

‘Masked Aversion’ - Walking and Staring Behavior towards Stigmatizing Products

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An encounter with a person using or wearing a potentially stigmatizing product is an impacting experience that is the result of the artifact itself, the individual experiencing the stigma, the observing bystanders and the cultural context in which the situation is set. Using or wearing a potentially stigmatizing product might stimulate bystanders to stereotype its user and arouse negative feelings or disgust, followed by avoidant behavior. Gaining insight in the causative factors of this process could help to create awareness amongst designers and assist them in overriding product related stigma.

The experiment on which this paper reports is a first attempt to measure the staring and walking behavior of passers-by towards a research confederate who's wearing a dust mask. Two categories of parameters were deduced. The first deals with two aspects of the staring behavior. The distance between a passer-by and the confederate on the moment of visual perception assessed the perception delay. Staring behavior was also measured by registering whether passers-by looked over their shoulders after passing the confederate. The second category, containing the most important measurement, deals with the registration of the closest interpersonal distance between the passer-by and the confederate. The research was conducted on a sample of 87 male and 82 female participants who were randomly assigned to three conditions, a no-mask reference condition and two distinct mask typologies. The results suggest that passers-by did notice the mask conditions significantly faster than the no-mask condition. The results also show a difference in the interpersonal distance for the three conditions; passers-by did maintain a significantly greater distance to the confederate with the dust mask.

This research presents a first step towards the development of a tool that can be indicative of the potential ‘degree of stigmatization’ of product concepts in an early phase of the design process.

Keywords: Product semantics; Stigma; Observational research; Human-Centered Design

1. Introduction

In this article we analyze the subtle as well as clearly visible reactions in situations that confront people with a potentially stigmatizing product in a natural setting. Some of these recurrent and all too familiar experiences include: the frustration of having to wear or use a product that damages one's self-esteem, the desire to be perceived as normal, the relief when a passer-by did not notice one's assistive or protective device. Understanding the individual and social processes behind such experiences might assist designers and companies to 'design against stigma' and relieve product-users from the stress of employing these potentially stigmatizing products.

In earlier research work, studies looked at the way bystanders' implicit-reflexive and reflective reactions to stigmatizing products (dust masks) can be measured (Vaes, 2010), and how designers can improve their empathy and become aware of dealing with stigma as part of a design assignment (Vaes, 2011).

This experiment focuses on the perception and behavioral response aspects of a stigma-specific human/product interaction. The set-up does not apply a classic 'designerly' approach whereby both the thoughts and feelings of the user are recorded. We believe that during the human-product interaction with a stigmatizing product, the wellbeing of the user can be strongly influenced by the reactions of his immediate social surroundings (bystanders or passers-by). A strong or visible reaction from their part can be viewed as an identity threat and has the potential of damaging the self-esteem of the product user. Bystanders, passers-by or groups might in return be influenced by a broader objective source of product stereotypes that is shaped by societal values. Instead of focusing on the person experiencing the stigma i.e. the inside perspective of stigma, this study concentrates on the outside perspective or the explicit and visible perception/response behavior of passers-by towards a confederate wearing a dust mask. The behavioral aspects, perception and responses of passers-by are translated into measurements of their walking and staring behavior based on camera observations and the classic parameter of interpersonal distance. The interpersonal or social distance is a common method used to examine stigma and refers to people's willingness to avoid/interact with individuals (LeBel, 2008). Hall (1966) states that the social distance between people is reliably correlated with physical distance, as are intimate and personal distance, according to the following delineations: intimate distance for embracing, touching or whispering (15 to 46 cm), personal distance for interactions among good friends or family members (46 to 120 cm), social distance for interactions among acquaintances (120cm to 370cm), and finally the public distance used for public speaking (370cm or more). This experiment attempts to quantify the obtained stigma of a passer-by by measurement of his overt behavior.

