Paper beats ping: On the effect of an increasing separation of notification and content due to digitization of government communication

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A B S T R A C T

Due to the massive uptake of online communication, people receive countless notifications on a given day. Governments also send more and more information via computer mediated communication instead of writing a paper letter to citizens. As a consequence, governments are increasingly exposed to the risk that citizens do not notice or act upon notifications that refer to governmental (sometimes legally binding) messages. This in turn may result in non-compliant behavior. Through a vignette study in three large scale surveys held in the Netherlands in 2015 and 2016, we have investigated how the channel (paper letter channel vs. e-mail channel that notifies that there is a digital letter available at a web portal) influences the speed with which people intend to read the actual content of a message while taking digital skills and expectations of the contents of a message into account. Results show that the channel has a significant and strong impact on the speed with which citizens read the contents of the message. This means that there is a risk that the efficiency gains that are won by communicating electronically are lost in effectiveness due to increased non-compliance because people do not actually see the government information that is sent to them. Therefore, it is important to think of new ways to effectively notifying people of new information in an online environment.

1. Introduction

Since the 1990's governments started using internet-based technologies in their service provision. Despite the fact that almost three decades later many users in citizen-to-government or business-to-government interactions prefer telephone or front desk over website (Østergaard Madsen & Kræmmergaard, 2018; Reddick & Anthopoulos, 2014; Reddick & Turner, 2012; Van den Boer, 2014) we see that governments further digitize their service landscape (Pieterson, Ebbers, & Østergaard Madsen, 2017). As a matter of fact, several government organizations are on a strategy where the use of technology (Bailey & Caidi, 2005; Ng-Kruelle, Swatman, Hampe, & Rebne, 2006; Smith, 2005) or digital channels (Ebbers, van de Wijngaert, & Lange, 2016; Østergaard Madsen & Kræmmergaard, 2016) is more or less mandatory. As it happens, mandatory online services are common practice in countries such as Denmark and the Netherlands for delivering businesses services. Half of European countries has made one or more services mandatory online (European Commission, 2016, p. 43).

As the governmental service landscape is further digitized, a question of particular interest relates to the effects of sending e-mail messages to citizens concerning legally binding messages. Legally binding governmental messages may carry official decisions, fines, and even warrants. If citizens do not notice, misinterpret or ignore this class of messages it will not only negatively affect citizens, it will also infringe on the functioning of government itself (see for instance May, 2005; and Bozeman & Feeney, 2011) such as unnecessary law enforcement costs and missed income due to unintentionally tax filing after the deadline or incomplete tax filing, or unintentionally late or non-payment of traffic fines.

Computer mediated communication events generally start with some form of notification which is carried by a device or medium. According to Licoppe (2010, p. 288), the purpose of a notification is to get a remote alter to somehow 'appear' in an ego's environment. Also, this 'appearance' has to be acknowledged. Due to the development of graphical user interfaces and with it various pop-up windows, notifications started to appear more and more frequently. Ranging from plain error notifications to very brief 'you have got mail' notifications. This trend has been further bolstered by the massive uptake and proliferation of social media and the rise of mobile or smart phones in the second place, sending countless notifications on a day-to-day basis (Licoppe, 2010). Nowadays, users of digital media are faced with a myriad of messages popping-up, for example news alerts or

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advertisements. Users tend to allocate only minimal cognitive resources to all these messages, which generally interest them very little (Courbet, Fourquet-Courbet, Kazan, & Intartaglia, 2014), to prevent them from information overload. Another drawback of digitization of notifications in our current information-dense world, is that digital notifications for the larger part of the time may not be visible to people, hovering un-noted somewhere on their smartphones. People may, therefore, easily forget them or may not feel the need to act. As such, from a user-per-spective, the massive application of notifications may backfire on all those alerts that try to appear in an ego's environment while using computer mediated communication.

One of the sources of alerts is of course government. In the Netherlands, governments such as the tax office traditionally send postal mail letters to citizens. The letter itself can be seen as the noti-fication, which is directly connected to the actual message. Moreover, traditionally, the Dutch tax office sends letters in distinct blue envelops. People that receive such an envelope immediately know that this letter contains important information. Other government departments may use a plain white envelope that may contain the name or logo of the government department and be recognizable in that way. By simply tearing open the envelope, people could take the step from notification to message.

As governments digitize the interaction with citizens, subsequently they started to use online notifications. In the Netherlands, the elec-tronic notifications are sent through e-mail by MyGovernment. The message simply reads '*There is a new message in your inbox on MyGovernment. Please go to MyGovernment to read it.*'. Users have to go to MyGovernment where they can login with their digital identity. Using their digital identity, citizens can log into the websites of gov-ernment agencies. Hence, the notification (e-mail) and the content of the message (MyGovernment) are logically separated. In addition, users need to apply (once) for a digital identity prior to using it. To sum-marize, the online notification not only disconnects the notification from the actual message but also requires a number of (digital) skills to actually get to the message.

