



Bachelor's Thesis
Theme 13: Message characteristics and the adoption of technological
innovation

Modern Technology: How do attribute framing and outcome-relevant
involvement influence privacy concerns due to domestic drones?

International Business Communication

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Abstract

The influence of the framing effect on perceptions, attitudes and decision-making processes are enormous, as a lot of in-depth studies have revealed: whether a message is formulated positively or negatively can be crucial to a person's understanding of the topic. Also, the personal involvement with a certain topic affects individuals in their decisions as well as in the way they process a message; in this experimental investigation, the combined effect of these concepts on modern technological devices are tested. Specifically attribute framing and outcome-relevant involvement were used to find out whether the degree to which people had privacy concerns would change. Domestic drones were used as a case study and representation of a modern technology. The results suggest that a differently framed message indeed influences how strong people feel their privacy at stake, even though the results were not significant. Highly outcome-relevant involved subjects showed significantly more privacy concerns than participants with low involvement, which is in line with what was hypothesized. No significant interaction effect could be found. Further results, future implications and limitations are discussed in the investigation.

Key words: Attribute framing, outcome-relevant involvement, modern technology, domestic drones, privacy concerns, message formulation

1.0 Introduction

1.1 Framing, outcome-relevant involvement, drones and privacy concerns

A framed message has the power to alter a person's perceptions, feelings and decision-making processes by just little changes in the wording (Levin, Schneider & Gaeth, 1998). The effects of this strategy have been investigated in many different contexts, especially in the health and medicine sector (Bizer, Larsen & Petty, 2010; Almashat, Ayotte, Edelstein, Margrett, 2008; Rothman, Salovey, Antone, Keough, Drake Martin, 1992), but within the emerging technology domain, only little research grasps the importance of framed messages to influence people's attitudes. Also an individual's personal interest with a topic can have big effects on how the person understands a message; a message is processed in detail and payed attention to, including the strength of the arguments, when the receiver of the message is involved with the topic (Petty & Cacioppo, 1979). Therefore, these two concepts and their combined effect could influence the degree to which people feel their privacy at stake, considering modern technology.

In the past few decades, technological achievements have led to incredible developments and rapid changes within a fairly short amount of time. In the 1980's, people were suspicious about the first computers which were a very special and expensive good that only few companies could afford (Kaplan, 1982). On the contrary, today's generations can barely spend a day without their smartphones, that are very advanced computers, inevitable for modern communication (Bambury, 2015). Due to technological achievements and highly modern data collection methods, many people articulate disapproval and resentment about the collection of personal information (Robling, Hood, Houston, Fay, Evans, 2004). Schneier (2015) wrote a whole book about secret data collection by mobile phones and most people not being aware of the constant surveillance whilst Tierney, Kissel, Swany & Pouyoul (2012) underline

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 the exponential growth rate of data sets, leading to big data transfers with the help of modern technologies. In the investigation at hand, domestic drones will serve as a case study; the technology is also known as "unmanned aerial vehicle (UAV)" that is capable of collecting big amounts of data; they have developed foremostly since the 21st century and its use is increasing rapidly (McKelvey, 2015).

1.2 Theoretical Framework

1.2.1 Attribute framing

The *framing effect* is a widely used concept in the communication domain. Many researchers have investigated the effects of framing in different contexts and found surprisingly robust results (Bizer, Larsen & Petty, 2010; Cheng & Wu, 2010). It presents a way to find out whether manipulated message characteristics have an influence on people's perceived privacy concerns due to a modern technology and in this specific case, due to domestic drones.

The prototypical framing effect is called *risky choice framing* and was first studied by Tversky and Kahneman in 1981. With this type of framing, a message of identical expected value is put either into a risky or a riskless wording. The wording is based on positive (e.g. lives saved) or negative (e.g. lives lost) terms (Levin et al., 1998). Tversky and Kahneman (1981) found that the risky option was preferred after the participants had been exposed to the negative frame and vice versa.

Later on, Levin et al. (1998) differentiated between two other classifications of framing, next to the risky choice framing. In *goal framing*, "[...] the message stresses either the positive consequences of performing an act or the negative consequences of not performing an act." (Levin et al., 1998, p. 167). Since privacy concerns due to drone usage refers to unknown individuals or organizations controlling the UAV's, there is no way to formulate a gain or loss message for the respondent. However, the third classification *attribute framing* stresses and manipulates only one key attribute of a specific event or object in either a positive or a negative manner. It is best suited to measure the basic process behind an evaluation and how distinct formulations can influence this process (Levin et al., 1998). In the study at hand, privacy concerns represent a key characteristic of any modern technology due to surveillance and data collection techniques of said technologies. Thus, attribute framing suits the purpose of this investigation best, since it makes the concept *privacy concerns* tangible for statistical tests and further analyses.

Levin et al. (1998) found that after having been exposed to an attribute framed message, people judged the described attributes more positively when positive terms were used to describe the object. Kuvaas & Selart (2004) conducted an experiment to study the effects of attribute framing in a business scenario and the results reveal that the positively framed scenario led to more positive evaluations whereas the negatively framed scenario led to more negative evaluations of the scenario. Many other investigations focusing on different types and contexts of framing supported these findings as well (Nelson, Oxley, Clawson, 1997; Nelson & Oxley, 1999; Smith & Petty, 1996; Cheng & Wu, 2010). Based on the findings of the presented authors, we hypothesize that individuals who are exposed to the positive frame will report fewer privacy concerns than individuals who are exposed to the negative frame.

H1: The positively framed text piece about domestic drones will result in lower scores for privacy concerns than the negatively framed text piece about domestic drones.

1.2.2 Outcome-relevant involvement

Having in mind that the degree to which people are involved with a topic is another factor that potentially affects a person's perception, it is presumable that individuals process the message differently, depending on their personal field of interest. Accordingly, the modern technology domain and its related risks and opportunities might cause a decrease or increase in how important the technology at hand is perceived to be and thus in the level of concern for one's own privacy. This leads us to *issue involvement*, a factor that potentially affects the degree to which people suffer from privacy concerns.