2. The time course of stigma - Dual Reactions to stigmatizing products

Stigma literature in social psychology is extensive, but does not directly address the issue of a product that elicits stigmatizing reactions and behavior. In her Identity Threat Model, Major (2005) assumes that possessing a consensually devalued social identity due to a stigma increases one's exposure to potentially stressful (identity-threatening) situations. A common and immediate reaction to stigma seems to be avoidance. People act as if physical contact or even proximity to the stigmatized can result in some form of contamination (Pryor, Reeder, Yeadon, & Hesson-McInnis, 2004). For example, people choose to stand or sit at greater distances from the stigmatized (e.g., the physically

disabled, people with HIV, etc.) than the non-stigmatized (Kleck, 1969; Mooney, Cohn, & Swift, 1992; Snyder, Kleck, Strenta, & Mentzer, 1979).

In addition, social psychologists have proposed a variety of dual process models to understand prejudice and stigma (Gawronski & Bodenhausen, 2006; Pryor, Reeder, & Landau, 1999; Smith & DeCoster, 2000; Strack & Deutsch, 2004). A common thread in these different models is that both reflexive (associative) and rule-based processes are believed to shape people's reactions to a stigmatized person. People's immediate reactions to a stigmatized person are typically dominated by their associative thinking. Associative processes involve automatic affective and reflexive reactions, such as a visual startling reaction or an 'involuntary' frown. In other words, merely being exposed to a stigmatized person immediately brings to mind negative evaluations (Fazio & Olson, 2003). These negative associations can be activated in a person's mind even if the person considers those reactions to be an inaccurate characterization of a target individual (Devine, 1989). Within a matter of seconds, however, more deliberative processing may come into play. Rule-based reactions to the stigmatized are the products of thoughtful, deliberative processes and take time to emerge. Rule-based processes feel volitional, controllable, and effortful to the person who is engaged in them (Liebermann, Gaunt, Gilbert, & Trope 2002). A result of these rule-based reactions may be a correction of our impulsive and reflexive reaction, such as a smile, or masking behavior where we pretend not to have noticed that unusual person.

Our previous research has also been inspired by this dual-process model of reactions to stigma, as proposed by Pryor et al. (2004). The measurement of associative processing often relies on implicit methods such as response time measures (Greenwald, McGhee, & Schwartz, 1998) or affective priming (Payne, Cheng, Govorun, & Stewart, 2005). In an earlier study of Vaes et al. (2010), attempts were made to assess these associative or reflexive reactions by an approach and avoidance experiment. This experiment measured the response times on approach and avoidance behavior towards pictures of people wearing different types of dust-masks. The results suggested that dust masks did make our targets less 'approachable' and that more fancy dust masks were more easily ignored. After exploring people's implicit reactions, this experimental study focuses on the explicit and rule-based reactions of bystanders towards potentially stigmatizing products, in this case dust masks.

Two important remarks need to be made regarding these dual-reactions. Although the associative or reflexive processes are continuously engaged during consciousness, rule-based processes may be turned on and off. Even in circumstances where perceivers have a negative reflexive reaction to the stigmatized, if perceivers have enough time, motivation, and cognitive resources, they may adjust their initial reactions (Pryor et al., 2004).

It is also important to note that attitudes measured with explicit and implicit methods are sometimes dissociated (Gawronski & Bodenhausen, 2006). In particular, explicit measures may better predict controlled behavior, whereas implicit measures may better predict subtle or automatic reactions (Fazio & Olson, 2003).

3. Experiment

The aim of this study was to investigate the rule-based (thoughtful or deliberative) reactions to an individual perceived to have a visual stigma. Rule-based processing is often assessed with explicit measures that rely on standard self-report questionnaires (for example, semantic differential or Likert-type scales). Since our focus is on the perception and responses of the observing bystander, we believe that it is more valuable to observe

and examine a real life interaction between a person wearing or using a potentially stigmatizing product and its immediate bystanders. By combining and analyzing the data from three selected variables, we hope to provide a valuable indicator for these rule-based reactions and the subsequent degree of stigmatization that is connected to a specific product proposal. The design of our straightforward experiment was inspired by classic observational research. By simulating real life conditions, we did measure the valuable 'first time encounter' of a large group of passers-by.

3.1 Method

In our experiment the independent variables were the gender of the confederate (mask wearer) and the 3 mask conditions (no-mask – standard white mask – sporty blue mask). All variables were manipulated between participants.