Taking in mind the implications of the abundance of digital notifi-cation described above, the overall research goal of this paper is to find out what the impact of digital government notifications are on whether or not citizens may or may not act when these notifications appear; i.e. actually read the government messages the notification refers to. Relevance of the research amongst others lies in its result, which offer starting points for improving digital notifications. So that notification will not only become successful from a technological or supply-side point of view, but from a citizen's point of view.

In three large scale surveys held in the Netherlands in 2015 and 2016, we have investigated how the means of notification might in-fluence how quickly people intend to read the actual content of a message while taking digital skills and expectations of the contents of a message into account. Results show that the means of notification have a significant impact on how quickly people act upon arrival of a mes-sage. This means that there is a risk that the efficiency gains that are won by communicating electronically are lost in effectiveness due to increased non-compliance because people do not actually see the gov-ernment information that is sent to them. Therefore, it is important to think of new ways to effectively notify people of new information in an online environment.

2. Theoretical framework

Several theoretical notions can help to understand possible effects of digital notifications. In this section, we will discuss theories and notions related to channels, digital skills, and the expectancy value theory. Based on these insights, we will develop a research model and for-mulate the hypotheses that result from this model.

2.1. Channel effects

The media richness theory (Daft & Lengel, 1984; Trevino, 1990) provides a well-known starting point for understanding the effective-ness of developing shared meaning, given a specific task. The basic assumption of this model is that an appropriate task/medium fit is es-sential for effective communication. In the case of this research, the task is to notify a receiver of a message from the government. According to Weick (1979) and Daft and Macintosh (1981), this task can be de-scribed as unambiguous (or unequivocal) as there are few multiple or conflicting interpretations about the meaning of a notification. Thus, according to the media richness theory, effective communication can be established through a lean channel. When we classify the two channels (paper letter and online notification) based on the four criteria that Daft and Lengel (1984) provide to establish media richness (speed of feed-back, natural language, multiple cues and personal focus), both chan-nels indeed score low on media richness. For example, both an online notification as well as a paper letter provide no direct, synchronous opportunity for feedback. As described in the previous section, there are also differences between the two channels. These differences however, are hard to explain in terms of the use of multiple cues, the degree of natural language and personal focus. To solve this, we turn to the older concept of social presence (Short, Williams, & Christie, 1976) to un-derstand the differences between the two channels. In the social pre-sence theory, different communication media can be classified along a continuum of social presence. The position of a channel on this con-tinuum depends on the degree of awareness of the other person in a communication interaction. Based on Lombard and Ditton (1997), we argue that the paper envelope can be placed higher on this continuum than an online notification. They provide six dimensions that support this argument:

- Presence as social richness: due to the physical proximity of a tan-gible envelope, the paper notification has a higher level of intimacy than an intangible online notification on screen.
- Presence as realism: although both a letter and an e-mail notifica-tion score low on realism (the tax office is not actually present), a letter will be perceived more as 'the real thing' because of the physical presence and associations that come with it due to the blue color as compared to a generic online notification.
- Presence as transportation: a paper letter will have much more the appearance of 'It is here' than a standard and unspecified online notification.
- Presence as immersion: the two channels differ in the way in which they submerge the perceptual system of the user. The online noti-fication uses a standard email notification in which their message is one of many emails people tend to receive in a day. In contrast, through branding mechanisms, the blue envelope is strongly asso-ciated with the tax office.
- Presence as a social actor within medium: as it is not possible to interact with a paper envelope and the email notification contains the text: 'This is an automatically generated message. A response to this message will not be read or answered.', both channels score low on presence as social actor within the medium. People will not very likely overlook the mediated nature of the notification and will not attempt to interact with it.
- Physical presence of a medium: the response to cues from the medium itself is again different for both channels. The paper en-velope requires a physical act whereas the online notification re-quires several 'mouse clicks' or 'swipes'. We consider the paper notification as more social present because the act to open the blue envelope is a single, simple and physical act. In contrast, opening a digital message is a multiple, more complex and digital act: it re-quires going to the government portal and remembering or seeking a username and password.

Table 1
Hypotheses.

	Hypothesis	Theoretical basis
H1	The channel through which the message is sent influences the speed with which people read the content of the message. This is faster for the paper channel, i.e. paper letter in a paper envelope than for the e-mail channel, i.e. an e-mail notifying that a digital letter is placed in a web portal.	Media richness social presence
H2a	Operational skills positively moderate the relation between the channel via which a message is sent and the speed with which people act upon the notification that there is a message for them.	Digital skills
H2b	Information skills positively moderate the relation between the channel via which a message is sent and the speed with which people act upon the notification that there is a message for them.	Digital skills
H3	People that have positive expectations of the contents of a message are more likely to act upon the notification of that message quickly.	Expectancy theory

By comparing the two channels on the six dimensions of Lombard and Ditton (1997), we conclude that both channels score rather low on presence. However, we can also conclude that the paper envelope scores higher on social presence than the online notification.