In 1979, Petty & Cacioppo were the first to introduce the concept of issue involvement, which can be defined as "a motivational state induced by an association between an activated attitude and the self-concept (Johnson & Eagly, 1989, p. 290). Later on, Marshall, Reinhart, Feeley, Tutzauer & Anker (2008) defined this concept based on Eagly & Chaiken (1993) and Perloff (2003) as "the extent to which a topic or issue is considered personally relevant or significant".

Johnson and Eagly further investigated this rather broad concept in 1989 by conducting a meta-analysis after which they were able to distinguish between three different types of issue involvement. Firstly, value-relevant involvement aims to specifically describe "[...] the psychological state that is created by the activation of attitudes that are linked to important values" (Johnson & Eagly, 1989, p. 291). Impression-relevant involvement in turn, is concerned with social acceptance, social desirability and self-presentation (Marshall et al., 2008). Lastly, outcome-relevant involvement "[...] make[s] salient to message recipients the relevance of an issue to their currently important goals or outcomes" (Johnson & Eagly, 1989, p. 292).

Specifically, outcome-relevant involvement (ORI) is applicable to our investigation since it is the type of involvement that considers personal goals and preferred outcomes. Privacy and its protection are a highly valuable and important goal individuals have at all times. The increased use of data collection devices for commercial as well as private purposes represents an interfering and endangering factor for the preservation of said goal. We therefore suspect that the degree to which an individual is outcome-relevant involved with the issue at hand impacts the level of concerns for his privacy due to modern technologies.

Cho & Boster (2005) conducted an experiment and found that when the described scenario was affecting an individual personally, they would pay more attention to the given information as well as process it at higher levels of cognition. The results of the study reveal that ORI has an effect on communication and processing, namely that the intensity with which a person is likely to process a message in-depth changes. Furthermore, Hubbell, Mitchell, & Gee (2001) and Levin et al. (1998) discovered that those with high ORI tend to process the information more objectively and with less biases. Just like Cho & Boster (2005), they found that individuals with high outcome-relevant involvement are less influenced by the message characteristics as they are motivated to evaluate the provided information extensively. These findings are in line with the communication-based "Elaboration Likelihood Model", established by Petty & Cacioppo in 1980, published in 1984. The model explains the cognitive human process of paying attention to a message and the strength of its arguments when the topic is interesting or personally relevant ("central processing route") versus the superficial message processing in case of no personal interest or relevance, where the focus lies on message cues such as source expertise, that are of no relevance for the text quality and logic ("peripheral route"). Okazaki, Navarro-Bailón & Molina-Castillo (2012) investigated the effects that high issue involvement has on information privacy concerns due to QR code mobile promotion and found significant results for their hypothesis that highly involved participants

Bachelor's Thesis - Modern Technology: How do attribute framing and outcome-relevant involvement influence privacy concerns due to domestic drones? Helene Winkels have greater information privacy concerns. In 2008, Bae conducted an experiment, revealing the effects of emotion and involvement on decision making and intention. The results suggest that emotional arousal fuels high involvement and therefore heightens the concerns around an issue.

Based on the aforementioned literature, we hypothesize that high outcome-relevant involved participants will have greater privacy concerns.

H2: Highly outcome-relevant involved participants will have greater privacy concerns due to drones than low outcome relevant involved participants.

1.2.3 The combined effect of framing and ORI

The results of Hubbel et al. (2001), Levin et al. (1998) and Cho & Boster (2005) described above suggest that the designer of the message can potentially influence the degree to which an individual is outcome-relevant involved with the topic based on the message characteristics. In other words, a combined effect of the two strategies is assumable.

Only a few investigations have studied the combined effect of involvement and framing and mainly focusing on different types of these concepts. Cheng and Wu (2010) tested for the effects of value-relevant involvement on the attribute framing effect and found that only low involved participants were impacted by the different attribute frames; for highly involved participants, no framing effect was found. Furthermore, Bosone & Martinez (2017) studied the influence of issue involvement on the effects of goal-framing and found similar results; low involved participants were more influenced by the framed messages than were highly involved participants. Even though the types of framing and involvement were different between the two studies, they both revealed that a person's involvement alters the attribute framing effects. Maheswaran & Meyers-Levy (1990) revealed that positively framed messages are more persuasive in case of little issue involvement, but high issue involvement leads to stronger persuasion when the message was framed negatively. The same effects were found by Rothman et al. (1993) in an experiment revealing people's responses to skin cancer detection examinations but focusing on goal-framing and issue involvement. Donovan & Jalleh (1999) studied whether the degree of involvement impacts the decision-making process after having been exposed to attribute framing conditions in the scenario of infant immunization. They found that for highly involved participants, there were no framing effects, in contrast to the low involvement participants. They explain that this might be due to more effortful processing (based on the ELM model, 1984), which is in line with the findings of Hubbel et al. (2001), Levin et al. (1998) and Cho & Boster (2005). Even though the authors did not state which type of involvement they based their investigations on, the study design suggests that outcome-relevant involvement was the decisive factor for the scenario, as they categorized the respondents (only females) either in young mothers, mothers to be or with the wish for a baby versus women who do not fit these conditions. It is assumable that a female belonging to the first category is interested in the outcome of infant immunizations, as her child's health is a goal and priority for her (outcome-relevant involvement).

The presented literature suggests, that most of the few research in the field of involvement and framing has been conducted focusing on different types involvement, such as value-relevant involvement or the all-including issue involvement. In terms of framing effects, most research has been conducted using the goal framing approach. Even though the studies presented did not study effects of ORI and attribute framing in combination (except Donovan & Jalleh, 1999), they tell us something about the consequences of the interaction between involvement and framing in general.