The dependent variables that were measured:

Variable 1 – Staring behavior / Moment of perception: This measure provides an indication of the moment or sector in which our confederate was noticed, as the passer-by approached him or her. A sector scale reflected whether the perception happened without delay, with short delay or with long delay. Early detection could be an indication of increased interest, vigilance or alertness, which could in return signal the mask wearer that the passer-by does not feel at ease in his or her presence.

Variable 2 - Staring behavior / Looking over the shoulder: An apparent type of staring behavior is the observation of people turning their heads after passing our research confederate. This reaction was encountered in previous observations and was inserted for exploratory reasons. The researchers could make this classification with ease because of the distinguishable rotation of the head over a large angle. This overt reaction has an undeniable impact on the mask wearer who notices it.

Variable 3 – Interpersonal distance: The closest distance between the passer-by and our research confederate during the interaction. The interpersonal distance reflects people's willingness to avoid or interact with an individual.

The experiment was set up in a controlled indoor environment and registered the behavior of people passing by a confederate, wearing a dust mask in a discrete set-up. During the course of the experiment the confederate was discretely occupied with his mobile phone and did not make visual eye contact with any passers-by. The walking and staring behavior of the passer-by was registered by 5 overhead HD-camera's and supplemented by two HD pen-camera's that were attached to a backpack in an unnoticeable way.

3.2 Stimuli

The experiment focused on those parameters that could serve as indicators or predictors of stigmatizing behavior towards dust masks. We repeated our experiment for 2 mask types and a no-mask reference situation. The first mask was a white disposable dust mask with a double headband and no breathing valve (NORTH 810-FFP1). These masks protect against non-volatile solid and liquid particles and are commonly used for light construction work.

The second mask is the Respro City mask, a cycle mask that is often used by bike couriers in busy city traffic. The blue neoprene City Mask has breathing valves on both sides and was chosen because of its high visibility. It would be interesting to detect whether there are differences between these two mask conditions on any of our three behavioral parameters.



Figure 1

Male and female confederate in the three conditions

3.3 Experimental set-up

The experiment was set up in a spacious hall with no visual or physical obstructions. The hall had a length of 20m and a width of 2,7m. The confederate was placed, leaning against the wall, at a distance of 12m from the entrance. Five overhead cameras were positioned in a lighting rail, 4m above the confederate. To avoid distortion we made sure that there was enough overlap between the video images of the overhead cameras. Combining the five images enabled us to monitor the passers-by over a distance of 15m, 10m before and 5m after passing the research confederate. Prior to the actual experiment we interrogated 35 passers-by and asked them whether they had noticed anything unusual in the empty hallway; none of them reported noticing the overhead cameras.



Figure 2

The hall in which the experiment was set up

3.3.1 Participants

The research was conducted on a total sample of 169 students and employees of the Artesis University College of Antwerp, of which 87 males and 82 females. Participants' age ranged from 18 to 50 years old. All participants had the Belgian nationality and participated unsuspected. Passers-by were intercepted at the end of the hallway, the intentions of our research were clarified and permission was asked to process the images. Male and female participants and confederates were counterbalanced within each condition (no-mask, white mask & blue mask).

3.3.2 Equipment

All 6 conditions were filmed in full sequence. To allow synchronization of the 5 video-images, an audio signal was incorporated at the start of the recordings. Above the research confederate, five Sanyo Xacti HD cameras were installed and in the backpack (Spy-Pack) two VIO POV wide-angle HD cameras were build in. Figure 3 shows how both cameras were integrated in the Spy-Pack. The five images from the overhead cameras were 'stitched' and carefully aligned in Adobe Premiere.



Figure 3

Build-up of the Spy-Pack backpack / confederate wearing Spy-Pack

3.3.3 Procedure

In order to be qualified as a valid participant, a passer-by had to singly approach our test person, without being obstructed by others during the full length of the interaction process. People walking in the reverse direction or that encountered any distracting events were excluded from the sample. The subjective data that were included in the observations offered valuable information on the 'rich' reactions (smile, frown, looking away, etc.) that passers-by displayed.

