en kregen daarna 32 zinnen te lezen die aanvullend politieonderzoek beschreven. Er werd steeds gezegd of bepaald bewijs was gevonden of niet. De zinnen werden gelezen vanaf een computerscherm. Op die manier konden de oogbewegingen van de proefpersonen worden geregistreerd tijdens het lezen. Nadat de proefpersonen de zinnen hadden gelezen, namen ze een beslissing met betrekking tot de schuld van de verdachte (op dezelfde manier als in Hoofdstuk 3). Vervolgens schreven ze alle informatie met betrekking tot de aanvullende onderzoeken op die ze zich konden herinneren. Op die manier konden we het geheugen voor aanwezig en afwezig (bewijs)materiaal onderzoeken. Ook gaven de proefpersonen aan welke informatie zij mee hadden genomen in hun oordeel over de schuld van de verdachte. Aan de hand van deze informatie konden we iets zeggen over hoe belangrijk aanwezige en afwezige informatie wordt gevonden voor de besluitvorming. We vonden dat mensen zich aanwezige informatie vaker konden herinneren dan afwezige informatie. Ook werd aanwezige informatie vaker meegenomen in het oordeel over de verdachte dan afwezige informatie. Mensen vonden aanwezige informatie dus belangrijker dan afwezige informatie. Tot slot vonden we ook dat mensen minder tijd nodig hadden om de aanwezige informatie te lezen in vergelijking met de afwezige informatie. Hoe meer tijd mensen nodig hebben om informatie te lezen, hoe meer moeite men heeft met het interpreteren van de informatie (zie Rayner, 1998). Aanwezige informatie werd dus makkelijker verwerkt dan afwezige informatie. Deze bevinding steunt het idee dat het FPE vroeg in het informatieverwerkingsproces aanwezig is. Immers, aanwezige en afwezige informatie worden al anders behandeld wanneer mensen informatie in zich op nemen.

De twee experimenten die beschreven worden in **Hoofdstuk 5** werden uitgevoerd om meer inzicht te krijgen in de resultaten van Hoofdstuk 4. In het bijzonder wilden we weten of de verschillen in het herinneren van aanwezige en

afwezige informatie veroorzaakt zouden kunnen worden door verschillen in de verwerking van de informatie. Om dit te onderzoeken hebben we studenten eerst weer een casus laten lezen. Vervolgens kregen zij aanvullende informatie betreffende het politieonderzoek. Deze informatie bestond uit 32 zinnen die beschreven of bepaald bewijs werd gevonden of niet. We manipuleerden de diepgang van de verwerking van deze zinnen. In de controle conditie werden de zinnen in willekeurige volgorde op een computerscherm aangeboden. Elke zin werd slechts een keer aangeboden en proefpersonen werden gevraagd de zinnen goed te lezen. In de experimentele conditie werden de zinnen die het aanvullende onderzoek beschreven drie maal in willekeurige volgorde aangeboden. Ook werden de proefpersonen gevraagd om de zinnen hardop voor te lezen. Dit deden we om er zeker van te zijn dat mensen de informatie goed verwerkten. Na het lezen van de zinnen werd een zogenaamde vrije herinneringstaak (i.e., een geheugentaak waarbij mensen alles opnoemen wat zij zich nog weten te herinneren) afgenomen. We vonden dat mensen in de experimentele conditie zich meer zinnen konden herinneren dan mensen in de controle conditie. Dit betekent dat de manipulatie heeft gewerkt. Echter, alle proefpersonen lieten een FPE zien. Dat wil zeggen dat mensen zich altijd meer aanwezige dan afwezige informatie konden herinneren, ongeacht in welke conditie zij zaten. Dit resultaat leidde tot de veronderstelling dat afwezige informatie misschien gewoon moeilijker te onthouden is dan aanwezige informatie. Dit wil zeggen dat het verwerken van afwezige informatie misschien meer capaciteit van het werkgeheugen vergt dan het verwerken van aanwezige informatie. In een tweede experiment hebben we dit idee getest. Ook nu lazen proefpersonen een casus en 32 zinnen die aanvullende informatie betreffende het politieonderzoek bevatten. Echter, deze keer moesten de proefpersonen een competitieve taak uitvoeren terwijl ze de aanwezige en afwezige informatie verwerkten. Het experiment zag er als volgt uit. Na het lezen van de casus zagen de proefpersonen een reeks van vier getallen kort op het scherm verschijnen. Deze reeks moesten zij onthouden. Vervolgens kregen zij een zin op het scherm te zien. Dit kon een van de 32 zinnen zijn die betrekking hadden op het aanvullende politieonderzoek. Echter, dit kon ook een zogenaamde ‘onzin’-zin zijn. Dit waren zinnen die onlogisch waren, maar wel soortgelijke woorden bevatten als de 32 eerdergenoemde zinnen (bijv. De vingerafdrukken zaten gezellig te kletsen). De proefpersonen moesten vervolgens zo snel mogelijk aangeven (door op een toets te drukken) of de zin logisch was of niet.

