Touch Matters: Improving Risk Communications By Inducing Congruence Among Physical and Linguistic Weight

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ABSTRACT

Often limited in success, many governmental campaigns aim at inducing various risk mitigating behaviours among citizens by providing rational arguments. Many years of research within a different context, however, have demonstrated the importance of unconscious information processing in attitude formation. In this paper it is argued that these subconscious psychological processes may be adopted in the context of risk communication as well to increase its effectiveness. Specifically, the role of touch was considered as a powerful means to influence citizen's impressions. This idea was tested within a 3 (presentation mode: digital, paper heavy, paper light) x 3 (type of language: neutral, heavy, light) between-subjects-design with an airplane safety card. Contrary to expectations, the presentation on screen versus paper had no effect on the evaluation of the dependent variables. The effect remained insignificant even for subjects with a high need for touch. The type of language, however, affected perceptions of importance and seriousness as well as valuation of the airplane safety card. Thereby, the integration of a tactile language compared to a neutral version induced higher scores on the dependent variables. Additionally, congruence effects were studied by cross-pairing presentation mode with type of language. It was assumed that information congruent with each other is processed more fluently and accordingly, evaluated more positively. However, results could not confirm this idea. Findings suggest that future risk information material could be directed through both the digital channel or via traditional print media. The lack of congruence effects indicates that risk communication design could incorporate a tactile language regardless of the format it will be presented in, since both screen and paper versions of the airplane safety card benefited for some variables from a tactile language.

Keywords: Risk Communication, Unconscious Information Processing, Weight, Tactile Language, Congruence.

1. INTRODUCTION

Imagine yourself in the situation of airplane boarding: You can observe many people getting seated comfortably in the plane, waiting for take-off. They start listening to music, reading newspapers or preparing the next business meeting. You may wonder why nobody really pays attention to the airplane safety card, instructing the passengers on the plane about procedures for dealing with potential emergency conditions. Pre-flight safety demonstrations, either conducted by the flight attendants or through a video presentation, instruct passengers to familiarise themselves with the safety cards prior to take-off. However, you notice that everyone is already occupied with doing something else, even though this procedural guide may safe their life during an emergency situation.

The question of why individuals on the one hand choose to mitigate and prevent, and on the other hand, to downplay or ignore risks has been a topic of much research over the past 30 years (Martin, Bender, & Raish, 2007) in areas for natural- and human-caused risks (e.g., smoking, earthquakes, contraceptive use, alcohol consumption, flooding, or safety). To motivate citizens to adopt preventive behaviours, different governmental campaigns have been established based on several theories existing in the context of risk research. For instance, the *Protection Motivation Theory* (PMT) by Rogers (1975) and the *Extended Parallel Process Model* (EPPM) developed by Witte (1992), attempt to explain how protective behaviours are initiated or maintained. Moreover, in order to study the determinants of risk-taking behaviours, models as the *Theory of Planned Behaviour* (TPB) developed by Fishbein and Ajzen (1975) and the *Health Belief Model* (HBM) developed by Rosenstock (1974) have frequently been applied (Ulleberg & Rundmo, 2003).

Although many factors that affect the chance that citizens participate in risk-taking behaviours have been identified, the explanatory power of models based on these factors is rather limited. As such, current risk communication that tries to enhance self-protective behaviours among citizens is not very successful (Kievik & Gutteling, 2011) and some behaviours in the context of risk remain unexplained.

This might be accounted for by the underlying nature of all the theories mentioned so far: weighing rational arguments. This process, however, is not able to capture the full picture of risk-taking behaviours. In this paper we examine the idea that this may be due, at least in part, to the neglect of subconscious psychological processes. We aim at investigating whether these factors may add value to existing models. While the models described so far already include psychological factors, such as attitudes, they do not focus on the psychological processes that appear below the surface. However, as Freud already declared, "the most important determinants [...] in our lives are outside of our consciousness" (McAdams, 2009, p. 256). In addition, the power of the unconsciousness has been demonstrated within several studies. For instance, studies in the field of consumer psychology showed that the unconscious exposure of words could affect consumer behaviour - known as subliminal priming (e.g. Veldkamp, Custers, & Aarts, 2011). This study, among many others, demonstrates that people's evaluation and choices are not solely based on rational argumentation (cf. Kahneman, 2011). Dijksterhuis (2004) goes even a step further by claiming, "conscious thought is [...] maladaptive when making complex decisions" (p. 586). Within several experiments he could reveal that unconscious thought improved the quality of decisions (cf. Dijksterhuis, 2004).

1.1 Subconscious Information Processing

Due to the influence on perception, behaviour and evaluation - which occurs out of awareness of citizens - subconscious processes are a powerful and important part of our daily life. For instance, Bargh, Chen, and Burrows (1996) demonstrated that exposing participants to the concept of elderly decreases the speed of walking (i.e. ideomotor-effect) and Zajonc (1986)

showed that a person's attitude toward an object can be improved by repeatedly exposing the person to the object (i.e. mere-exposure effect).

Even though subconscious factors are often neglected in studies regarding risk-taking behaviours, they can play an important role and could be utilised in increasing the explanatory power of risk models. Specifically, the present research is guided by the *endowment effect*, an *embodiment perspective*, and the *principle of congruence*. Applying these concepts to the context of risk communication, this research is particularly interested in how to increase the evaluation of airplane safety instructions by varying the design features (touch and vision) of these cardboards. Specifically the following research question has been formulated:

How do tactile experience and tactile language influence the evaluation of a risk communication?

In recent years, researchers in the field of marketing have increasingly focused on subconscious information processing by manipulating sensory input, such as vision, hearing, scent, and touch and its influence on consumer behaviour. These studies suggest that subconscious information processing influences consumer attitude and behaviour. For instance, the *sense of vision* has been targeted by Veldkamp and colleagues (2011), who showed that the subliminal presentation of the words drinking, glass and water affected drinking behaviour and perceived thirst of the experimental group. Promoting consumer behaviour by targeting the sense of vision was also demonstrated by adjusting the in-store illumination and pursuing its impact on shoppers' search, purchase, and consumption behaviours (Areni & Kim, 1994). The results indicated that brighter lighting influenced shoppers to examine and handle more merchandise.

1.2 Touch As a Powerful Means For Influence

The first experiment - often described as the roots of research about subconscious processes - done in the year 1884 by Peirce and Jastrow, was targeting *the sense of touch*. They revealed with their weight-discrimination-experiment that a human subject is able to discriminate between weights, even though the absolute difference is minimal so that it could not be detected consciously. As the success rate of guessed weight-judgments deviated significantly from chance, the authors inferred that unconscious perception has to be responsible for this finding.

However, studies looking into this sense are rather scarce. One example can be provided by Ackerman and colleagues (2010), who investigated the role of touch and found that three dimensions of the haptic experience - weight, texture, and hardness - subconsciously influenced subsequent judgments formed about unrelated people, events, and situations. For instance, in one experiment the researchers showed that reviewing a resume on a heavy versus light clipboard affected the evaluation of a job candidate. In the heavy-clipboard condition, candidates were overall evaluated as better and perceived as having a more serious interest in the job. The study conducted by Piqueras-Fiszman and Spence (2011) gives another example of the influence of weight on how people perceive and appraise products. The experimenters offered three bowls of yoghurt, which were only differing in weight. When asking participants to hold one bowl at a time with one hand and evaluating the same yoghurt, they found that participants rated the samples differently in terms of price expectation and density. Also, there is evidence that the object of evaluation does not necessarily have to carry the tactile manipulation itself. This is demonstrated in a study that incorporated a touch element (without product attribute information) in a brochure, which was unrelated to the content (Peck & Wiggins, 2006). The researchers concluded, that the haptic experience at the moment of evaluation is sufficient to achieve the desired effect.

These findings suggest that subconscious information processing by varying sensory input affects decision making. While this effect is frequently investigated in the context of marketing, it is rather neglected in the context of risk research. However, especially this field may benefit from adapting the focus on subconscious psychological processes to increase, for instance, the adoption of risk preventing measures. Specifically, when producing risk information material, such as airplane safety cards, different sources of sensory input can be utilised to achieve the desired effect (e.g. increased memorability of the message). As discussed above, in particular touch is an important source of information, which is also reflected in the fact that touch is the first sense to develop in embryos (Krishna, 2011). Also later in life touch is a means to explore the environment (Jansson-Boyd, 2011). Specifically, the hand serves - as the principal source of input (Peck & Childers, 2003a) - the function to act on and manipulate the environment. Despite the fact that tactile sensations are vital to our inter- and intrapersonal lives (Ackerman et al., 2010), touch remains one of the most underappreciated senses in behavioural research and little is known how touch relates to and influences judgment and decision-making. In the context of risk communication, this sense can be utilised to subconsciously influence the evaluation of the communicated message; notably, focusing on the medium of communication: paper.

It can be argued that in times of an enriched digital world many forms of traditional print media are under heavy pressure (Dooley, 2012). The advantages of immediate access, faster search, instant updating, or targeted marketing in digital media seem to supplement physical print and ink marketing more and more. However, the conclusion of abolishing print media may be too fast as demonstrated by several studies (e.g. O'Hara & Sellen, 1997; Noys & Garland, 2008). Overall, it was found that paper continues to be the preferred medium for much of our reading activity, which includes higher reading speed, better comprehension and reading accuracy.

Moreover, the branding agency Milward Brown (2009) used functional magnetic resonance imaging (fMRI) brain scans to show that our brains process paper-based and digital communication differently. Specifically, when physical material is presented more processing is taking place in the right retrosplenial cortex. This part of the brain is involved in the processing of emotionally powered stimuli and memory, which suggests that the physical presentation may be generating greater emotional processing (Milward Brown, 2009). On top of that, physical materials produced more brain responses connected with internal feelings, suggesting greater internalisation of the ads and a more vivid memory for the communication. These findings of deeper emotional processing are also in line with the endowment effect, which is outlined in the next section.

1.3 Endowment Effect – Facilitating Perceived Ownership Through Touch

The endowment effect can partly account for the fact that objects being touched are generally evaluated more favourably. On the one hand, people's valuation of an object increases

when they are the owner of it (Shu & Peck, 2011). Specifically, Kahneman and colleagues (1991) found a discrepancy in the valuation of the same object depending on the reference point: buyer versus seller. In the position of the buyer the maximum financial amount he/she was willing to spend on the object would be lower than the minimum financial amount willing to accept in the position of the seller. On the other hand, physical contact is the main driver of the subjective feeling of one's ownership (Reb & Connolly, 2007). Similar to the sense of ownership a person may feel when working for a company – without any legal basis – also physical objects can be attributed varying levels of ownership – despite the person's awareness that the object is not really owned. Combining those two insights leads to the conclusion that solely touching an object can lead to a feeling of psychological ownership and accordingly result in higher valuation of this object (Reb & Connolly, 2007). Accordingly, it is predicted that a risk communication, such as airplane safety cards, presented on paper will be evaluated better than those presented in digital format.