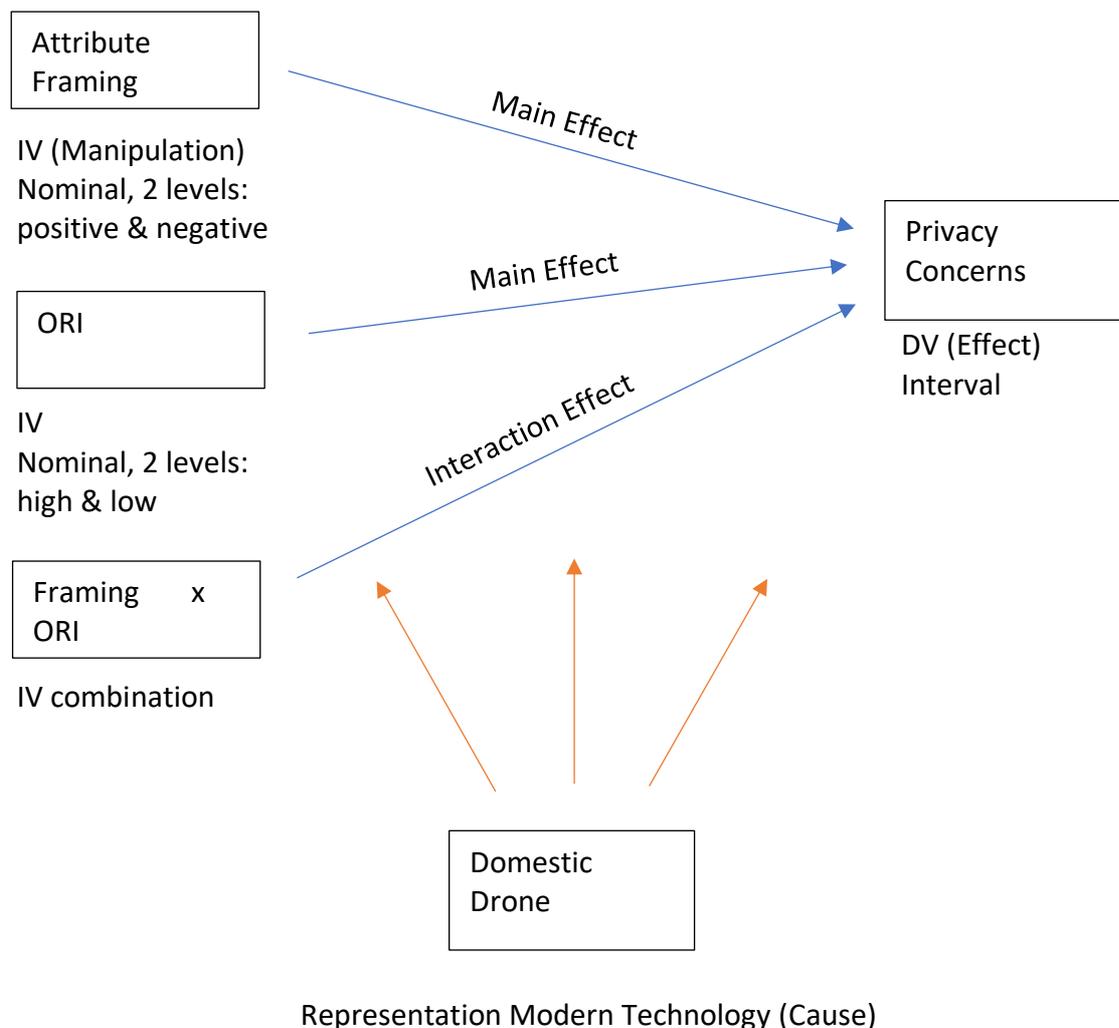
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The abovementioned research gap suggests that further investigations need to be conducted, specifically combining the effects of ORI and attribute framing on a certain issue. The studies presented point towards a certain direction, namely that individuals that are highly involved with an issue are less influenced by framed messages than participants with low involvement.

Therefore, we decided to conduct an extensive study on the specific effects of outcome-relevant involvement and attribute framing. We hypothesize, that also with this specific combination of the two concepts, highly outcome-relevant involved people with the issue of privacy concerns due to modern technologies will be less influenced by the type of attribute framing they are exposed to.

H3: Highly outcome-relevant involved participants will be less influenced by the type of attribute framing used, compared to low outcome-relevant involvement participants.

The analytical model presented below visualizes the process and the functioning of this experiment; the privacy concerns caused by modern technologies are tested on, using a manipulation and the presented variables. More about this in the method section.



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1.2.4 Privacy concerns

Since domestic drones are the case study of this experimental research of attribute framing and ORI effects on privacy concerns due to modern technologies, the literature review on privacy concerns was specifically constricted to research focusing on privacy concerns due to UAV's.

Various researchers have conducted investigations on where exactly people's privacy concerns due to drones might be reasoned. Chang, Chundury & Chetty (2017) conducted a laboratory experiment where user perceptions of privacy and safety threats around drones were evoked by exposing them to either a real or a model drone. They found that participants suffered from substantial concerns about their privacy, however, depending particularly on the drones' design. Specifically, the dark color, the size and the sound were factors that made participants feel insecure about the technology. In addition, Rao, Goutham Gopi & Maione (2016) focused on the societal impact of commercial drones and performed a discourse analysis of spontaneous written texts. According to the authors' conclusion, the population can be divided into unmanned aerial vehicle enthusiasts and skeptics, the latter of which foremostly feel their privacy and freedom at stake. In a spontaneous written text the investigators analyzed for research purposes, Ipsos (2015) conducted a survey including 2405 US citizens and revealed that about 42% of the interviewees declared considerable privacy concerns and thus articulated a disapproval for private drone-ownership.

In contrast, Clothier et al. (2015) as well as Lidynia et al. (2016), both of which conducted quantitative surveys, did not find significant results, suggesting that there is no relationship between the increased usage of UAV's and privacy concerns. The contradictory findings of the aforementioned authors prove that there is an inconsistency with regard to the status quo of the investigations conducted to date.

