The Influence of Disgust on Technology Acceptance

Full Paper

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Abstract

Technology usage can hold different kinds of disgust elicitors. In this paper, it is postulated that Perceived Disgust, which is described here as the extent to which a person feels disgusted by the prospective usage of a technology, has a direct negative influence on the Behavioral Intention to Use a technology as well as an indirect influence on the Behavioral Intention to Use a technology through Perceived Usefulness. After collecting 136 online questionnaires and applying a structural equation modeling approach, these hypotheses were confirmed. These findings suggest that technology manufacturers should address people's potential negative perceptions of their devices in terms of the different domains of disgust, for example, by using antibacterial coatings, corresponding advertisements, and collaborating with respected medical experts.

Keywords

Perceived Disgust, Technology Acceptance.

Introduction

It is generally accepted that utilitarian technology acceptance is primarily determined by Perceived Usefulness (e.g., Davis et al. 1989; Davis et al. 1992). However, the influence of Perceived Usefulness on technology acceptance behavior does not provide manufacturers with specific guidance, since they still do not know *why* technologies are or are not perceived as being useful. One potential influence factor that has not been adequately integrated into the domain of technology acceptance is the emotion of disgust.

Imagine using shared devices, such as the tablet computers that some restaurants provide to their customers so as to order their meal. One aspect of this "multi-user" usage is that users can be in potential contact with known disgust elicitors such as other people's sweat. Disgust, which is understood as "a defensive emotion, guarding the purity of the body …" (Haidt et al. 1994, p. 704) is known to act as a strong driver of human behavior. More specifically, since disgust makes "people cautious not only about what they put into their mouths, but about what they do with their bodies", it causes avoidance behavior with regards to different disgust stimuli such as objects (Haidt et al. 1994, p. 711; Olatunji et al. 2008; Rozin et al. 2008; Rozin et al. 1999). As a result, Perceived Disgust, which is described here as the extent to which a person feels disgusted by the prospective usage of a technology, might negatively influence people's technology acceptance behavior.

The Pilot is an in-ear earpiece that enables people to communicate with others without any language barriers, as it offers almost real-time translations between languages. After collecting 136 complete online questionnaires about this technology, and applying a structural equation modeling approach, the findings confirmed that utilitarian technology acceptance is influenced by Perceived Usefulness. Also, Perceived Disgust was found to have a direct negative influence on the Behavioral Intention to Use a technology as well as an indirect negative influence on the Behavioral Intention to Use a technology through Perceived Usefulness. These findings suggest that technology manufacturers need to address people's potential negative perceptions of their devices in terms of disgust.

In the next section, Perceived Usefulness will be introduced as an influence factor of technologies that provide utilitarian benefits to the user, and the theoretical foundations of Perceived Disgust will be

presented. Following this, the research model and research design will be described. After the results are revealed and discussed, the findings will be summarized, the theoretical and practical implications of these results will be presented, and an outlook on further research will be provided.

Theoretical Background

The Role of Perceived Usefulness on Technology Acceptance

Generally, technologies that provide users with utilitarian benefits "aim to provide instrumental value to the user" (Van der Heijden 2004, p. 696). Perceived Usefulness — i.e., "the degree to which a person believes that using a particular system would enhance his or her job [and task] performance" (Davis 1989, p. 320) — centers on the motivations and benefits that are external to the system-user interaction itself, referred to as extrinsic motivations (Brief and Aldag 1977; Van der Heijden 2004). For example, the external benefits/extrinsic motivations of a text-processing program can be to foster a good writing performance in terms of a well-structured and orthographically error-free text (Davis et al. 1989).

Various studies in multiple contexts have consistently confirmed that Perceived Usefulness is a central antecedent for the acceptance of a certain technology (e.g., Davis 1989). In other words, a person can be expected to adopt a technology if he/she believes that it fulfills his/her expectations with regards to its instrumental benefits, that is, to its Perceived Usefulness.

Perceived Disgust

Disgust is one of the basic emotions that is found across all cultures (Ekman 1992) and has been studied at length in academic spheres (cf. Olatunji et al. 2008). First, disgust was primarily seen as a *guardian of the mouth* (e.g., Rozin and Fallon 1987; Rozin et al. 2008) with many early definitions centering on food rejection (e.g., Angyal 1941; Tomkins 1963) and studies researching the characteristics of foods that are rejected due to disgust (e.g., Martins and Pliner 2006; Rozin et al. 1986).