1.4 Embodiment of Weight

Above it was argued that viewing a message on paper causes more emotional processing than viewing the same message on a screen. On top of this, there is another possibility on how paper is superior - its *weight*. The weight effect could not only play an important role in the paper versus digital question, but also when comparing different paper versions. When designers try to impress the recipient, they often use heavy stock. Milward Brown (2009) conclude from their study to draw attention to the tactile nature of a print piece. They suggest that heavier stock and a textured finish could emphasise the tangibility of the communication.

The underlying idea of the weight effect is related to the embodied cognition perspective. Since the early childhood we experience that dealing with heavier objects takes more effort than interacting with light objects; being hit by a heavy object is more serious and has more consequences than being hit by a light object; or carrying a heavy moving box takes more energy than carrying a light one. Accordingly, heavy objects have a greater impact on people's bodies and require more effort in terms of physical strength and cognitive planning (Jostmann et al., 2009). Generally, the experience of weight may get along with associations of effort later in life. Accordingly, the embodied perspective can account for the positive effects of weight on the candidate and yoghurt evaluation mentioned earlier. Summarising, it was found that "weight influences how people deal with abstract issues much as it influences how people deal with concrete objects: It leads to greater investment of effort" (Jostmann et al., 2009, p. 1173).

Going a step further, the abstract concept of weight is grounded metaphorically in embodied and situated knowledge (Barsalou, 2008). The underlying idea is the formation of a "haptic mindset" originating from diverse associative linkages that are triggered when touching heavy objects (Ackerman et al., 2010). Based on this haptic mindset each tactical dimension evokes certain metaphorical associations, which is echoed by our language (Dooley, 2012); heavy is a near-synonym for *serious* or *important* (Ackerman et al., 2010). According to Jostmann and colleagues (2009) the metaphoric use of weight suggests that the association between weight and importance has developed from a concrete link to a conceptual relationship on an abstract level. As such, we have a tendency to take words from the physical world, which we are able to experience directly, in order to express reasoning, emotion and conversational structure, which is less accessible to us (Fesmire, 1994). This process is illustrated in the expressions "weigh the value of different options", "add weight to place emphasis on important ideas", or "her opinion carries weight" (cf. Jostmann et al., 2009). Applying the embodiment perspective to the present context, it can be assumed that the associations evoked by the tactile experience of the paper may be transferred and attributed to the communicated (risk) message. Accordingly, it is predicted that a heavy print document conveys a more serious impact than the light version and as such the content on the heavy communication is evaluated better.

1.5 Improving Information Processing By Establishing Congruence Among Linguistic and Physical Weight

Next to the weight-effect a print communication can be designed even more persuasive by increasing the cognitive fluency with which the message is processed (Van Rompay, Pruyn, & Tieke, 2009). This effect can be explained based on the fact that stimuli that can be easily processed are evaluated more positively and evoke more favourable attitudes. For instance, a way of increasing the cognitive fluency when processing information is to induce congruence among sensory inputs.

When facing the task to develop an opinion, such as evaluating an object or written information, the individual is challenged by integrating different sensory inputs into an overall impression. Arguably, this integrating process is facilitated if the different elements are carrying the same message. The general need for unity, and more specifically, the benefit of congruence among visual features for a fictive product evaluation, is demonstrated by Van Rompay and Pruyn (2011). For this aim they used two shape variants and cross-paired them with two typeface variants of a fictitious brand of bottled water connoting either luxury or casualness within their first study and either masculinity or femininity within their second investigation. Results indicated that participants were more attracted to the product representing congruence. This study was targeting congruence for the sense of vision, therefore investigating the effects of "intra-sense congruence". Much of similar exploration has focused on the effects of congruence among features of single senses on behaviours, that is, in isolation from the other senses.

Despite the acknowledgement that individual senses in isolation greatly impact behaviour, the effect of the combination of different sensory inputs has not received much attention (Morrin & Ratneshwar, 2003; Peck & Wiggins, 2006). In order to show that congruence of semantic association across senses leads to more positive perceptions Krishna et al. (2010) matched stimuli on the olfactory and tactile dimension. Specifically, they cross-paired a scent that is perceived as either feminine or masculine with smooth paper (perceived as rather feminine) and rough paper (perceived as rather masculine). Results indicated that when the smell was congruent with the haptic properties of the stimulus (paper), participants rated the haptic perceptions more positively (Krishna et al., 2010) than in the incongruent conditions.

However, studies targeting "inter-sense congruence" are scarce, which is supported by the suggestion of Krishna and colleagues (2010) to focus future research on exploring instances where multiple sensory modalities are matched on their semantic associations. In the context of the current study, physical media such as print pieces are stimulating multiple senses. Specifically, investigating the content of a print piece (vision) is supplemented with input the individual receives when holding the communication (touch). As such, next to expected

individual effects of the two dimensions presentation mode and type of language respectively, a congruent combination of physical experience and tactile language is expected to improve information processing and lead to an even more favourably evaluation of the risk communication.

As outlined in paragraph 1.4 there is a link between weight and importance on linguistic level (cf. metaphors) and conceptual level. As such, both vision (i.e. metaphors) and touch (i.e. weight) induce similar semantic associations of importance. Accordingly, this process can be utilised in order to generate more positive evaluations of print pieces and the communicated message. Specifically, the tactile experience of weight can be supported by including "weighty words" in the message. Depending on whether they match or not, information processing can be facilitated and therefore, evaluations can benefit from this sensory congruence. Accordingly, it is predicted that congruent matches between weight of paper and the tactile language will be evaluated better than incongruent matches of the senses touch and vision. Specifically, the perception of importance evoked through the experience of weight – on physical and linguistic level – may be transferred to the content of the communicated message. Accordingly, risk-mitigating messages that incorporate weight at both levels may be perceived to be more important.

1.6 Individual Variation – The Need for Touch Scale

According to Childers and colleagues (1985) individuals differ in terms of preference for sensory information. With respect to the sensory dimension touch, the sensitivity to tactile stimuli varies among individuals. However, this variance is quite small (Spreen & Strauss, 1991) and a more important factor – potentially determining the degree of the persuasive influence of touch – may be an individual's motivation or preference to touch an object (Peck & Wiggins, 2006). Peck and Childers (2003a) identified individual differences in the need for touch (NFT).

Individuals can have varying degrees of NFT on the instrumental as well as autotelic dimension of touch. Firstly, touch is used as a mean to gather information about an object to make a judgment (Peck & Wiggins, 2006). The instrumental motivation is initiated by an explicit goal, such as having the intention to buy a certain product. For this purpose, the touch information serves as input for organised analytical thought to drive behaviour (Peck & Childers, 2003b). The second autotelic motive is more hedonic and an end in itself as opposed to the instrumental dimension. The act of touching is rather motivated intrinsically and not elicited by reference of unmet goals (Peck & Wiggins, 2006). In order to determine the effects of incorporating a touch element in a communication's message on people differing in NFT, Peck and Childers (2003a) asked participants to evaluate a sweater and a cellular phone either providing the opportunity to touch it or presenting the objects under Plexiglas. Results showed that high-NFT subjects were more confident and less frustrated when they could touch to evaluate products, whereas low-NFT subjects' confidence in their attitude judgments did not change on the basis of whether they could touch the products (Peck & Childers, 2003a). In line with these findings, it is predicted that in the current research context the persuasive influence of tactile information will be higher for individuals with a high need for touch, and in particular with respect to the autotelic dimension.

1.7 The Present Research: Research Model and Hypotheses

To test the ideas as outlined above, an experimental study was conducted in which participants were asked to evaluate an airplane safety card, differing among two dimensions. Firstly, the same information was presented (1) in digital format, (2) on relatively heavy paper or (3) relatively light paper. Secondly, the scenario information about the plane participants received beforehand was using a (1) neutral language, (2) a "heavy" tactile language or (3) a "light" tactile language.

By cross-pairing those dimensions, participants either received a congruent or incongruent version of the airplane safety card in terms of the weight dimension. Subsequently, rating scales were administered that measured potential effects on (A) Processing Fluency, (B) Perceived Seriousness/ Importance, (C) Interaction, (D) Valuation, (E) Behavioural Intention (to adopt risk mitigating measures) and (F) Need for Touch. Most of those dimensions were selected due to the fact that many rational risk models, as introduced in paragraph 1, do build on these constructs. Based on the previous argumentation around endowment, embodiment and congruence we predict the following (conceptual model displayed in figure 1):

H1: ***There is a main effect for the mode of presentation of a risk communication with respect to the dependent variables.***

H1.a: A risk communication presented physically on paper will be evaluated more positively with respect to the dependent variables than presented in digital format.

H1.b: A risk communication presented on relatively heavy paper will be evaluated more positively with respect to the dependent variables than presented on light paper.

H2: ***There is a main effect for the type of language used for the risk communication with respect to the dependent variables.***

H2.a: A risk communication applying a "tactile language" will be evaluated more positively with respect to the dependent variables than a neutral message.

H2.b: A risk communication supplemented with a "heavy tactile language" will be evaluated more positively with respect to the dependent variables than supplemented by with "light tactile language".

H3: ***There is an interaction effect between the mode of presentation and type of language with respect to the dependent variables.***

H3.a: Congruent combinations of mode of presentation and type of language will be evaluated more positively with respect to the dependent variables than incongruent combinations.

H3.b: A risk communication presented on heavy paper supplemented with a "heavy tactile language", will be evaluated most positively followed by the combination of light paper and "light tactile language" and least positive evaluation is expected when presented digitally with a neutral language.

H4: ***The main effect for the mode of presentation on the dependent variables is moderated by the degree of the individual's "need for touch" (NFT), whereby the effect will be more distinct for those scoring high on NFT.***

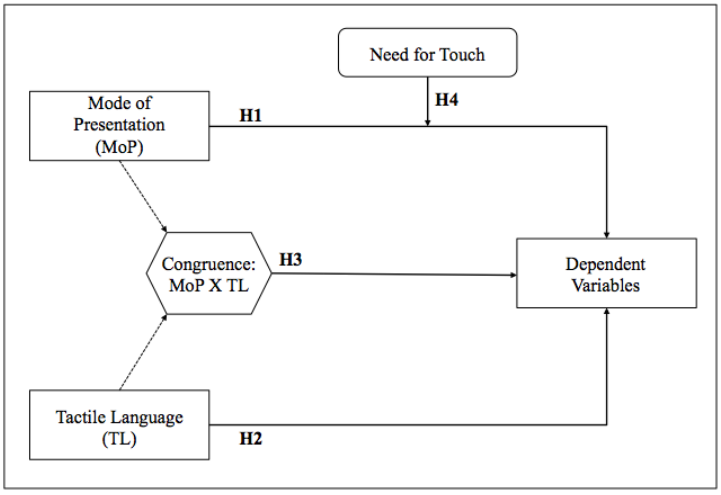

Figure 1. *Research Model*

2. METHOD

2.1 Participants and Design

Based on a power analysis 180 participants (20 per group) were randomly selected to take part in the study and were randomly assigned to one of the conditions (whereof 167 participants were included in the analysis (cf. Appendix A.2); 15-20 participants per condition; 77 male and 89 female; mean age 27.46 years (SD = 10.97); a frequency distribution can be found in Appendix A.2, Table A.2.1).

