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**Breaking the ice: How physical warmth shapes social comparison
consequences**

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Abstract

Social judgments take place in a concrete physical context. Recent research has explored how incidental physical experiences such as warmth influence social perception and behavior. However, we do not yet know if warmth affects self-evaluation. The present research seeks to examine this possibility by focusing on a central self-evaluative mechanism, namely social comparison. We hypothesized that physical warmth induces a general similarity focus that in turn fosters assimilative social comparison consequences and tested this in three studies. Study 1 established that warmth increases the perceived similarity of object pairs. In Study 2, participants compared themselves to a physically strong or weak standard. On warmer but not on colder days, they assimilated self-evaluations towards the target. Study 3 showed a similar pattern in a controlled laboratory setting. Together, these findings demonstrate that physical warmth shapes social comparison processes and as a consequence influences self-evaluation.

Keywords: warmth; social comparison; similarity; assimilation

Introduction

Social information processing does not take place in a physical vacuum, but in a concrete physical context. Surprisingly, relatively little is known about how physical context features shape social information processing. Yet, just as incidental affective experiences influence processing of social information (Bodenhausen, 1993), incidental physical experiences may shape judgments about ourselves and others. The present research examines whether social comparison depends not only on characteristics of the judge and the target, but also on physical experiences.

One prominent feature of any physical context is temperature. Recent research has begun to explore how physical warmth affects social information processing. For instance, physical warmth influences social perception and fosters prosocial behavior (Williams & Bargh, 2008) as well as the perception of social proximity (IJzerman & Semin, 2009). Conversely, social exclusion leads to lower temperature perception and a preference for warm beverages (Zhong & Leonardelli, 2008). Similarly, higher physical and social proximity to strangers results in higher estimates of ambient temperature (IJzerman & Semin, 2010). These findings suggest a bidirectional link between the experience of physical warmth and the content of our social thinking.

How may this link have developed? Lakoff and Johnson (1999) speculate that the co-experience of physical warmth and affection in infancy leads to an association of these concepts. Other recent research also suggests that physical warmth and interpersonal similarity may be intimately linked. For one, experiencing physical warmth fosters the perception of social proximity: Participants holding a warm beverage saw themselves as closer to another person than those holding a cold beverage (IJzerman & Semin, 2009). Social proximity is closely related to interpersonal similarity in that we are typically close to others who are similar to us,

which already suggests a potential relationship between warmth and interpersonal similarity. More direct support for this possibility stems from research examining whether increased interpersonal similarity fosters the experience of physical warmth. Indeed, when participants see themselves as more similar to another person, they experience the ambient temperature as higher (Ijzerman & Semin, 2010). This demonstrates the existence of a link from perceived social similarity to experienced physical temperature. Since such links are often bidirectional in nature (Mussweiler & Förster, 2000), the reverse direction of influence may also hold: Experiencing higher temperatures may lead people to see themselves as more similar to others.

This hypothesized association of physical warmth and similarity perception allows for broadening the scope of research on how warmth shapes social information processing. Past research has focused on the influence of physical warmth on perceptions of others. Even though “the self” constitutes a central domain of social psychological research (Baumeister, 1998), it is unknown how experiencing physical warmth influences self perception. The present research seeks to reduce this gap by focusing on social comparison as a central and ubiquitous process in self perception (Festinger, 1954).

Recent social comparison research has established that perceived self-other similarity determines the direction of social comparison, namely whether assimilation or contrast effects become more likely to emerge (Mussweiler, 2003): The more similar the self and a social comparison standard are perceived, the more likely self-evaluations are assimilated towards the standard. In combination with the hypothesized link between physical warmth and similarity perception, this suggests that social comparison consequences may depend not only on characteristics of the perceiver and the target, but also on experienced physical warmth: A warmer physical context leads to more assimilation of self-evaluations.