Now that we have identified a difference in social presence between the two channels, we need to understand how this difference could influence the response that citizens give to notifications. Although there is no prior research into the role of social presence on response to notifications, much research has been done into the role of social presence in other domains such as health, learning and technology. Recent meta-analyses from Cummings and Bailenson (2016) and Richardson, Maeda, Lv, and Caskurlu (2017) show that there is a relation between social presence and satisfaction and perceived learning. In addition, the results from a meta-analysis by Fox et al. (2015) indicate that virtual representations perceived to be controlled by humans produced stronger responses with regard to social influence than those perceived to be controlled by computer algorithms. These studies provide sufficient evidence to hypothesize that the channel through which the notification of a message is sent influences the speed with which people read the content of the message.

2.2. Digital skills

The concept of digital skills has been thoroughly investigated (Van Dijk and Van Deursen (2014). Van Deursen and Van Dijk (2009) and Van Deursen, Helsper, and Eynon (2016) have researched operational skills (the skills to operate digital media), formal skills (the skills to handle the special structures of digital media such as menus and hyperlinks), information skills (the skills to search, select and evaluate information in digital media) and strategic skills (the skills to employ the information contained in digital media as a means to reach a particular personal or professional goal) in a eGovernment context. In their research, they conclude that although Dutch citizens generally have high operational skills, their information and strategic skills are lower.

In the case of the paper letter and a paper envelope, the notification is physically connected to the message: the letter that contains the information is literally inside the blue envelope. The only thing that is needed to consume the information is to tear open the envelope. In the case of an e-mail notification, users need to connect to a government service (a digital message box inside a so-called MyGovernment portal for which a user name and password is required) in order to actually read the message. We expect that this may introduce a hurdle that prevents citizens from quickly addressing the actual contents of the message. Hence, the digital skills may influence the relation between channel and speed with which the content of the message is consumed. As for operational skills, we expect that citizens with higher skills are better skilled in quickly opening the notification message, then manually but still quickly go to the message portal, login in to the MyGovernment portal and open the message box. As far as information skills are concerned, we expect that citizens with higher information skills are quicker in evaluating information properly, thus knowing better that messages from government shouldn't be neglected but instead acted upon as quickly as possible. In short, we expect that low

operational and information skills will lead to a slower response.

2.3. Expectancies

Vroom (1964) proposes that motivation relies on people's expectations about their performances and their rewards. People's behavior targets the desired outcome. This theory is based upon the relation between effort, performance and valued outcome. These elements lead to three concepts: valence, which is the attraction one can have for the outcome, thus determining his or her effort into it; expectancy, which is the belief that putting effort will give a good performance; and instrumentality, which is the belief that a good performance will lead to the desired outcome. A citizen's response to a notification can be explained from these notions. People that have positive expectations with regard to the contents of a message may be more inclined to quickly open the message. As mail from the tax office may herald unfavorable news to be acted upon swiftly, we expect that a higher level of presence (i.e. the (blue) paper envelope) leads to a higher inclination to actually read the message. Based on this we expect that the channel that is used affects the speed with which people intend to actually read the message.

2.4. Model building

Based on the notions of task-technology fit, digital skills and expectancy theory, the model that we developed for this research is depicted in Fig. 2.

The core of this model is the relation between channel and response speed. This relationship is mediated by digital skills. Expectations of the contents of the letter is also expected to influence the response speed. The hypotheses adopted by this research are listed in Table 1.

3. Research method

3.1. Research approach and data gathering

In our empirical research, we made use of the policy capturing (Rossi & Nock, 1982) method, which is a method for studying choice. Policy capturing, also known as Factorial Survey or Vignette Studies, combines the advantages of multivariate experimental designs with sample survey procedures. Policy capturing borrows and adapts the concept of manipulation from the experimental tradition. From the survey tradition it borrows the greater richness of detail and complexity that characterizes real-life circumstances. It is a method that can be used to uncover the principles that lie behind human evaluation (Rossi & Nock, 1982). The basic idea behind policy capturing is to present people with contrived hypothetical situations. In the situations that were used in this research, the respondent is confronted with the situation that he or she receives either a letter from the tax office (the 'blue envelope') or an e-mail notification that a new message is placed on mijn.overheid, i.e. the MyGovernment portal. Moreover, the vignette states that the receiver has positive, negative or neutral (no) expectations of the contents of the letter. After a respondent has seen the vignette the question is asked when he or she would actually read the

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Table 2
Example vignettes.

Type of notification expectations	Paper positive	Electronic negative
	"Suppose you receive a blue envelope from the tax authorities on the doormat. You expect that you will receive a refund. When will you open the envelope?"	"Suppose you receive an e-mail from the Tax Authorities. The message states that there is a new message in the MyGovernment portal. You expect that you have to pay money to the tax authorities. When do you open the message?"

Table 3
Chronbachs alpha related to operational and information skills in three measurements.

Cronbach alpha's	Measurement 1	Measurement 2	Measurement 3
Operational skills	0,90	0,91	0,91
Information skills	0,82	0,79	0,78

contents of the message. Two (contrasting) examples of vignettes can be found in Table 2.

