UNIVERSITY OF TWENTE.

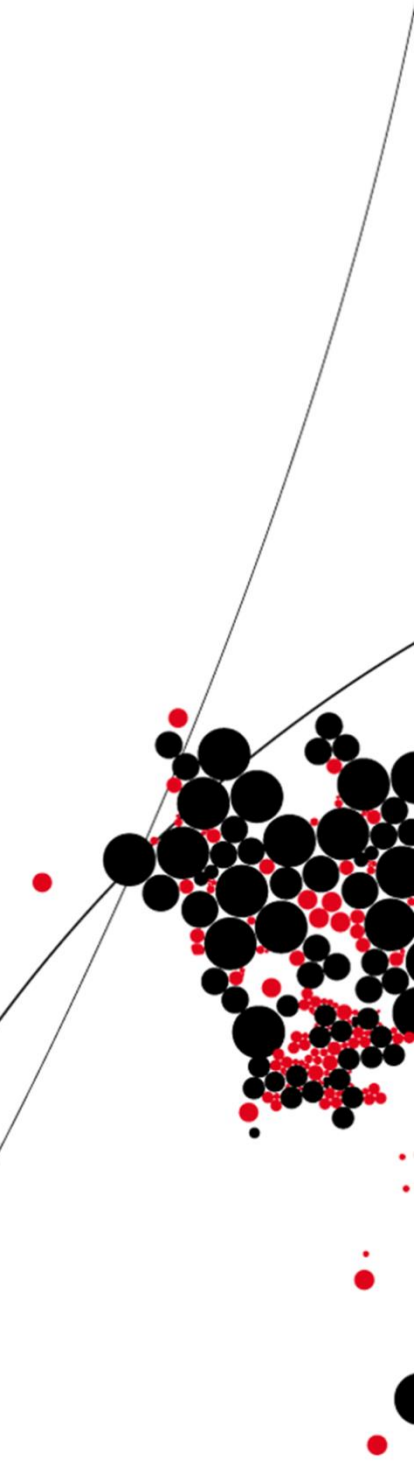

**Faculty of Behavioral, Management and Social Sciences**


# Warm Hands Warm Thoughts?

## Substitutability of Physical Warmth as a Trigger for Interpersonal Warmth


**Maria Paula Schäper**


**Master Thesis**
**May 2017**




**Supervisors:**
Prof. Dr. A. T. H. Pruyn
Dr. T. J. L. van Rompay

S1344722
Communication Studies
Marketing Communication

## Abstract

**INTRODUCTION**: Experiencing physical warmth in the form of holding a cup of hot coffee for a short amount of time can favorably alter one's evaluation of others. This effect seems to be a substitution of bodily warmth, evoking positive emotions and could therefore improve personality and product evaluations.

**OBJECTIVES**: The primary objective of the study at hand is to determine the effects of visual stimuli over actual physical warmth on the evaluation of persons and products. In order to do this, the effects of physical warmth are also investigated.

**METHOD**: The study features a 2 (Temperature) x 2 (Medium of Manipulation) between subjects factorial design. The temperature was either hot or cold, and the medium was a physical cup of coffee or the picture of a cup of coffee with visual cues indicating the temperature of the coffee. A total of 149 experimental subjects were distributed over the four experimental conditions. After either shortly holding a cup of coffee or looking at a picture of a cup of coffee, experimental subjects filled in a product rating questionnaire, then read a personality description and filled in a personality rating questionnaire.

**RESULTS**: There was no statistically significant effect of Temperature on personality assessment. There was also no effect found of Medium on the personality rating. While this might suggest that a trigger, in this case the pictures of a cup of coffee, elicits the same effects as the physical object, cups of coffee, that cannot be concluded from the experiment because overall no effect was found. Only a marginal effect was discovered that experimental subjects from both hot conditions had a more positive attitude towards the product than experimental subjects from both cold conditions. In this case, it did not matter if the temperature was experienced through physical touch or visual perception.

**CONCLUSION**: This experiment suggests that neither physical warmth nor a trigger of physical warmth can be used to elicit interpersonal warmth, but they might be able to elicit a more favorable product evaluation. However, more research would be necessary for a definite conclusion. Future research should focus on factors that might mediate the effect.



Keywords: embodied cognition, persuasion, physical temperature, interpersonal warmth

# Table of Content

# 1 Introduction

Embodied cognition describes the phenomenon of a person's bodily responses influencing their attitudes (Briñol & Petty, 2008). Behavior and posture can affect attitudes and change behavior (Wells, & Petty, 1980; Cacioppo, Priester, & Berntson, 1993). Vertical head movements, for example, have a positive connotation and have been found to lead to more favorable attitudes, in contrast with negatively perceived horizontal head movements. The type of head movement and its positive or negative connotation get adopted into someone's attitudes (Wells, & Petty, 1980). Furthermore, flexing one's arm leads to more positive attitudes than the movement of arm extension. The action of extending one's arm is considered to be avoidance behavior to keep others away, while arm flexion is perceived as approach behavior and leads to more positive attitudes (Cacioppo, Priester, & Berntson, 1993). Williams and Bargh (2008) revealed that short exposure to physical warmth by means of holding a cup of hot coffee elicits more favorable evaluations about another person than short exposure to iced coffee, concluding that the experience of physical warmth may lead to interpersonal warmth. They also found that holding a heating pack leads to more prosocial behavior than holding a cooling pad. This experiment was replicated several times without finding the same effect (Lynott et al., 2014). Since the replication of Williams and Bargh's (2008) second experiment introduced doubt about the concept of physical warmth promoting interpersonal warmth, the replication of Williams and Bargh's (2008) first experiment will form the basis of the study at hand.

It might not be necessary to physically experience a trigger to produce an attitude change and a reminder of said trigger might be enough to evoke a response (Briñol & Petty, 2008). There is a huge gap in research about embodied persuasion when it comes to the replacement of the trigger of an embodied reaction. This gives relevance to research about the possibility to replace the physical act or behavior that triggers embodiment with a reminder of said physical act or behavior. The study at hand intends to find out if physical warmth can be substituted by images and still evoke interpersonal warmth without the direct experience of physical warmth.

Generating interpersonal warmth in customers can have positive outcomes for businesses in terms of generating new customers, long term commitment and brand loyalty (Fiske, Cuddy, & Glick, 2007; Wojciszke, Bazinska, & Jaworski, 1998; Ganesan, 1994). Perceived interpersonal warmth is an important factor in a person's decision to approach or avoid (Wojciszke, Bazinska, & Jaworski, 1998). For businesses it could make a difference in winning more customers by being perceived as more approachable. Interpersonal warmth refers to personality traits like friendliness, helpfulness and trustworthiness (Williams & Bargh, 2008) that are important in relationships between customers and businesses (Fiske, Cuddy, & Glick, 2007). Customers unconsciously use those traits to evaluate the perceived intent of the business. Presenting products and brands in a context that triggers

interpersonal warmth would create a positive attitude and trust towards the brand or product and promote a customer's long term commitment towards the company (Ganesan, 1994).The concept of trustworthiness is of special interest for exchanges in an online environment as the acceptance of online shopping and online money transactions relies on trust (Suh & Han, 2002). The amount of online transactions rose rapidly in the last few years ("Online Retailing: Britain, Europe, US and Canada 2017", 2017) and being able to create interpersonal warmth in online transactions could make online businesses even more successful. Results of this experiment could not only give implications on how to present products in physical stores, but also on how to design online environments and portray products in a way to create interpersonal warmth and trust through the screen.

# 2 Theoretical Framework

This chapter first discusses the bidirectional relationship between physical warmth and interpersonal warmth to explain how physical warmth influences attitudes and behavior and how mediating factors like context or personality traits might come into play. It is also described how perceived interpersonal warmth can have an effect on perceived physical temperature, and how this relationship is bidirectional, as well. The second paragraph illustrates the relationship between physical warmth and product perception with findings that suggest that warm temperatures are often associated with a more positive attitude towards products. Subsequently, a substitution of physical acts is discussed with the conclusion that physical acts may be substituted with triggers. The last paragraph defines the research hypotheses that resulted from the theoretical framework.

## 2.1 Physical Warmth promoting Interpersonal Warmth

The connection between physical and interpersonal warmth is an innate instinct and can already be observed in children. Children experience and act on the connection between physical warmth and interpersonal warmth by needing physical contact in the form of hugs and being held to feel an intimate connection to their parent and feel safe (Bowlby, 1958). Children are helpless and rely on adults for their safety, being held warm in the arms of the mother is directly translated to interpersonal warmth and well-being. Breast feeding strengthens the bond between mother and child, it includes physical warmth through skin to skin contact and fosters interpersonal warmth. This need for warmth, both physical and interpersonal, is necessary for survival. When children start to cry they can often be calmed by being picked up and feeling the warm embrace of another person.

Including the words warm or cold in personality descriptions has been found to dramatically alter one's impression of a person. The word warm elicits a more positive attitude than the word cold (Asch, 1946). Being described as warm leads to being perceived as more appealing and making more favorable impressions, than being described as cold (Nisbett & Wilson, 1977).Descriptions of warm versus cold can also influence behavior. People who have been told that a person is "warm" tend to interact more with that person while people who have been told that the same person is "cold" tend to avoid that person (Kelley, 1950).

More recent research discovered that interpersonal warmth is related to perceived intent and includes personality traits like friendliness, helpfulness, sincerity, trustworthiness and morality (Fiske et al.,2007). Judging interpersonal warmth and deciding if someone is 'friend or foe' happens automatically and does not need to happen intentionally. The connection between physical and interpersonal warmth is an innate instinct, 'having a warm feeling' about someone is often a positive first impression someone can have (Williams & Bargh, 2008).