The study had a 3 (Mode of Presentation: digital, paper heavy, paper light) x 3 (Type of Language: neutral, heavy, light) between-subjects factorial design. Specifically, the context of flight safety was utilised and an airplane safety card was created. This same risk communication was presented to participants either on a screen or in a print format. The last mentioned version was presented either on heavy [300g/mC] or light [90g/mC] paper. Except for the variations discussed, the risk communications were identical (Appendix A.3). Therefore, there was no influence that could bias potential differences between conditions.

The different types of language were integrated in a message participants received beforehand, giving information about the airplane. This scenario message was either using neutral (scenario 1) words or integrated words and expressions communicating the concept of weight. Thereby, scenario 2 was supplemented with "heavy" words and for scenario 3 "light" words were integrated into the text (Appendix A.4). Next to reading the information, participants had to fill in a quiz that included questions that required the participants to select answers that incorporated neutral, heavy, or light words; depending on the condition they were assigned to. In doing so, it was ensured that the manipulation was more salient than just superficially scanning the text.

2.2 Procedure

Participants received an envelope containing for all conditions the scenario descriptions as mentioned before and a questionnaire (piloted in advance, see Appendix A.1). For those participants assigned to the print conditions, the envelope also contained the instructions how to mitigate risks during an emergency situation during a flight (i.e. airplane safety card). By offering participants an envelope it was ensured that those in the print conditions touched the safety cards at least once. In doing so, participants could not get suspicious of the real purpose of the study as potentially would have been the case if the experimenter explicitly had asked for touching the cards. After carefully reading the scenario, participants were asked to fill in a quiz related to the information given about the airplane. Afterwards, participants took a look at the risk communication (either on screen or the one provided in the envelope). Thereby, they were instructed that they were allowed to study the instructions as long as they want, but they were not required to know each detail presented, but rather to get a global overall impression. Next, participants filled in the enclosed questionnaire (Appendix A.5.1) comprising the dependent measures. After completion of the questionnaire, participants were thanked for their cooperation.

2.3 Measures

The dependent variables were measured on 7-point rating scales as part of the questionnaire. In order to prevent participants from just filling in their answers at one extreme of the likert-scale, some items were reversed (for a detailed overview see appendix A.5.2). In this study six constructs were measured, as outlined below. They were partly based on previously validated scales. These were adapted to relate specifically to airplane safety cards in the context of safety. After the reliability analysis, the five constructs were computed by adding the individual items and dividing by the total number of items per construct (Appendix A.5.3 & A.5.4).

Processing Fluency was measured with six items (based on Ellen & Bone, 1991), reflecting the extent to which participants considered the airplane safety card as clear, fuzzy, vivid, detailed, weak, and vague (Cronbach's alpha: 0.62).

Perceived Importance and Seriousness was measured with five items (based on Gerst, Pruyn, & De Vries, 2013), reflecting the extent to which the participants perceived the airplane safety card to look serious, important, sophisticated, relevant, and gentle (Cronbach's alpha: 0.60).

Interaction with the airplane safety card was measured with four items, reflecting the extent to which participants enjoyed and liked studying the material, experienced it as pleasant, and would like to get a copy of it (Cronbach's alpha: 0.69).

Valuation of the airplane safety card was measured with three items, reflecting the extent to which participants valued the information given and the card itself (Cronbach's alpha: 0.75).

Behavioural Intention (to adopt risk mitigating measures) was measured with two items (based on Johnston & Warkentin, 2010), reflecting the extent to which the participants intended to study, and planned to use the airplane safety card during their next flight (Cronbach's alpha: 0.84).

Need for Touch was measured with five items (based on Peck & Childers, 2003), reflecting the extent to which participants consider touching products to be fun, the extent to which they like touching products and the way they behave when walking through stores (Cronbach's alpha: 0.91).

3. RESULTS

3.1 Multivariate Analysis of Variance

A multivariate analysis of variance (MANOVA) with Mode of Presentation (neutral versus heavy versus light) and Language (neutral versus heavy versus light) as independent variables, and Processing Fluency, Perceived Seriousness/ Importance, Interaction, Valuation, and Behavioural Intention as dependent variables was conducted. Beforehand, items appropriate for further analysis were identified by means of a reliability analysis (Appendix A.5.3) and constructs were computed. Afterwards an outlier analysis was conducted (Appendix A.5.4) using boxplots to identify scores that deviated more than two standard deviations from the mean score of each construct. Thereby, two scores were identified and adjusted following the procedure suggested by Field (2009), which entails to replace those scores by the mean plus/minus two standard deviation (Appendix C.4). Finally, the assumptions of a MANOVA were investigated (i.e. independence measurements, dependent variables measured at interval level, homogeneity of variance, normal distribution of the dependent variables). For details see Appendix A.5.5. Results of the MANOVA revealed a significant effect of both independent variables on the dependent variables across the experimental conditions. Also, the interaction between Mode of Presentation and Language was significant (Table 1).

In order to study the dependent variables individually, the univariate test results served as a follow-up (for a detailed overview see Appendix A.5.6, Table A.5.6.1). Since the multivariate analysis revealed a significant interaction effect on the dependent variables, the interaction was studied in more detail as well by conducting a simple effects analysis (for a detailed overview see Appendix A.5.7, Table A.5.7). Mean ratings (M) and standard deviations (SD) as a function of the independent variables can be found in Table 2.

Table 1. *MANOVA Results: Processing Fluency, Perceived Importance/ Seriousness, Interaction, Valuation, Behavioural Intention*

Variable	df	Error	F	p	η2
Mode of Presentation	10	310	2.50	.007	.08
Language	10	310	2.23	.016	.07
Mode of Presentation X Language	20	628	2.84	.000	.08

Table 2. *Average Ratings and Standard Deviations of Dependent Variables as a Function of Mode of Presentation and Language*

Mode of Presentation	Language	Processing Fluency			Perceived Seriousness/ Importance			Interaction			Valuation			Behavioural Intention		
		M	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*	*N*
Neutral	Neutral	5.27	0.59	20	4.19[b]	0.86	20	3.16	0.90	20	5.60	0.69	20	3.53	1.34	20
	Heavy	5.25	0.55	19	5.03[a]	0.68	19	2.66	0.88	19	5.70	0.97	19	4.34	1.48	19
	Light	5.38	0.89	18	4.87[a]	0.90	18	3.19	1.05	18	5.50	1.09	18	4.06	1.82	18
	Total	**5.30**	**0.68**	**57**	**4.68**	**0.89**	**57**	**3.00**	**0.96**	**57**	**5.60[x]**	**0.91**	**57**	**3.96**	**1.56**	**57**
Heavy	Neutral	4.94	0.87	20	4.57	0.79	20	3.39	1.10	20	3.93[d]	0.99	20	3.78	1.55	20
	Heavy	5.15	0.88	15	4.71	0.68	15	3.37	1.18	15	5.49[c]	0.99	15	4.47	2.01	15
	Light	5.28	0.59	20	4.53	0.96	20	3.40	1.22	20	5.17[c]	1.13	20	3.25	1.95	20
	Total	**5.12**	**0.78**	**55**	**4.59**	**0.82**	**55**	**3.39**	**1.14**	**55**	**4.80[y]**	**1.23**	**55**	**3.77**	**1.86**	**55**
Light	Neutral	5.27	0.98	19	4.47[f]	0.80	19	2.84	1.33	19	4.86[e]	1.27	19	3.53	1.87	19
	Heavy	5.22	0.96	17	4.36[e]	1.17	17	3.49	1.13	17	5.04	1.00	17	4.38	1.86	17
	Light	5.19	0.76	19	5.06[e]	0.83	19	3.12	1.10	19	5.58[f]	0.58	19	4.34	1.34	19
	Total	**5.23**	**0.89**	**55**	**4.64**	**0.97**	**55**	**3.14**	**1.20**	**55**	**5.16**	**1.02**	**55**	**4.07**	**1.72**	**55**
Total	**Neutral**	**5.16**	**0.83**	**59**	**4.41[h]**	**0.82**	**59**	**3.14**	**1.12**	**59**	**4.80[g]**	**1.21**	**59**	**3.61**	**1.57**	**59**
	Heavy	**5.21**	**0.79**	**51**	**4.71**	**0.90**	**51**	**3.14**	**1.10**	**51**	**5.42[h]**	**1.01**	**51**	**4.39**	**1.74**	**51**
	Light	**5.28**	**0.74**	**57**	**4.82[g]**	**0.91**	**57**	**3.24**	**1.12**	**57**	**5.41[h]**	**0.97**	**57**	**3.87**	**1.76**	**57**
	Total	**5.21**	**0.78**	**167**	**4.64**	**0.89**	**167**	**3.17**	**1.11**	**167**	**5.20**	**1.11**	**167**	**3.94**	**1.71**	**167**

Note: a > b; c [1]> d; e > f; g > h; x > y

[1] It was considered to conduct a MANCOVA, with Need for Touch as covariate. However, assumptions were not fulfilled as described in Appendix A.5.5.

Processing Fluency. An analysis of variance revealed a non-significant main effect of Mode of Presentation, $F(2, 158) = 0.69$, *ns*, as well as the non-significant main effect of Language on Processing Fluency, $F(2, 158) = 0.37$, *ns*. Similarly, the interaction between the independent variables was non-significant, $F(4, 158) = 0.37$, *ns*.

Perceived Seriousness/ Importance. An analysis of variance revealed a non-significant main effect of the independent variable Mode of Presentation, $F(2, 158) = 0.17$, *ns*, while there was a significant main effect of Language on Perceived Seriousness/ Importance, $F(2, 158) = 3.43$, $p = .04$. Pairwise comparisons revealed that ratings of Perceived Seriousness/ Importance were significantly higher for the light-Language condition ($M = 4.82$; $SD = 0.91$) compared to the neutral-Language condition ($M = 4.41$; $SD = 0.82$), but not compared to the heavy-Language condition ($M = 4.71$; $SD = 0.90$; $p = .04$ and *ns*, respectively). Also, there was no difference between scores of the neutral- and heavy-Language condition (*ns)*.

The interaction between the independent variables was significant for the dependent variable Perceived Seriousness/ Importance, $F(4, 158) = 2.74$, $p = .03$. Subsequent contrast analyses revealed significant differences between the Language conditions within the *neutral-Mode of Presentation condition*, $F(2, 158) = 5.19$, $p = .01$. Specifically, participants who received the neutral-Language version ($M = 4.19$; $SD = 0.86$) scored lower on Perceived Seriousness/ Importance than participants exposed to a heavy ($M = 5.03$; $SD = 0.68$) or light tactile Language ($M = 4.87$; $SD = 0.90$); $p < .001$ and $p = .02$, respectively). There was no difference between the heavy- and light-Language versions (*ns*). Also, contrast analyses revealed significant differences between the Language conditions within the *light-Mode of Presentation condition*, $F(2, 158) = 3.54$, $p = .03$. Specifically, participants who received the light-Language version ($M = 5.06$; $SD = 0.83$) scored higher than participants exposed to a neutral ($M = 4.47$; $SD = 0.80$) or heavy tactile Language ($M = 4.36$; $SD = 1.17$; $p = .04$, and $p = .02$, respectively). There was no difference between the neutral- and heavy-Language versions (*ns*). Contrast analyses revealed no significant differences between the Language conditions within the *heavy-Mode of Presentation condition*, $F(2, 158) = 0.19$, *ns*. Specifically, there was no difference in scores between neutral- and heavy- or light-Language versions (*ns* and *ns*, respectively). Also the difference between the heavy- and light-Language condition was not significant (*ns*; cf. Figure 2).