The data was gathered through an online questionnaire using Qualtrics software. The vignette study was part of a broader questionnaire that also contained questions with regard to knowledge about and attitude towards the governmental web portal. The data for this research was gathered in three separate waves: in November 2015, May 2016 and November 2016. The same research approach was conducted in every wave. This allowed us to obtain insight into the robustness of our research model. All three measurements were performed using an online panel and yielded a response of 1215, 1195 and 1233 respectively. A professional marketing research agency conducted the sampling and fieldwork for every measurement. Participants were recruited via an online panel and received a small monetary reward to participate. The use of an online panel implies that all participants must have at least some digital skills to be included. In theory, this might affect the research results. There are two reasons why we believe this effect is most likely to be negligible. First of all, Dutch citizens have a lot of skills with regard to the use of ICT. A recent study from Akkermans (2016) shows that together with Luxembourg, Denmark and Finland, the Netherlands is one of the EU countries with the largest share of residents with a high level of ICT-skills. This involves searching for information and communicating via the Internet, the use of computers and online services, and handling software. Hence, we believe that we were able to capture the majority of Dutch citizens through an online panel. Secondly, as our research used a Policy Capturing approach, we focus on the effects of the manipulations in the vignettes. In that sense, diversity of the sample is more important than representativity. Despite careful data collection, a number of small deviations in terms of representativeness of the Dutch population have emerged. In the sample, young people (15–35) with a low level of education are slightly underrepresented. In addition, middle-aged men and women (36–55) with a secondary education are slightly over-represented in the sample of measurement 3. As these are only minor deviations, we assume that, given the size of the sample and the reflection of the different societal groups, the results of the research can be generalized to the part of society that has access to and uses the internet.

3.2. Measurements and analysis

Operational and information skills were measured through multiple items. Items for operational skills (based on Van Deursen et al., 2016) are 'I know how to open downloaded files', 'I know how to download/save a photo I found online', 'I know how to use shortcut keys (e.g. CTRL-C for copy, CTRL-S for save)', 'I know how to open a new tab in my browser' and 'I know how to bookmark a website'.

Items for information skills were 'I find it easy to decide what the best keywords are to use for online searches', 'I find it hard to find a

website I visited before', 'I don't get tired when looking for information online', 'I hardly ever end up on websites without knowing how I got there', 'I find the way in which many websites are designed confusing' (based upon Van Deursen et al., 2016) and 'I know the difference between MyGovernment, My TaxOffice and MyAllowances' (in Dutch: "Mijn Overheid", "Mijn Belastingdienst" en "Mijn Toeslagen").

In all three measurements, Chronbachs' Alpha showed satisfactory results with values between 0,78 and 0,91 for both constructs. Detailed results can be found in Table 3.

Positive, negative and neutral expectations were coded as two dummy variables. Negative expectations were coded 1 if present and 0 if absent. Positive expectations were coded likewise: 1 if present and 0 if absent. Neutral expectations were indicated by a score of 0 on both dummy variables. Channel was also dummy coded: 0 signifies a paper letter (blue envelope) and 1 an online notification (via e-mail). Table 4 shows how many times each of the conditions in the vignettes were presented in each of the three measurements.

Because the dependent variable (the speed with which people read the content of the message) is strongly skewed, also residuals based on a regular linear regression are not distributed normally. Hence, we chose to use binary logistic regression to test the hypotheses that were posed. A direct (immediate) response was encoded 0 and a delayed (later) response was coded 1. Furthermore, we used a backward stepwise method to reduce the chances for Type II error (Field, 2005).

4. Results

4.1. Effects of socio-demographics

The first step in the analysis was to test any cohesion between the speed with which people read in a message and socio-demographic variables. A t-test was performed to test the difference between men and women. Pearson's r was computed to test cohesion between speed and age. Finally, a Chi^2 test was used to test cohesion between educational level and speed.

In measurement 1 and 2 no significant differences were found for the three socio-demographic variables that we considered. Results from measurement 1 are for gender (t (402) = 0.23, p = .819), for age (r (404) = -0.09, p = .074) and for education ($??^2$ (8) = 7061, p = .53) and results from measurement 2 are for gender (t (692) = 0.92, p = .36), for age (r (734) = -0.09, p = .016) and for education ($??^2$

Table 4
Number of times a condition was presented in the vignettes per measurement.

		Measurement 1	Measurement 2	Measurement 3
Channel	E-mail	220	333	354
	Letter	184	361	380
	Total	404	694	734
Expectations	Negative	139	240	261
	Neutral	136	230	237
	Positive	129	224	236
	Total	404	694	734
Response speed	Later response	167	288	314
	Direct action	237	406	420
	Total	404	694	734

(8) = 17,069, p = .029).