Experiencing physical warmth has been found to elicit interpersonal warmth. People who shortly held a cup of hot coffee rated a target person higher on a scale that measures interpersonal warmth, than people who held iced coffee instead. Also holding a heating pad led to people being more likely to choose a gift for a friend instead for themselves than holding a cooling pad (Williams & Bargh, 2008).

Several replications of the experiment claiming that heating packs lead to more prosocial behavior were not able to replicate the results and concluded that there is no relationship between experiencing physical warmth by means of touch and interpersonal warmth (Lynott et al., 2014). This creates doubt about the working of the concept of physical warmth promoting interpersonal warmth.

Feelings of interpersonal warmth (or coldness) are also theorized to have an influence on the perception of physical temperature. High scores on chronic loneliness, which can be interpreted as interpersonal coldness, have been connected to an increased tendency to take warm baths and showers (Bargh & Shalev, 2012). Thus, feeling interpersonal coldness creates an increased need for physical warmth. This effect is bidirectional, brief experiences of physical coldness led to experimental subjects reporting increased feelings of chronic loneliness (interpersonal coldness) (Bargh & Shalev, 2012). Furthermore, research suggests that interpersonal coldness not only affects the perception of temperature, but even the actual body temperature. People who were excluded from a group while playing a computer game in order to experience interpersonal coldness and subsequently had the temperature of their fingers measured had colder fingers than before being excluded (IJzerman et al., 2012). This effect can be undone by holding a cup of warm tea, suggesting that physical warmth can undo social coldness and increase interpersonal warmth. Social exclusion also leads to perceiving the environmental temperature to be lower and a greater desire for warm food and drinks (Zhong & Leonardelli, 2008).

Mediating factors have been hypothesized to play a role in the relationship between physical warmth and interpersonal warmth. If physical warmth is accompanied by a social context, like an encounter with another person, the context has to be positive in order to elicit interpersonal warmth. A negative social context, such as an unpleasant encounter with another person leads to physical warmth promoting interpersonal coldness (Wei, Ma, & Wang, 2015). In addition to social context, certain personality traits have been found to mediate the effect. Children who relate to their friends with a secure attachment style experience the effect that physical warmth leads to interpersonal warmth, whereas this effect cannot be found in children who relate to their friends with an insecure attachment style (IJzerman, Karremans, Thomsen, & Schubert, 2013). The way a child relates to their friends is a specific personality trait but the fact that it has an impact on the

effect of physical warmth on interpersonal warmth introduces the possibility that other personality traits might influence the effect of physical temperature, as well.

Temperature can influence interpersonal warmth and coldness in different ways and several factors that are claimed to influence this process have been found. However, temperature does not only influence interpersonal warmth, other research found relationships between temperature and product perception.

## 2.2 Physical Warmth promoting Product Evaluation

The effects of physical warmth have also been studied in the marketing environment. It has been found that thinking about positively perceived communal brands leads to heightened temperature estimates of the in-store temperature (IJzerman, Janssen, & Coan, 2015). This effect can be bidirectional (Bargh & Shalev, 2012), and physical and interpersonal warmth are to some extent interchangeable as warm temperatures in stores increase product valuation (Zwebner, Lee, & Goldenberg, 2014), this effect handles a room temperature of 22°C and warm temperature of 26°C. Customers are hypothesized to translate the warm temperature into a warm feeling towards the product, which is equal to a more positive attitude. As a consequence, customers estimate the product to have a higher value, in comparison to people experiencing a lower environmental temperature. This introduces the possibility that physical warmth can have an influence on the customer's perception of products.

Moreover, studies show that temperatures can influence the customer's processing of a product (Cheema & Patrick, 2012). Warm temperatures hinder complex thinking and lead to people making decision on grounds of superficial attributes instead of relevant arguments. Higher in-store temperatures could hinder the customer's ability to make a well thought out decision and could influence them in their purchase decisions. When the ability to process is constrained, people are more likely to base their decisions on their emotions (Petty & Briñol, 2014).

## 2.3 Substitution of Physical Acts

The substitution of physical acts can happen in different forms: believing that the act occurred, reminding one of past experience of the physical act, imaging future experience of the physical act or observing the physical act in others (Briñol & Petty, 2008). There is a gap of research within the field of embodied persuasion regarding the substitution of the trigger of embodied persuasion. It is proposed that a physical act or physical behavior which triggers a certain act of embodiment could possibly be replaced by a reminder of this physical act or behavior, meaning that an effect could be caused without the physical presence of the stimulus (Briñol & Petty, 2008).

Even being triggered with words associated with hot temperatures can change a person's attitude (Nathan DeWall & Bushman, 2009). Those words can increase aggressive thoughts and hostile perceptions, literally leading to people being hot-headed. This suggests that the physical presence of temperature might not be necessary to influence someone, and a trigger of temperature in the form of words might be enough to elicit a reaction.

A lot of research of this phenomenon has been done with regard to pain. Observing someone else in pain elicits neural activity in the observer that is similar to experiencing pain (Cheng et al., 2007). In addition, it was discovered that observing someone else in pain increases the sensitivity to a current painful stimulation to the body of the observer (Godinho et al., 2011; Höfle, Hauck, Engel, & Senkowski, 2012).

Even a visual representation of a trigger might be enough to elicit a response. A picture of a person being touched elicits more favorable evaluations than pictures of the same person without being touched (Schirmer et al., 2014). Thus suggesting that interpersonal warmth, simulated by the touching in the picture, can also be conveyed via pictures and direct interpersonal contact may not be necessary.

To conclude, there is a huge gap in research about embodied persuasion and the substitution of the trigger of embodied persuasion with regard to physical and interpersonal warmth. Research shows that the substitution of the trigger works in other areas of study and through visual representation (Schirmer et al., 2014). This could mean that experiments about substituting physical warmth with a trigger might have similar results as previous experiments about the relationship between physical and interpersonal warmth.

## 2.4 Research Hypotheses

Physical warmth can influence the perception of people and by being translated to interpersonal warmth, leads to a more positive evaluation of someone's personality (Williams & Bargh, 2008). As a starting point, this experiment will try to replicate study 1 of Williams and Bargh (2008) to investigate the relationship between physical warmth and interpersonal warmth.

> H1a: Experiencing physical warmth by means of physical touch promotes interpersonal warmth.

Interpersonal warmth can influence the perceptions of people (Williams & Bargh, 2008) and therefore has the potential to be used as a marketing tool. The physical presence of warmth would mean this marketing tool is restricted to the retail environment. Several researchers suggest that in some cases only a substitution of a trigger can be enough to provoke a bodily response (Cheng et al., 2007; Godinho et al., 2011; Höfle et al., 2012) and a visual representation could work (Schirmer et al., 2014). To investigate if this effect would also be eligible in the online environment, research has to be done to see if physical warmth can be substituted so that the same effect can also be elicited without direct physical contact.

> H1b: Experiencing physical warmth by means of visual perception promotes interpersonal warmth.

Additionally, to further investigate the usability of physical warmth, or a trigger of such physical warmth as a marketing tool, the study will not only investigate the influence of physical warmth on personality perception, but also on product perception. According to research by Zwebner, Lee and Goldenberg (2014) people's perception of certain product qualities, like product valuation, may be susceptible to temperature influence.

> H2a: Experiencing physical warmth by means of physical touch promotes a more positive evaluation of products.

A physical presence of warmth would mean that warmth as a marketing tool can only be used in physical stores. To see if temperature manipulation can be used in the online environment it will also be tested if a substitute of physical warmth influences product evaluation.

> H2b: Experiencing physical warmth by means of visual perception promotes a more positive evaluation of products.

# 3 Method

## 3.1 Research Design

The experiment featured a 2 (Temperature) x 2 (Medium of Manipulation) between subjects factorial design. The first factor is Temperature and was either hot or cold. The second factor was the Medium the experimental subjects experienced the temperature through. The first medium was a physical cup of coffee the experimental subjects were asked to hold, and through which subjects were able to feel the temperature of the coffee inside, hot or cold. The second medium of manipulation was a picture of a cup of coffee with distinct visual cues that suggested the temperature of the coffee, such as emerging steam for hot coffee, or floating ice cubes for iced coffee, the pictures were accompanied by instructions for the experimental subjects to imagine themselves holding the cup.

The effect of the manipulations was measured by asking experimental subjects to fill in a questionnaire rating a product and another questionnaire to evaluate a person's personality. This product evaluation and personality rating are the dependent variables, as it was hypothesized that manipulation through the hot cup and the picture of the hot cup leads to interpersonal warmth, and therefore, a more favorable evaluation of the product and the personality. The experimental design can be found in table 1.

**Table 1 |** *Experimental Design and Number of Experimental Subjects*

| | | **Temperature** | |
|---|---|---|---|
| | | Hot | Cold |
| **Medium** | Cup | 34 | 39 |
| | Picture | 38 | 38 |

## 3.2 Experimental Subjects

To replicate the experiment of Williams and Bargh (2008) as closely as possible the experimental subjects were chosen to be similar to the original experimental subjects of Williams and Bargh (2008).

The experimental subjects are male and female students of the University of Twente between the age of 18 and 28. The limited age range is due to the research population needing to be as homogeneous as possible because the study does not aim to generalize the results, but rather test an effect. Furthermore, temperature sensitivity is age-dependent (Meh & Denišlič, 1994). Therefore, the age range of the research population needed to be small enough to not influence the results, while still being big enough to be able to acquire enough experimental subjects. The experimental subjects were quasi-randomly assigned to the experimental conditions and the sampling method consisted in convenience sampling.

Originally, 163 experimental subjects participated in the experiment. After entering the data, the sets of three subjects had to be eliminated because of non-response to several items. Deleting the sets was chosen because doing so did not significantly impact the sample size, as the non-response made up only 1.8% of the sample and therefore, does not warrant other methods, as enough data was left to execute the analyses (Schafer & Graham, 2002).