Later, it was acknowledged that disgust was not only limited to anything mouth-related and its domain was broadened to other arrays of elicitors (Haidt et al. 1994). More specifically, disgust was understood as "a defensive emotion, guarding the purity of the body, and perhaps of the self or soul residing within the body" (Haidt et al. 1994, p. 704). Multiple classification systems were developed ranging from eight-domain classifications (Haidt et al. 1994) to the now commonly accepted four-domain classification that includes core disgust, animal reminder disgust, interpersonal disgust and moral disgust (Rozin et al. 2008).

First, all oral-centered elicitors and other related elicitors that can cause infections and spread diseases are now classified as core disgust (Haidt et al. 1994). These potential harmful things include food, body products, and some animals such as rats (Rozin et al. 2008). More specifically, core disgust acts as an defense of the body "in the presence of microbial threats" (Haidt et al. 1997, p. 115; Rozin et al. 2008).

Second, animal reminder disgust includes everything that reminds people of their animal origin, acting as a defense "of the distinction between humans and animals" (Haidt et al. 1997, p. 115). More specifically, people have found ways to humanize such activities that provide evidence of their animal nature (such as eating, excreting, and having sex) through taboos, customs and rituals with a feeling of disgust being associated with any violation against these behaviors (Haidt et al. 1994). Likewise, when people are confronted with things that remind them of the fragility and animalistic quality of their bodies (such as body envelope violations) or of their own mortality (such as contact with corpses), they tend to experience disgust (Haidt et al. 1994). Overall, animal reminder disgust can be seen as "a defensive emotion that guards … against the recognition of … animality and, perhaps ultimately, of … mortality" (Haidt et al. 1994, p. 712).

Third, interpersonal disgust elicitors include all things and places that were used by undesirable or unknown persons (Rozin et al. 2008). However, interpersonal disgust is not based on a concern with regards to body products such as a person's sweat or hair but on the pre-user's nature (Haidt et al. 1997). More specifically, four identifiable aspects of a pre-user, i.e. strangeness, disease, misfortune, and moral taint, drive interpersonal disgust (Rozin et al. 1994), since all are potentially offensive or contaminating (Rozin et al. 2008). As a result, "[i]nterpersonal disgust … discourages contact with other human beings

who are not intimates [,] … reducing an infection risk and … [serving] the purpose of maintaining social distinctiveness and social hierarchies" in a "social world, where we use it to avoid 'evil' and increase contact with 'goodness'" (Haidt et al. 1997, p. 116; Rozin et al. 2008, p. 762).

Finally, moral disgust is about people's social behavior such as brutality, racism, political attitudes, hypocrisy, and violations of important social relationships (Haidt et al. 1997). More specifically, it has been shown that moral offenses can show similar properties as contamination (Rozin et al. 2008) with the extent of contact aversion being similar to that of contagious illnesses (Rozin et al. 1994).

In summary, disgust is a defensive emotion that can act as a strong driver of human behavior. More specifically, since disgust makes "people cautious not only about what they put into their mouths, but about what they do with their bodies" and their selves/souls, it causes avoidance behavior with regards to different disgust stimuli such as objects, events, situations, and people (Haidt et al. 1994, p. 711; Olatunji et al. 2008; Rozin et al. 2008; Rozin et al. 1999). As a result, people with high disgust sensitivity tend to be less adventurous and more anxious that others (Haidt et al. 1994).

Perceived Disgust, which is described here as the extent to which a person feels disgusted by the prospective usage of a technology, may also play an important role in the context of technologies: First, imagine a family's tablet, a video game controller at a friend's house, or a computer in a public library. All of these technologies may have regularly been in contact with core disgust elicitors including other people's body products such as sweat or hair as well as animals such as pets. As a result, such technologies, which are regularly used by multiple people, could be perceived as disgusting. Another aspect of these "multi-user" technologies is the potential usage by strangers. A current user often cannot know who has used the technology before him/her. Hence, interpersonal disgust, with its central aspect of strangeness, also contributes to the potential feeling of disgust elicited by the use of certain technologies. Finally, moral disgust might also play a role on technology acceptance. For example, news outlets regularly report about bad working conditions at the assembly lines of smartphones, tablets, etc. This might potentially be perceived as morally offensive behavior, leading to users' moral disgust with regards to the company and their products.