In measurement 3 we also did not find a significant difference between men and women with regard to response speed (t (732) = −0.52, p = .601). We did however find a small negative effect for age (r (734) = −0.09, p = .016). In the category 16–35 year old, 51% of the respondents responded immediately after notification whereas in the categories 35–55 and 55 and older 59% of the people responded immediately. We also found a small but significant effect for Education in measurement 3 ($??^2$ (8) = 17,069, p = .029; Cramer's V = 0.11, p = .029). People with a lower level of education seem to respond both faster and slower to a notification: 66% of the lower educated people responded immediately whereas 58% of the middle educated and 50% of the higher educated people responded immediately. Interestingly, lowed educated people also responded slower: 5,4% of the lower educated people responded (very) slowly to a notification whereas 2,9% of the middle educated and 2,8% of the higher educated people responded (very) slowly. This leads to the conclusion that there is no linear cohesion between education and response speed.

Because these effects for age and education in measurement 3 are very small and we did not find any effects with regard to any of the socio-demographics in measurement 1 and 2, we decided to continue our analyses without taking socio-demographics into account.

4.2. Hypothesis testing

The model fit for all three measurements is depicted in Table 5. In measurement 1 the percentage of correct predictions increased from 59% to 73%, in measurement 2, the percentage of correct predictions increased from 59% to 77% and in measurement 3 the percentage of correct predictions increased from 57% to 72%. Cox & Snell R Square are 22%, 29% and 20% for measurement 1, 2 and 3 respectively. Nagelkerke R square shows similar results: 22% for measurement 1, 29% for measurement 2 and 20% for measurement 3. In all three measurements the Chi^2 test of Hosmer and Lemeshow Test are not significant which means that the results are satisfactory. In sum, we can conclude that in all three cases the model fits fairly well given the fact that we used only a few variables to predict the speed with which people would act upon a notification. Furthermore, measurement 2 overall seems to have yielded the most accurate results.

Table 6 presents the results from the variables in the regression equation. In order to interpret these results, we examined the B coefficients, their significance and Exp(B) coefficients for each of the variables in the model. In all three measurements, channel has a strong effect on the speed with which people act upon the notifications: an e-mail notification increases the chance of a delay significantly. Figs. 2 and 3 provide more detailed results with regard to this effect. The y-axis shows the odds ratio of an immediate response to a notification. From the fact that the black line (which represents the paper notification) is situated much higher on the y-axis than the dotted line (which represents the e-mail notification), we can deduct that the likelihood of immediately acting upon a notification is much higher for the paper notification than for the e-mail notification. The odds ratio of directly acting upon a notification drop from approximately 80% for the paper notification to a mere 40% for the e-mail notification. Based on the

Table 5
Goodness of fit.

Goodness of fit	Measurement 1	Measurement 2	Measurement 3
−2 Log likelihood	447,873	708,508	840,411
Cox & Snell R square	0,22	0,29	0,20
Nagelkerke R square	0,30	0,38	0,27
Hosmer and Lemeshow test			
Chi-square	2,09	3,56	0,32
df	4	5	4
Sig.	0,72	0,61	0,99

Table 6
Results from binary logistic regression with Response speed (1 = direct / immediate, 2 = later/delayed) as dependent variable.

	B	S.E.	Wald	df	Sig.	Exp(B)
Measurement 1						
Channel	2,59	0,85	9,33	1	0,00	13,39
Channel × Operational skills	0,47	0,16	8,74	1	0,00	1,60
Channel × Information skills	−0,62	0,19	10,46	1	0,00	0,54
Constant	−1,60	0,20	65,70	1	0,00	0,20
Measurement 2						
Channel	4,78	0,80	35,45	1	0,00	119,38
Positive expectations	−0,33	0,20	2,70	1	0,10	0,72
Channel × Information skills	−0,41	0,14	8,25	1	0,00	0,67
Constant	−1,61	0,15	110,38	1	0,00	0,20
Measurement 3						
Channel	2,40	0,72	11,23	1	0,00	11,03
Channel × Operational skills	0,32	0,11	9,26	1	0,00	1,38
Channel × Information skills	−0,44	0,15	8,63	1	0,00	0,65
Constant	−1,31	0,13	108,71	1	0,00	0,27

scores of Exp(B) in Table 5 the chances for delaying acting upon an e-mail notification increase with 120%, 1180% and 100% for measurement 1, 2 and 3 respectively.

The analysis in Table 6 showed no significant effects for positive or negative expectations. In none of the models expectations with regard to the contents of the message played a significant role. For operational and informaiton skills we did find interaction effects.

Table 6 shows that in measurement 1 and 3 relatively small but significant and similar interaction effects were found for operational skills (B = 0,47 and Exp(B) = 1,60 in measurement 1 and B = 0,32 and Exp(B) = 1,38 in measurement 3). In measurement 2, no significant interaction effects for operational skills were found. Fig. 2 shows these interaction effects for operational skills. The level of operational skills does not influence the odds ratio of immediately acting upon a paper notification (black line is horizontal or slightly sloping down). However, the dotted line is sloping down in measurement 1 and 3. In order to understand these specific results, we should take into account that the construct of operational skills is skewed negatively (left): 65% of the respondents have a score of 6 or higher and almost 40% of the respondents have the maximum score of 7. This means that the majority of people can be considered highly skilled when it comes to operational skills. The graphs in Fig. 1 compare the maximum score (7) to all other (lower) scores. From this and from the fact that only measurements 1 and 3 rendered significant results, we carefully and provisionally conclude that people with low operational skills are more prone to immediately responding to an electronic notification.