Interaction. An analysis of variance revealed a non-significant effect for the main effect of Mode of Presentation, $F(2, 158) = 1.70$, *ns*, as well as the main effect of Language on Interaction with the airplane safety card, $F(2, 158) = 0.14$, *ns*. Similarly, the interaction between the independent variables was non-significant, $F(4, 158) = 1.40$ *ns*.

Valuation. An analysis of variance revealed a significant main effect of the independent variable Mode of Presentation on Valuation, $F(2, 158) = 7.87$, $p < .001$. Pairwise comparisons revealed that ratings of Valuation were significantly higher for the neutral-Mode of Presentation condition ($M = 5.60$; $SD = 0.91$) compared to the heavy-Mode of Presentation condition ($M = 4.80$; $SD = 1.23$), as well as compared to the light-Mode of Presentation condition ($M = 5.16$; $SD = 1.02$; $p < .001$ and, $p < .001$ respectively). There was no difference between scores of the light- and heavy-Language condition (*ns).*

Also, there was a significant main effect of Language on Valuation, $F(2, 158) = 7.41$, $p < .001$. Pairwise comparisons revealed that ratings of Valuation were significantly lower for the neutral-Language condition ($M = 4.80$; $SD = 1.21$) compared to the heavy- ($M = 5.42$; $SD = 1.01$) and light-Language conditions ($M = 5.41$; $SD = 0.97$; $p = .03$ and, $p = .04$ respectively). There was no difference between scores of the light- and heavy-Language condition (*ns).*

The interaction between the independent variables was significant for the dependent variable Valuation, $F(4, 158) = 4.19$, $p < .001$. Subsequent contrast analyses revealed significant differences between the Language conditions within the *heavy-Mode of Presentation condition*, $F(2, 158) = 13.9$, $p < .001$. Specifically, participants who received the neutral-Language version ($M = 3.93$; $SD = 0.99$) scored lower on Valuation than participants exposed to a heavy ($M = 5.49$; $SD = 0.99$) or light ($M = 5.17$; $SD = 1.13$) tactile Language ($p < .001$ and $p < .001$, respectively). There was no difference between the heavy- and light-Language versions (*ns*). Also, contrast analyses revealed significant differences between the Language conditions within the *light-Mode of Presentation condition*, $F(2, 158) = 2.59$, $p = .08$. Specifically participants who received the light-Language version ($M = 5.58$; $SD = 0.58$) scored higher than participants exposed to a neutral ($M = 4.86$; $SD = 1.27$) tactile Language, but not compared to the heavy-Language condition ($M = 5.04$; $SD = 1.00$; $p = .03$ and *ns*, respectively). The difference between the neutral- and heavy-Language conditions was not significant (*ns*). Contrast analyses revealed no significant differences between the Language conditions within the *neutral-Mode of Presentation condition*, $F(2, 158) = 0.18$ *ns*. Specifically, there was no difference in scores between neutral- and heavy- or light-Language versions language (*ns* and *ns*, respectively). Also the difference between the heavy- and light-Language condition was not significant *ns*; cf. Figure 3).

Behavioural Intention. An analysis of variance revealed a non-significant effect for the main effect of Mode of Presentation, $F(2, 158) = 0.30$, *ns*, as well as the main effect of Language, $F(2, 158) = 3.00$, *ns*, on Behavioural Intention to engage with and use the airplane safety card during an upcoming flight. Similarly, the interaction between the independent variables was non-significant, $F(4, 158) = 0.99$, *ns*.

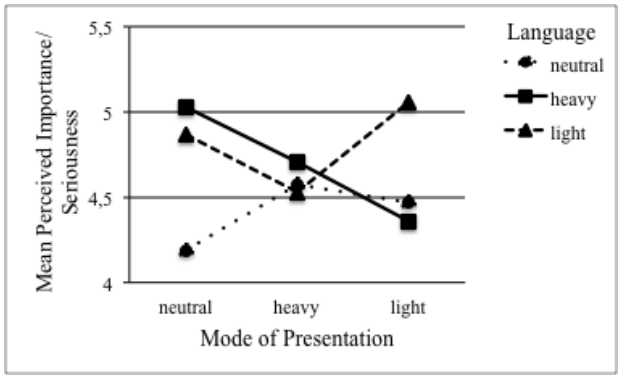

Figure 2. *Interaction of Perceived Seriousness/ Importance as a function of Mode of Presentation and Language*

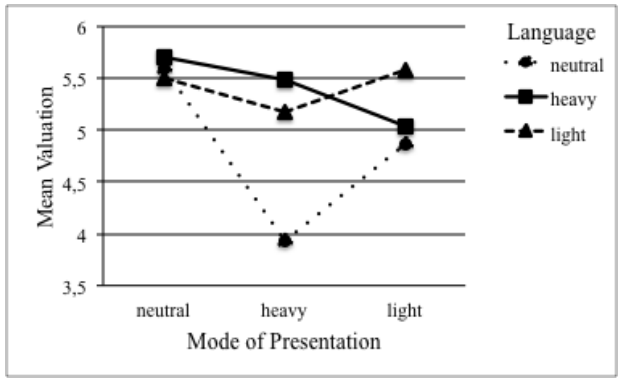

Figure 3. *Interaction of Valuation as a function of Mode of Presentation and Language*

3.2 Moderation

To ascertain whether or not the relationship between Mode of Presentation and the dependent variables (Processing Fluency, Perceived Importance/ Seriousness, Interaction, Valuation, Behavioural Intention) depends on the individual's Need for Touch a hierarchical multiple regression analysis was conducted (for more detail see Appendix A.5.8, Table A.5.8.2). To represent the interaction between neutral, heavy, or light Mode of Presentation and the respective dependent variable, the variables were first centred and an interaction term between Mode of Presentation and Need for Touch was created (Aiken & West, 1991).

In the first step, four variables were included: Mode of Presentation, Tactile Language, Need for Touch, and the interaction term between Tactile Language and Need for Touch. Only for two dependent variables the overall model was significant; for Valuation, R^2 = .028, $F(4, 162) = 3.88$, p = .01, and Perceived Importance/ Seriousness, R^2 = .059, $F(4, 162) = 2.53$, p = .04. Multicollinearity diagnostics were assessed and were within an acceptable range (i.e. .016 to .198, cf. Appendix A.5.8, Table A.5.8.1). Next, the interaction term between Mode of Presentation and Need for Touch was added to the regression model. However, it did not significantly add to the amount of variance in the criterion accounted for, neither for Valuation, ΔR^2 = .002, $\Delta F(1, 161) = 0.338$ *ns*, nor for Perceived Importance/ Seriousness ΔR^2 = .000, $\Delta F(1, 161) = 0.049$ *ns.*

4. DISCUSSION

4.1 Conclusion

The results show that participants, who received the airplane safety card on paper as opposed to the presentation on screen, did not score higher on the measured variables. Also, there was no difference between the light and heavy paper version. Therefore, hypothesis 1 was rejected.

Moreover, findings indicate that participants who received the scenario description with the integration of a tactile language, scored higher on part of the measured variables than participants who received a neutral scenario description without applying a tactile language. However, the evaluation of the dependent variables did not benefit from a heavy tactile language compared to a light tactile language. Therefore, hypothesis 2 was only partly confirmed.

Contrary to the expectation that the evaluation of the measured variables would benefit from a congruent version of a combination of mode of presentation and tactile language, this effect could only be revealed in some cases. Therefore, hypothesis 3 was partly confirmed.

Finally, it was shown that the potential effect of the relationship between Mode of Presentation and the measured variables does not vary as a function of different levels of participants' Need for Touch. Therefore, hypothesis 4 was rejected (summary of described results can be found in Appendix 6, Table A.6.1).

4.2 Mode of Presentation

The results of the study do not support the findings by Milward Brown (2009) that paper-based and digital communication is processed and evaluated differently, namely favouring the physical exposure. Likewise, no difference between the two paper versions could be revealed, which is therefore not in line with the embodied perspective (Jostmann et al., 2009). It could be argued that the missing weight effect in part relates to the content of the risk communication. While the effect of weight in print communication could be revealed for a product brochure in an earlier study (Gerst, Pruyn, & De Vries, 2013), the effect could not be replicated in the context of the airplane safety card. A main difference between those two stimuli may be the fact, that an airplane safety card has a more abstract character than an advertised product. The consumer is able to actually touch the product in the real world, which is not the case in this sense for an abstract airplane evacuation procedure.

The proposition that solely touching an object can lead to higher valuation because of a higher feeling of perceived ownership (cf. endowment effect; Reb & Connolly, 2007) could not be supported either. Even contrary to the direction expected, the presentation on the screen led to higher scores compared to the presentation on heavy paper for the variable Valuation. This inconsistent finding could in part be explained by the nature of the stimulus. Reb and Connolly (2007) demonstrated the endowment effect in the context of consumer behaviour, where participants may really have the feeling of wanting to own a product. In the present context of risk communication, however, the general scores across all conditions on Interaction were rather at the negative end of the scale (M = 3.17, SD = 1.11), suggesting that people not even want to own the airplane safety card.

In addition, Need for Touch was supposed to moderate the relationship of Mode of Presentation and the dependent variables. However, no such effects of the construct could be revealed. This lack of moderation may be due to the operationalisation and measurement of the construct. Within the present study only the autotelic dimensions was measured

as operationalised by Peck and Childers (2003b). However, it could be argued that people with a high instrumental Need for Touch would benefit from studying a physical version of the airplane safety card, which they can hold. Even though across conditions people gave rather low ratings with respect to the variable Interaction, participants who have a high need for instrumental (and autotelic) touch, might have been more affected by the manipulations of the variables physical and linguistic weight. It should be considered to measure both dimensions of the construct in future research.

Another explanation, for the inconsistent findings of the Mode of Presentation can be offered by the likelihood-elaboration model (Petty & Cacioppo, 1979), which argues that a persuasion technique needs to be aligned to characteristics of the receiver. Thereby, the key variable in this process is involvement, "the extent to which an individual is willing and able to 'think' about the position advocated" (Shumarova & Swatman, 2006). Arguably, the perception formation process of a risk taking measure may be more important to the citizen in the case of high involvement. Under these circumstances, the air passenger may put more effort in gathering and evaluating relevant information. In other words, depending on risk type and citizen involvement, effects of tactile manipulation may vary with respect to risk information material evaluations. Future research should also take these implications into account.

4.3 Tactile Language

The findings reported partly confirm the importance of incorporating the tactile language dimension in the design of risk information material. Although the main effect varied in strength across the dependent variables, the overall results partly support the prediction that perceptions benefit from a message incorporating a tactile language.