Another 11 sets had to be deleted because the answers to the manipulation check suggested that the manipulation did not work. Experimental subjects were asked to estimate the temperature of the trigger, either the cup they held or the picture of the cup they looked at. If the answers to this question did not match the research conditions it was assumed that the manipulation did not work. This resulted in 149 valid experimental subjects for the experiment. The distribution of the conditions can be seen in table 1.

The ratio of female students, 64.4% as can be seen in table 2, is almost identical to the ratio in the experiment of Williams and Bargh (2008) who had 66 % females. Only the age differs from the original experiment. While Williams and Bargh (2008) had an average age of 18.5, the experiment at hand has experimental subjects with an average age of 20.95 (SD = 2.26) which is statistically significantly different, $t(148) = 13.20$, $p = .00$.

**Table 2 |** *Gender*

| | Frequency | Percent |
|---|---|---|
| Male | 53 | 35.6 |
| Female | 96 | 64.4 |
| Total | 149 | 100 |

The sample mainly consists of bachelor students. This is due to the fact that the majority of the experimental subjects was obtained through Sona Systems, the web-based human subject pool management software of the University of Twente. Mostly bachelor students participated via Sona Systems and received research credits for their participation. This explains the high number of bachelor students that participated, as they had a greater incentive to sign up, in comparison to master students. The distribution of the educational level of the subjects is depicted in table 3.

**Table 3 |** *Educational Level*

| | Frequency | Percent |
|---|---|---|
| Bachelor | 124 | 83.2 |
| Master | 25 | 16.8 |
| Total | 149 | 100 |

## 3.3 Procedure

Experimental subjects were picked up by the researcher at an appointed meeting point and escorted to the experimental room. In front of the room, the researcher acted as if she had to search for her keys and asked the experimental subjects to hold either a cup with hot or iced coffee, or an empty cup in the case of subjects that were later presented with a picture. The iced coffee had an average temperature of 3.21 degrees Celsius (SD = 1.93) with a range of 7.2 degrees Celsius and the hot coffee had an average temperature of 68.82 degrees Celsius (SD = 6.25) with a range of 23.1 degrees Celsius. In the original experiment the researcher was handing the cup to the experimental subjects under the disguise of having to write down their name on a clipboard (Williams & Bargh, 2008), to fulfill the ethics code, it was chosen to use a different decoy story so the experimental subjects could stay anonymous. The purpose of the empty cup was to simulate the act of doing a favor for the researcher without actually being manipulated by the temperature of the object handed to the subject. After approximately 20 seconds the door was unlocked and the researcher took the cup from the experimental subject. The original experiment (Williams & Bargh, 2012) exposed their subjects to the cups between 10 and 25 seconds, the exposure time in this experiment was within this range. Subsequently, the experimental subject was asked to sit in front of a computer.

The experimental subjects in the physical temperature conditions immediately started with the written instructions to the questionnaire. Experimental subjects from the visual temperature conditions were asked to look at a picture of a cup of either hot or iced coffee (Appendix C) for 30 seconds and instructed to imagine holding the cup in their hands before reading the instructions to the questionnaire and start filling it in.

The researcher took a passive role inside the experimental room. She silently sat beside the experimental subject and pretended to be reading while the experimental subject filled in the questionnaire. This proved to be necessary because several subjects neglected to read the instructions and intended to fill in the questionnaire without looking at the corresponding part of the website. In case this happened the experimental subject was again reminded to read the instructions on the questionnaire carefully.

After finishing filling in the questionnaire, experimental subjects were asked if they suspected anything and with pointed questions tested if they were aware of the manipulation. Experimental subjects were also asked if they believed the researcher's acting in front of the experimental room. The answers indicated that no experimental subjects suspected that the cup in front of the room was part of the experiment.

## 3.4 Research Instrument

The actual questionnaire consisted of two parts. The first part measured the attitude towards the product and the second part measured the attitude towards the person. Both parts referred to a website that was created to feature a picture of a sculpture and the fictitious description of a person in order to give the experiment an authentic context (Appendix B).

The picture of the sculpture (Appendix B, Image 1) was chosen because the sculpture is a piece of contemporary decoration and, in the context of the website, is presented as a product to be sold on the website. Experimental subjects were asked to take a good look at the picture and subsequently there were six items to rate the sculpture on, on a 7-point bipolar scale anchored by a trait and its opposite; *Good Quality/ Bad Quality, Beautiful/ Ugly, Expensive/ Cheap, Fancy/ Plain, Cozy/ Uncomforting,* and *Welcoming/ Unwelcoming.* These items were chosen because they were suitable to describe the sculpture shown in the picture. Furthermore, although the items do not stem from a preexisting scale, a sufficient Cronbach's alpha of .746 suggests that for the purpose of the experiment, the six items mentioned above could be treated as a construct, AttitudeSculpture. It is unclear what AttitudeSculpture measures, but for the purpose of further analyses it will be referred to as measuring a positive/ negative attitude towards the sculpture.

In the second part of the questionnaire experimental subjects were directed to a description of a person's personality (Appendix B, Image 2) and then asked to rate the person on 10 items based on the given description. On the website the person was described as *intelligent, skillful,* and *industrious.* As well as *determined, practical,* and *cautious.* The description stems from the original research of Williams and Bargh (2008). As in their original questionnaire, 5 items related to the warm-cold distinction: *Generous/ Ungenerous, Sociable/ Anti-Social, Caring/ Selfish Good-Natured/ Irritable,* and *Happy/ Unhappy*. These are used as a construct, PersonAssessment, to measure interpersonal warmth and are suitable to do so with a Cronbach's alpha of .73. The reliability of PersonAssessment could be increased by .004 points by deleting item generous/ ungenerous, however, as the scale already is very small with only five items, and the increase in reliability is small, it was chosen to keep all items and continue with the same construct Williams and Bargh (2008) used in the original experiment.

According to the original study, the other five items do not relate to the warm/ cold dimension: *Carefree/ Serious, Honest/ Dishonest*, *Talkative/ Quiet, Attractive/ Unattractive,* and *Strong/ Weak.* As a construct, they possess a Cronbach's alpha of .09. In the original experiment they were only used as filler items and the low Cronbach's alpha was therefore to be expected.
All items were mixed to appear in a random order.

The second part of the questionnaire also contains one extra item, *Warm/Cold*. This item was added as a control factor for Williams and Bargh's (2008) scale. The item directly asked if the personality description is perceived as being "warm" or "cold" on the same 7-point scale used for the rest of the items, *Warm/ Cold*. In order not to influence the answers to the original items, this item was placed last on the questionnaire. A scale reliability analysis revealed that including *Warm/ Cold* in PersonAssessment increases the Cronbach's alpha from .73 to .79, therefore it was chosen to include this item in PersonAssessment for further analysis.

The last part of the questionnaire asked for demographic data like gender, age and current phase of study. Furthermore, the funnel debriefing technique was used to check for awareness of the manipulation (Bargh & Chartrand, 2000). First, experimental subjects were asked what they thought the purpose of the experiment was, then they were asked if they think their answers were influenced by any surrounding circumstances, and lastly, they were asked if they thought their answers were influenced by either holding a cup of coffee, or looking at a picture of a cup of coffee before the experiment. If answers indicated that the experimental subject was aware of the manipulation, their questionnaire was excluded from the analysis. As an additional manipulation check, experimental subjects were asked to rate the temperature of the cup they were holding or looking at on a 7-point scale ranging from cold to hot. Questionnaires indicating a temperature that did not match their experimental condition were also excluded from the analysis, because it was assumed that the manipulation did not work.

# 4 Results

This chapter contains the analyses that were executed to answer the research hypotheses and check for other points of interest.

## 4.1 Test of homogeneity

To test the homogeneity of the groups a Chi-Square test for the gender of the experimental subjects was executed. There is no statistically significant association between gender and experimental condition $\chi^2(3, N = 149) = 4.33$, $p = .23$.

The assumption of homogeneity of variances between the experimental conditions was tested with regard to age, and found tenable using Levene's Test, $F(3, 145) = 1.64$, $p = .18$. Therefore, there is no statistically significant association between age and experimental condition and the assumption of homogeneity is not violated.

These two tests suggest that the groups are homogeneous with regard to gender and age and there is no need to include those variables in further statistical analyses.

## 4.2 Univariate Analyses

Calculating the mean and standard deviation of several items and constructs was done to take a look at central tendencies and levels of dispersion (Appendix E, Table 13).

Assuming that the middle of a 7-point-scale is 4, the mean of PersonAssessment is close to being neutral (M = 4.04, SD = .83). Whereas AttitudeSculpture leans towards the more positive side of the scale (M = 4.87, SD = .78) with 1 signifying a negative attitude towards the sculpture and 7 signifying a positive attitude. Only *Warm/ Cold* is slightly more towards the lower side of the scale (M = 3.64, SD = 1.31) with 1 meaning cold and 7 meaning warm.

A one sample T-Test confirms these observations. The average rating of PersonAssessment does not statistically significantly differ from the neutral middle of the scale. The average evaluation of AttitudeSculpture was statistically significantly higher than the neutral middle, t(148) = 13.58, p = .00. The average evaluation of *Warm/ Cold*, on the other hand, was found to be statistically significantly lower than the neutral middle, t(148) = -3.37, p = .00. A test value of 4 was determined in order to accommodate the used 7-point-scale.