The construct of information skills is distributed more normally with an average of 5,4 and a standard deviation of 1,0 across all three measurements. Table 6 shows signficiant interaction effects of information skills and notification channel on the response speed. In all three measurements, respondents are more likely to quickly act upon an
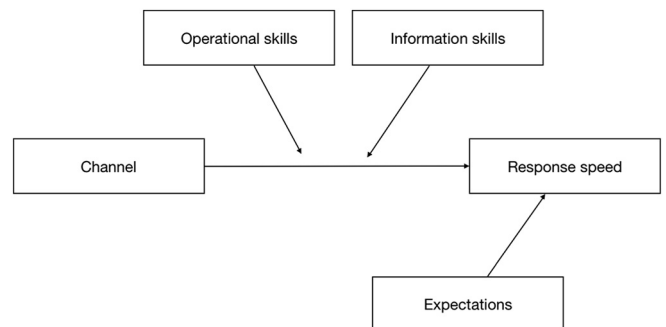
Fig. 1. Research model.
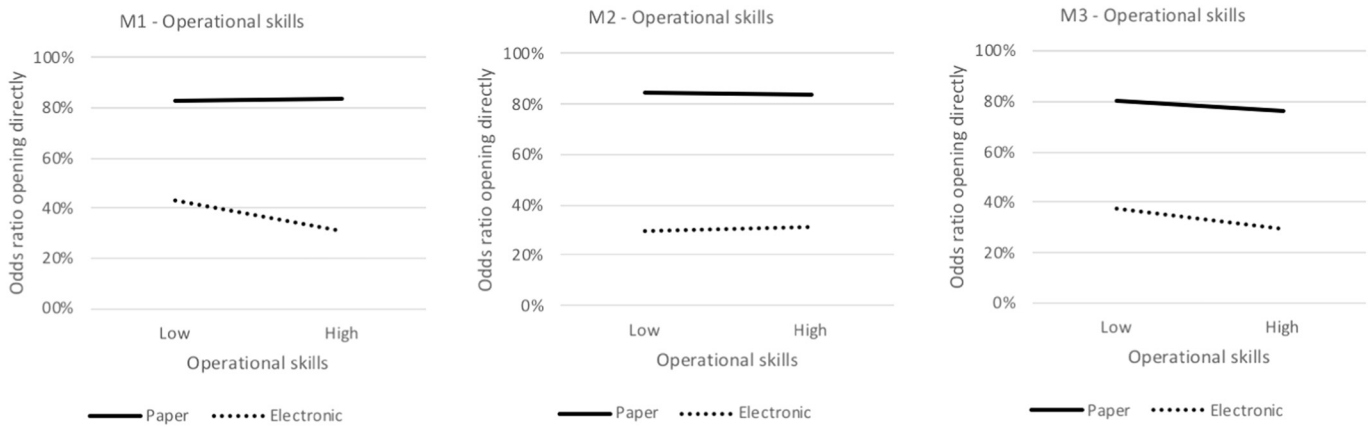
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Fig. 2. Interaction effects for channel and operational skills for measurement 1, 2 and 3.

electronic notification when they have high information skills. These chances are 54%, 67% and 65% smaller in measurement 1, 2 and 3 respectively. Fig. 3 provides a graphical overview of these interactions. For the paper condition we found increasing odd ratio's. This means that people with a higher score are slightly more likely to quickly respond to a notification. In the e-mail condition, there is a bigger difference between people with low and high information skills: the odds ratio of directly acting upon an e-mail notification increases with 11%, 7% and 2% in measurement 1, 2 and 3 respectively for respondents with high information skills as compared to respondents with low information skills.

In order to summarize the above, Table 7 provides an overview of the four hypotheses that were formulated and the overall results.

5. Main conclusions and discussion

5.1. Conclusion

All mediated communication events generally start with some notification carried by a device or medium. Due to digitization of communication, users of digital media are faced with a myriad of notifications that are easily overlooked. As such, digitization of communication may increase the chance that people will somehow miss out on important messages, amongst them presumably important government messages. Accordingly, the overall research goal was to find out what the impact of digital government notifications are on whether or not citizens may or may not act when these notifications appear. To understand possible impact, we incorporated three different theoretical bases in our study: task-technology fit, digital skills and expectancy theory. The model was tested in three separate waves of research that

all yielded very similar results. This shows the robustness of the model that was tested.