All video images were processed in Adobe Premiere and compiled into one overall image that comprised the images of all 7 cameras used in this experiment. The images were assessed on a 32" High Definition LCD screen that provided the necessary resolution and contrast for an accurate observation.

Variable 1 – Staring behavior / Moment of perception: It would have been time consuming to generate an overall distance measurement between the passer-by and our confederate during the entire interaction process. We therefore employed a scale that indicates whether the perception happened without delay, with short delay or with long

delay. If the passer-by did not visibly look towards our confederate, within any of these three areas, we encoded this person's perception as 0. This measure was derived by analyzing the frontal video image of the Spy-Pack on a large screen, combined with the composed image of the overhead cameras. Passers-by that clearly turned their head towards our confederate or stared into the camera mounted on the confederates' shoulder were considered as valid participants. When a clear visual detection of the passer-by was observed on the frontal camera, the image was paused and the correspondent sector was indicated with the appropriate statistical value: 0 (no visual perception), 1 (sector 1/long delayed perception), 2 (sector 2 /shortly delayed perception), 3 (sector 3/no delay or immediate perception). In Figure 4 a passer-by noticed our confederate in sector 2, with a short delay.



Figure 4

Variable 1 – Staring behavior: no delay, short delay or long delay

Variable 2 – Staring behavior / Looking back: This variable is an indication of enhanced staring behavior and was derived from the images of the rear camera in our Spy-Pack. Displayed on a large screen, these images enabled us to detect whether people looked over their shoulder or stared into the rear camera. This parameter was transformed into a 0 (no looking back) or a 1 (looking back behavior). No attention was given to the relative position of the passer-by towards our confederate on the moment of looking back.

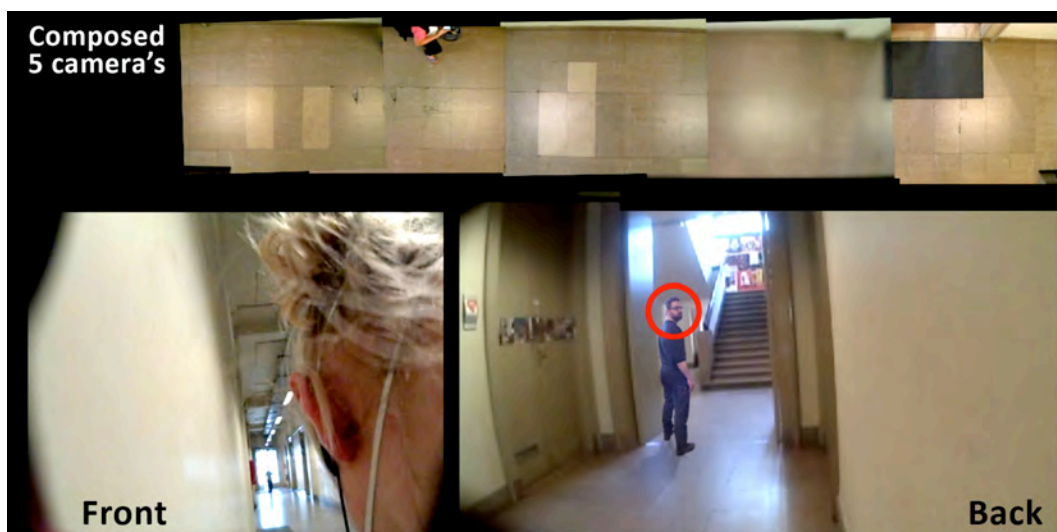


Figure 5

Variable 2 – Staring behavior: a passer-by looking over his shoulder

Variable 3 – Interpersonal distance: This variable was the main focus of our experiment and was conscientiously derived from the combined overhead camera images. The wall against which our confederate leaned served as the zero mark for our distance measures. As portrayed in Figure 6 we intended to measure the distances between the zero mark and the passer-by at three points in the walking-trajectory. Differences between the distances at WD1 (Walking Distance 1) and WD3 provided us with an indication of the explicitness of the avoidant walking behavior. In this article we only address the interpersonal distance at WD3, which is the shortest distance between the confederate (zero-mark) and the passer-by. When a passer-by was aligned with this mark, the video-image was paused and the distance between the center of the head and the zero mark was assessed with the help of a grid-overlay. This grid, with an accuracy of 25mm, was positioned over the composed and aligned images of three overhead cameras, one exactly above the confederate and two consecutive ones in the direction of the entrance. To increase the accuracy, measurements were taken from this ‘zoomed-in’ image.