Specifically, it could be revealed that participants who received the scenario description with the integration of a tactile language, scored higher on the measured variables Perceived Seriousness/ Importance and Valuation than participants who received a neutral scenario description without applying a tactile language. The fact that this effect applied only to the variables measuring the *perception* towards the risk communication, but not the *processing* of and (intended) *reaction* towards the airplane safety card, can be accounted for by the idea of a haptic mindset offered by Dooley (2012). Thereby, the concept of weight is associated with the perception of importance and seriousness on an abstract level (Jostmann et al., 2009). Accordingly, participants who were able to touch the airplane safety card valued it more and perceived it as more important and serious compared to the screen condition.

4.4 Congruence Effect

The research design of the study incorporated - next to the tactile dimensions Mode of Presentation and Language - congruence effects among these two variables. Contrary to the expectation that the evaluation of the measured variables would benefit most from a congruent version of a combination of heavy paper and a heavy tactile language, no such interaction effect could be revealed. However, it was found that dependent variables were evaluated better when applying a tactile language as opposed to a neutral language within the condition the airplane safety card was presented on a screen (i.e. Perceived Seriousness/ Importance) and on a heavy paper version (i.e. Valuation). Within the light paper condition, however, only a light tactile language led to a better evaluation of Perceived Seriousness/ Importance and Valuation not the heavy tactile language. As such, a congruence effect could only be revealed in this last case and for two mentioned dependent variables.

Congruence is assumed to be reflected in the fluency of processing (e.g. Van Rompay, De Vries, & Van Venrooij, 2010), which was measured in the current study based on prior validated items. However, no significant difference with respect to this dependent variable could be detected across conditions. This may be due to the fact that the study did no incorporate direct measures of Processing Fluency, such as reaction speed and/ or psychophysiological measures (Winkelman & Cacioppo, 2001). Accordingly, future research should spend more attention to the operationalisation of the variable.

As not even the construct Processing Fluency did vary across conditions, also the expected subsequent influence of congruence – already demonstrated in various research settings – could not be replicated. For instance, Van Rompay and Pruyn (2011) found that "intra sense-congruence" increases processing fluency and as such, product evaluation, and Krishna and colleagues (2010) concluded that also "inter-sense congruence" among semantic associations leads to more positive perceptions. A general explanation for the overall missing congruence effects might be offered by the findings of Meyers-Levy, Loui, and Curren (1994), who propose that people may prefer moderate levels of incongruence. The positive effects of incongruence on attitude formation could already be revealed in the context of product design, which could be utilised as a strategy to evoke amazement (Ludden, Schifferstein, & Henkert, 2008). Within the present context of risk communication, however, the findings of the conducted study could neither reveal a positive effect of incongruence. Accordingly, future research should aim at clarifying potential effects of (in)congruence among sensory stimulation for different contexts.

4.5 Implications

Current findings are not in line and provide no further support for the supposition proposed by Peck ad Childers (2003), that next to visual input, tactile information can function as a subsequent cue and framer for impression formation. In addition, the findings suggest no need for congruence of symbolic meanings because consistency among language and tactile characteristics did not facilitate processing. The lack of a general congruence effect and the superiority of a tactile compared to a neutral language indicate that a risk communication design could incorporate any tactile language (light or heavy) regardless the medium of communication.

In terms of practical implications, it seems that decisions regarding risk communication design do not need to incorporate the dimension of touch in order to increase the effectiveness and persuasiveness of the campaign. In times of an enriched digital world (Milward Brown, 2009), it seems to be an advantage that, according to the present findings, there is no need to go back to the traditional print media to communicate with citizens.

Concluding, while the tactile experience does not seem to matter, subtle changes in language my affect the evaluation of risk communication campaigns.

4.6 Limitations

The study applied a design whereby two factors were cross-paired on respectively three dimensions, resulting in nine conditions. The total sample size for the study consisted of 180 participants. After selecting eligible candidates for data

analysis this sample reduced even more, leading to a small number of participants (i.e. 166) for each of the nine conditions (range: 15 to 20). Therefore, the power to find differences between the conditions was rather small.

Another important limitation of the study is the context in which the data were sampled. The data collection took place shortly after the 24th of March 2015, when the Germanwings Flight 9525 crashed in the French Alps and all 144 passengers and six crewmembers were killed. Since the co-pilot deliberately caused the crash, the incident caused a long investigation period and strong media presence. As such, it can be assumed that many participants who were sampled at an airport had generally rather a negative attitude towards the topic of air safety. The situation may therefore have introduced response bias among participants. As a consequence, the introduced manipulation of the factors physical and linguistic weight and their interaction may have worked to a much lesser extent, as the general negative attitude of participants towards the research subject influenced their replies predominately.

4.7 Future Research

As previous research suggests, congruence effects are distinct within one dimension, such as vision (e.g. Van Rompay & Pruyn, 2011). However, as the effect of different sensory inputs has not received much attention yet (Morrin & Ratneshwar, 2003; Peck & Wiggins, 2006), it should further be investigated if and how congruence effects or incongruence effects are working across different sensory dimensions.

Most importantly, however, the present findings do not offer support for the idea that the sensory dimension of touch is relevant for the design of risk communication material. Since previous research has, however, demonstrated that tactile factors are able to influence brand and product evaluations in the context of consumer behaviour by the means of visual communications (e.g. Ackerman, Nocera, & Bargh, 2010; Gerst, Pruyn, & De Vries, 2013), future research should address the question if the effectiveness of tactile manipulation of print media is depending on the context and how the design process could utilise these insights to the maximum extent.

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APPENDIX

A.1 Pilot Study

Four participants took part in a pilot study. The aim was to identify potential problems related to study procedure and survey design. For this aim, they all completed the first version of the experiment (in the same condition). First of all, it could be figured out that participating in this study took longer than expected (about 15 minutes). According to the participants the scenario text about the plane was in some parts too complicated and detailed. Accordingly, the text was shortened. In addition, not only reading the text but filling in the cross-word puzzle was taking a lot of time. As a consequence, it was decided to adjust this part of the study by replacing it with three simple questions and three possible answers to choose from. Finally, participants were asked to indicate if they had any problems understanding certain formulations or if they had general comments. Since there was no problem with understanding the items, the phrasing was not changed for the real study. One participant mentioned that it would be possible to adjust the possible answer categories by removing the neutral alternative from the likert scale. Accordingly, he argued, participants were 'forced' to choose a positive or negative answer. However, it was decided for remaining this neutral alternative, since respondents truly might feel neutral about a given item. Forcing them to choose for on side, either positive or negative, would possibly introduce respondent bias.

A.2 Participants – Frequency Distribution

A first step of data analysis was to identify those participants that were eligible for further analysis. Thereby, the results of the quiz served as a mean of selection. Specifically, the quiz questions were constructed in a way that they were very easy to answer. As such, it is assumed that every participant who reads the text carefully is able to answer those questions. Further, if the questions were not answered correct it might be the case that participants either did not read the text at all or did not engage fully. As a result, it can be argued that hose participants were not exposed to the manipulation Language appropriately. Therefore, it was decided to exclude those candidates (13) from further analysis that did not achieve the full score on the quiz questions, leading to a total number of 167 participants. A frequency distribution by condition can be found below (Table A.2.1).

Table A.2.1. *Frequency Distribution: Gender, Age, and Level of Education*

Condit-ion	***Mode of Presen-tation***	***Language***	**Gender**		**Age**	**Education**				**Total Number Partici-pants**
			Male	Female		Uni-versity	Poly-technic	High School	Other	
1	*Neutral*	*Neutral*	9 *45.0%*	11 55.0%	M = 34.15 SD = 13.57	12 60.0%	2 10.0%	3 15.0%	3 15.0%	**20** **12.1%**
2	*Heavy*	*Neutral*	8 40.0%	12 60.0%	M = 25.55 SD = 12.71	14 70.0%	1 5.0%	4 20.0%	1 5.0%	**20** **12.1%**
3	*Light*	*Neutral*	11 57.9%	8 42.1%	M = 25.79 SD = 7.69	14 73.7%	2 10.5%	3 15.8%	0 0.0%	**19** **11.5%**
4	*Neutral*	*Heavy*	13 68.4%	6 31.6%	M = 29.84 SD = 11.37	14 73.7%	3 15.8%	2 10.5%	0 0.0%	**19** **11.5%**
5	*Heavy*	*Heavy*	8 53.3%	7 46.7%	M = 24.93 SD = 9.66	9 60.0%	2 13.3%	3 20.0%	1 6.7%	**15** **9.0%**
6	*Light*	*Heavy*	8 50.0%	8 50.0%	M = 25.38 SD = 8.03	11 68.6%	1 6.2%	4 25.0%	0 0.0%	**16** **9.6%**
7	*Neutral*	*Light*	3 16.7%	15 83.3%	M = 39.33 SD = 9.46	16 88.9%	0 0.0%	2 11.1%	0 0.0%	**18** **10.8%**
8	*Heavy*	*Light*	7 35.0%	13 65.0%	M = 21.90 SD = 5.26	9 45.0%	2 10.0%	7 35.0%	2 10.0%	**20** **12.1%**
9	*Light*	*Light*	10 52.6%	9 47.4%	M = 20.11 SD = 2.38	13 68.4%	0 0.0%	5 26.3%	1 5.3%	**19** **11.5%**
Total/ Average			**77** **46.4%**	**89** **53.6%**	**M = 27.46** **SD = 10.97**	**112** **67.5%**	**13** **7.8%**	**33** **19.9%**	**8** **4.8%**	**166** **100%**