Most importantly, our study found out that people responded significantly slower to a digital notification as compared to a 'paper' notification. This strong effect is in line with our expectations based upon the social presence theory. Although we did not investigate whether or not people do not see the message behind the electronic notification at all, there is still reason for concern. If people decide to open a message later (provided they actually see the electronic notification), they are more likely to overlook the message altogether. This may have serious consequences for governmental agencies. In the next section, we will address this issue.

Moreover, our study showed that there is a significant moderating effect of digital information skills on the speed of taking in the message after a 'digital' notification, and not after a paper notification. This is in line with our expectations based upon the theoretical bases of digital skills. Surprisingly though, for operational skills it seems to be the other way around.

Initially, we expected that citizens with higher operational and information skills will respond more quickly to an electronic notification. However, people with lower operational skills are prone to act quicker when receiving a digital notification via e-mail. A possible explanation for this is that people with lower operational skills are afraid to lose the digital notification if not acted immediately upon, as they may not know how to operate alternatively and retrieve an already noticed digital notification at a later moment in time.

From the social presence theory, we derived that a higher level of presence of a sender that may herald unfavorable news leads to a higher inclination to actually read the message. We found out that expectations have no moderating influence on the speed with which messages
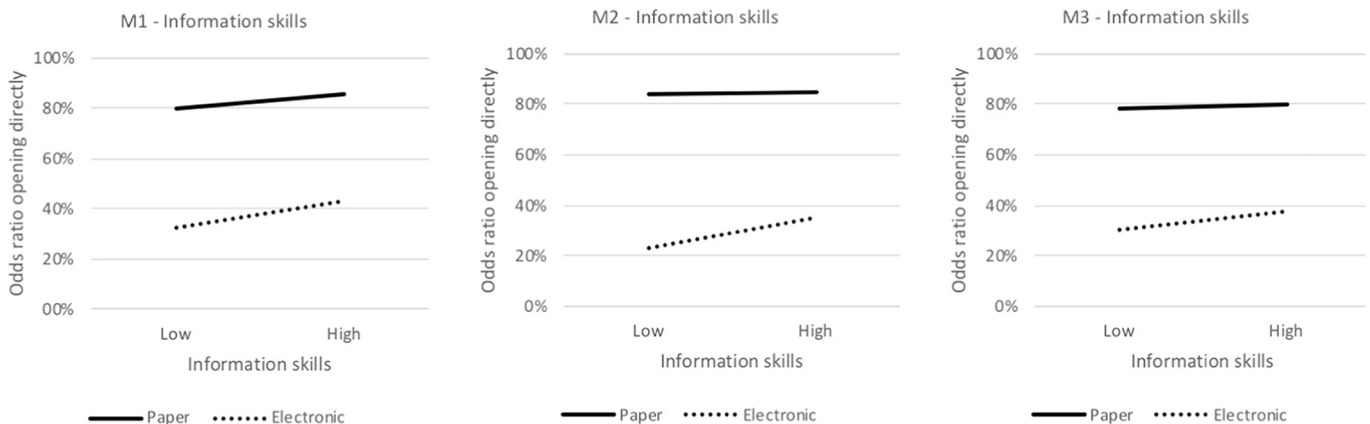

Fig. 3. Interaction effects for channel and information skills for measurement 1, 2 and 3.

Table 7
Overview of results for hypotheses.

	Hypothesis	Result	Remark
H1	The channel through which the message is sent influences the speed with which people read the content of the message. This is faster for the paper channel, i.e. paper letter in a paper envelope than for the e-mail channel, i.e. an e-mail notifying that a digital letter is placed in a web portal.	Supported	All three measures showed a strong effect on speed. The paper letter in a paper envelope is read much faster.
H2a	Operational skills positively moderate the relation between the channel via which a message is sent and the speed with which people act upon the notification that there is a message for them.	Opposed	Operational skills have a significant negative moderating effect in measurement 1 and 3 and a non-significant effect in measurement 2.
H2b	Information skills positively moderate the relation between the channel via which a message is sent and the speed with which people act upon the notification that there is a message for them.	Supported	Informational skills have a significant positive moderating effect.
H3	People that have positive expectations of the contents of a message are more likely to act upon the notification of that message quickly.	Rejected	N/A

are read after notification. A possible explanation for this is that any tax administration as a herald of possibly unfavorable news for an individual citizen may cause people to feel uncertain or insecure anyway. As such, even when expected good news, the effect of the expectation may be neutralized by the mere fact that the sender is the tax administration.

Our study contributes in to the multidisciplinary domain of eGovernment studies in two ways. First, it helps filling a specific gap in studies into multichannel management of government organizations, namely by studying the effects of channel usage. Second, reasoning in line with our findings from a social presence theory and digital skill theory, this study adds to the notion of the importance of user centric design and the relevance of design studies. We will discuss both briefly, as we also discuss future research.

5.2. Discussion

5.2.1. Limitations

Before we will discuss the implications of this research for theory and practice, we will discuss the limitations of the research.

