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Temperatures of Envy:

Associations between Temperature Perceptions and Experiences of Envy

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ASSOCIATIONS BETWEEN TEMPERATURE PERCEPTIONS AND EXPERIENCES OF ENVY

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Abstract

Envy is generally thought of as a negative emotional response involving a contrast between oneself and another. In its proper form, it can have detrimental effects upon relational interactions and attentional resources, but recent evidence indicates that two forms of envy exist. While malicious envy is characteristically hostile, benign envy is related to admiration and involves a motivational component. In light of research demonstrating associations between temperature and affect, the present research examines associations between temperature perception and envy. In study 1, participants primed with sentence-unscrambling tasks involving heat-associated words reported greater maliciousness in subsequent recalls of envy. In study 2, participants who recalled an experience of benign envy perceived ambient temperature as warmer than those who recalled an experience of malicious envy. In study 3, an admiration condition was added in order to better understand the influence of positive, upward evaluations of others on temperature perceptions in experiences of envy. Participants recalling benign envy again perceived warmer temperatures than in the malicious condition, and estimates in the admiration condition fell in between those of the benign and malicious conditions. Consistent with previous research, benign envy was found to involve more interpersonal overlap than admiration or malicious envy, and was demonstrated to be the least comfortable of the emotions to recall. Malicious envy, on the other hand, was seen to be a cooler, more comfortable experience. The differences between the benign and admiration conditions in particular highlight the frustrating, often motivational aspect of benign envy absent in experiences of admiration.

Keywords: envy, embodiment, appraisal, self-esteem

Dedication

This thesis is dedicated to my incredible parents, Lynn & Keith Suttle and Ken & Romona Thompson, my advisors and mentors, Robert Mather and Gabriel Rupp, and my dear friend Keia Atkinson. This endeavor would not have been possible without their continued support, and for this I thank them from the depths of my heart.

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Chapter 1: Introduction

Envy is by no means a new concept. It has been acknowledged in religions throughout the world since ancient times, standing as a fundamentally negative aspect of human existence. From western to eastern religions, envy is advised against and considered detrimental to the experience of a wholesome life. In Christian doctrine, envy is one of the seven deadly sins (Proverbs 6:16-19). Similarly, Buddhist text includes envy in the list of the 16 means through which the mind is defiled (Vatthupama Sutta). Although the ultimate implications of envy vary between religions, the recognition that this concept is a critical component of destructive thoughts and behaviors is exemplified, nonetheless. Considering such, it is evident that humans have long known of the harmful repercussions that particular social comparisons can have upon contentment with life, as well as the possible damage that these comparisons produce in the context of societal well being.

If envy is an ancient construct, it follows that speculation concerning its underpinnings is valuable for a more thorough understanding of human nature in social environments. This brings to question how conceptualizations of envy have transformed since ancient times. Specifically, what has been supposed regarding this concept in recent history? In light of present purposes, an initial clarification of the distinctions between envy and jealousy is warranted, as these two terms are often assumed to be interchangeable. In the most basic sense, envy is customarily held as an emotional response that arises as a result of the desire for another's characteristics or possessions. Jealousy, on the other hand, transpires in the framework of important interpersonal relationships. It involves the experience of fear and anxiety in response to perceived

rivalry for relations with another. Thus, while envy concerns desire for that which another possesses, jealousy involves the fear of losing a relationship already possessed (Parrot & Smith, 1993).

It is thought that the common implementation of the term jealousy as a substitution for envy, in both lay and academic realms, is grounded in unease with the perceived severity of its moral implications. Extending beyond morality, envy's implications for security also provoke unease. The mere thought of being the subject of another's envy elicits fear, often leading individuals to conceal success or prosperity (Schoeck, 1969). As a personal experience, envy is not only uncomfortable, but also associated with feelings of shame (Silver & Sibini, 1978). Given the variability of human nature, it stands to reason that some individuals are more prone envy than others. This is not say that individuals lacking envious inclinations do not experience episodes of considerable envy, though. Evidence suggests that episodic envy is actually more predictive of possible emotional and behavioral consequences than dispositional envy (Cohen-Charash, 2009).