A.3 Airplane Safety Card

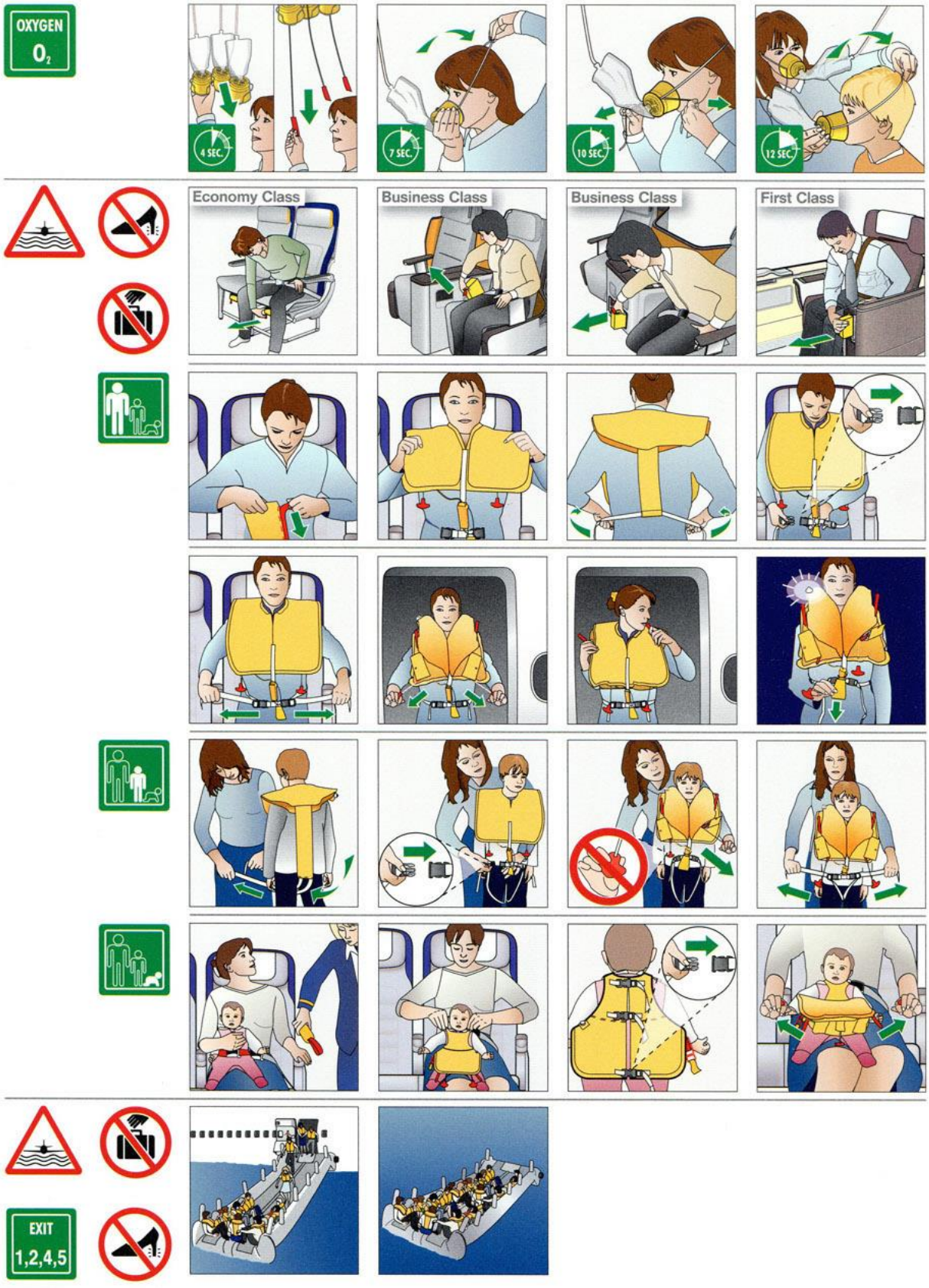

Figure A.3.1 Stimulus material for the present study

A.4 Scenarios

Dear participant,

An airline is interested in the effectiveness of a new prototype of flight information material. Innovative principles were applied when designing the following material to educate passengers.

- **Part 1:** You will be given information on the developments of an airplane. You are asked to read the text carefully and afterwards answer three questions to test your understanding.
- **Part 2:** You are asked to get an overall impression of the newly developed airplane safety card provided to you in the envelope [on the screen].
- **Part 3:** You complete a three-minute survey (available in the envelope).

Thanks in advance for your participation!

Kind regards,
Corinna Gerst
University of Twente

A.1.1 Neutral Language

The ***Boeing 737 Next Generation***, commonly abbreviated as Boeing 737NG, is the third generation derivative of the 737. Prompted by the development of the Airbus A320, in 1991 Boeing initiated the development of an updated series of aircraft.

Background

The 737NG is to date the most significant upgrade of the airframe. The wing was modified and more fuel-efficient engines were used. Also, Boeing replaced the current brakes for the Next-Gen 737s. On average, the new airplane has about the same weight as its predecessor.

Production

The production process included substantial international content. International contributors included Mitsubishi Industries, Kawasaki Industries, and Hawker de Havilland.

Interior

The interior on the 737NG improved on the previous style interior; most noticeably larger, more rounded overhead bins, more comfortable chairs and curved ceiling panels. This interior also became the standard of other Boeings.

Incidents

In December 2005 a Southwest Airlines Flight skidded off a runway upon landing at Chicago Airport in snow conditions. A six-year-old boy died in a car struck by the plane after it skidded into a street.

QUIZ

1. Which international industry was involved in the production phase of the 737NG next to Kawasaki Industries and Hawker de Havilland?
    a. Opel Industries
    b. Mitsubishi Industries
    c. Audi Industries
2. Next to improved wings and engines, what was another major introduction?
    a. Brakes
    b. Stairs
    c. Restaurant
3. Which conditions caused the incident in December 2005?
    a. Snow
    b. Sand
    c. Wind

SOLUTION

1. Mitsubishi Industries (b)
2. Brakes (a)
3. Snow (a)

A.1.2 Heavy Language

The ***Boeing 737 Next Generation***, commonly abbreviated as Boeing 737NG, is the third generation derivative of the 737. Prompted by the development of the Airbus A320, in 1991 Boeing initiated the development of an updated series of aircraft.

Background

The 737NG is to date the most significant upgrade of the airframe. The wing was modified and more fuel-efficient engines were used. Also, Boeing replaced the steel brakes, which makes the weight of the brake package less heavy. On average, the predecessor is heavier than the new airplane.

Production

The production process included substantial international content. International contributors included Mitsubishi Heavy Industries, Kawasaki Heavy Industries, and Hawker de Havilland.

Interior

The interior on the 737NG improved on the previous style interior; most noticeably larger, more rounded overhead bins, bigger weighty chairs and curved ceiling panels. This interior also became the standard of other Boeings.

Incidents

In December 2005 a Southwest Airlines Flight skidded off a runway upon landing at Chicago Airport in heavy snow conditions. A six-year-old boy died in a car struck by the plane after it skidded into a street.

QUIZ

1. Which international industry was involved in the production phase of the 737NG next to Kawasaki Heavy Industries and Hawker de Havilland?
    a. Opel Heavy Industries
    b. Mitsubishi Heavy Industries
    c. Audi Heavy Industries
2. Which is the material the brakes were made of before improvement?
    a. Steel
    b. Carbon
    c. Wood
3. Which conditions caused the incident in December 2005?
    a. Heavy-Snow
    b. Light-Sand
    c. Cold-Wind

SOLUTION

1. Mitsubishi Heavy Industries (b)
2. Steel (a)
3. Heavy-Snow (a)

A.1.3 Light Language

The ***Boeing 737 Next Generation***, commonly abbreviated as Boeing 737NG, is the third generation derivative of the 737. Prompted by the development of the Airbus A320, in 1991 Boeing initiated the development of an updated series of aircraft.

Background

The 737NG is to date the most significant upgrade of the airframe. The wing was modified and more fuel-efficient engines were used. Also, Boeing introduced new carbon brakes, which makes the weight of the brake package lighter. On average, the predecessor is lighter than the new airplane.

Production

The production process included substantial international content. International contributors included Mitsubishi Light Industries, Kawasaki Light Industries, and Hawker de Havilland.

Interior

The interior on the 737NG improved on the previous style interior; most noticeably larger, more rounded overhead bins, smaller and lighter chairs and curved ceiling panels. This interior also became the standard of other Boeings.

Incidents

In December 2005 a Southwest Airlines Flight skidded off a runway upon landing at Chicago Airport in light snow conditions. A six-year-old boy died in a car struck by the plane after it skidded into a street.

QUIZ

1. Which international industry was involved in the production phase of the 737NG next to Kawasaki Light Industries and Hawker de Havilland?
   a. Opel Light Industries
   b. Mitsubishi Light Industries
   c. Audi Light Industries
2. Which is the material the brakes are made of after improvement?
   a. Carbon
   b. Steel
   c. Wood
3. Which conditions caused the incident in December 2005?
   a. Light-Snow
   b. Heavy-Sand
   c. Cold-Wind

SOLUTION

1. Mitsubishi Light Industries (b)
2. Carbon (a)
3. Light-Snow (a)

A.5 Study

A.5.1 Questionnaire

Please indicate to what extent you agree with the following statements. For this purpose tick the corresponding box ranging from 1 (definitely disagree) to 7 (definitely agree).

Your impression of the Airplane Safety Card

N°	Item	definitely disagree – definitely agree 1	2	3	4	5	6	7
1	For me the safety card is clear.	□	□	□	□	□	□	□
2	For me the safety card is fuzzy.	□	□	□	□	□	□	□
3	For me the safety card is vivid.	□	□	□	□	□	□	□
4	For me the safety card is detailed.	□	□	□	□	□	□	□
5	For me the safety card is weak.	□	□	□	□	□	□	□
6	For me the safety card is intense.	□	□	□	□	□	□	□
7	For me the safety card is vague.	□	□	□	□	□	□	□
8	To me the airplane safety card looks serious.	□	□	□	□	□	□	□
9	To me the airplane safety card looks complex.	□	□	□	□	□	□	□
10	To me the airplane safety card looks important.	□	□	□	□	□	□	□
11	To me the airplane safety card looks sophisticated.	□	□	□	□	□	□	□
12	To me the airplane safety card looks relevant.	□	□	□	□	□	□	□
13	To me the airplane safety card looks difficult.	□	□	□	□	□	□	□
14	To me the airplane safety card looks gentle.	□	□	□	□	□	□	□
15	I enjoy studying the airplane safety card.	□	□	□	□	□	□	□
16	I would prefer to put the airplane safety card aside.	□	□	□	□	□	□	□
17	I would like to take a copy of the airplane safety card with me.	□	□	□	□	□	□	□
18	I like engaging in handling this airplane safety card.	□	□	□	□	□	□	□
19	Even though I saw different airplane safety cards, dealing with this one is particularly pleasant.	□	□	□	□	□	□	□
20	I value the information given on the airplane safety card.	□	□	□	□	□	□	□
21	I don't appreciate studying the airplane safety card during a flight.	□	□	□	□	□	□	□
22	The airplane safety card is valuable.	□	□	□	□	□	□	□
23	I think there is no added value to take a closer look at the airplane safety card.	□	□	□	□	□	□	□
24	I have a good feeling when looking at the airplane safety card.	□	□	□	□	□	□	□
25	I intend to study the airplane safety card during my next flight.	□	□	□	□	□	□	□

26	I predict I will ignore the airplane safety card during my next flight.	□	□	□	□	□	□	□
27	I plan to use the airplane safety card during my next flight.	□	□	□	□	□	□	□

Your material preferences

N°	Item	definitely disagree – definitely agree						
		1	2	3	4	5	6	7
28	When walking through stores, I can't help touching all kind of products.	□	□	□	□	□	□	□
29	Touching products can be fun.	□	□	□	□	□	□	□
30	When browsing in stores, it is important for me to handle all kinds of products.	□	□	□	□	□	□	□
31	I like to touch products, even if I have no intention of buying them.	□	□	□	□	□	□	□
32	When browsing in stores, I like to touch lots of products.	□	□	□	□	□	□	□
33	I find myself touching all kind of products in stores.	□	□	□	□	□	□	□

Please answer some general questions by ticking one box per question or filling in your answer on the empty line.

- What is your gender?
  - Male
  - Female
- What is your highest education?
  - University
  - Polytechnic
  - High School
  - Middle School
  - Main School
  - Other: _____
- How old are you?