***Table 4*** **|** One-Sample T-Test Dependent Variables

| | Test Value = 4 | | | |
|---|---|---|---|---|
| | t | df | p | Mean Difference |
| PersonAssessment | .64 | 148 | .52 | .04 |
| AttitudeSculpture | 13.58 | 148 | .00 | .87 |
| *Warm/ Cold* | -3.37 | 148 | .00 | -.36 |

## 4.3 Bivariate Analyses

### Chi-Square Tests

Chi-square tests were performed between experimental condition and the items of PersonAssessment. This was done to check for the manipulative abilities of the independent variables on the single items and look for differences between the single items. Separate chi-square tests between condition and the single items of PersonAssessment revealed that there is no statistically significant association between experimental condition and Generous/ Ungenerous ($\chi^2$ (15) = 21.04, $p$ = .13), Sociable/Anti-Sociable ($\chi^2$ (18) = 21, $p$ = .28), Caring/Selfish ($\chi^2$ (15) = 16.18, $p$ = .37), Good-Natured/Irritable ($\chi^2$ (15) = 17.29, $p$ = .30), or the item Happy/Unhappy ($\chi^2$ (15) = 11.99, $p$ = .68).

Another crosstabulation with chi-square test between ReportedTemperature and AssignedTemperature was done as a form of manipulation check. The chi-square test for AssignedTemperature and ReportedTemperature with $\chi^2$ (5) = 149, $p$ = .00 hints that there is a relationship between those variables and the crosstabulation (table 5) shows that all experimental subjects reported the temperature according to their condition. Experimental subjects from the hot conditions reported the temperature with 5, 6, or 7 and experimental subjects from cold conditions reported the temperature with 1, 2, or 3.

***Table 5*** **|** Crosstabulation AssignedTemperature * ReportedTemperature

| | | ReportedTemperature | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 1 (Cold) | 2 | 3 | 4 | 5 | 6 | 7 (Hot) | Total |
| Assigned Temperature | Hot | 0 | 0 | 0 | 0 | 10 | 38 | 24 | 72 |
| | Cold | 53 | 21 | 3 | 0 | 0 | 0 | 0 | 77 |
| Total | | 53 | 21 | 3 | 0 | 10 | 38 | 24 | 149 |

An independent t-test for ReportedTemperature with AssignedTemperature as the grouping variable confirms the success of the manipulation. The reported temperature of the experimental subjects that were assigned to the hot conditions (M = 6.19, SD = .66) statistically significantly differs from the reported temperature of the experimental subjects that were assigned to the cold conditions (M = 1.35, SD = 1.35), t(147) = -48.39, $p$ = .00.

### Regression Analysis

In the original experiment it was assumed that the five items making up PersonAssessment measure interpersonal warmth towards a person. Statistical analysis was done to check in what way the individual PersonAssessment items contribute to measuring interpersonal warmth.

A multiple linear regression was performed to check the predictive ability of the items *Generous/Ungenerous*, *Sociable/Anti-Social*, *Caring/Selfish*, Good-*Natured/Irritable*, and *Happy/Unhappy* for *Warm/ Cold*. A statistically significant regression equation was found ($F(5,143) = 29.13$, $p < .00$), with an $R^2$ of .51.

***Table 6*** **|** Predictive ability of PersonAssessment Items regarding Warm/ Cold

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | -1.17 | .46 | | -2.55 | .01 |
| | Generous_Ungenerous | .13 | .09 | .09 | 1.39 | .17 |
| | Sociable_AntiSocial | .10 | .06 | .10 | 1.58 | .12 |
| | Caring_Selfish | .17 | .08 | .16 | 2.09 | .04 |
| | GoodNatured_Irritable | .24 | .09 | .21 | 2.76 | .01 |
| | Happy_Unhappy | .50 | .08 | .41 | 6.00 | .00 |

a. Dependent Variable: Warm/ Cold

The regression analysis indicates that the 5 items explain 51% of the variance of *Warm/ Cold*. It was found that three items statistically significantly predict *Warm/ Cold*; *Caring/Selfish* ($\beta = .16$, $p<.04$), *Good-Natured/Irritable* ($\beta = .21$, $p<.01$), and *Happy/Unhappy* ($\beta = .41$, $p<.00$). The other two items were found to be no statistically significant predictors of *Warm/ Cold*.

As mentioned in the method chapter, *Warm/ Cold* was included in PersonAssessment, as it increases the internal consistency considerably.

## 4.4 Correlation Analyses

A correlation analysis was done in order to check for an influence of physical touch and visual perception of warmth in a more general context and not only in the context of a warm/ cold scale.

ReportedTemperature can be used as an indicator of AssignedTemperature because of the high correlation between AssignedTemperature and ReportedTemperature. AssignedTemperature is not convenient to be used in a correlation analysis because it is a nominal variable and for this correlation matrix an ordinal variable is more suitable for comparison. The items that make up PersonAssessment were not included because they were already examined with the help of Chi-Square tests and will be part of a MANOVA and subsequent ANOVAs. This correlation analysis was executed in order to look at the data for trends and any other points of interest.

The filler items cannot be treated as a construct because they lack internal consistency and are therefore looked at as individual items in the correlation analysis (table 7).

There was no statistically significant correlation found between ReportedTemperature and any other variables, this suggests that the association of perceived temperature and the perception of people and products could be questionable.

PersonAssessment has a statistically significant positive correlation with *Warm/ Cold* $r(147) = .80$, $p < .01$, this was to be expected as *Warm/ Cold* is included in the construct PersonAssessment to raise the Cronbach's alpha and both variables are meant to measure interpersonal warmth. This confirms the functionality of the scale used to measure PersonAssessment.

The items *Carefree/ Serious, Honest/ Dishonest*, *Talkative/ Quiet, Attractive/ Unattractive,* and *Strong/ Weak* were intended as filler items to disguise the purpose of the scale to the experimental subjects. These items were included in the correlation analysis to look for interesting results. Just like PersonAssessment, AttitudeSculpture, and *Warm/ Cold*, none of the filler items correlate with ReportedTemperature. What stands out is the fact that while all filler items statistically significantly correlate with each other, all correlations with the item *Carefree/ Serious* are negative.

***Table 7*** **|** Correlation Matrix

| | Reported Temperature | Person Assessment | Attitude Sculpture | Warm Cold | Carefree Serious | Honest Dishonest | Talkative Quiet | Attractive Unattractive | Strong Weak |
|---|---|---|---|---|---|---|---|---|---|
| Reported Temperature | 1 | | | | | | | | |
| Person Assessment | .07 | 1 | | | | | | | |
| Attitude Sculpture | .12 | .05 | 1 | | | | | | |
| Warm Cold | -.01 | .80** | -.02 | 1 | | | | | |
| Carefree Serious | -.04 | -.15* | -.07 | -.09 | 1 | | | | |
| Honest Dishonest | .09 | .47* | .24** | .28** | -.45** | 1 | | | |
| Talkative Quiet | .01 | .37** | -.05 | .20* | -.08 | .26** | 1 | | |
| Attractive Unattractive | -.01 | .42** | .07 | .32** | -.26** | .26** | .25** | 1 | |
| Strong Weak | -.00 | .24** | .08 | .02 | -.41** | .38** | .30** | .38** | 1 |

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

## 4.5 Analyses of Variance

### MANOVA

In order to accommodate the research model with 2 independent variables and 2 dependent variables it was chosen to perform a two-way MANOVA. Before the analysis was performed, several assumptions had to be tested to check if a MANOVA was applicable. One assumption is to check that there is no multicollinearity between the two dependent variables. The Pearson Correlation between the two dependent variables is .09 (Appendix E, Table 14) and therefore, below .9, proving that there is no multicollinearity. However, the Pearson Correlation indicates another problem. A Pearson Correlation below .2 suggests that there is no considerable correlation between the two dependent variables and instead of executing a MANOVA, it is more appropriate to execute two separate ANOVAs and look at the dependent variables separately.

### ANOVAs

Two-way ANOVAs are applicable since the effect of two independent variables on one dependent variable is tested.

Levene's test confirms homogeneity of variances for both research models, the effect of Temperature and Medium on PersonAssessment and their effect on AttitudeSculpture, as can be seen in Table 8. This meets the assumption necessary to perform ANOVAs.

***Table 8*** **|** Levene's Test of Equality of Error Variances

| Dependent Variable: PersonAssessment | | | |
|---|---|---|---|
| F | df1 | df2 | p |
| .57 | 3 | 145 | .63 |
| **Dependent Variable: AttitudeSculpture** | | | |
| F | df1 | df2 | p |
| 1.04 | 3 | 145 | .38 |

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + Medium + Temperature + Medium * Temperature

A Shapiro-Wilk Test of normality, shown in table 9 shows that while AttitudeSculpture is approximately normally distributed, PersonAssessment is not. ANOVAs are robust against violations against the normal distribution assumption (Schmider, Ziegler, Danay, Beyer, & Bühner, 2010), so even though the assumption is not fully met, it does not hinder the ability to perform an ANOVA.

***Table* 9 |** Shapiro-Wilk Tests of Normality

| | | Shapiro-Wilk | | |
|---|---|---|---|---|
| | | Statistic | df | p |
| PersonAssessment | Cup | .97 | 71 | .08 |
| | Picture | .93 | 75 | .00 |
| AttitudeSculpture | Cup | .98 | 71 | .28 |
| | Picture | .98 | 75 | .33 |

a. Lilliefors Significance Correction

## Person Assessment

A two-way analysis of variance was conducted to compare the main effects of the independent variables Medium and Temperature and the interaction effect between Medium and Temperature on the dependent variable PersonAssessment.