There is thus an indication that Perceived Disgust could be relevant in the context of technology usage. Indeed, since disgust is a strong driver of general human behavior, Perceived Disgust can be expected to influence people's technology acceptance behavior. However, no study of which the author is aware has yet empirically evaluated the role of Perceived Disgust on the acceptance of a technology.

Research Model

As described earlier, Perceived Usefulness has been found in numerous studies to be an important antecedent of technology acceptance, and is thus commonly accepted as such (e.g., Davis et al. 1989). It is hypothesized that:

*There is a positive influence of Perceived Usefulness on the Behavioral Intention to Use[1] a technology (**H1**).*

As argued above, technology usage might be perceived as disgusting to people in some contexts. Indeed, technology usage can span several disgust domains including core, interpersonal and moral disgust elicitors. Since it is a defensive emotion like fear (Haidt et al. 1994; Olatunji and Sawchuck 2005), disgust has a behavioral component that manifests itself as a distancing from objects, events, and situations in order to protect the body, soul, and social order (Rozin et al. 2008). Overall, disgust leads to behavioral avoidance of the corresponding disgust elicitors (Rozin et al. 1999). Consequently, Perceived Disgust can be expected to exert a negative influence on technology usage. Indeed, it has been shown that negative

[1] At the time of the study (August 2016), the technology used for empirical evaluation, the Pilot, was not available to the general public. As a result, only Behavioral Intention to Use, and not Actual System Use, was included into the research model. Behavioral Intention to Use is a commonly accepted mediator between people's beliefs and their actual behavior. It "capture[s] the motivational factors that influence a [person's] behavior; they are indications of how hard people are willing to try, of how much of an effort they are planning to exert, in order to perform the behavior" (Ajzen 1991, p. 181).

connoted emotions can negatively influence technology usage (Beaudry and Pinsonneault 2010). It is hypothesized that:

*There is a negative influence of Perceived Disgust on the Behavioral Intention to Use a technology (**H2**).*

Moreover, research suggests that emotions can influence people's beliefs about a technology (e.g., Cenfetelli 2004). For example, it has been shown that positive emotions are able to positively influence the Perceived Ease of Use of a technology and that negative emotions are able to negatively influence the Perceived Ease of Use of a technology (Cenfetelli 2004). In this sense, Perceived Disgust as a defensive emotion can be expected to negatively influence an individual's beliefs with regards to a technology's instrumental benefits, i.e., its Perceived Usefulness. It is hypothesized that:

*There is a negative influence of Perceived Disgust on the Perceived Usefulness of a technology (**H3**).*

Figure 1 presents the complete research model.

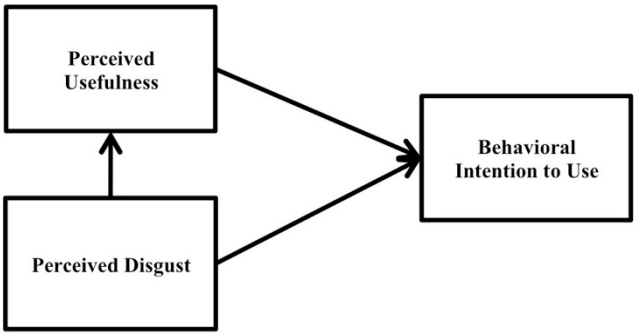

Figure 1. Research Model

Research Design

Data Collection

To empirically evaluate the research model, a call was posted on the online student newsboard of a German university. The call promised a raffle of a 25 € gift certificate from Amazon for the participants. In this manner, 136 complete German-language online questionnaires about one specific wearable technology, the Pilot, were obtained. At the beginning of the questionnaire, a short description of the Pilot and its functionality was provided, including a promotional image of a woman wearing one:

Pilot is an in-ear earpiece that enables people to communicate with others without any language barriers. It consists of two earpieces as well as a corresponding smartphone application. One typical use case: You are in a foreign city, you do not speak the language but you want to talk to someone local. You use one of Pilot's earpieces and give the other one to the person you want to talk to. Pilot then translates your and the other person's spoken sentences in almost real-time.[2]

92 of the respondents were female (67.65 percent) and 44 were male (32.35 percent). The average age was 24.98 years (standard deviation: 4.49).