Turning attention to the cognitive consequences of envy, research indicates that experiences of envy substantially influence memory and attention. For instance, when participants were primed by means of recalling previous experiences of envy, memory for specifics concerning same-sex targets was enhanced. Envy primed participants also attended to same-sex targets for longer periods of time than did control participants. Similarly, when participants were presented with fictitious interviews of students and asked to report their emotions in response to these interviews, increased feelings of envy were found to result in enhanced recall. Information within fictitious interviews involving

envied individuals was thus more thoroughly recalled. The cognitive consequences of envy are not restricted to the domains of memory and attention, as evidence indicates that self-regulation is influenced as well. Consistent with the supposition that the increased encoding of material during experiences of envy amplifies the depletion of cognitive resources essential for self-regulation, findings demonstrate that individuals are less likely to persevere through failure following the elicitation of envy. When participants were asked to examine fictitious interviews of students, the categorization of these interviews as involving envy-inducing or neutral targets predicted subsequent exertions of self-regulation. Participants who were administered envy-inducing interviews were better able to recall targets' names, exhibiting heightened expenditure of cognitive resources, yet were less willing to exert effort in attempting to solve exceptionally demanding or impossible anagram puzzles (Hill, DelPriore, & Vaughan, 2011).

It is important to note that the concept of envy is not only applicable to the individual-level of human interaction, but also to the group-level. Perceptions of groups to which individuals do not belong, or outgroups, are grounded in interactions between the two evaluative dimensions of warmth and competence. While the dimension of warmth involves evaluations of intent, namely whether intent is positive or negative, competence evaluations concern the extent to which intent may materialize (Fiske, Cuddy, Glick, & Xu, 2002). Evidence reveals that groups evaluated high along the dimension of competence, yet low along the dimension of warmth, tend to be subjects of envy. The behavioral repercussions of such evaluations may be detrimental to individuals, as feelings of envy toward outgroup members are associated with active, or intentional, harm (Cuddy, Glick, & Fiske, 2007).

The term envy, as generally employed in studies of this concept, is what scholars consider envy proper. Envy in this sense involves a component of hostility, yet it has been noted that not all experiences of envy seem characteristically hostile in nature. Based upon such acuities, it is supposed that some experiences of envy may be entirely devoid of ill will, perhaps even stimulating a dash of benevolent respect. Drawing upon this, it is posited that if envy can exist without hostility, experiences of envy may be far more common than previously thought (Smith & Kim, 2007). This line of reasoning has initiated empirical speculation concerning the implications of envy extending beyond a single construct.

Chapter 2: Envy as a Bifurcated Construct

Envy involves social comparison, or the comparison of oneself with another, thus when individuals reduce comparative margins between themselves and envied others, feelings of envy consequentially decrease. The reduction of these margins may be accomplished either by progressing upwards to the positions of envied others or by drawing envied others downwards to lower positions. This notion of leveling-up versus leveling-down lays the foundation for the support of the division of envy into two discrete forms. Termed benign and malicious, evidence indicates that these forms are indeed distinct experiences of emotion, with each involving different underlying patterns of thought. While malicious envy parallels the classical conceptualization of envy proper, benign envy is of a considerably less antagonistic nature. To be sure, the emotions most closely associated with benign and malicious envy are admiration and resentment, respectively. Regarding the association between benign envy and admiration, findings reveal that although these emotions closely resemble one another, benign envy involves a component of frustration that admiration lacks. Although the lack of frustration in admiration entails greater experiential positivity, the frustration in experiences of benign envy does appear to be a motivating factor for personal improvement. With respect to the association between malicious envy and resentment, although both involve experiential negativity, resentment is decidedly more negative (van de Ven, Zeelenberg, & Pieters, 2009).

In distinguishing between benign and malicious envy, the importance of understanding their corresponding appraisal patterns cannot be overstated, as consideration of appraisals allows for a more comprehensive grasp of their implications.