Examining the effect of Medium on PersonAssessment through an ANOVA (table 10) turned out no statistically significant effect, with F(1, 145) = 1.12, p = .29. This suggests that there is no statistically significant difference between using a cup (M = 3.94, SD = 0.80) and using a picture (M = 4.12, SD = 0.83). Both groups rated the personality similarly. There was also no statistically significant main effect for Temperature, with F (1, 145) = 0.30, p = .58. This means that there was no statistically significant difference between the groups that were exposed to hot temperature (M = 4.08, SD = 0.76) and the groups that were exposed to cold temperature (M = 3.98, SD = 0.87). The interaction effect between Temperature and Medium on PersonAssessment was not statistically significant, as well, F(1, 145) = 1.27, p = .26.

***Table 10* |** ANOVA PersonAssessment

| | F | df1 | df2 | p | Partial $\eta^2$ |
|---|---|---|---|---|---|
| Medium | 1.12 | 1 | 145 | .29 | .01 |
| Temperature | 0.30 | 1 | 145 | .58 | .00 |
| Medium * | 1.27 | 1 | 145 | .26 | .01 |

a. R Squared = .019 (Adjusted R Squared = -.00)

## Attitude Sculpture

Table 11 shows the results of the second ANOVA that investigated the relationship between the two independent variables Medium and Temperature and the dependent variable AttitudeSculpture.

There was no statistically significant effect of Medium on AttitudeSculpture ($F(1,145) = .28$, $p = .60$), meaning that there was no statistically significant difference between using a cup ($M = 4.93$, $SD = .76$) and using a picture ($M = 4.87$, $SD = .70$). Temperature had no statistically significant effect, as well ($F(1,145) = 3.46$, $p = .07$). This indicates that there was no statistically significant difference between using the temperature hot ($M = 4.99$, $SD = .72$) or the temperature cold ($M = 4.82$, $SD = .74$). Even though the effect of Temperature on AttitudeSculpture is not statistically significant, it is very close with a p-value of .07, there is a marginal effect of Temperature on attitude towards the sculpture. Comparing the means of the hot and cold groups reveals that the experimental subjects from the hot groups evaluated the sculpture slightly more positive than the experimental subjects from the cold groups. The interaction effect was not statistically significant, $F(1, 145) = .00$, $p = .95$. The combination of both independent variables, Temperature and Medium, had no statistically significant effect on the attitude towards the sculpture.

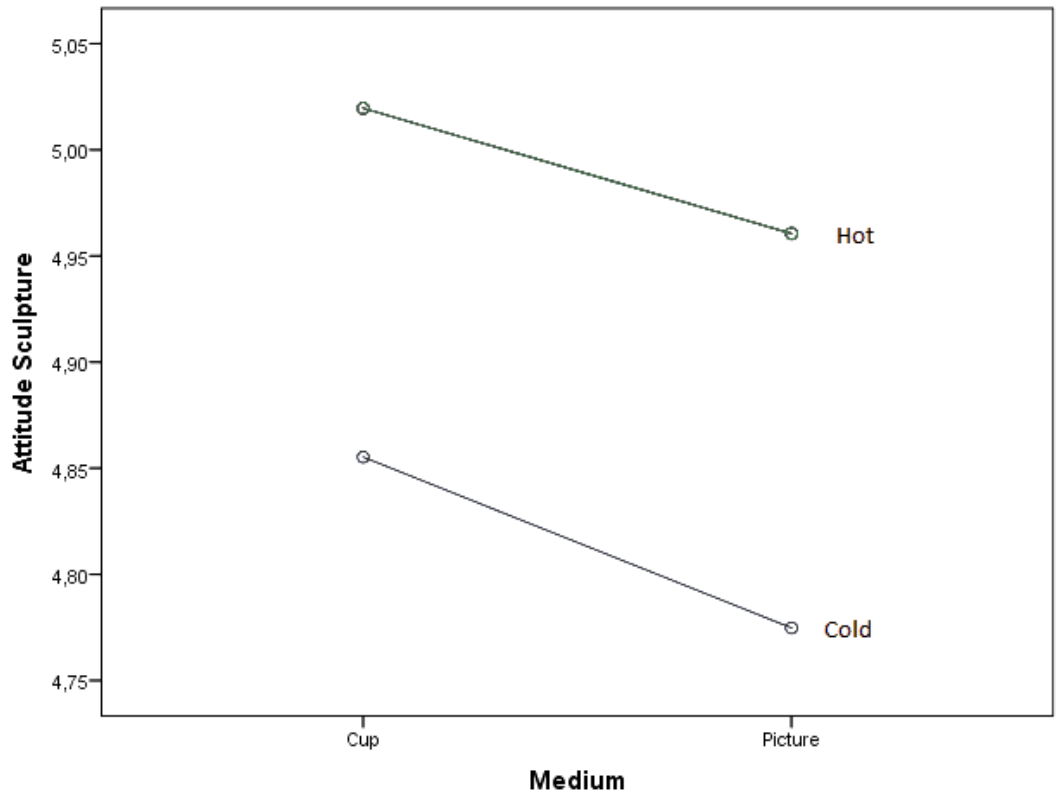
***Table 11*** **|** ANOVA AttitudeSculpture

| | F | df1 | df2 | p | Partial $\eta^2$ |
|---|---|---|---|---|---|
| Medium | 0.28 | 1 | 145 | .60 | .00 |
| Temperature | 3.46 | 1 | 145 | .07 | .02 |
| Medium * | 0.00 | 1 | 145 | .95 | .00 |

a. R Squared = .025 (Adjusted R Squared = .01)

Even though, there is no statistically significant effect, the p-value for the effect of Temperature on someone's attitude towards the sculpture, .07, is close to being statistically significant. Figure 1 shows the direction of the marginal effect. Experimental subjects from both hot conditions evaluated the sculpture more positive than the experimental subjects from both cold conditions. A t-test confirms that the effect is not statistically significant, there was no statistically significant difference between cold ($M = 4.82$, $SD = .74$) and hot ($M = 4.99$, $SD = .72$) conditions; $t(145) = -1.44$, $p = .15$.

*Figure 1* | Profile Plot AttitudeSculpture



# 5 Discussion

## 5.1a Conclusion and Limitations Replication

The first hypothesis was the replication of the experiment by Williams and Bargh (2008), H1a: "Experiencing physical warmth by means of physical touch promotes interpersonal warmth". The ANOVA done with regard to Person Assessment shows that there was no statistically significant effect of the variable Temperature for the Medium cup on PersonAssessment. This means that there was no difference between experimental subjects that were manipulated by holding cups of iced coffee and experimental subjects that were manipulated by holding cups of hot coffee with regard to rating the personality description on a scale for interpersonal warmth. On grounds of these results, hypothesis H1a was rejected.

This does not comply with the results of the original experiment (Williams & Bargh, 2008). Differences in the setup of the experiment, like age and language efficiency of the experimental subjects or location of the experiment could have played a role. But also other factors like environmental temperature or personality traits of the experimental subjects might have had an unknown impact on the results.

The age of the experimental subjects of the experiment at hand statistically significantly differs from the age of the experimental subjects of the original experiment. Even though temperature sensitivity is age-dependent, the difference of 2.45 years was considered to be small enough to be neglected (Meh & Denišlič, 1994). The age of the experimental subject could have had another unknown effect than a difference in temperature sensitivity with regard to the perception of the statue and the personality description.

The main difference between this experiment and the original experiment by Williams and Bargh (2008) is the number of native English speakers among the experimental subjects. In the original experiment all experimental subjects were native speakers, while there was not a single native speaker that participated in this experiment. The experiment did not take the language abilities of the experimental subjects into account but relies on subjects being able to correctly understand the personality description and the scales on the questionnaire. If experimental subjects did not understand words or interpreted them wrong, it is only logical that the results of both experiments did not match.

Another unknown variable is if the experimental rooms in the original experiment where temperature controlled. The original experiment did not mention air conditioned rooms, but those are much more common in the US than in the Netherlands. This experiment did not use temperature controlled rooms and the environmental temperature could have had an unknown effect on the

perceived temperature of the pictures and cups. Also, the climate of the city the experiment was conducted in might have influenced the results. It is imaginable that people who live in hot climate experience temperatures differently than people who live in cold climate. Warm climate could possibly elevate the effect of a hot cup of coffee or, in contrary, might even diminish a possible effect. Future research would need to test the influence of climate. As it is not known at what time of the year the original experiment was conducted, therefore it cannot be compared to the experiment at hand.

Another explanation for this rejection could be the influence of personality traits on the effect of physical warmth on interpersonal warmth (Ijzerman et al., 2013). This group of researchers only investigated the effect in children under specific circumstances, but introduced the possibility that certain personality traits might have an impact. This replication of the experiment of Williams and Bargh (2008) did not take the subjects' personality traits into account, which the original experiment did not do, as well. There is a possibility that the experimental subjects of Williams and Bargh (2008) and the experimental subjects of this experiment were different with regard to personality traits in ways that altered the results of the experiments and explains the differences in the results. More research would need to be done to investigate if personality traits could play a role in this experiment.

### 5.1b Conclusion and Limitations Additional Research

The second hypothesis is H1b:" Experiencing physical warmth by means of visual perception of a picture promotes interpersonal warmth". The ANOVA for PersonAssessment also found no statistically significant effect of Temperature for the experimental subjects that looked at pictures of hot or iced coffee. Hypothesis H1b has to be rejected, as well.

For hypotheses H2a: "Experiencing physical warmth by means of physical touch promotes a more positive evaluation of products"; and H2b: "Experiencing physical warmth by means of visual perception promotes a more positive evaluation of products" a marginal effect has been found. The ANOVA for AttitudeSculpture shows a marginal effect for Temperature on the attitude towards the statue. A comparison of the mean values of the cold conditions (M = 4.82, SD = .74) and the hot conditions (M = 4.99, SD = .72) reveals that this trend supports the hypotheses. Experiencing physical warmth by means of physical touch or visual stimulus led to a more positive evaluation of the statue.