Daarna werden ze gevraagd om de eerdergenoemde reeks van vier getallen in omgekeerde volgorde te reproduceren. Onze resultaten laten zien dat mensen even vaak een goede reeks getallen reproduceerden wanneer ze een aanwezige dan wanneer ze een afwezige zin hadden gelezen. Ook was de snelheid waarmee de reeksen werden geproduceerd gelijk voor beide soorten zinnen. Het lijkt er dus op dat voor het verwerken van aanwezige en afwezige informatie evenveel inspanning nodig is. Wel vonden we dat het verwerken van afwezige informatie meer tijd kostte dan het verwerken van aanwezige informatie. Dit verschil hing echter niet samen met hoe goed mensen presteerden op de competitieve taak. Daarom concluderen wij dat zowel diepte van verwerking als cognitieve capaciteit geen verklaring voor het FPE kan zijn en dat het FPE later in het verwerkingsproces moet ontstaan. Volgens de situatiemodel-theorie vormen mensen mentale representaties van een situatie om taal te kunnen begrijpen (e.g., Johnson-Laird, 1983; Morrow et al., 1987; van Dijk & Kintsch, 1983; Zwaan & Radvansky, 1998). We weten echter niet of deze representatie verschilt voor aanwezige en afwezige informatie. We hebben reden om aan te nemen dat aanwezige informatie leidt tot een meer levendige representatie van de beschreven informatie dan afwezige informatie.

In **Hoofdstuk 6** hebben we nogmaals de impact van aanwezige en afwezige informatie op de besluitvorming onderzocht. Dit keer hebben we echter de impact van de losse bewijsmaterialen bekeken in plaats van de impact van een hele set aan bewijsmateriaal. Voor dit experiment hebben we een nieuwe casus bedacht. De achtergrondinformatie en de extra informatie met betrekking tot het aanvullende politieonderzoek waren dit keer verwerkt in een verhaal. De proefpersonen kregen dit verhaal zin voor zin te lezen vanaf een computerscherm. Wanneer er een zin werd gepresenteerd waarin de aanwezigheid of afwezigheid van bewijs werd beschreven moesten proefpersonen aangeven hoe schuldig ze de verdachte op dat moment vonden. Zij konden dit aangeven door een getal van 0-100 in te voeren in de computer, waarbij geldt dat hoe hoger het getal, hoe schuldiger men de verdachte vindt. We gebruikten twee versies van het verhaal, die verschilden qua aanwezigheid van het bewijs. Wanneer in het ene verhaal stond dat er vingerafdrukken waren gevonden van de verdachte, stond er in de andere versie van het verhaal dat deze niet waren gevonden. Op die manier konden we de impact van aanwezig en afwezig bewijs op hoe schuldig men de verdachte vindt goed vergelijken. Onze resultaten

tonen aan dat aanwezig bewijs inderdaad meer impact heeft op de schuld van de verdachte dan afwezig bewijs. Deze bevinding steunt het idee van een FPE.