A possible explanation for the contradictory findings is that understandings of what privacy means, what it includes and where its limits lay vary substantially (Warren & Brandeis, 1890; Schoeman, 1984; Culnan, 1993). Xu, Dinev, Smith & Hart (2011) summarize that the definitions given for this term heavily depend on the field of usage, and refer to Margulis (1977), who pointed out that the specific perspectives from which to look at the topic need to be taken into account. Altman (1977) and Laufer & Wolfe (1977) further described privacy as an elastic, multidimensional concept which can undergo alterations due to life experience, thus, is dynamic and dependent on its context. Therefore, giving a clear definition of what privacy generally and objectively means is nearly impossible.

A possible solution to this issue is the approach of Xu et al. (2011); the authors distinguish between general and situation-specific concerns about one's privacy. They state that most investigations tested for privacy concerns in general terms, however they found that peoples' concerns about their privacy and about personal information disclosure are rather situation-specific and subjective. The authors state that specific concerns are better understandable than general, rather abstract ones. Thus, adapting to the findings of Xu et al. (2011), we decided to work with the definition given for situation-specific contexts, as our investigation is researching the issue of privacy concerns in the specific context of domestic drone usage. It is defined as: "[...] consumers' concerns about possible loss of privacy as a result of information disclosure to a specific external agent (e.g., a specific website.)" (p. 800).

1.2.5 Domestic Drones

New technologies are going far beyond what one thought was possible and drones are one of these technologies. Drones are the communication devices of tomorrow, facilitating modern communication through connections to smart objects (Won, Seo, Bertino, 2015;

Bachelor's Thesis - Modern Technology: How do attribute framing and outcome-relevant involvement influence privacy concerns due to domestic drones? Helene Winkels Jones et al., 2016). Initially, drones were designed and built only for military purposes (Ritchie, Fioranelli, Griffiths & Torvik, 2015), but domestic drones of today can be used by the government, organizations and laypeople (West, Klofstad, Uscinski & Connolly, 2019). According to Floreano & Wood (2015), UAV's influence humans' ways of working in the domains of transportation, agriculture, environment preservation and communication, since many organizations and laypeople use the technology for commercial, private and communicative purposes. Whether they are used for surveillance in order to increase safety and to decrease criminality on the streets or for taking private high-quality photos; people have immense concerns about their privacy when it is about this highly developed, new technology (Thompson II, 2015). These concerns are not unreasoned. As McKelvey (2015) points out, drones could be potential targets for terrorists or criminals in the field of cybercrime. Stealing or damaging sensitive information are considerable risks new technologies bring along and every piece of data that is collected has to be communicated to an unknown external platform (Clark, Meffert, Baggili, Breitinger, 2017). However, nearly no laypeople get to know where photos or other confidential information collected by drones are saved (Finn & Donovan, 2016).

In his content analysis, Thompson II (2015) analyzed which factors hinder the full integration of domestic drones in the western society. He pointed out that defining the term *privacy* as well as finding the entity that should be responsible for controlling drone usage and privacy laws are moderating factors. Based on these issues, for many people drones and drone usage lead to substantial concerns about personal privacy (Thompson II, 2015). We decided to focus on domestic drones that are "small, unmanned aircraft capable of delivering packages or capturing photos." (Rule, 2015, p. 156), because these are the types of drones that threaten individuals' privacy in their everyday lives most, as the laws and regulations for this specific drone type are yet to be clarified and established (Lidynia, Philipsen & Ziefle, 2016). Anyone can make use of this type of UAV without limitations (West et al., 2019). The technological advances can, in many aspects, be of great help in people's everyday life. However, as it is with any highly advanced technology, doubts about how far the developments may go and how controllable the immense flow of data is rise, considering the technological achievements (Vattapparamban, Güvenç, Yurekli, Akkaya, & Uluagaç, 2016).

Considering the aforementioned research gap, the following specific research question emerges: How do attribute framing and outcome-relevant involvement influence privacy concerns due to domestic drones? It is important to underline the representative role of *domestic drones* in this experiment, since this concrete technology is used to make *modern technologies* more tangible for research.

2.0 Methodology

To find out whether main and interaction effects could be found in order to answer hypotheses 1-3 as well as the research question, an experimental survey, divided into three different stages, was conducted: A representing the article with the stimuli (framing), B being the ORI statements and C showing the privacy concerns statements. The precise steps that were undertaken for this research as well as exact variable descriptions are presented in the following subsections.

2.1 Materials

The first independent variable is attribute framing; we manipulated two conditions, namely positive and negative frame, which resulted in a variable at the nominal level. The second independent variable is outcome-relevant involvement with the issue of privacy concerns due to modern technologies. It is also at the nominal level, as we categorized the people into either high or low ORI candidates. Only the framing variable was manipulated in a way that participants received different versions to which they were assigned to randomly. The stimulus material was a little text piece containing a picture of a domestic drone of white color flying in the sky on the right-hand side to make sure that every participant had the same type of drone as a reference point. The picture was present in both text-versions whilst a short article described drones and their fields of usage in an objective way. The framed paragraph followed at the end of said article, according to the definition of attribute framing by Levin et al. (1998, p.158). Of the 185 responses considered for further analyses, 92 subjects were exposed to the positive frame (47,7%) whereas 93 respondents were presented with the negative frame (50,3%). Thus, the frame distribution was fairly equal. The articles were identical in terms of length and how they were presented. The second independent variable 'involvement' was part of the non-manipulated survey, henceforth it was a random-effect variable. More about this will follow in the statistical treatment.