A limitation for the comparability of the research conditions using a cup and the conditions using the picture is the time that subjects were exposed to the stimulus. While experimental subjects in the physical touch conditions were exposed for a varying time between 10 and 25 seconds, all subjects from the picture conditions were exposed for exactly 30 seconds. It is not known how much

influence the time of exposure has on this particular effect, therefore, it is possible that the time of exposure might have mediated the effect in an unknown way.

Past studies that found an effect of temperature on product evaluation used environmental temperature instead of direct contact with physical objects, a higher environmental temperature led to a higher product valuation (Zwebner, Lee, & Goldberg, 2014). The results of the experiment at hand could signify that touching objects of certain temperatures might have a different influence than environmental temperature, as the experiment at hand only found a marginal effect.

Another reason for the marginal effect could be the subjects' capacity to process information. Hot environmental temperatures impair complex thinking (Cheema & Patrick, 2012), if this is also the case for tactile experience of temperature the differences in answers between the hot and cold groups could be explained by the experimental subjects' capacity to process information. Subjects of the cold conditions were able to thoroughly think about their answers while subjects from the hot conditions based their answers on easily available information. When the ability to process is constrained, people are more likely to base their decisions on their emotions (Petty & Briñol, 2014). In case that the warm cups and the picture of the warm cup did evoke interpersonal warmth, the effect might have been amplified by the subjects' constricted processing abilities which caused them to rely on their emotions while filling in the questionnaire. One argument against this theory is the fact that the marginal effect was only found for AttitudeSculpture, but not for PersonAssessment.

## 5.2 Discussion

The study at hand replicated the original experiment by Williams and Bargh (2008). The research sample was very similar with regard to gender, and just like in the original experiment, all experimental subjects were university students. There was a statistically significant difference in age between the two samples. Similar to the original experiment (Williams & Bargh, 2008), a cover story was used to hand the cups to the experimental subjects without them suspecting that it was a part of the experiment. The debriefing questions on the questionnaire confirmed that no subject suspected that holding the cup was part of the experiment. Furthermore, the exposure time of holding the cups was within the range of 10 and 25 seconds, like in the experiment of Williams and Bargh (2008).

Even though the personality description and scale were adopted from the original and the only alteration from the researcher was adding a question at the end of the second scale, the context in which the description was presented was different. This experiment used a website in order to present all parts of the experiment in an authentic context. The biggest difference between the original experiment and this replication is the language proficiency of the experimental subjects.

Another factor that could not be incorporated in the experiment was environmental temperature. There was no information available if Williams and Bargh (2008) factored in an influence of environmental temperature or did anything to actively control the environmental temperature. This experiment did not control the environmental temperature or include it in any other way. There was also no information available about the temperature of the cups of coffee Williams and Bargh (2008) used. The temperature range for the hot coffee used for the experiment at hand is large, but the manipulation check confirmed that all experimental subjects in the hot conditions experienced the cup they held as hot.

Environmental temperature can influence the way someone processes information (Cheema & Patrick, 2012). The experimental room for this experiment was not temperature controlled, so the environmental temperature might have had an unknown influence on the experimental subjects. The original experiment was conducted in the United States where air conditioning is more common., this makes it reasonable to assume that the original experiment (Williams & Bargh, 2008) was executed in temperature controlled rooms. Which might have contributed to the difference in results.

Also, the original experiment did not use a website to present the personality description. The website was introduced to provide a more authentic context so that experimental subjects would not be suspicious of the true purpose of the experiment. There is a possibility that this could have backfired and influenced the subjects in unknown ways. Some elements of the website could have been distracting, or the fact that experimental subjects actively had to navigate the website could have influenced their answers.

Lastly, language proficiency might have played a role. Several experimental subjects asked for translations of words of the personality description or of the questionnaire. This suggests that there might have been subjects who did not know words but did not ask for the translation, which could have influenced the results. In contrary to the original experiment, not a single native English speaker participated. Words play an important role in this experiment, and an exact understanding of the personality description and the questionnaire is crucial for the success of the experiment. Especially the five items of the personality impression questionnaire that were used to measure interpersonal warmth, *Generous/ Ungenerous, Sociable/ Anti-Social, Caring/ Selfish, Good-Natured/ Irritable,* and *Happy/ Unhappy* needed to be understood correctly in order to measure what they were supposed to measure. If words were not understood or misinterpreted it is likely to have led to inconclusive results.

## 5.3 Recommendations

### Implications

The study revealed no effect of the temperature used on the personality ratings. There has also been no statistically significant effect found of the Medium used. A marginal effect has been found for Temperature on product evaluation for both, physical touch and visual perception. This gives implications for the use of temperature as a marketing tool in retail settings and online. Future research would need to test if warm objects and images of warm objects could be used to create a warm feeling towards a certain product and stimulate a more positive attitude.

The trend found in the ANOVA for AttitudeSculpture gives reason to suspect that a visual trigger could be used to elicit a bodily response in the form of a warm feeling towards a product, and a the physical presence of a trigger might not be necessary. This would enable online businesses to use a phenomenon that usually requires direct physical contact. Trust is important to build rapport with a customer and encourage a long-term commitment. Visual cues on websites that indicate warm temperature may be used to create a more positive attitude towards products that are offered on the website. Visual cues that suggest cold temperatures should be avoided.

The results of this study do not agree with the results of the original experiment from Williams and Bargh (2008). The experiment at hand raises awareness for other factors that would need to be included in research about the relationship between physical warmth and interpersonal warmth. It is possible that there are factors that mediate the effect, like context or personality traits.

A future replication of the original experiment of Williams and Bargh (2008) would need to focus more on details. One factor that is likely to have influenced the results of this study is the language barrier. Future replications of their study should either be done with native English speakers or include translations of the personality description and the scales in the mother tongue of the experimental subject. This would prevent the influence of the subject's language ability on the results of the experiment.

## Future Research

Future research should be done with regard to factors that possibly mediate the relationship between physical warmth and interpersonal warmth, like personality traits, environmental temperature or climate.

A starting point to see if personality traits influence the relationship between physical warmth and interpersonal warmth could be to conduct an experiment that tests the effect of physical warmth on interpersonal warmth but include a questionnaire for the big five personality traits. A big five inventory measures the five most basic human traits (Rammstedt & John, 2007) and comparison between experimental subjects could give indications if personality traits mediate the relationship between physical warmth and interpersonal warmth.

Environmental temperature, like a controlled room temperature could have an immediate effect on a person and possibly elevate or diminish the effect of a trigger. To test this, future research would need to focus on controlled conditions where the room temperature is manipulated in addition to the tactile stimulus.

The climate someone lives in would need to be investigated as well. It might have similar effects like environmental temperature but it is reasonable to assume that being exposed to hot or cold temperatures for longer than merely the duration of the experiment could have different effects than the manipulation of the room temperature. An experiment that investigates the relationship between physical warmth and interpersonal warmth would need to be conducted in different climate zones.

Further research could also investigate whether the physical touch of temperature controlled objects could be paired with controlled environmental temperature. Zwebner, Lee and Goldenberg (2014) found that higher environmental temperatures lead to a higher valuation of products. Research could test if those two effects might complement each other and lead to an even better effect, or cancel each other out and make the use of a combination of both types of temperature control useless.

Furthermore, more research needs to be done about embodied persuasion, as there is a gap in this field (Briñol & Petty, 2008). This is not limited to research about interpersonal warmth or even the field of marketing. A lot of fields of study could benefit from more research about embodiment.

# References


Asch, S. (1946). Forming Impressions of Personality. *The Journal of Abnormal and Social Psychology*, *41*(3), 258-290. http://dx.doi.org/10.1037/h0055756

Bargh, J. A., & Chartrand, T. L. (2000). Studying the Mind in the Middle: A Practical Guide to Priming and Automaticity Research In H. Reis & C. Judd (Eds.), *Handbook of Research Methods in Social Psychology* (pp. 311-344). New York: NY: Cambridge University Press

Bargh, J., & Shalev, I. (2012). The Substitutability of Physical and Social Warmth in Daily Life. *Emotion*, *12*(1), 154-162. http://dx.doi.org/10.1037/a0023527

Bowlby, J. (1958). The Nature of the Child's Tie to his Mother. *International Journal of Psycho-Analysis, 39*, 350-379

Briñol, P., & Petty, R. E. (2008). Embodied Persuasion: Fundamental Processes by which Bodily Responses can Impact Attitudes. *Embodied Grounding: Social, Cognitive, Affective, and Neuroscientific Approaches*, 184–207. http://doi.org/10.1111/j.1460-2466.2006.00284.x

Cacioppo, J., Priester, J., & Berntson, G. (1993). Rudimentary Determinants of Attitudes: II. Arm Flexion and Extension have Differential Effects on Attitudes. *Journal of Personality and Social Psychology*, *65*(1), 5-17. http://dx.doi.org/10.1037/0022-3514.65.1.5

Cheema, A., & Patrick, V. (2012). Influence of Warm versus Cool Temperatures on Consumer Choice: A Resource Depletion Account. *Journal of Marketing Research*, *49*(6), 984-995. http://dx.doi.org/10.1509/jmr.08.0205

Cheng, Y., Lin, C., Liu, H., Hsu, Y., Lim, K., Hung, D., & Decety, J. (2007). Expertise Modulates the Perception of Pain in Others. *Current Biology*, *17*(19), 1708-1713. http://dx.doi.org/10.1016/j.cub.2007.09.020

Fiske, S., Cuddy, A., & Glick, P. (2007). Universal Dimensions of Social Cognition: Warmth and Competence. *Trends in Cognitive Sciences, 11*(2), 77-83. http://dx.doi.org/10.1016/j.tics.2006.11.005

Ganesan, S. (1994). Determinants of Long-Term Orientation in Buyer-Seller Relationships*. Journal of Marketing, 58*(2), 1. http://dx.doi.org/10.2307/1252265