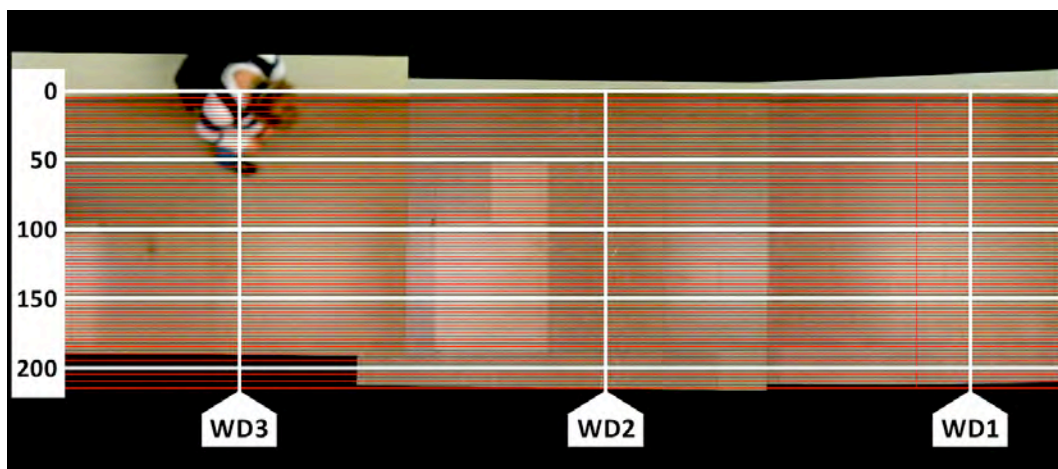


Figure 6

Variable 3: Deriving the walking distance between the zero-mark and the passer-by

4. Results

Two hypotheses were examined after the data were gathered. The hypotheses are linked to the detection and measurement of explicit behavioral responses, namely staring behavior (moment of perception and looking back) and avoidant walking behavior towards a wearer of a potentially stigmatizing dust mask. Our first hypothesis predicts that a person who wears a dust mask is perceived significantly faster, which could in return be an indication of heightened alertness or self-protection of the passer-by. Our second hypothesis forecasts that a passer-by will maintain a greater (safer) walking distance when our confederate is wearing a dust mask. In addition it would be interesting to discover significant behavioral differences in any of the three parameters, related to the two mask conditions and related to the gender of the participants or confederates.

Prior to the validation of our hypotheses, we examined whether the gender of the confederate or passer-by had the potential of influencing any of our three parameters. For each of the three conditions (no-mask / blue mask / white mask) the experiment was executed with both a male and a female confederate.

After analyzing the results of 87 male and 82 female passers-by, we noted a similar distribution of the results among male and female passers-by and confederates when it came to the two staring variables (moment of perception and looking back). A chi-square

with continuity correction showed no significant difference for looking back (passers-by: $X^2(1, \text{correction}) = 0.022$; $p = .881$ / confederates: $X^2(1, \text{correction}) = 0.146$; $p = .702$). A Mann-Whitney U test showed no significant difference between the medians for the sector in which the confederate was perceived (passers-by: $z = -0.007$; $p = .995$ / confederates: $z = -1.347$; $p = .178$).

Analyzing the valid results of 44 male and 47 female passers-by assessed the gender influences on the walking behavior. The Mann-Whitney U test did not show a significant difference between medians of both confederates (median male: 177,5 / median female: 167,5, $z = -1.483$, $p = .138$) and passers-by (median male: 172,5 / median female: 170, $z = 0.810$, $p = .418$). Looking to the four gender combinations of passers-by and confederates a median test showed no significant difference for the walking distance ($X^2(3) = 1.338$; $p = .720$).