2.2 Subjects

During the analysis, the sample was divided into groups based on their age since investigations in the field of technology acceptance and risk perception tend to use a fairly wide age range (Clothier et al., 2015; Chang et al., 2017); this could be a limitation as to the different perceptions of technology older and younger generations might have (Rama, de Ridder, & Bouma, 2001; Lorence & Park, 2006). To be confident about representative findings for a homogeneous group, we decided to focus on the *millennial's generation*. According to Gibson and Sodeman (2014), "[m]illennials (born between 1981-2000) [...] have seen [...] the impact of technology in all aspects of their lives from healthcare, transportation, to communication" (p. 66). Also, Lippincott (2012) concludes that people born in these years have differently working brains compared to older generations; differences could be found in their capabilities for multitasking, their speed with which they are able to operate technological devices and their online interactions. Consequently, respondents who were younger or older according to the given definition of the millennial's generation were not taken into account for further analyses. Of 210 completed questionnaires, 185 pertained to the millennial's generation. This approach allowed for more specific results for that age group, even though the range of age that was analyzed as a homogeneous group was fairly wide. Accordingly, possible differences within that age range stayed undetected.

Barke, Jenkins-Smith & Slovic (1997) and Donovan & Jalleh (2000) found different results for men and women in terms of risk perception and type of framing, thus a question about the participant's gender was included in the demographics; 60% were women, 39.5% were men and 0.5% described themselves as other. Because most investigations used a single culture approach, nationality was included in case significant differences between respondents based on their country of origin were evident. Most respondents were Germans, namely 43.2%, followed by other nationalities (29.2%) and then the Dutch (27.6%). In total, subjects pertaining to 30 different nationalities took part in the experiment. Two questions about their occupation and their educational or professional relation to technology were

Bachelor's Thesis - Modern Technology: How do attribute framing and outcome-relevant involvement influence privacy concerns due to domestic drones? Helene Winkels asked, based on the research of Ziefle & Schaar (2010), in that a high level of expertise in the technology domain was proved to positively affect acceptance of new technologies. 57.3% of the respondents indicated that they were studying at the university, whilst 36.2% were working; 6.5% indicated "other". To the question whether their occupation or field of study is related to technology, 37.8% answered with yes.

2.3 Design

An experiment was chosen for based on various reasons: firstly, we as researchers consciously designed the context that the participants were exposed to, with the goal of triggering certain effects by using a manipulation. Secondly, the designed context functioned as an interrelated system where one factor would not work without the other. Lastly, as researchers we went through a thought progress throughout the experiment in terms of theories and developing the hypotheses, rather than knowing about a fixed concept that could be tested (Cobb, Confrey, diSessa, Lehrer, Schauble, 2003). A 2x2 between-subjects factorial design was used for the experiment, since the respondents were only exposed to one version of the framing effect. Furthermore, the second independent variable 'involvement' was categorized into high and low outcome-relevant involved subjects based on a median split calculation, since ORI was a random-effect variable.

2.4 Instruments

The dependent variable 'privacy concerns due to domestic drones' was at the interval level and was measured using four statements anchored by seven-point Likert scales (strongly agree – strongly disagree) based on Xu et al. (2011). Cronbach's Alpha was conducted to test for the inter-scale reliability of the four items of *privacy concerns* and it was found to be high ($\alpha = .854$). Two questions serving as a manipulation check for the framed article based on Ferguson & Gallagher (2010) followed, a Cronbach's Alpha test revealed a good inter-scale reliability ($\alpha = .777$). Secondly, the independent variable 'outcome-relevant involvement' was measured according to the statements based on Cho & Boster (2005). Eight statements with seven-point Likert scales (strongly agree – strongly disagree) were used to find out whether people had high or low outcome-relevant involvement with the issue. An item inversion for the items 2, 4 and 5 was necessary so that "1" would always describe low ORI and "7" would always represent high ORI. To test for the internal consistency of the eight ORI scale items, Cronbach's Alpha was conducted and it was found to be high ($\alpha = .844$). Thus, the sets of items used to measure the according concepts were both highly related.

Lastly, five demographic questions were asked, namely about the respondents, gender (m/ f/ d), their age (<20, 20-39, >39), their occupation (student: yes no), their nationality (open) and if their occupation or education is in some way related to the field of technology (yes/ no).

2.5 Procedure

The experiment was conducted in April 2020 and the survey which was designed on a platform called *Qualtrics.com* was made available online on public Facebook sites such as "Survey sharing 2020". The simple random sampling approach was used, since the survey was public and made available for anyone. Considering that this method of distribution ensures the representativeness of the sample, we were able to generalize to the target population.

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Furthermore, the simple random sampling approach was used because it allows for an equal chance of selection from the population as it is part of the *probability sampling methods* (Acharya, Prakash, Saxena, Nigam, 2013). It is one of the most popular and most functional sampling methods used in research (Fox, 2010). Due to our 2x2 factorial design, there were four conditions people could be exposed to; the randomizer of Qualtrics assigned participants randomly to one of the two framing conditions, while a median split was used to ensure an equal distribution of ORI. No incentives were used to motivate the respondents to take part in the study.

Before starting the questionnaire, the participants were welcomed to the survey and were then clarified about the anonymity and the option to step back from participating at all times. An introduction about the topicality of the presented issue of drone usage in times of the coronavirus SARS-CoV-2 was present below the link after mentioning that the survey is part of a Bachelor thesis investigation. In the following, the participants were presented with the newspaper article containing the framing effect and the neutral picture of a drone (see Appendix 1). To guarantee the full understanding of the framed sentences by all respondents, a definition written by the Cambridge Dictionary of *informed consent* was given.

The questionnaire followed, with the statements about privacy concerns based on Xu et al. (2011), two manipulation check questions, the ORI statements based on Cho & Boster (2005) and lastly the demographic questions. After the participants finished, they were presented with a debriefing, since none of the previously given information disclosed the real purpose of the study. The survey respondents could send back the filled-out questionnaire, to which insight was possible right away; the participants were thanked for having taken part in the survey. Reading the materials and filling out the questionnaire took the respondents approximately ten minutes; the procedure was the same for everybody.