Because the research was administered in the Netherlands, the specific MyGovernment solution that is used in the Netherlands ('Berichtenbox') formed the backdrop of the research. Although every country will have a specific implementation of their systems, we believe that there are general patterns across countries. The issues that are addressed in this paper therefore are likely to emerge in other countries as well.

A second limitation is that this study did not measure actual behavior in response to a notification. Instead, we measured intended behavior based on a vignette. However, there is reason to believe that this intention is related to actual behavior. Research by the National Ombudsman of the Netherlands (2017) shows that after four weeks more than a third of the messages in the web portal have not been read. After a year, almost a quarter of the messages is still not read. Although the explanation may be that people have received the messages in a different way (e.g. on paper), and although we do not know what proportion of blue envelopes ends up unread with the paper waste, these are considerable percentages. Percentages that make it plausible that there is a considerable effect of sending an electronic notification on the chance that people will read a message (directly).

5.2.2. Multichannel management and channel choice research

While so far, many multichannel management studies specifically focus on the uptake and on the why's and wherefores of channel choice, only a few scholars have focused on the effects of channel use in the field of eGovernment (Østergaard Madsen and Kræmmergaard, 2018). Our study specifically helps to fill this gap as it focuses on the effects of channel use for both users at the receiving end of communication processes as for governments at the sending side. For users we found that the effect of digitization of notifications may be, that one fails to

notice that there is an important, perhaps even legally-binding message. For government organizations, as senders, it implies that due to digitization of notifications, governments are increasingly exposed to the risk that citizens do not notice legally binding government message. This in turn may result in non-compliant behavior, which of course as explained in the introduction of this paper, will also possibly infringe the functioning of government itself. Future research therefore should not only focus on the effect that digital notifications have on whether or not timely reading a message, but more importantly future research should consider the effect of timely reading legally binding messages and compliant behavior. As the latter may determine the functioning of government itself in an age of massive digitization of its services.

5.2.3. User centric design and design studies

Notifications are generally the start of mediated communication, especially computer mediated communication. In our theoretical section we argue that due to the digitization of communication and the massive uptake of e.g. social media and smart phones, notifications are easily overlooked. The results of our study imply that the social presence of the sender affects the speed with which users read a message. In this, the extent of social presence is determined by whether or not there is an immediate visibility of the identity of the sender. Meaning that the channel through which the message is sent clearly influences the speed with which people read the content of the message: the response speed is much higher for the paper channel than for the e-mail notification. The theoretical implication of this is that, although the functionality of a notification through two different channels may not differ much, the practical implications could be substantial. The results of this research also indicate that citizens with higher digital operational skills seem to postpone going from a notification to subsequently taking in what follows the notification, namely the message itself. In itself, this may not seem as a problem. We are scared, however, that many individuals will forget that they have been notified. A study of the National Ombudsman of the Netherlands in about the same time period as our measurement showed that about 25% of the Dutch population that activated the government portal in which governments place their digital letters did not visit that portal even after one year a message got placed there (Nationale Ombudsman, 2017). Other research showed that people who activated this portal in the Netherlands have significantly higher digital skills than those citizens who didn't activate that portal. Also, interesting, Østergaard Madsen & Kræmmergaards study (2018) found that in subsequent years the recipients of digital messages were quicker than paper letter recipients to conduct intended tasks, once it became possible to read the messages and carry out the intended task on the same platform. When combining these findings with the findings in this study, we think that there is an increased urgency to rethink and especially redesign the way in which governments digitally notify citizens that there is a message. We think the effortlessness and social presence of contemporary digital communication needs to be improved to have citizens read important and especially

legally binding messages more effectively.

For that, in future research, the help of design studies that take a user centric design approach is much needed. For instance, by designing and testing specific smartphone apps or including the sender in the notification. At the same time, we have to warn that from a digital skills point of view, the effectiveness of smartphone apps should not be assumed and should be studied carefully. A government app notifying there is a message may contribute to the myriad of already existing app notifications.

Related to digital skills and the effects of social presence of contemporary digital communication is the concept of administrative skills and experience. A substantial amount of government communication involves recurring administrative events like annual tax returns or monthly benefit payment. People's knowledge and experience with these events and the potential and possible consequences that go along with these events might influence whether, and how fast they read government information. Over the years, citizens may learn that it is better to react fast upon obligations in order to prevent or to mitigate any undesirable consequences. However, our results so far tell otherwise. Whether or not people expected that they had to pay taxes or that they would receive money, or that they hadn't an expectancy at all, was of no significant influence in either of the three measurements over the course of one and a half year. Especially the variable 'having no expectancy at all', meaning the tax message comes as a surprise, should start to trigger an influencing alarm of some kind. More or less surprisingly, there was no effect. As scholars however, we are still prone to believe that administrative skills are of some influence (see for example Bertot & Jaeger, 2008; Grönlund, Hatakka, & Ask, 2007 and Skaarup, 2012) on how fast citizens read government messages. Future research in which more administrative skills (i.e. more than several expectancies) are merged or supplemented with relevant digital administrative skills will have to show us what that influence is.

Acknowledgements

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