The central assumption of appraisal theory is that emotions are associated with configurations of appraisals, or interpretations of situational circumstances. Thus, patterns of interpretations concerning the various circumstances encompassing experiences are thought to give rise to emotions. Of particular relevancy to the distinction between benign and malicious envy are the appraisal dimensions of deservingness and control potential. Evidence reveals that when an envied individual is perceived as deserving of their envy-inducing circumstances, benign envy is more likely to result. Malicious envy, on the other hand, is likely to arise if an envied individual is deemed undeserving of their circumstances. In the context of control potential, it is imperative to note that control of situations influences subsequent feelings of envy only when envied individuals are perceived as deserving. The perception of high control on the part of oneself and deservingness on the part of an envied other is predictive of benign envy. This finding in particular illuminates the supposition that benign envy is characteristically motivational (van de Ven, Zeelenberg, & Pieters, 2012).

The notion that appraisals prompt feelings of either benign or malicious envy exemplifies the situational dependency of these experiences. Naturally, this brings to question whether somatic factors might also exert influence upon experiences of envy. Temperature is implicated as a significant factor in the formation and regulation of emotions, both in laboratory settings and daily life. For instance, when participants hold a cold therapeutic pack for a period of merely one minute, their feelings of loneliness consequentially increase. Additionally, participants who score high in loneliness are found to cope with such by means of using warmer water in their daily bathing routines (Bargh & Shalev, 2012). Building upon such findings, the purpose of the present

experiment is to examine the relationship between perceptions of temperature and feelings of envy. Specifically, how are benign and malicious envy differentially associated with ambient temperature perceptions?

Chapter 3: Semantic Networks

One theoretical framework that can be used to understand emotional priming by means of temperature involves cognitive networks of associated concepts. In the most basic sense, priming entails the activation of a concept in response to the introduction of a stimulus. Concepts are thought to be associated with one another by means of networks, with each concept constituting a node and each association constituting a link. The length of a link between two nodes is dependent upon semantic similarity, such that concepts that share a great deal of semantic properties with one another are closely linked. It necessarily follows that the shorter the link between two nodes, the greater the capacity of one node to activate the other. Hence, in networks of associated concepts, as activation spreads outwards, the strength of activation decreases (Collins & Loftus, 1975). Bearing in mind that emotions are nodes within semantic networks, it is thought that experiences of emotions are dependent upon the concepts to which they are respectively linked (Altarriba & Bauer, 2004). It is imperative to note, though, that semantic activations possess the characteristic of dual directionality (Lindemann, Stenneken, van Schie, & Bekkering, 2006). To be sure, the following evidence exhibits that patterns of activation between temperature and emotion are transposable.

Bearing in mind that emotions can be conceptualized as moderators between social temperature evaluations and consequent forms of behavior, it is necessary to turn attention to the operation of emotions in the relationship between the human body and cognition. The coupling of evaluations with emotion is complex, to say the least, given the multifaceted nature of the human experience. Initially, consider the causal directionality between evaluations and emotions. When humans form evaluations, states

of emotion are generally involved. Once evaluations have been formed, emotional states may be amplified or wholly altered as a result. Although this circular possibility of influence is certainly important, the point that emotions and evaluations are capable of existing independently cannot be overstated. Humans may experience emotions in the absence of evaluations and, conversely, evaluations may be formed in the absence of emotions. In such instances, it becomes clear that an overarching system is functioning. The body itself is thought to be the essential ingredient in this system (Spackman & Miller, 2008), thus the concept of embodiment ascends.

Chapter 4: Embodiment

In the most general sense, embodiment speaks to the notion that the brain is not necessarily the sole ground within which cognitions develop. Rather, the body as a whole provides the cognitive resources required to traverse daily life, accomplishing much of the work necessary to achieve goals through perceptually guided actions. *Embodiment* in the purest sense removes the necessity of internal representations to explain even the most complex and dynamic of behaviors (e.g. the learning and use of language). Proponents of this "strong" view of embodied cognition thus advocate the *replacement hypothesis*, which replaces internal representations entirely with perceptual system couplings amongst the brain, body, and environment (Wilson & Golonka, 2013).