How general may our proposed association of physical warmth and social similarity be? The temperature-similarity link may have developed because physical warmth and social proximity are often co-experienced (Hebb, 1948). Nevertheless, this link is likely to generalize to the realm of non-social similarity. Because social and non-social comparisons involve the same cognitive mechanisms (Gentner & Markman, 1997; Mussweiler, 2003) and neuronal circuitries (Kedia, Lindner, Mussweiler, & Linden, 2010), consequences of social comparison generalize to non-social comparison. For example, motivational consequences typical of social comparison generalize to non-social comparison (Mussweiler & Mayer, in press). Analogously, the association of physical warmth and social similarity may well apply to non-social similarity perception, so that non-social objects seem more similar if physical temperature is higher.

We report three studies that tested these intriguing possibilities. Study 1 establishes the theoretical basis for our predictions by examining whether higher ambient temperature fosters similarity perception. Studies 2 and 3 then investigate whether social comparison consequences are influenced by the level of physical warmth. We hypothesized that physical warmth increases similarity of the self to a comparison standard, meaning that assimilation of self-evaluations to the standard is more likely with increasing temperature levels.

Study 1

To provide a strong test of the hypothesized warmth-similarity link, we examined in Study 1 whether experienced physical warmth would influence the perception of non-social similarity. To this end, we asked participants to judge the similarity of object pairs in two environments with different levels of warmth.

Method

Participants. We recruited 58 undergraduates (28 female) for a study on individual differences in perception and offered them a chocolate bar as compensation.

Materials and procedure. The study took place outside either on a warmer (25-27° Celsius) or on a colder (8-12° Celsius) day. All days of data acquisition had similar weather conditions (cloudy, no rain). Participants were seated outside a university cafeteria. Upon informed consent, participants worked on a similarity-perception task, modelled after Mussweiler and Damisch (2008). Participants indicated how similar they perceived six object pairs (e.g. white wine–red wine, bicycle-motorcycle) on 6-point rating scales (*very different* to *very similar*).

Results

The mean object similarity rating of each participant served as the similarity-perception score. Object pairs were perceived to be more similar in the warmer ($M = 3.47$, $SD = .77$) than in the colder condition ($M = 2.83$, $SD = .74$), $t(56) = -3.22$, $p = .002$, $d = 0.85$. This suggests that physical warmth fosters similarity perception.

Study 2

In light of Study 1, we set out to examine whether physical warmth also influences social comparison and thereby self-evaluation. We expected physical warmth to shape the direction of social comparison consequences. Specifically, warmth may foster assimilation of self-evaluations to a standard, since warmth increases similarity perception. To test this possibility, we engaged participants in a social comparison task under different temperature conditions. Participants were confronted with either a physically strong or weak target person and then rated their own physical strength. If physical warmth leads participants to perceive themselves as more similar to the standard, as Study 1 suggests, self-evaluations should more likely be assimilated to the standard the higher the experienced temperature.

Exposure to a stronger (weaker) target would thus be more likely to result in higher (lower) own strength perception in a warmer environment.

Method

Participants. We recruited 55 male¹ undergraduates and offered them a chocolate bar for participating in a study on person perception. Again, the study took place on a warmer (25-27° Celsius) and a colder (8-12° Celsius) day. Experimenters randomly assigned participants to one of the two standard strength conditions.

Materials and procedure. The setup was the same as in Study 1. Again, the weather was cloudy but not rainy in both temperature conditions. Upon informed consent, participants saw a printed picture of a strong (weak) looking man whose upper body and face were visible.

Following standard procedures to examine the self-evaluative consequences of social comparison (e.g., Mussweiler, Rüter & Epstude, 2004), we instructed participants to form an impression of the depicted person, describe him in writing, compare themselves to him and indicate how difficult they found this comparison. The latter item has been used in similar research (Mussweiler, 2001; Mussweiler, Rüter & Epstude, 2004) to further prompt participants to engage in comparison. Subsequently, participants reported their own perceived strength on five items such as: "What would you say how many push-ups you can do?"; "... for how long can you hold a liter of beer with your arm extended?". The response format of these items was open, i.e. without fixed scale endpoints. Responses were log transformed to avoid a skewed distribution and subsequently z-transformed. The mean response on the five items served as our dependent measure. At the end of the study, participants completed five control items about the pleasantness of the overall study, the ambience, the weather, the temperature and the location where the study was conducted. These items were included to control for positive vs. negative valence of

the given temperature. Finally, experimenters compensated and debriefed the participants.