Godinho, F., Faillenot, I., Perchet, C., Frot, M., Magnin, M., & Garcia-Larrea, L. (2011). How the Pain of Others Enhances our Pain: Searching the Cerebral Correlates of 'Compassional Hyperalgesia'. *European Journal of Pain*, *16*(5), 748-759. http://dx.doi.org/10.1002/j.1532-2149.2011.00039.x

Höfle, M., Hauck, M., Engel, A., & Senkowski, D. (2012). Viewing a Needle Pricking a Hand that you Perceive as yours Enhances Unpleasantness of Pain. *Pain*, *153*(5), 1074-1081. http://dx.doi.org/10.1016/j.pain.2012.02.010

IJzerman, H., Gallucci, M., Pouw, W., Weibgerber, S., Van Doesum, N., & Williams, K. (2012). Cold-Blooded Loneliness: Social Exclusion Leads to Lower Skin Temperatures. *Acta Psychologica*, *140*(3), 283-288. http://dx.doi.org/10.1016/j.actpsy.2012.05.002

IJzerman, H., Janssen, J., & Coan, J. (2015). Maintaining Warm, Trusting Relationships with Brands: Increased Temperature Perceptions after Thinking of Communal Brands. *PLOS ONE*, *10*(4), e0125194. http://dx.doi.org/10.1371/journal.pone.0125194

IJzerman, H., Karremans, J., Thomsen, L., & Schubert, T. (2013). Caring for Sharing. *Social Psychology*, *44*(2), 160-166. http://dx.doi.org/10.1027/1864-9335/a000142

Kelley, H. (1950). The Warm-Cold Variable in First Impressions of Persons. *Journal of Personality*, *18*(4), 431-439. http://dx.doi.org/10.1111/j.1467-6494.1950.tb01260.x

Lynott, D., Corker, K., Wortman, J., Connell, L., Donnellan, M., Lucas, R., & O'Brien, K. (2014). Replication of "Experiencing Physical Warmth Promotes Interpersonal Warmth" by Williams and Bargh (2008). *Social Psychology*, *45*(3), 216-222. http://dx.doi.org/10.1027/1864-9335/a000187

Meh, D., & Denišlič M. (1994). Quantitative Assessment of Thermal and Pain Sensitivity. *Journal of the Neurological Sciences*, *127*(2), 164-169. http://dx.doi.org/10.1016/0022-510x(94)90069-8

Nathan DeWall, C., & Bushman, B. (2009). Hot Under the Collar in a Lukewarm Environment: Words Associated with Hot Temperature Increase Aggressive Thoughts and Hostile Perceptions. *Journal Of Experimental Social Psychology*, *45*(4), 1045-1047. http://dx.doi.org/10.1016/j.jesp.2009.05.003

Nisbett, R., & Wilson, T. (1977). The Halo Effect: Evidence for Unconscious Alteration of Judgments. *Journal of Personality and Social Psychology*, *35*(4), 250-256. http://dx.doi.org/10.1037//0022-3514.35.4.250

*Online Retailing: Britain, Europe, US and Canada 2017*. (2017). *Retailresearch.org*. Retrieved 25 April 2017, from http://www.retailresearch.org/onlineretailing.php

Petty, R., & Briñol, P. (2014). Emotion and Persuasion: Cognitive and Meta-Cognitive Processes Impact Attitudes. *Cognition and Emotion*, *29*(1), 1-26. http://dx.doi.org/10.1080/02699931.2014.967183

Rammstedt, B., & John, O. (2007). Measuring Personality in One Minute or Less: A 10-item Short Version of the Big Five Inventory in English and German. *Journal Of Research In Personality, 41*(1), 203-212. http://dx.doi.org/10.1016/j.jrp.2006.02.001

Schafer, J. & Graham, J. (2002). Missing data: Our View of the State of the Art. *Psychological Methods*, *7*(2), 147-177. http://dx.doi.org/10.1037/1082-989x.7.2.147

Schirmer, A., Reece, C., Zhao, C., Ng, E., Wu, E., & Yen, S. (2014). Reach out to One and you Reach Out to Many: Social Touch Affects Third-Party Observers. *British Journal of Psychology*, *106*(1), 107-132. http://dx.doi.org/10.1111/bjop.12068

Schmider, E., Ziegler, M., Danay, E., Beyer, L., & Bühner, M. (2010). Is it Really Robust?. *Methodology, 6*(4), 147-151. http://dx.doi.org/10.1027/1614-2241/a000016

Suh, B., & Han, I. (2002). Effect of Trust on Customer Acceptance of Internet Banking. *Electronic Commerce Research and Applications*, *1*(3-4), 247-263. http://dx.doi.org/10.1016/s1567-4223(02)00017-0

Wei, W., Ma, J., & Wang, L. (2015). The 'Warm' Side of Coldness: Cold Promotes Interpersonal Warmth in Negative Contexts. *British Journal of Social Psychology*, n/a-n/a. http://dx.doi.org/10.1111/bjso.12108

Wells, G., & Petty, R. (1980). The Effects of Over Head Movements on Persuasion: Compatibility and Incompatibility of Responses. *Basic and Applied Social Psychology*, *1*(3), 219-230. http://dx.doi.org/10.1207/s15324834basp0103_2

Williams, L., & Bargh, J. (2008). Experiencing Physical Warmth Promotes Interpersonal Warmth. *Science*, *322*(5901), 606-607. http://dx.doi.org/10.1126/science.1162548

Wojciszke, B., Bazinska, R., & Jaworski, M. (1998). On the Dominance of Moral Categories in Impression Formation. *Personality and Social Psychology Bulletin, 24*(12), 1251-1263. http://dx.doi.org/10.1177/01461672982412001

Zhong, C., & Leonardelli, G. (2008). Cold and Lonely: Does Social Exclusion Literally Feel Cold?. *Psychological Science*, *19*(9), 838-842. http://dx.doi.org/10.1111/j.1467-9280.2008.02165.x

Zwebner, Y., Lee, L., & Goldenberg, J. (2014). The Temperature Premium: Warm Temperatures Increase Product Valuation. *Journal of Consumer Psychology*, *24*(2), 251-259. http://dx.doi.org/10.1016/j.jcps.2013.11.003

# Appendix

## Appendix A – Questionnaire

Dear Experimental subject,

Thank you for participating in this study. This questionnaire intends to investigate the relationship between person perception and consumerism. In addition to the questionnaire you will also look at a website. You will find clear instructions about what to do in the questionnaire, please follow the provided instructions precisely.

Please be informed that you can stop this experiment at any time. The data gathered here will be treated confidentially and it will not be possible to trace back your answers to you. If you want to receive the results of this study, please feel free to contact the researcher at m.p.schaper@student.utwente.nl.

Thank you in advance,

Maria Schäper
University of Twente
Marketing Communication

_____

I understand that participation in this experiment is voluntary and that I can stop at any time.

_____ (Signature Participant)

In front of you, you see the welcome page of a website. Please click on the drop-down menu in the top right corner and select “Products”.

Take your time and take a good look at the picture. If you are ready, please proceed and fill in the questions below.

| **I think the sculpture in the picture is …** | | | | | | |
|---|---|---|---|---|---|---|
| **Good Quality** | | | | | | **Bad Quality** |
| ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| **Beautiful** | | | | | | **Ugly** |
| ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| **Expensive** | | | | | | **Cheap** |
| ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| **Fancy** | | | | | | **Plain** |
| ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| **Cozy** | | | | | | **Uncomforting** |
| ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| **Welcoming** | | | | | | **Unwelcoming** |
| ○ | ○ | ○ | ○ | ○ | ○ | ○ |

When you are done, proceed to the next part of the questionnaire.

Please click on the drop-down menu in the top right corner and select “About Us”. You see a description of the product designer. Please take your time and read it carefully, when you are ready, fill in the questions below.

| **I think the product designer is …** | | | | | | |
|---|---|---|---|---|---|---|
| **Carefree** | | | | | | **Serious** |
| ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| **Generous** | | | | | | **Ungenerous** |
| ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| **Honest** | | | | | | **Dishonest** |
| ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| **Talkative** | | | | | | **Quiet** |
| ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| **Attractive** | | | | | | **Unattractive** |
| ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| **Strong** | | | | | | **Weak** |
| ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| **Sociable** | | | | | | **Anti-Social** |
| ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| **Caring** | | | | | | **Selfish** |
| ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| **Good-Natured** | | | | | | **Irritable** |
| ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| **Happy** | | | | | | **Unhappy** |
| ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| **Warm** | | | | | | **Cold** |
| ○ | ○ | ○ | ○ | ○ | ○ | ○ |

When you are done, proceed to the next part of the questionnaire.

This last part of the questionnaire asks for demographic data and asks some general questions about your experience of the experiment.

● Gender: □ Male
□ Female

● Age: _____ years

● Current Phase of Study: □ Bachelor
□ Master
□ Other: _____

● What do you think was the purpose of this experiment?

_____

_____

● Do you think your answers were influenced by any surrounding circumstances?

_____

_____

● Do you think your answers were influenced by seeing the picture of the cup of coffee beforehand? If yes, how? OR Do you think your answers where influenced by holding the cup of coffee before entering the room?