2.6 Statistical Treatment

In order to answer the research question and hypotheses, a two-way ANOVA was conducted to test for the relationship between attribute framing and ORI on privacy concerns due to drones. Because of the random-effect variable involvement, a median split was used to ensure that sufficient participants were present for both involvement conditions. The median split intends to split the scale relative to the median of the sample scores instead of splitting it based on the scale median. Using this strategy, the statistical confidence might decrease, however, an equal distribution of high and low involved participants is assured for (Allen, 2018). Two independent samples t-tests were conducted to test whether the manipulation check questions grasped the manipulative intention of the framed article. The realization of an analysis of covariance (ANCOVA) was used to test for the effects that the confounding variable *expertise* had on the framing effect for both conditions, thus, whether subjects seen as having experience with technology perceived the frames differently than non-experts. A frequencies test was conducted for the different percentages pertaining to the demographical questions.

3.0 Results

3.1 Framing, ORI and its interaction effect on privacy concerns

The data that was collected allowed for extensive analyses to answer the research question and the three hypotheses, in other words, whether there were main effects as well as an interaction effect between framing and ORI on privacy concerns due to drones. Before the two-way univariate analysis could be conducted, the ORI variable which was at the interval level was converted to a nominal level variable by using a median split. As table one shows, this process allowed for an equal distribution of high and low involved participants. The median split value lay at 38, which means that all subjects who had a score of 38 or lower on the sum of all eight ORI scale items were considered as participants with low ORI (50.8%, N = 94), whilst people who had a higher accumulated score than 38 on the ORI items were considered as highly involved (49.2%, N = 91). The median split assured for an equal dichotomization, but it might have altered the results since rather neutral participants were categorized into the high or low ORI condition as well (Sedney, 1981).

Table 1.

Descriptive statistics of the median split for ORI division

	Frequency	Percent	Valid Percent	Cumulative percent
Valid 0	91	49.2	49.2	49.2
1	94	50.8	50.8	100.00
Total	185	100.00	100.00	

Note. 0 = high ORI, 1 = low ORI

Table 2.

Descriptive statistics of a two-way ANOVA for ORI and framing on privacy concerns (N= 185).

ORI	Frame	Mean	Std. Deviation	N
High	negative	13.19	4.25	41
	positive	12.80	4.38	50
	Total	12.97	4.31	91
Low	negative	11.13	4.82	52
	positive	10.40	4.20	42
	Total	10.80	4.54	94
Total	negative	12.04	4.67	93
	positive	11.70	4.44	92
	Total	11.87	4.55	185

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The descriptive statistics (table 2) show the fairly equal distribution of the participants amongst the ORI condition.

A two-way ANOVA with ORI and framing as factors showed a significant main effect of ORI on privacy concerns ($F(1, 181) = 11.48, p = .001$). Framing was not found to have a significant main effect on privacy concerns ($F(1, 181) < 1$), neither did the interaction effect of ORI and framing ($F(1, 181) < 1$).

The results indicate that high outcome-relevant involved participants had significantly more privacy concerns ($M = 12.98, SD = 4.31$) than people with low ORI ($M = 10.81, SD = 4.55$), meaning that personal interest lead to more fearful as well as negative processing.

Table 3.

Descriptive statistics of an Analysis of Covariance (ANCOVA) for expertise (confounding variable) and framing on privacy concerns (N= 185).

Frame	Mean	Std. Deviation	N
Negative	12.04	4.67	93
Positive	11.70	4.44	92
Total	11.87	4.55	185

Table three shows that the means for the negative and the positive frames are fairly similar, suggesting no substantial differences among these two groups when testing for expertise as a confounding variable.

An analysis of covariance (ANCOVA) showed that after controlling for the confounding variable level of expertise related to the study or work in the field of technology, there was no significant impact found on the framing effect ($F(1, 182) < 1$). The test revealed that subjects who were categorized to have some kind of expertise in the technology domain either through their work or their study did not perceive the frames differently than the non-expert subjects.

Table 4.

Descriptive statistics of an independent samples t-test for manipulation check-question 1 and framing (N=185).

	Frame	N	Mean	Std. Deviation	Std. Error Mean
Do you think the tone of the text was positive or negative?	negative	93	4.40	1.31	.136
	positive	92	4.23	1.16	.121

Table 4 shows the similar mean scores of the positive and negative frame exposure in relation to the first manipulation question.

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 An independent samples t-test showed a non-significant relationship between the first manipulation-check question and the framing conditions ($t(183) = .93, p = .353$).

Table 5.

Descriptive statistics of an independent samples t-test for manipulation check-question 2 and framing (N=185).

	Frame	N	Mean	Std. Deviation	Std. Error Mean
Do you think the text focused on the benefits of drones?	negative	93	4.61	1.54	.160
	positive	92	4.21	1.58	.165

Table 5 shows that the mean scores for the two framing conditions are similar in terms of manipulation-check question 2.

An independent samples t-test showed a non-significant relationship between the second manipulation-check question and the framing conditions ($t(183) = 1.77, p = .079$).

The independent samples t-tests for the two manipulation check questions suggest that the items measured do not grasp the framing manipulation in a strong enough way.

4.0 Conclusion and Discussion

The goal of this research was to answer the research question and the hypotheses whether effects of outcome-relevant involvement and attribute framing on privacy concerns due to modern technologies could be found, whilst the effects were tested on drones as a representation for such technologies. Drones only display a fraction of today's data collection devices, considering the diverse fields of usage for such technologies (Mann, Nolan & Wellman, 2002), however, representing a popular device for said purpose (Floreano & Wood, 2015).

Firstly, it must be underlined that the results obtained represent only a certain population, namely the millennials generation. A sample of this homogeneous group allowed us to answer a very specific question, however, excluding other groups from the results discussed in the following (Mugabi, September 2019).