Results

We hypothesized that assimilation of self-evaluations to the standard is more likely the higher the experienced temperature. As expected, under warmer temperatures participants evaluated themselves as stronger when confronted with a strong ($M = .22$, $SD = .62$) rather than a weak standard ($M = -.55$, $SD = .57$), $p = .004$, $d = 1.34$. Under colder temperatures, no such assimilation effect emerged, $M = .10$, $SD = .61$, vs. $M = .07$, $SD = .64$, $p = .894$, $d = .04$, in the strong vs. weak standard condition (see Figure 1a). In a 2 (temperature) x 2 (strength) analysis of variance (ANOVA), this pattern produced a significant interaction effect, $F(1, 51) = 4.69$, $p = .035$, $\eta^2 = .08$. The main effect of temperature was not significant, $F(1, 51) = 2.11$, $p = .153$, $\eta^2 = .04$, whereas the main effect of standard strength reached significance, $F(1, 51) = 5.48$, $p = .023$, $\eta^2 = .10$. None of the control items used as covariates had a significant main effect ($p > .40$). Pleasantness of temperature did not significantly interact with any of the factors or their interaction, all $F < 1$. These findings demonstrate that physical warmth does indeed shape the direction of social comparison consequences.

Study 3

In our final study, we further examined the effect of physical warmth on social comparison consequences in a controlled laboratory setting.

Method

Participants. We recruited 41 male undergraduate students outside the laboratory and offered them a chocolate bar for their participation². Assignment to standard strength condition was random.

Materials and procedure. Before entering the laboratory, experimenters asked participants under a pretext to take off their jackets. Thereby, we ensured that temperature perception would not be attenuated by participants' attire. In the lab, participants were led to separate warmer (24-25° Celsius) or colder (17-18° Celsius) booths, using similar temperature ranges as IJzerman and Semin (2009). Participants first worked on a filler word search task with neutral words for eight minutes to acclimate to the room temperature, and then completed the social comparison task already used in Study 2. The mean responses to the five items assessing self-evaluation of strength served as the dependent measure. To avoid a skewed distribution, responses were log transformed and subsequently z-transformed. Finally, participants answered the same control items as in Study 2, were rewarded for their participation and debriefed.

Results

We again expected the direction of social comparison consequences to depend on ambient temperature. Our results are consistent with our hypothesis. Under warmer temperatures, participants assimilated self-evaluations towards the standard and judged themselves as stronger when confronted with a strong ($M = .22$, $SD = .58$) rather than a weak standard ($M = -.32$, $SD = .80$), $p = .042$, $d = .85$. Under colder temperatures, this assimilation effect did not emerge. Rather, participants judged themselves similarly after comparison with the strong ($M = -.22$, $SD = .39$) and the weak standard ($M = .04$, $SD = .37$), $p = .342$, $d = .73$ (see Figure 1b). In a 2 (temperature) x 2 (strength) analysis of variance (ANOVA), this pattern produced a significant interaction effect, $F(1, 33) = 4.65$, $p = .039$, $\eta^2 = .12$. None of the main effects reached significance, all $F < 1$. None of the covariates had a significant effect ($p > .20$). Valence of temperature did not interact with any of the factors or their

interaction, all $F < 1$. In accordance with our hypothesis, these findings demonstrate that physical warmth influences the direction of social comparison consequences.

General discussion

Three studies examined the effects of physical warmth on similarity perception and social comparison consequences. We hypothesized that physical warmth fosters similarity perception of non-social and social stimuli. Following from this, we expected more assimilative social comparisons under physical warmth. In line with our reasoning, Study 1 demonstrates that object pairs appear more similar when evaluated in a warmer environment. Warmth thus induces a general focus on similarities, which in turn fosters assimilative social comparison consequences (Mussweiler, 2003). Studies 2 and 3 show that assimilation is more likely when social comparisons are carried out in warmer environments. Physical warmth thus influenced the direction of social comparison effects.