Not all researchers that recruit the basic concept of embodiment relinquish ties with internal representations, though, attempting instead to demonstrate that abstract mental phenomena are "grounded" in bodily states. This form of embodiment is built upon what Shapiro (2011) terms the *conceptualization hypothesis*, being that the nature of our conceptions of the world are based upon, and thus grounded in, perception-action systems (Wilson & Golonka, 2013). Under the title *grounded cognition*, Barsalou (2010) explains that from this perspective, grounding of central cognitions occurs by means of interactions amongst situational factors, bodily states, and simulations occurring in modal systems of the brain. This form of embodiment, or grounded cognition, thus advocates for internal presentations, maintaining that these modally situated representations simulate the environment in order to interface well with external structures. Lines of such conceptualization-style embodiment research often draw upon the notion that common metaphors are grounded in our corporeal experience (e.g. future is *forward*) (Lakoff &

Johnson, 1999), emphasizing not that there are a lack of internal representations, but rather that manipulations of bodily (grounding) states alter or influence the application of concepts (Wilson & Golonka, 2013).

Given the circular, recursive causality of physical responses and emotional evaluations, the concept of embodiment, whether this is in the radical or grounded sense, best lays the groundwork for comprehending the employment of temperature-sensitive perceptual systems in emotional domains of life. These perceptual systems affect the socialization of human beings to such an extent that their systemic integration is likely an essential factor in social perceptions and coordinated interpersonal behavior. An analysis of the integration of these systems lends itself to a dynamical systems perspective, though it should be mentioned that this paradigm is generally not applied to the present form of research, as by its very nature it more heavily reflects previous research falling within the domain of conceptualization-style embodiment. Nonetheless, models generated by dynamical systems can be instructive in deciphering the intricate complexities inherent to the similar, yet divergent experiences of benign and malicious envy.

Chapter 5: Dynamical Systems

The work of Kugler, Kelso, and Turvey (1980) is often heavily credited with inspiring an upswing of interest in the application of dynamical systems modeling to psychological phenomena. Using dynamical modeling, their research attempted to answer a question central to the ecological perspective of perception posited by Gibson (1979). Gibson noted that behavior does not appear to be governed by decisions made by an agent, and thus is "regular without being regulated," but was unable to achieve certainty explicating the mechanisms that constitute the processes and outcomes. The realization by Kugler et al. (1980) that behavior is self-organizing directly addressed Gibson's queries, suggesting that similar dynamical modeling techniques to those applied to systems involving self-organization in other sciences can be used to understand human behavior (Chemero, 2013). The dynamical systems approach most drastically differs from classic statistical modeling in that it incorporates nonlinearity, effectively modeling behavior as context-bound nonlinear functions. Considering that the process of emotion formation or transition involves various subsystems with vastly flexible response patterns, the tools of dynamical systems can aid in modeling emotions in a more veridical manner than can be achieved with classical statistics. Rather than viewing emotions as processes of linear, directly correlating components, dynamical techniques enable the exploration of complex synchronizations, including but not limited to such features as lagged covariation, nonlinearity, and differential dampening (Scherer, 2009).

In this paradigm, emotions are episodes of self-organization amongst neurophysiological systems. The specific components that synchronize, or couple, between systems in the process of self-organization are termed *coupled oscillators*, thus

in the case of emotions, coupled neurophysiological oscillators driven by appraisals are observed to model synchronization. The couplings amongst neurophysiological oscillators increase or decrease in their extent of synchronization over periods of time, with more stable synchronizations amongst coupled oscillators constituting the specific modes, or *attractor basins*, that we label emotions (Scherer, 2009). Attractor basins for biological states (e.g. sleep) have been well demonstrated, and the process of forced coupling synchronizations in physiological systems has been extended to illustrate how underlying biological oscillators are driven by psychological factors (Redington & Reidbord, 1992). Appraisals are psychological, oscillating processes and thus have continuously variable influences upon synchronizations of subsystems. Although appraisals may be credited with initiating synchronization processes that constitute emotions as stable attractor basins, it is important to note that appraisals are consequentially influenced by shifts in subsystems and synchronizations. This exemplifies the recursive nature of emotions, as evolving processes engaging continual integration of feedback (Scherer, 2009).