4.1 Results overview

It can be concluded that no significant effect of framing on privacy concerns could be found, even though the results suggest a tendency that subjects who were exposed to the positive frame had less privacy concerns than participants who were exposed to the negative frame. Also the tests for the manipulation check questions were not significant, meaning that the questions did not capture the framings in a strong enough way. Dwita (2007) states that this could be due to the superficial reading of the framed article; she hypothesized that the framing effect might occur only after the text has been read various times, after finding her

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 manipulation check to be insignificant. ORI was found to have a significant effect on privacy concerns due to drones. Specifically, highly involved subjects had more privacy concerns than participants with low outcome-relevant involvement. Further, no significant interaction effect of ORI and framing on privacy concerns could be found; high ORI participants who were exposed to the negatively framed message showed more privacy concerns than participants of the same category exposed to the positive frame, a trend that was equally found for subjects with low ORI. Contrarily to our predictions, low ORI participants of both conditions scored lower on privacy concerns than the total of high ORI participants; even though this finding was not significant, it suggests that the subjects with high outcome-relevant involvement were slightly more influenced by the framing effect than low ORI subjects.

Lastly, no significant effects were found for a relationship between the level of expertise in the technology domain and privacy concerns, meaning that technology related workers or students did not differ in their degree to which they had privacy concerns due to drones. The same was found for level of expertise and framing; experts in the field of technology did not perceive the framing differently than non-experts.

4.2 Discussion

The findings of Levin et al. (1998), Hubbell et al. (2001) and Cho & Boster (2005) could not be replicated; their results that high ORI leads to more objective processing and thus less influence by the message characteristics was not evident in our results, an effect that could be due to the first main effect, *framing*. Even though our first hypothesis that the positive frame results in less privacy concerns than the negative frame could not be confirmed by significant results, a visible trend of this phenomenon in our sample supports the findings of Levin et al. (1998) and Kuvaas & Selart (2004), that individuals who received a negatively framed message evaluated the described scenario more negatively and as a consequence had more concerns due to drone usage.

Another explanation for the non-significant results of the first hypothesis could be the level of expertise an individual has. As Levin et al. (1998) and Hubbell et al. (2001) pointed out, participants who are involved with an issue are prone to process a message more objectively and to be more resistant to communicative manipulation strategies. Working or studying in the field of technology could therefore lead to more objective processing of a technology related message, as ours was. However, the results are non-significant and therefore suggest that the one-third of the sample that worked or studied in a technology related field did not process the framed messages differently and thus did not score differently on privacy concerns than the two-third of non-experts, a finding that is contradictory to the results of Ziefle & Schaar's (2010) research.

The significant results of the second main effect *outcome-relevant involvement* confirm our hypothesis that high ORI leads to more privacy concerns due to drone usage and are in line with the findings of Cho & Boster (2005), who found that involved individuals processed a message with more care and intensity. Also, the ELM model (Petty & Cacioppo, 1980) is supported by these findings, in that the central processing route was used by highly involved people for whom the topic was of personal relevance whereas the peripheral processing route served the low involved participants. Furthermore, Bae's (2008) and Okazaki et al.'s (2012) more specific findings that highly involved people had more privacy concerns were equally supported by our results, though our investigation expands the knowledge to date to the effect one specific type of involvement has on privacy concerns.

Just as the first hypothesis, also the third presumption could not be confirmed. There was no proof for our hypothesis that highly outcome-relevant involved individuals were less

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influenced by the type of attribute framing used. High as well as low ORI participants showed the same pattern, namely that the positive frame exposure lead to less privacy concerns than the negative frame exposure. And surprisingly, even though the effect was non-significant, the mean scores indicate that low ORI subjects were slightly less influenced by the framed articles than high ORI participants, which is the opposite of what was hypothesized. Consequently, the effects that Cheng and Wu (2010) found for value-relevant involvement and Bosone & Martinez (2017) found for the general issue involvement, namely that for these types of involvement only the highly involved people were affected by the message framing, could not be supported. The results of Maheswaran & Meyers-Levy (1990) and Rothman et al. (1993) that a positive frame was more persuasive when the subjects had low issue involvement and vice versa was not evident either. Also, the findings of Donovan and Jalleh (1999) could not be replicated. The researchers found the same effect as did Cheng and Wu (2010) and Bosone & Martinez (2017) in the scenario of infant immunization. They explained these findings with the help of the ELM model (Petty & Cacioppo, 1984), and effortful processing in case of personal relevance. Even though confirmatory results could be found for the ELM model in case of the involvement condition (second hypothesis), the interaction effect of framing and involvement as was found in the investigation of Donovan and Jalleh (1999) could not be supported.

4.2.1 Limitations

Since the framing effect is an in-depth studied and robust concept (Zhao & Pechmann, 2006), the rejection of hypotheses one and three are surprising. A possible explanation for the results could be the sample size. Since only 185 questionnaires could be used for further analyses, it is plausible that the number of participants did not allow for a big enough sample in a quantitative investigation in order to be representative of the target population. Furthermore, even though the framed paragraphs were designed according to Ferguson & Gallagher (2010) its position at the end of the article may have caused a rather superficial reading of the – for the purpose of this investigation – most important part. Also, the order in which the different parts were presented in the survey may have influenced the results, which is in line with the primacy effect theory first studied by Asch (1946). Also Li (2009) found that information presented first is better memorized than more recent information. Furthermore, mentioning Covid-19 under the link to the survey may have altered the results, as its topicality could have had emotional effects on the subject. Another explanation that may have caused our findings is the type of technology that was chosen for as a representation of a modern technology. Even though drone usage is increasing rapidly, especially now in times of Covid-19 (Marr, March 2020), for many people in the western world it is a technology which is remote to one's own, personal life. This may have resulted in weaker motivation to pay full attention to the message as well as fewer understanding of the articles' relevance. Lastly, the realization of a pre-test would have increased the chances for significant framing effects as we would have had the opportunity to adapt the framed article. However, we chose to include a manipulation check instead, based on the research design of the very similar study of Donovan and Jalleh (1999) and based on literature supporting the effectiveness of a manipulation check (Kidd, 1976).