Measurement

Existing reflective scales were adapted to the study's context in order to measure Behavioral Intention to Use and Perceived Usefulness. The existing disgust scales measure people's general sensitivity to the

[2] As a result of the device's characteristics, it was assumed that elicitors of both core disgust and interpersonal disgust could elicit different extents of disgust for the respondents. More specifically, earpieces used by multiple persons have been potentially in contact with other people's earwax, sweat, etc. (→ core disgust). Additionally, users regularly do not know who has used the earpiece before them (→ interpersonal disgust).

different domains of disgust. However, Perceived Disgust is not about people's general disgust sensitivity but about the extent to which a person feels disgusted by the prospective usage of a specific technology. As a result, three reflective items were developed for Perceived Disgust by consulting the literature (Haidt et al. 1994; Haidt et al. 1997; Olatunji et al. 2008; Olatunji et al. 2007; Rozin et al. 2008; Rozin et al. 1999) and several researchers throughout the development process. Table 1 presents the resulting reflective items with their corresponding sources as well as the means and standard deviations in the collected samples. PD3 was measured using a seven-point semantic differential with the adjectives "not disgusting at all" and "extremely disgusting" at the endpoints. All other items were measured using a seven-point Likert-type scale ranging from "strongly disagree" to "strongly agree".

Construct	Items (Labels)	Mean	Std. Dev.	Adapted from
Behavioral Intention to Use	I intend to use the Pilot in the next 6 months (BI1)	3.38	1.57	Hu et al. (2011) Venkatesh et al. (2003)
	I predict that I will use the Pilot in the near future (BI2)	3.37	1.53	
	In the future, I am very likely to use the Pilot (BI3)	4.68	1.53	
Perceived Disgust	The usage of the Pilot is disgusting (PD1)	2.96	1.67	Developed by the author
	Using the Pilot would be disgusting (PD2)	2.90	1.66	
	Using the Pilot is … (PD3)	3.31	1.89	
Perceived Usefulness	Overall, the Pilot is useful (PU1)	6.07	.93	Alarcón-del-Amo et al. (2012) Ernst et al. (2013)
	I consider that the Pilot is useful to me (PU2)	5.35	1.15	
	The Pilot benefits me (PU3)	5.82	.90	

Table 1. Items of the Measurement Model

Results

The Partial-Least-Squares approach was used by using SmartPLS 3.2.4 (Ringle et al. 2015). With 136 datasets, the suggested minimum sample size threshold of "ten times the largest number of structural paths directed at a particular latent construct in the structural model" (Hair et al. 2011, p. 144) was met. To test for significance, the integrated Bootstrap routine with 5,000 samples was used (Hair et al. 2011).

In the following section, the measurement model will be evaluated first. Indeed, the indicator reliability, the construct reliability, and the discriminant validity of the constructs will be examined. Following this, the results of the structural model will be presented.

Measurement Model

Tables 2 and 3 present the correlations between constructs along with the Average Variance Extracted (AVE) and Composite Reliability (CR), and the reflective items' factor loadings, respectively: All items loaded high (.764 or more) and significant ($p<.001$) on their parent factor and, hence, met the suggested threshold of indicator reliability of .70 (Hair et al. 2011); AVE and CR were higher than .62 and .83, respectively, meeting the suggested construct reliability thresholds of .50/.70 (Hair et al. 2009). The loadings from the reflective indicators were highest for each parent factor and the square root of the AVE of each construct was larger than the absolute value of the construct's correlations with its counterparts, thus indicating discriminant validity (Fornell and Larcker 1981; Hair et al. 2011).

Structural Model

Figure 2 presents the path coefficients of the previously hypothesized relationships as well as the R^2s of both endogenous variables (***=$p<.001$, **=$p<.01$). Perceived Usefulness was found to have a significant positive influence on Behavioral Intention to Use ($\beta=.483$, $p<.001$), confirming hypothesis 1. Perceived Disgust was found to have a negative influence on Perceived Usefulness ($\beta=-.334$, $p<.001$) and Behavioral Intention to Use ($\beta=-.198$, $p<.01$), confirming hypotheses 2 and 3, respectively. Overall, the research model included two predecessors of Behavioral Intention to Use (Perceived Usefulness and Perceived Disgust) and one predecessor of Perceived Usefulness (Perceived Disgust). By taking this into account, the

explanatory power of the structural model is good, since it explains 33.6 percent of the variances of Behavioral Intention to Use and 11.1 percent of the variances of Perceived Usefulness.