At the core of any experience of envy is a sense of desire built upon a series of appraisals stemming from an upward comparison with another individual. The circumstances that underlie this upward comparison are appraised specifically along the dimensions of deservingness and control potential, thus individuals appraise the extent to which the envied other is deserving of their circumstances as well as the extent to which they themselves are in control of the situation eliciting envy. In experiences of benign envy, individuals appraise envied others high along the dimension of deservingness and appraise themselves high along the dimension of control potential, culminating in the

desire, or motivation, to improve personal standing. Conversely, in experiences of malicious envy, individuals appraise envied others low along the dimension of deservingness and appraise themselves low along the dimension of control potential, culminating in the desire to harm the others' standing (van de Ven, Zeelenberg, & Pieters, 2012). Applying the aforementioned principles of dynamical modeling to this understanding, it is possible to conceptually render the appraisals of deservingness and control potential as nonlinearly coupled oscillators constituting the attractor basins of benign and malicious envy. Thus, the tightly coupled oscillations of high deservingness and control potential can be modeled into the single attractor of benign envy, while tight coupling of low deservingness and control potential can be modeled in the single attractor of malicious envy. Given the close nature of these emotions, though, both attractor basins would fall within a larger basin encompassing the desire fundamental to envy.

In resting states, appraisal patterns are loosely coupled, and are therefore unstable and highly flexible, yet when emotions are elicited, these patterns tighten and synchronize, recursively influencing an array of subsystems (Scherer, 2009). In order to take the psychophysiological subsystem comprising temperature perception into account, as this is a central component of the present exploration, complex nonlinear couplings amongst neural areas associated with the appraisals of deservingness and control potential should first be examined and modeled. With spatiotemporal modeling of neural oscillators, it would be possible to determine the most suitable internal, neural oscillator to examine in a nonlinear, dynamically coupled system with a physiological oscillator related to temperature perception. This physiological oscillator would likely involve skin temperature in a particular region of the body or face as measured temporally by a

thermal imaging device. For instance, modeling the coupling between a neural oscillator heavily implicated in experiences of benign envy and an interdependent, physiological oscillator involving heat-response would effectively illustrate a dynamical pattern of this emotion process, being instructive as to how these episodes vary from those in malicious envy in particular. Though the present research does not integrate the tools of dynamical systems, it does draw upon the concept of possible nonlinearity for the purpose of clarity, acknowledging that the aforementioned nonlinear models can be instructive in the interpretation of results.

Chapter 6: Associations Between Temperature and Emotions

Cold physical temperatures, or perceptions thereof, have been shown to result in increased feelings of exclusion from others by various rather clever means. In a study by Ijzerman and Semin (2009), when participants were asked to hold a cup containing either a cold or warm liquid, those in the cold condition subsequently reported less overlap between conceptualizations of themselves and familiar others than those in the warm condition. In a follow-up study, participants were exposed to either cold or warm ambient temperatures while viewing a short film. Consistent with the previous study, participants in the cold condition reported greater exclusion, or less overlap with another, than those in the warm condition. Focusing upon the opposite direction of this relationship, Zhong and Leonardelli (2008) revealed that feelings of exclusion influence perceptions of physical temperature. For instance, when participants were asked recall an event during which they were either included or excluded within a social environment, those in the exclusion condition indicated perceptions of lower physical temperature than those in the inclusion condition. Correspondingly, participants primed to feel excluded by means of a computer simulation were significantly more inclined to exhibit fondness for warm food products than control participants. These inclinations indicated a compensatory mechanism for perceptions of lower physical temperature.

Extending upon these findings, Ijzerman and Semin (2010) demonstrated that comprehending similarities with another exerts an effect upon perceptions of physical temperature. Indeed, when participants were instructed to list either three or ten similarities between themselves and another, those who listed ten similarities perceived the physical temperature of a room as warmer than those who listed only three

similarities. In a complementary study, as a means of further demonstrating the influence of interpersonal comparisons upon perceptions of physical temperature, impressions of dissimilarities were employed. Consistent with the aforementioned finding, participants who listed ten differences between themselves and another perceived the temperature as colder than those who listed only three.