4.2.2 Future research

The fields of usage for modern data collection techniques are overwhelming and they are made more tangible by rapid developments (Mann et al., 2002; Antoniou, Balakrishna & Koutsopoulos, 2011). Considering future research, it might be appropriate to compare

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technologies and see whether results differ on that parameter, thus if the effects of framing and involvement are limited by the type of technology. As Demchenko, Grosso, de Laat and Membrey (2013) point out, big data transfers are shifting focus and infrastructure in the science as well as in the industry domain, privacy concerns are not only an issue of domestic drones. Moreover, it might be useful to investigate further the effects of age on the issue at hand. Since most of previous research focused on no particular age range and in the investigation at hand the focus lay on people aged between 20 and 39, the direct comparison of a sample that contains younger as well as older individuals than the millennial's generation might give insight into differing technology-perceptions due to age as well as the perceived value privacy has for various generations.

4.2.3 Relevance

The above described investigation might be of theoretical value for future researchers considering various aspects. Firstly, it offers insight into the effects of an individual's outcome-relevant involvement on the way he or she will process a message, which might be useful for linguistic research, for example on text perception or the human mental process during persuasive message exposure. Secondly, the inconsistent findings of the interaction effect between attribute framing and ORI of Donovan & Jalleh (1999) and the investigation at hand lead to the necessity of more in-depth research on this specific interaction effect. Research should be done to find out whether attribute framing, ORI and their interaction effect have stronger or weaker impact concerning topics away from the technology related field. From a practical perspective, the results suggest that people's privacy concerns due to the increased usage of drones can be controlled for to some extent, based on the message formulation. Even though the results were not significant, the trend that was found for the positively and negatively framed articles suggests that by formulating a message about a certain technology in a positive manner based on one key characteristic, it could lead to a decrease in people's privacy concerns. Even though some of the findings of the investigation at hand are inconsistent with previous research findings, it is assumable that with the help of communication, one can steer people's responses towards an intended direction; this could be useful when it comes to crisis management for companies and organizations or the formulation of persuasive messages for possible clients in the marketing domain.

All in all, the investigation realized at hand contributes to previous research and opens up new ways for future research, in that the hypotheses and discussed literature could only be confirmed partially. Nevertheless, it is of inevitable importance to understand that there is a connection between the framing effect, ORI and privacy concerns and how communication science and working with the right communicative strategies can impact tendencies, attitudes and even feelings. This insight can be used to one's advantage, be it in theory or in practice.

7500 words

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Appendix

1. Article & framing

a) Negative frame

Data collection by drones

April, 2020.

Over the years, the usage of drones has increased around the world. The development of drones started with large drones for military purpose. Nowadays, drones are equipped with a variety of sensors, for example cameras and heat sensors that collect and store data.

This data is used in many different fields; for instance, private photos or videos but also official surveillance by the police or government. Some people are scared of them and do not want to appear in the data because they are not able to give their informed consent.^[1]



Drone in the sky. Photo by Freepik.

The degree to which drones collect data with informed consent varies according to the field and purpose for which they are used. Experts agree that a minor amount of data by drones is likely to be collected without informed consent. The latest studies have shown that informed consent for the storage of data collected by drones is obtained in about 15% of cases. Some drones can transfer the data in real time, while others collect the data and store it for later analyses.

...

^[1] Informed consent: "Agreement or permission to do something from someone who has been given full information about the possible effects or results" (Cambridge Dictionary, 2020).

b) Positive frame

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Data collection by drones

April, 2020.

Over the years, the usage of drones has increased around the world. The development of drones started with large drones for military purpose. Nowadays, drones are equipped with a variety of sensors, for example cameras and heat sensors that collect and store data.

This data is used in many different fields; for instance, private photos or videos but also official surveillance by the police or government. Some people are scared of them and do not want to appear in the data because they are not able to give their informed consent.^[1]



Drone in the sky. Photo by Freepik.

The degree to which drones collect data with informed consent varies according to the field and purpose for which they are used. Experts agree that a significant amount of data by drones is likely to be collected with informed consent. The latest studies have shown that informed consent for the storage of data collected by drones is obtained in about 85% of cases. Some drones can transfer the data in real time or near real time, while others collect the data and store it for later analyses.

...

^[1] Informed consent: "Agreement or permission to do something from someone who has been given full information about the possible effects or results" (Cambridge Dictionary, 2020).

2. Survey Questions

Privacy Concerns:

Questions based on Xu et al., (2011)

I am concerned that the information that is collected by the drones could be misused.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

I am concerned that others can find private information about me due to drone surveillance.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

I am concerned that the drones could save personal information about me, because of what others might do with it.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

I am concerned that the drones could save personal information about me, because it could be used in a way I did not foresee.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

Manipulation Check:

Questions based on Ferguson & Gallagher (2010)

Do you think the tone of the text was positive or negative?

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Extremely Positive Moderately positive Slightly positive Neither positive nor negative Slightly negative Moderately negative Extremely negative

Do you think the text focused on the benefits of drones?

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

Outcome-relevant Involvement

Questions based on Cho & Boster (2005)

Whether or not governments impose privacy regulations has little impact on my life.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

My life would be changed if privacy regulations were eliminated by the government.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

Changes in laws for or against privacy regulations will have little effect on me.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

My life would be changed if privacy concerns were eliminated throughout the states.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

It is easy for me to think of ways in which privacy regulations may affect my life.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

My life would not change much if privacy regulations were adopted by the government.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

It is difficult for me to think of ways privacy regulations impact my life.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

All in all, the effect of changes in privacy regulations on my life would be little.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

Demographic questions:

- What is your gender? Male Female Diverse
- What is your age? <20 20-39 >39 (according to the millennials definition)
- What is your occupation? Work: Student
- What is your nationality? Open

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- Is your education or profession related to the field of technology and science? Yes
No

A) Statement of own work

+++ deleted due to privacy policies+++