_____

_____

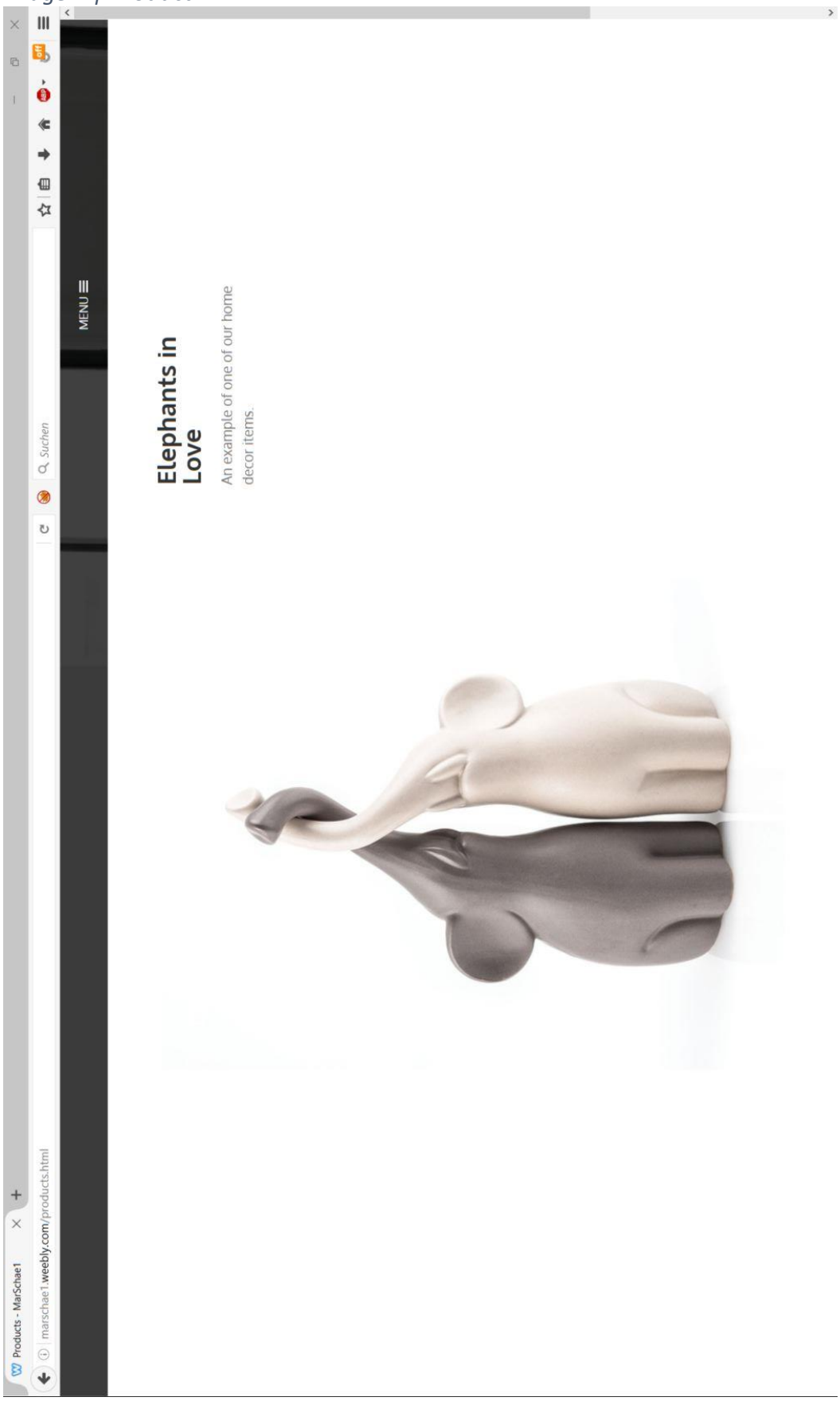
What do you think was the temperature of the cup of coffee you saw before the experiment? OR What do you think was the temperature of the cup of coffee you held before the experiment?

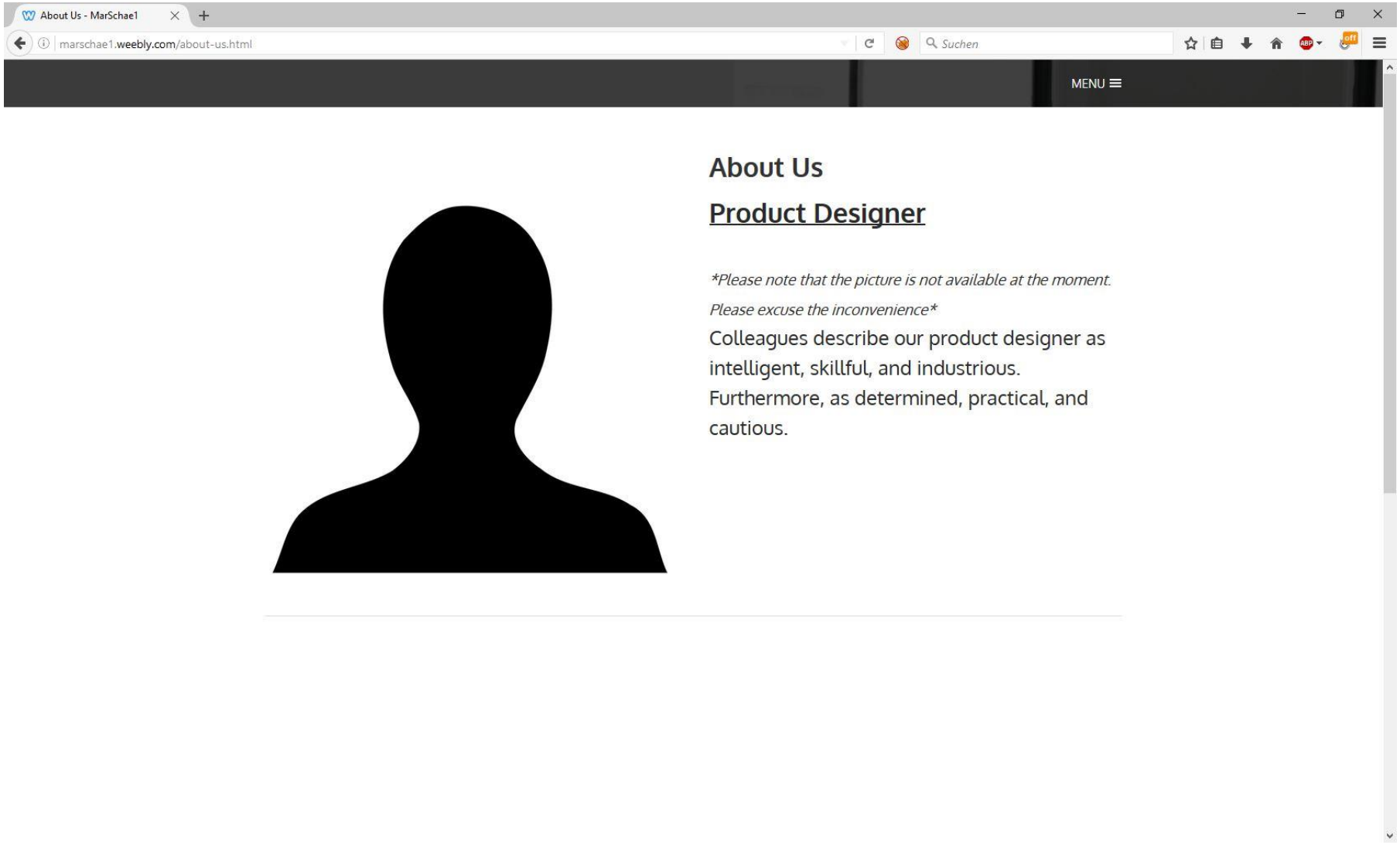
| **Hot** | | | | | | **Cold** |
|---|---|---|---|---|---|---|
| ○ | ○ | ○ | ○ | ○ | ○ | ○ |

Thank you for your participation. If you want to receive the results of the experiment please contact m.p.schaper@student.utwente.nl

## Appendix B – Screen Captures

*Image 1* | Product




About Us - MarSchae1
marschae1.weebly.com/about-us.html
Suchen
MENU
About Us
Product Designer
*Please note that the picture is not available at the moment.
Please excuse the inconvenience*
Colleagues describe our product designer as intelligent, skillful, and industrious. Furthermore, as determined, practical, and cautious.

## Appendix C – Trigger Pictures

*Image 3* | Trigger Hot

*Image 4* | Trigger Cold

## Appendix D – Overview Items

| ***Table 12 \|*** Overview items |
|---|
| *Attitude Sculpture* |
| *Good Quality/ Bad Quality* |
| *Beautiful/ Ugly* |
| *Expensive/ Cheap* |
| *Fancy/ Plain* |
| *Cozy/ Uncomforting* |
| *Welcoming/ Unwelcoming* |
| *Person Assessment* |
| *Generous/ Ungenerous* |
| *Sociable/ Anti-Social* |
| *Caring/ Selfish* |
| *Good-Natured/ Irritable* |
| *Happy/ Unhappy* |
| *Filler Items* |
| *Carefree/ Serious* |
| *Honest/ Dishonest* |
| *Talkative/ Quiet* |
| *Attractive/ Unattractive* |
| *Strong/ Weak* |
| *Extra Item* |
| *Warm/ Cold* |

## Appendix E – Analyses

***Table 13*** **|** Descriptive Statistics Dependent Variables

| | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| PersonAssessment | 149 | 2.50 | 6.17 | 4.04 | .83 |
| AttitudeSculpture | 149 | 2 | 7 | 4.87 | .78 |
| *Warm/ Cold* | 149 | 1 | 7 | 3.64 | 1.31 |
| Valid N (listwise) | 149 | | | | |

***Table 14*** **|** Correlations

| | | PersonAssessment | AttitudeSculpture |
|---|---|---|---|
| PersonAssessment | Pearson Correlation | 1 | .091 |
| | Sig. (2-tailed) | | .269 |
| | N | 149 | 149 |
| AttitudeSculpture | Pearson Correlation | .091 | 1 |
| | Sig. (2-tailed) | .269 | |
| | N | 149 | 149 |