Considering the potentially negative repercussions of cold physical temperature, in terms of perceptions of social environments and consequential emotions, it follows that humans necessarily possess mechanisms to brace against these. An evidenced example of one such mechanism is the emotion of nostalgia, which involves positive regard for past experiences. In everyday life, findings suggest that individuals experience increasingly more nostalgia as temperature decreases. When temperatures were manipulated to investigate this causal effect in laboratory settings, participants in the cold condition provided confirmatory evidence, reporting more nostalgia than warm or neutral participants. In support of the underlying supposition that nostalgia heightens perceptions of physical warmth, participants who merely thought of nostalgic experiences provided higher estimates of the temperature within a room (Zhou et al., 2012).

The revelation that preferences for romance films are enhanced when participants are subjected to cold environments is similarly indicative of the notion that humans brace against the negative affects initiated by cold temperatures. Accordingly, participants in cold temperature conditions, as opposed to warm temperature conditions, were found to be not only more partial to romance films, but also more inclined to allocate resources to view them. Extending this beyond laboratory settings, findings indicated that climatic conditions were negatively related to romance film rentals. These findings suggest that

the emotional warmth of romantic content soothed the discomfort induced by physically cold temperatures (Jiewen & Yacheng, 2012).

The association between aggression and temperature is vastly supported by empirical evidence. Violent crime rates have been found to upsurge as atmospheric temperatures increase (Anderson, 1987). In baseball, pitchers exhibit a greater degree of aggression toward batters when as temperatures rise (Reifman, Larrick, & Fein, 1991). In a study by DeWall and Bushman (2009), it was demonstrated that merely being primed with words related to heat increased the accessibility of aggressive concepts. Indeed, participants who unscrambled sentences involving heat-related words subsequently created of far more aggressive words than control participants in a stem-completion task.

With respect to the findings that cold temperatures elicit emotional discomfort, namely feelings of exclusion or loneliness, and that such discomfort may be compensated for by means of emotional warmth, study 1 examined the hypothesis that cold primes induce significantly more benign affect than hot primes in subsequent recalls of envy. Thus, participants administered cold-oriented sentence-unscrambling primes were expected to indicate more benign feelings in self-evaluating their experiential recalls of envy than participants administered hot-oriented sentence-unscrambling primes. Further, considering the evidence that heat enhances aggression, study 1 examined the hypothesis that heat primes induce significantly more malicious affect than cold primes in subsequent recalls of envy. Thus, participants administered heat-oriented sentence unscrambling primes were expected to indicate more malicious feelings in self-evaluating their experiential recalls of envy than participants administered cold-oriented sentence-unscrambling primes. In light of the robust association between malicious envy and

perceptions of unfairness (van de Ven, Zeelenberg, & Pieters, 2009), participants in the heat-oriented sentence unscrambling primes were also expected to indicate the greatest levels of perceived unfairness in self-evaluating their experiential recalls.

Chapter 7: Study 1

Method

Participants

40 students (31 female, 9 male) were recruited through introductory psychology courses at the University of Central Oklahoma. They received partial course credit in exchange for their participation. Participants were randomly assigned to either the hot (n = 20) or cold (n = 20) condition. All participants were proficient in English and were at least eighteen years of age.

Materials

Sentence-unscrambling tasks were employed as primes in both hot and cold conditions, though the semantic content of these tasks varied between conditions (Vess, 2012). Sentence-unscrambling tasks comprised 13 sequences of words, each of which included 5 words scrambled in such a way as to be rendered incoherent. Participants unscrambled each of the 13 sequences in order to create grammatically sound sentences from four of the five words within each sequence. In both the cold and hot prime tasks, six of the scrambled sequences respectively incorporated words coupled with either hot or cold temperatures. An example of one such sequence from the hot prime task is "sunburn he has a riding;" see Appendix A. Likewise, an example of one such sequence from the cold prime task is "freezes eggs she the bricks;" see Appendix B. When such sequences were unscrambled, the presence of these words prompted the realization of applicable temperature concepts. Employing only four of the given words in each sequence, the unscrambling of the former example generated "He has a sunburn," whereas the unscrambling of the latter example generated "She freezes the eggs."