  _____
- How often do you take the plane (NB: outward and return flight count as separate flights)
  - Less than 5 a year
  - 5-10 a year
  - 11-24 a year
  - More than 24 a year
- Do you enjoy taking the plane?
  - Not at all
  - Neutral
  - Very much

This is the end of the survey. Many thanks for your participation!

If you are interested into the results please indicate your e-mail address below:

_____

A.5.2 Questions Arranged By Construct

Table A5.2.1. *Items for the Questionnaire*

Construct	Construct Number	Item	Reversed
Processing Fluency	PF1	For me the safety card is clear.	
	PF2	For me the safety card is fuzzy.	x
	PF3	For me the safety card is vivid.	
	PF4	For me the safety card is detailed.	
	PF5	For me the safety card is weak.	x
	PF6	For me the safety card is intense.	
	PF7	For me the safety card is vague.	x
Perceived Importance/ Seriousness	IS1	To me the airplane safety card looks serious.	
	IS2	To me the airplane safety card looks complex.	x
	IS3	To me the airplane safety card looks important.	
	IS4	To me the airplane safety card looks sophisticated.	
	IS5	To me the airplane safety card looks relevant.	
	IS6	To me the airplane safety card looks difficult.	x
	IS7	To me the airplane safety card looks gentle.	
Interaction	I1	I enjoy studying the airplane safety card.	
	I2	I would prefer to put the airplane safety card aside.	x
	I3	I would like to take a copy of the airplane safety card with me.	
	I4	I like engaging in handling this airplane safety card.	
	I5	Even though I saw different airplane safety cards, dealing with this one is particularly pleasant.	
Valuation	V1	I value the information given on the airplane safety card.	
	V2	I don't appreciate studying the airplane safety card during a flight.	x
	V3	The airplane safety card is valuable.	
	V4	I think there is no added value to take a closer look at the airplane safety card.	
	V5	I have a good feeling when looking at the airplane safety card.	
Behavioural Intention	BI1	I intend to study the airplane safety card during my next flight.	
	BI2	I predict I will ignore the airplane safety card during my next flight.	x
	BI3	I plan to use the airplane safety card during my next flight.	

Need for Touch (autotelic)	NFT1	When walking through stores, I can't help touching all kind of products.
	NFT2	Touching products can be fun.
	NFT3	When browsing in stores, it is important for me to handle all kinds of products.
	NFT4	I like to touch products, even if I have no intention of buying them.
	NFT5	When browsing in stores, I like to touch lots of products.
	NFT6	I find myself touching all kind of products in stores.

A.5.3 Reliability Analysis

To measure the dependent variables in the most effective way, the internal consistency (Cronbach's alpha) was tested as a first step. By excluding some items for further analysis it was possible to increase the internal consistency for all constructs (increase ranging from .029 to .119). As a result of this reduction, all constructs could exhibit a reliability of at least .6. The results and chosen items are shown in Table A5.3.1.

As a next step, constructs were computed by adding those items and dividing by the total number of items per construct. In advance, missing values were identified (51 in total out of 5.511) and replaced by the mean of that specific item.

Table A.5.3.1. *Cronbach's Alpha Scores and Selected Items*

Construct	Alpha before reduction	Alpha after reduction	Selected items
Processing Fluency	.578	.619	PF1, PF2, PF3, PF4, PF5, PF7
Perceived Importance/ Seriousness	.479	.598	IS1, IS3, IS4, IS5, IS7
Interaction	.656	.685	I1, I3, I4, I5
Valuation	.679	.751	V1, V3, V4
Behavioural Intention	.759	.840	BI1, BI3
Need for Touch	.872	.911	NFT2, NFT3, NFT4, NFT5, NFT6

A.5.4 Outlier Analysis

An outlier analysis was conducted as a following step. Thereby, boxplots were used to identify the outliers of each construct individually. As a result, the following respondents were identified as outlier per construct (Table A.5.4.1).

Consequently, the scores of these outliers have been adjusted. Depending on their position at the extreme positive or negative side of the scale, these scores have been replaced by the mean of that specific construct plus/ minus two standard deviations.

Table A.5.4.1. *Identified Outliers*

Construct	Participant No.
Processing Fluency	77
Perceived Importance/ Seriousness	-
Interaction	-
Valuation	26
Behavioural Intention	-
Need for Touch	-

A.5.5 Checking Assumptions

Since the current study was set up using a factorial design, specifically a 3 (Mode of Presentation: neutral, heavy paper [3000g/m²], light paper [90g/m²]) x 3 (Language: neutral, heavy, light) between-subject design, as well as measuring several dependent variables (i.e. Processing Fluency, Perceived Seriousness/ Importance, Interaction, Valuation, Behavioural Intention) a multivariate analysis of variance (MANOVA) needs to be conducted in order to investigate possible and to reduce the risk of an inflated Type 1 error.

However, it can be assumed that persons who enjoy flying have a different affiliation with the topic of airplane safety cards than those who do not like flying. Also the fact that some participants fly more regularly than others, may affect the dependent variables anyway. For these reasons it was chosen to include the variables Enjoyment Plane and Frequency Plane as Covariates. Also the potential moderator Need for Touch was included as covariate. Accordingly, the assumptions of conducting a multivariate analysis of covariance (MANCOVA) had to be checked.

Firstly, measurements should be statistically independent (Field, 2009), which is assured by utilising a between-subject design for the current study. Secondly, participants were randomly sampled from the population of interest and dependent variables were measured at an interval level (i.e. likert scale). Thirdly, homogeneity of variance needs to be present, which was checked by conducting the Levene's test (Table A.5.5.1). Since the sample sizes were not equal across the groups, the Box's test has been applied in order to test for equality of covariance matrices. Box's M value of 184,37 was associated with a p value of .006, which was interpreted as non-significant based on Huberty and Petoskey's (2000) guideline (i.e., $p < .005$). Thus, the covariance matrices between the groups were assumed to be equal for the purposes of the MAN(C)OVA. The fourth assumption is a normal distribution of the dependent variables, whereby this needs to be the case across different conditions (not only in general; Field, 2009). This criterion has been met partially: The scores on Valuation and Behavioural Intention were not significantly non-normal, while scores on Processing Fluency, Perceived Importance/ Seriousness, and Interaction were significantly deviating from a normal distribution (Table A.5.5.2). Accordingly, it was tried to transform the data with the aim of arriving at a normal distribution of all dependent variables afterwards. However, none of the applied transformations (i.e. Log transformation, square transformation, square root transformation, 1/square root transformation, and reciprocal transformation) led to the desired result. Consequently, all

subsequent analyses were performed using the original data. Fortunately, the Pillai Bartlett trace is relatively robust to violations of assumptions (Field, 2009). Accordingly, it was still appropriate to conduct a MAN(C)OVA.

Table A.5.5.1. *Homogeneity of Variance*

Construct	Levene's Test
Processing Fluency	F(8, 158) = 1.47, *ns*
Perceived Importance/ Seriousness	F(8, 158) = 1.07, *ns*
Interaction	F(8, 158) = 1.08 *ns*
Valuation	F(8, 158) = 1.82, *ns*
Behavioural Intention	F(8, 158) = 1.34, *ns*

Table A.5.5.2. *Normal Distribution*

Condit-ion	***Mode of Presen-tation***	***Language***	Processing Fluency	Perceived Importance/ Seriousness	Interaction	Valuation	Behavioural Intention
1	*Neutral*	*Neutral*	D(20) = 0.127, *ns*	D(20) = 0.127, p < .05	D(20) = 0.203, p < .05	D(20) = 0.151, *ns*	D(20) = 0.143, *ns*
2	*Heavy*	*Neutral*	D(20) = 0.122, *ns*	D(20) = 0.130, *ns*	D(20) = 0.129, *ns*	D(20) = 0.175, *ns*	D(20) = 0.109, *ns*
3	*Light*	*Neutral*	D(19) = 0.211, p < .05	D(19) = 0.142, *ns*	D(19) = 0.158, *ns*	D(19) = 0.140, *ns*	D(19) = 0.182, *ns*
4	*Neutral*	*Heavy*	D(19) = 0.176, *ns*	D(19) = 0.127, *ns*	D(19) = 0.191, *ns*	D(19) = 0.170, *ns*	D(19) = 0.198, p < .05
5	*Heavy*	*Heavy*	D(15) = 0.256, p < .05	D(15) = 0.119, *ns*	D(15) = 0.144, *ns*	D(15) = 0.105, *ns*	D(15) = 0.138, *ns*
6	*Light*	*Heavy*	D(17) = 0.172, *ns*	D(17) = 0.133, *ns*	D(17) = 0.163, *ns*	D(17) = 0.147, *ns*	D(17) = 0.138, *ns*
7	*Neutral*	*Light*	D(18) = 0.145, *ns*	D(18) = 0.248, p < .05	D(18) = 0.117, *ns*	D(18) = 0.135, *ns*	D(18) = 0.108, *ns*
8	*Heavy*	*Light*	D(20) = 0.138, *ns*	D(20) = 0.131, *ns*	D(20) = 0.145, *ns*	D(20) = 0.169, *ns*	D(20) = 0.151, *ns*
9	*Light*	*Light*	D(19) = 0.080, *ns*	D(19) = 0.131, *ns*	D(19) = 0.161, *ns*	D(19) = 0.192, *ns*	D(19) = 0.161, *ns*

Subsequently, it was checked for the independence of covariate and treatment effect. For this purpose, a factorial MANOVA was conducted with the potential covariates (Enjoyment Plane, Frequency Plane, and Need for Touch) as dependent variables and the two grouping variables Mode of Presentation and Language as fixed factors. There was a non-significant main effect of Mode of Presentation on Enjoyment Plane, Frequency Plane, and Need for Touch, F(6, 312)= 1.545, *ns*. Similarly, the main effect of Language on the dependent variables was non-significant as well, F(6, 312)= 0.642, *ns*. Moreover, the interaction effect between Mode of Presentation and Language on the dependent variables was found to be non-significant, F(12, 471) = 0.859 *ns.*

The final step was to test for the assumption of homogeneity of regression slopes. For this purpose, the MANCOVA model was customised. The analysis revealed significant interaction effects of the grouping variables with the potential covariates. Those results can be found in Table A.5.5.3. As such, the assumption has been violated and the relationships between the factors and the dependent variable (the main effects) cannot be interpreted because the interpretation changes when the values of the covariate differ (Field, 2009).

Concluding, the assumptions a MANCOVA requires have not been fulfilled. Therefore, it has been decided to conduct a multivariate analysis of variance (MANOVA) as those assumptions have been met (i.e. independence measurements, dependent variables measured at interval level, homogeneity of variance, normal distribution of the dependent variables).