These results enabled us to add the male and female samples for the three experimental conditions. Collapsing these variables generated a bigger sample for each condition and increases the accuracy of further statistical analysis.

Variable 1 – Staring behavior / Moment of perception: The data stored in this variable were linked to a score of 0 (no visual perception), 1 (delayed perception), 2 (shortly delayed perception), or 3 (no delay or immediate perception), according to the sector in which the passer-by made visual contact with our confederate. A confederate in the neutral no-mask condition was not perceived by 39% of the passers-by. This percentage drops to respectively 9% (white mask) and 5% (blue mask) for the mask conditions.

The white mask is detected earlier with a total of 84% in sectors 2 (shortly delayed) and 3 (immediate detection), whereas the blue mask is detected later with a total of 82% in sectors 1 (delayed) and 2 (shortly delayed).

	<i>No-perception (0)</i>	<i>Delayed (1)</i>	<i>Short-delayed (2)</i>	<i>Immediate (3)</i>
Neutral	39%	20%	35%	6%
White mask	9%	7%	54%	30%
Blue mask	5%	37%	45%	13%

Tables 4
Percentage indicating the moment (sector) of perception

After performing a test for equality of medians (Kruskal Wallis), we do notice a significant difference between the three medians ($X^2(2) = 29,886$; $p < .002$). Comparing the equality of medians two by two with the Mann-Whitney U test each time delivered a significant difference (neutral - white mask: $z = -5.117$; $p < .001$ / neutral - blue mask: $z = -3.031$; $p < .003$ / white mask – blue mask: $z = -3.175$; $p < .003$).

Variable 2 – Staring behavior / Looking back: This variable was introduced to serve as an indicator for increased visual interest from the part of the passer-by. Our results show that none of the participants looked over their shoulders after passing a confederate without a dust mask. For the blue mask 7 out of 56 participants (12%) looked back and for the white mask 11 out of 59 participants (18%) did so. The chi-square with continuity correction did not indicate a significant difference for the two mask conditions ($X^2(1, \text{correction}) = 0.422$; $p = .516$).

Variable 3 – Interpersonal distance: The interpersonal distance on which we report is measured at point WD3 (closest distance between confederate and passer-by) as

indicated in Figure 6. A test for equality of medians (Kruskal Wallis) displays a significant difference between the medians of the walking distance for the three mask conditions ($X^2(2) = 8.606$; $p < .015$). The median of the walking distance for the blue mask condition is significantly higher than for the no-mask condition (Mann-Whitney U: $z = -2.996$; $p < .004$). With 10 percent significance there is a significant difference between the medians of the walking distance of the neutral and the white mask condition (Mann-Whitney U: $z = -1.682$; $p < .094$). A Post Hoc Tukey HSD used on a oneway ANOVA shows a .068 significance between the neutral and white mask conditions.

In Table 6, which gives a better depiction of the spread of results, we can note an almost unvarying spread in the range between 110 and 200cm for the no-mask condition. For the white mask we can see a shift of results towards the right, which clearly indicates that the passers-by did prefer to maintain a greater distance as they walked by our confederate. This shift is even more apparent for the blue-mask condition.