The central implication of our reasoning is that the direction of social comparison effects depends on the level of physical warmth. This argument is supported by the interaction effects obtained in Studies 2 and 3. On a more fine-grained level, our reasoning may also be used to derive more specific hypotheses about the occurrence of assimilative vs. contrastive social comparison consequences. Specifically, one might hypothesize on which temperatures are sufficiently high to induce a similarity focus sufficiently strong to result in assimilation. Analogously, one could speculate which temperatures are sufficiently low to induce a dissimilarity focus sufficiently strong to result in contrast. The results of Studies 2 and 3 indicate that our higher temperature range was sufficiently high for assimilation whereas our low temperature range was not sufficiently low to produce contrast. Importantly, this is extraneous to our hypothesis which focuses on the general

possibility of a moderation of social comparison consequences by temperature, not on the specific occurrence of assimilation and contrast per se.

To our knowledge, the present studies are the first to look at the effects of incidental physical experiences on self-perception in general and social comparison in specific. Our findings contribute to the social comparison literature by demonstrating that social comparison consequences not only depend on characteristics of the judge and the standard (for a review, see Mussweiler, 2003), but also on the physical environment in which comparisons are carried out. Furthermore, these results support the idea of grounded cognition (Barsalou, 1999; Semin & Smith, 2008) and the notion that physical experiences such as temperature influence social information processing. Together with previous research (Ijzerman & Semin, 2009), the present findings hold the intriguing possibility that one of the most basic characteristics of our physical environment, namely temperature, influences a wide range of interpersonal experiences.

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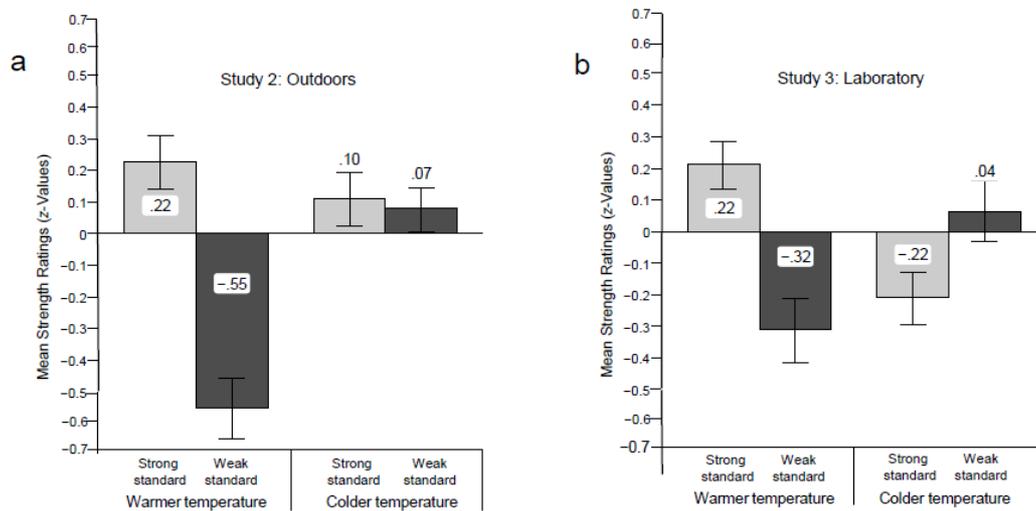
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Highlights

- We examine how physical experiences shape social comparison, a ubiquitous mechanism in self-evaluation.
- We demonstrate that experienced physical warmth moderates the direction of social comparison consequences.
- Physical context features shape self perception.

Figure

Figure 1



¹ This sample solely consists of male students and comparison targets because physical strength is a self-esteem dimension more relevant to men (Franzoi & Herzog, 1987).

² In Experiment 3 we excluded four participants from analyses because they had used derogatory language when describing the comparison target, which made a subsequent comparison unlikely. Their exclusion did not change the pattern of results.

Figure 1:

a: Outdoor Study. Means and standard errors of own perceived strength estimates (z-transformed), depending on temperature and standard strength.

b: Laboratory Study. Means and standard errors of own perceived strength estimates (z-transformed), depending on temperature and standard strength.