Table A.5.5.3. *Homogeneity of Regression Slopes*

Interaction Effect	Multivariate Test
Mode of Presentation X Language X Enjoyment Plane (EP)	V = 0.37, F(40, 625) = 1.31, p = .10
Mode of Presentation X Language X Frequency Plane (FP)	V = 0.39, F(40, 625) = 1.31, p = .10
Mode of Presentation X Language X Need for Touch (NFT)	V = 0.38, F(40, 625) = 1.28, p = .12
Mode of Presentation X Language X EP X FP X NFT	V = 0.47, F(45, 625) = 1.44, p < .05

A.5.6 Results Multivariate Analysis of Variance

Table A.5.6.1. *ANOVA Results*

Construct	df	F	p	η2
A. Tests of Between-Subject Effects for Processing Fluency				
Mode of Presentation	2	0.69	*ns*	.01
Language	2	0.39	*ns*	.01
Mode of Presentation X Language	4	0.37	*ns*	.01
Error	158			
B. Tests of Between-Subject Effects for Perceived Seriousness/ Importance				
Mode of Presentation	2	0.17	*ns*	.00
Language	2	3.43	.035	.04
Mode of Presentation X Language	4	2.74	.030	.07
Error	158			
C. Tests of Between-Subject Effects for Interaction				
Mode of Presentation	2	1.70	*ns*	.02
Language	2	0.14	*ns*	.00
Mode of Presentation X Language	4	1.40	*ns*	.03
Error	158			
D. Tests of Between-Subject Effects for Valuation				
Mode of Presentation	2	7.88	.001	.09
Language	2	7.41	.001	.09
Mode of Presentation X Language	4	4.19	.003	.10
Error	158			
E. Tests of Between-Subject Effects for Behavioural Intention				
Mode of Presentation	2	0.30	*ns*	.00
Language	2	2.99	*ns*	.04
Mode of Presentation X Language	4	0.99	*ns*	.02
Error	158			

A.5.7 Follow-up analysis for significant interaction

In order to study the interaction effect in more detail a simple effects analysis was conducted as a follow-up. Thereby, it is looked at the effect of one independent variable at individual levels of the other independent variable (Field, 2009). For this purpose, a syntax for SPSS was used. As the interaction effect between Model of Presentation and Language was only significant for the dependent variable Perceived Seriousness/ Importance and Valuation, this analysis was limited to those two variables. Results can be found in Table A.5.7.1.

Table A.5.7.1. *Simple Effect Analysis*

Mode of Presentation	Language (I)	Language (J)	Mean Difference (I-J)	
			Perceived Seriousness/Importance	Valuation
neutral	neutral	heavy	-0.84**	-0.10
		light	-0.68*	0.10
	heavy	neutral	0.84**	0.10
		light	0.16	0.20
	light	neutral	0.68*	-0.10
		heavy	-0.16	-0.20
heavy	neutral	heavy	-0.14	-1.66***
		light	0.04	-1.33***
	heavy	neutral	0.14	1.66***
		light	0.17	0.32
	light	neutral	-0.04	1.33***
		heavy	-0.17	-0.322
light	neutral	heavy	0.12	-0.18
		light	-0.59*	-0.72**
	heavy	neutral	-0.12	0.18
		light	-0.71*	-0.54
	light	neutral	0.59*	0.72**
		heavy	0.71*	0.54

Note: * p < .1 ** p < .05 *** p < .001

A.5.8 Hierarchical multiple regression analysis

Table A.5.8.1. *Bivariate Correlations Among Mode of Presentation, Language, and Need for Touch*

Subscale	1	2	3
1. Mode of Presentation	-	.017	*.171**
2. Language		-	-.056
3. Need for Touch			-

Note: Correlations marked with an asterisk (*) were significant at p < .05.

Table A.5.8.2. *Regression Processing Fluency*

	Model 1			Model 2		
Variable	B	SE B	β	B	SE B	β
Mode of Presentation	-0.10	0.06	-.01	-0.10	0.06	-.01
Tactile Language	0.05	0.06	.07	0.05	0.06	.07
Need for Touch	-0.06	0.06	-.07	-0.06	0.06	-.08
Tactile Language x Need for Touch	-0.05	0.06	-.06	-0.05	0.06	-.06
Mode of Presentation x Need for Touch				0.02	0.07	.02
R^2		.016			.016	
F for change in R^2		0.66			0.08	

Note: Mode of Presentation and Need for Touch were centred at their means. * p < .1 ** p < .05

Table A.5.8.3. *Regression Perceived Seriousness/ Importance*

	Model 1			Model 2		
Variable	B	SE B	β	B	SE B	β
Mode of Presentation	-0.02	0.07	-.02	-0.02	0.07	-.02
Tactile Language	0.18	0.07	.20**	0.18	0.07	.20**
Need for Touch	0.03	0.07	.03	0.03	0.07	.03
Tactile Language x Need for Touch	-0.13	0.07	-.15	-0.13	0.07	-.15
Mode of Presentation x Need for Touch				0.16	0.07	.02
R^2		.059**			.059	
F for change in R^2		2.53			0.05	

Note: Mode of Presentation and Need for Touch were centred at their means. * p < .1 ** p < .05

Table A.5.8.4. *Regression Interaction*

	Model 1			Model 2		
Variable	B	SE B	β	B	SE B	β
Mode of Presentation	0.04	0.09	.04	0.04	0.09	.04
Tactile Language	0.04	0.09	.04	0.05	0.09	.05
Need for Touch	0.08	0.09	.07	0.11	0.09	.10
Tactile Language x Need for Touch	-0.00	0.08	-.00	-0.01	0.08	-.01
Mode of Presentation x Need for Touch				-0.14	0.09	-.13
R^2		.009			.024	
F for change in R^2		0.38			2.48	

Note: Mode of Presentation and Need for Touch were centred at their means. * p < .1 ** p < .05

Table A.5.8.5. *Regression Valuation*

	Model 1			Model 2		
Variable	B	SE B	β	B	SE B	β
Mode of Presentation	-0.20	0.09	-.18**	-0.20	0.09	-.18**
Tactile Language	0.28	0.09	.25**	0.28	0.09	.25**
Need for Touch	0.07	0.09	.06	0.08	0.09	.07
Tactile Language x Need for Touch	-0.02	0.08	-.02	-0.03	0.08	-.02
Mode of Presentation x Need for Touch				-0.05	0.09	-.05
R^2		.087			.089	
F for change in R^2		3.88*			0.34	

Note: Mode of Presentation and Need for Touch were centred at their means. * p < .1 ** p < .05

Table A.5.8.6. *Regression Behavioural Intention*

	Model 1			Model 2		
Variable	B	SE B	β	B	SE B	β
Mode of Presentation	0.06	0.14	.04	0.06	0.14	.04
Tactile Language	0.12	0.13	.07	0.12	0.13	.07
Need for Touch	-0.70	0.14	-.04	-0.70	0.14	-.04
Tactile Language x Need for Touch	-0.21	0.13	-.13	-0.21	0.13	-.13
Mode of Presentation x Need for Touch				0.01	0.14	.00
R^2		.026			.026	
F for change in R^2		1.07			0.00	

Note: Mode of Presentation and Need for Touch were centred at their means. * p < .1 ** p < .05

A.6 Summary of Results

Table A.6.1. *Summary of Results*

	Hypothesis	Results	Source of Statistics
H1	**There is a main effect for the mode of presentation of a risk communication with respect to the dependent variables.**		
H1.a	A risk communication presented physically on paper will be evaluated more positively with respect to the [dependent variables] than presented in digital format.	*Not supported*	
H1.a.1	[Processing Fluency]	Not supported	A.5.6.1A
H1.a.2	[Perceived Seriousness/ Importance]	Not supported	A.5.6.1B
H1.a.3	[Interaction]	Not supported	A.5.6.1C
H1.a.4	[Valuation]	Not supported	A.5.6.1D
H1.a.5	[Behavioural Intention]	Not supported	A.5.6.1E
H1.b	A risk communication presented on relatively heavy paper will be evaluated more positively with respect to the [dependent variables] than presented on light paper.	*Not supported*	
H1.b.1	[Processing Fluency]	Not supported	A.5.6.1A
H1.b.2	[Perceived Seriousness/ Importance]	Not supported	A.5.6.1B
H1.b.3	[Interaction]	Not supported	A.5.6.1C
H1.b.4	[Valuation]	Not supported	A.5.6.1D
H1.b.5	[Behavioural Intention]	Not supported	A.5.6.1E
H2	**There is a main effect for the type of language used for the risk communication with respect to the dependent variables.**		
H2.a	A risk communication applying a "tactile language" will be evaluated more positively with respect to the [dependent variables] than a neutral message.	*Partly supported*	
H2.a.1	[Processing Fluency]	Not supported	A.5.6.1A
H2.a.2	[Perceived Seriousness/ Importance]	Partly supported	A.5.6.1B
H2.a.3	[Interaction]	Not supported	A.5.6.1C
H2.a.4	[Valuation]	Supported	A.5.6.1D
H2.a.5	[Behavioural Intention]	Not supported	A.5.6.1E
H2.b	A risk communication supplemented with a "heavy tactile language" will be evaluated more positively with respect to the [dependent variables] than supplemented by with "light tactile language".	*Not supported*	
H2.b.1	[Processing Fluency]	Not supported	A.5.6.1A
H2.b.2	[Perceived Seriousness/ Importance]	Not supported	A.5.6.1B
H2.b.3	[Interaction]	Not supported	A.5.6.1C
H2.b.4	[Valuation]	Not supported	A.5.6.1D
H2.b.5	[Behavioural Intention]	Not supported	A.5.6.1E
H3	**There is an interaction effect between the mode of presentation and type of language with respect to the dependent variables.**		
H3.a	Congruent combinations of mode of presentation and type of language will be evaluated more positively with respect to the [dependent variables] than incongruent combinations.	*Partly supported*	
H3.a.1	[Processing Fluency]	Not supported	A.5.6.1A
H3.a.2	[Perceived Seriousness/ Importance]	Partly supported	A.5.6.1B
H3.a.3	[Interaction]	Not supported	A.5.6.1C
H3.a.4	[Valuation]	Partly supported	A.5.6.1D
H3.a.5	[Behavioural Intention]	Not supported	A.5.6.1E
H3.b	A risk communication presented on heavy paper supplemented with a "heavy tactile language", will be evaluated most positively with respect to the [dependent variables] followed by the combination of light paper and "light tactile language" and least positive evaluation is expected when presented digitally with a neutral language.	*Not supported*	
H3.b.1	[Processing Fluency]	Not supported	A.5.6.1A
H3.b.2	[Perceived Seriousness/ Importance]	Not supported	A.5.6.1B
H3.b.3	[Interaction]	Not supported	A.5.6.1C

H3.b.4	[Valuation]	Not supported	A.5.6.1D
H3.b.5	[Behavioural Intention]	Not supported	A.5.6.1E
H4	**The main effect for the mode of presentation on the [dependent variables] is moderated by the degree of the individual's "need for touch" (NFT), whereby the effect will be more distinct for those scoring high on NFT.**	*Not supported*	
H4.1	[Processing Fluency]	Not supported	A.5.8.2
H4.2	[Perceived Seriousness/ Importance]	Not supported	A.5.8.3
H4.3	[Interaction]	Not supported	A.5.8.4
H4.4	[Valuation]	Not supported	A.5.8.5
H4.5	[Behavioural Intention]	Not supported	A.5.8.6