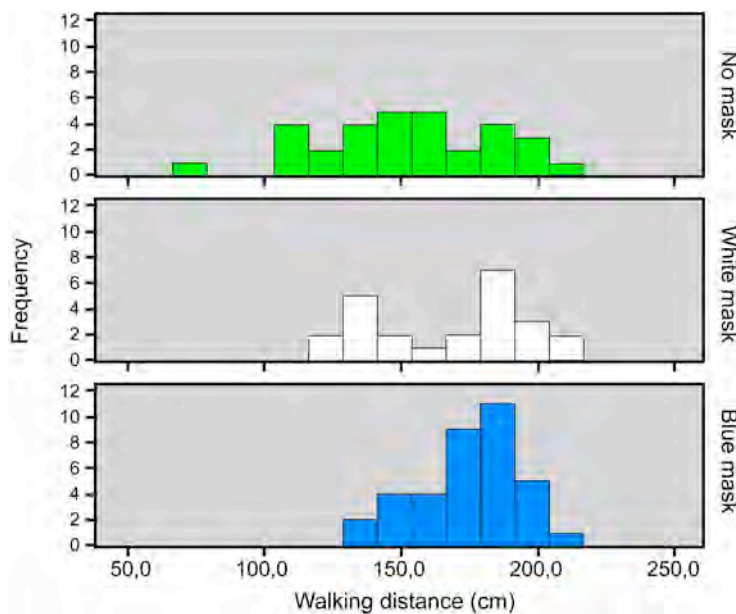


Table 6
Relation between the walking distance, the three mask conditions and the frequency of occurrence

5. Discussion

The results of this experiment led us to infer that passers-by do perceive a confederate with a dust masks noticeably faster and do exhibit behavioral changes, such as increased staring behavior and a greater interpersonal distance.

Both mask conditions were detected significantly faster then the no-mask condition, with the shortest delay for the white mask condition. A confederate without a mask wasn't noticed by 39% of the passers-by. This percentage dropped significantly to 9% for the white mask and only 5% for the blue mask. The white mask was detected earlier than the blue mask, with an immediate detection rate of 30% (16% for the blue mask). Both masks did get high detection rates (54%-white / 45% blue) in sector 2 (short delay). Comparing the two mask conditions indicated a significantly faster perception for the white dust mask. This quick detection could be related to its contrasting color or the slightly larger size of the mask. Although visual detection is crucial, consequently determining the moment of detection proved to be a challenging task. We do realize that this parameter can be subjected to interpretation and therefore problematic. In future experiments we

hope to focus on the personal distance, as the one parameter that does deliver an objective measure. By taking sufficient samples we could eliminate influences of variations in the moment of perception.

The increased visual interest for both mask conditions was also reflected in the number of passers-by that looked over their shoulders. None of the participants looked back after passing a confederate without a dust mask, whereas respectively 18% and 12% did so for the blue and white mask conditions. Analyzing the images of the rear camera on a large screen, did allow an objective observation of this oftentimes overt reaction.

Apart from a heightened alertness, our results also depicted a significantly greater interpersonal distance between a passer-by and a person with versus without a dust mask. Although the interpersonal distances did not vary significantly between the two mask conditions, we can note a more consistent and greater interpersonal distance (less variance) towards the blue mask.

The experimental setup in this specific hall did teach us that it is advisable to use a wider passage area. With a width of 2,7m this hallway might have restricted the freedom of the passer-by. Moreover, the fact that subjects crossed the path of potential participants from the opposite side did limit the number of valid participants and increased the duration of the experiment considerably. In a future setup we will transfer the experiment outdoors and allow a passage of at least 4m, with a more consistent flow of pedestrians. In addition the experiment did require a lot of hardware and preparation. By limiting the experiment to its essentials we hope to dramatically reduce the setup and evaluation time. Video images towards the oncoming stream of passer-by as well as away from them, does remain valuable for gathering 'rich' information and to review gathered data.

6. Conclusion

In our quest for a tool that can determine the potential degree of stigmatization related to a product, the relevant contribution of this experiment was the confirmation that the three parameters of interest proved to be comprehensive, measurable and valuable for further exploration. Due to the exploratory nature of these findings and the basic stimuli, it was impossible to make any valid statements concerning the degree of acceptance of both mask conditions or the product attributes to which passers-by might have reacted.

Although we have confidence in our findings we do hope to improve the measurability of these behavioral parameters in real life outdoor situations. The current setup indicated two points of amelioration. The challenge to objectively determine the moment of perception, together with the multitude of images that had to be processed and evaluated, turned this experiment into a very time consuming undertaking. It would be beneficial to replicate this study with improved experimental scenarios and a combination of camera's and sensors that allow us to process the data quicker and more accurately, with a focus on the objectively measurable parameter of interpersonal distance.

By introducing carefully designed mask stimuli that display a controlled variance in appearance we hope to make more valid statements regarding the impact of specific anti-stigma design interventions.

7. References

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