	BI	PD	PU
Behavioral Intention to Use (BI)	.796 (.921)		
Perceived Disgust (PD)	-.237	.836 (.938)	
Perceived Usefulness (PU)	.555	-.352	.624 (.832)

Table 2. Correlations between Constructs [AVE (CR) on the Diagonal]

	BI	PD	PU
BI1	.900 (27.03)	-.201	.399
BI2	.895 (27.53)	-.265	.361
BI3	.882 (53.41)	-.425	.619
PD1	-.300	.959 (88.34)	-.301
PD2	-.431	.965 (121.78)	-.351
PD3	-.203	.812 (11.73)	-.246
PU1	.431	-.297	.795 (21.17)
PU2	.500	-.282	.810 (20.91)
PU3	.347	-.197	.764 (15.69)

Table 3. Loadings of the Reflective Items (T-Values)

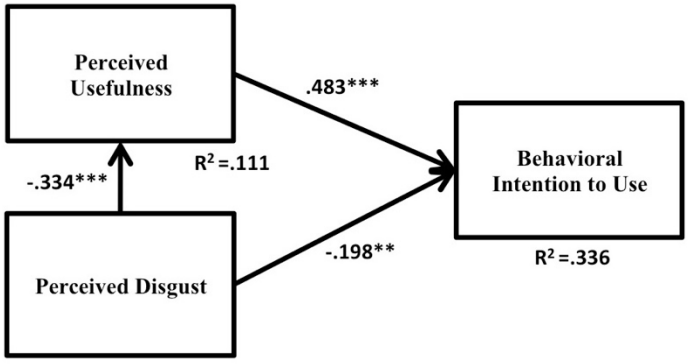

Figure 2. Findings

Conclusions

In this article, a first insight into the role of disgust on the acceptance of technologies was provided. After collecting 136 complete online questionnaires and applying a structural equation modeling approach, the findings indicated that Perceived Disgust negatively influences technology acceptance directly as well as indirectly through Perceived Usefulness.

In summary, the study contributes to technology acceptance literature by introducing the notion of disgust into the field and by confirming its direct and indirect influence on technology acceptance in the context of one specific device. Moreover, the findings have important practical implications. They suggest that manufacturers of technologies should address people's potential negative perception of their devices with regards to the different domains of disgust. For example, they could use antibacterial coatings in order to keep the devices largely germ free, in combination with advertisements that reflect this characteristic. In order to implement this, manufacturers could collaborate with respected medical experts or ask health-oriented athletes to provide testimonials about the products in order to convince people that their devices will not adversely affect the purity of their body.

The study has some limitations. First, the empirical findings are based on only one specific technology: the Pilot. Therefore, there might be differences between this particular technology and others. For

example, the Pilot did not have any relation to the domain of moral disgust. Indeed, neither the provided description of its functionality nor any reports on Google provided any hint of dubious moral behavior of the manufacturer. In addition, the used measurement of Perceived Disgust did not differentiate between the commonly accepted domains of disgust. As a result, the findings did not provide any insight regarding which specific disgust domains play a role on technology acceptance. Furthermore, the description of the Pilot's functionality at the beginning of the questionnaire might not have readily brought to the respondents' minds the feeling of disgust, since they may not have considered usage from the perspective of being offered an earpiece by a stranger. Moreover, since only German-speaking people were surveyed, the results might not hold true for non-German speaking people. Furthermore, the sample individuals were relatively young (mean: 24.98 years; standard deviation: 4.49). Hence, differences might be found for other age groups. Finally, the survey was only posted on the online student news board of a university and, hence, excluded non-students, who could reveal different results.

As a next step, I plan to develop specific Perceived Disgust measurement scales for the different domains of disgust. Moreover, I plan to evaluate the role of Perceived Disgust in different usage contexts such as at in-store hands-on areas and I also plan to study its role with regards to a variety of different kinds of technologies. Finally, I want to roll out the survey to a greater number of countries around the world in order to evaluate if there are potential differences between countries.

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