Het verminderen van het FPE

In **Hoofdstuk 7** hebben we onderzocht of het FPE, en de eventuele ernstige gevolgen hiervan, verminderd zou kunnen worden door mensen te informeren over dit effect. We veronderstelden dat het informeren van mensen nuttig zou kunnen zijn aangezien mensen zich er meestal niet van bewust zijn dat ze met twee maten meten wanneer het gaat om het evalueren van aanwezige en afwezige informatie. In twee soortgelijke experimenten kregen proefpersonen een casus te lezen. Hierna moesten zij een beslissing nemen met betrekking tot de schuld van de verdachte en aangeven welke informatie zij hadden gebruikt om tot een beslissing te komen. In de experimentele conditie kregen proefpersonen meer informatie over het FPE voorafgaand aan het nemen van de beslissing. In de experimentele conditie kregen de proefpersonen niet relevante informatie voorafgaand aan het moment van beslissen. De resultaten van deze studies laten zien dat mensen die meer informatie kregen over het FPE vaker afwezige informatie meenamen in hun uiteindelijke beslissing. Echter, de twee condities verschilden niet van elkaar met betrekking tot hoe schuldig men de verdachte vond (Experiment 1). Wanneer mensen uitgebreidere informatie ontvingen over het FPE (Experiment 2) werd de verdachte wel minder schuldig bevonden dan wanneer mensen niet relevante informatie ontvingen. Het lijkt er dus op dat het FPE verminderd kan worden. Steun voor dit idee komt uit de hoek van de klinische psychologie, waarbij cognitieve therapie is gebaseerd op de assumptie dat gedachten, zelfs automatische, veranderd kunnen worden (Beck, Rush, Shaw, & Emery, 1979). Als het onmogelijk zou zijn om (automatische) gedachten te veranderen dan zou cognitieve therapie nooit zo effectief kunnen zijn (zie voor een overzicht Dobson, 1989).

Conclusie

Ondanks dat men graag zou willen denken dat het juridische besluitvormingsproces een rationeel proces is, zijn er verschillende biasen en heuristieken die dit proces beïnvloeden (Tversky & Kahneman, 1986). Het feature positive effect (FPE; Jenkins & Sainsbury, 1969) is in dat kader van belang. Dit effect stelt dat mensen meer waarde hechten aan aanwezige dan aan afwezige informatie. In situaties waarin de

diagnostische waarde van afwezige informatie wordt onderschat resulteert het FPE in een bias. Ik heb aangetoond dat dit effect voorkomt in juridische besluitvorming. Het lijkt erop dat het FPE al vroeg in het informatieverwerkingsproces ontstaat. Uit onderzoek naar het verwerken van informatie blijkt dat mensen meer moeite hebben met het verwerken van afwezige informatie. Deze informatie wordt ook minder goed onthouden en minder vaak gebruikt wanneer er een beslissing moet worden genomen dan aanwezige informatie. Mensen lijken zich niet bewust van het feit dat zij de waarde van afwezige informatie onderschatten. Dit zou betekenen dat we te maken hebben met een automatisch proces. Echter, door mensen meer informatie te geven over het FPE kan de impact ervan worden verminderd. Voor een beter begrip van het FPE en inzicht in hoe we het beste met dit effect om kunnen gaan, is er meer onderzoek nodig naar dit fenomeen.

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Presentations

Paper

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Curriculum Vitae

Anita Eerland was born on November 14th, 1983, in Capelle aan den IJssel, the Netherlands. She completed her secondary education in 2001 at the Emmauscollege in Rotterdam. Hereafter, she started a study Italian Language and Culture at Leiden University. After one year she started studying Psychology at the Erasmus University Rotterdam. She received her Master's degree in Clinical and Health Psychology in 2006 (cum laude). Her master thesis concerned the creation of false memories in student populations. After her degree in Clinical and Health Psychology she started studying Clinical Neuropsychology at Leiden University. During this study she worked as a tutor in general psychology at the Erasmus University Rotterdam. She received her Master's degree in Clinical Neuropsychology in 2007. Her master thesis concerned the development of memory function in elderly patients after cardiac surgery. She worked from September until December 2007 as a neuropsychologist at GGZ Haagstreek with patients who have acquired brain damage. In January 2008, Anita started as a PhD student at the Institute for Psychology at the Erasmus University Rotterdam, studying the feature positive effect in legal decision making. The results of this PhD project are reported in the present dissertation. As PhD student she taught a number of theoretical and practical courses and supervised several bachelor and master theses. She also developed, together with Suzanne Broeren, a practical course in Neuropsychology. At the time of this writing Anita is employed as assistant professor at the Open University.