A measure devised by van de Ven, Zeelenberg, and Pieters (2009) was used to distinguish magnitudes of benign and malicious affect in recalls of envy. This measure also involved a component of perceived unfairness. Initially, participants recalled a personal experience of envy in one or two written sentences. No definitions concerning envy were provided in the instructions for this recall; see Appendix C. A short questionnaire subsequently specified the extent to which this recall involved benign and malicious affect, as well as whether the recalled experience was perceived as unfair; see Appendix D. This questionnaire consisted of 7 items formatted in such a way as to be responded to by means of a 9-point Likert scale. For each item, a response of 0 is indicated *Not at all*, while a response of 8 indicated *Very much so*. The first three questionnaire items were directly related to the experiential contents of benign envy. An example of one such item was “I tried harder to achieve my goals.” The second three questionnaire items were directly related to the experiential contents of malicious envy. An example of one such item was “I wanted to hurt the other.” The seventh questionnaire item was directly indicative of the perception of unfairness. This item, “I considered the situation to be unfair,” remained independent from the aforementioned composites due to its analytical, rather than experiential, nature. The most distinguishing feature between benign and malicious envy is the perception of unfairness, thus this item provided a supplementary means of specification.

Procedure

Participants were first randomly administered hot or cold priming tasks (Vess, 2012). These primes were sentence-unscrambling tasks that each consisted of 13 sequences of words. Though all sequences contained five words, participants were

instructed to use only four of these words to generate coherent sentences. Regarding the differences between conditions, both hot and cold sentence-unscrambling primes contained six sequences of words oriented toward temperature. Each of these sequences included a different word associated with temperature. In the cold prime, an example of a temperature word was “frostbite.” In the hot prime, an example of a temperature word was “roasted.” The unscrambling of these sequences placed temperature words in realistic contexts, activating concepts linked to the central concepts of either hot or cold. In order to decrease the possibility of environmental colors exerting an effect upon emotion (Hemphill, 1996), thus interacting with the primes, the experimenter dressed in neutral colors.

Immediately following the administration of primes, participants were instructed to provide a written account of a personal experience of envy in one or two sentences. In these instructions, no indication of the meaning of envy was given. Subsequently, participants answered a series of questions concerning their written account. Three of these questions were associated with the experiential content of benign envy, three were associated with the experiential content of malicious envy, and one was associated with the analytical perception of unfairness (van de Ven, Zeelenberg, and Pieters, 2009).

Results

A one-way analysis of variance (ANOVA) was computed in order to determine whether there were significant differences in composite scores of items reflecting benign envy (items one through three) and composite scores of items reflecting malicious envy (items four through six) between cold and warm conditions. Item seven was also included in this analysis in order to determine whether perceptions of unfairness differed between

conditions. Participants in the cold condition were expected to have the highest composite scores for benign items, while participants in the hot condition were expected to have the highest composite scores for malicious items and the highest perceptions of unfairness.

The analysis revealed that malicious scores significantly varied as expected between conditions, $F(1, 38) = 5.36$, $p = .026$; see Figure 1. Although participants in the cold condition did exhibit the highest benign scores, the analysis revealed that the differences between conditions were not significant. Further, differences in perceptions of unfairness were insignificant between conditions, though these scores were highest in the hot condition; see Table 1. A Pearson correlation was subsequently computed to determine the relationship between the benign and malicious composite scores and perceptions of unfairness. The correlation revealed that perceptions of unfairness were positively correlated with malicious composite scores, Pearson's $r(38) = .383$, $p = .015$; see Figure 2.

Discussion

Although malicious scores were the only significant difference between conditions, a closer look at the means suggested that trends followed the expected directions. The mean benign score was highest in the cold condition and the mean malicious score was highest in the hot condition. Likewise, the malicious score was lowest in the cold condition and the mean benign score was lowest in the hot condition. Although participants with high benign scores generally reported low perceptions of unfairness, this was not always the case. Multiple participants broke this trend, exhibiting predominately benign affect but heightened perceptions of unfairness. These participants,

therefore, held positive regard for the target of their envy, yet perceived an unfair discrepancy between themselves and this individual. For this reason, perceived unfairness did not differ to the extent expected. This finding warrants further investigation regarding the role of perceived unfairness in the context of envy.

Implicated by the concept of embodiment, causality between emotional cognition and bodily sensations flows in a circular pattern. Given that physical temperature perceptions hold the ability to influence emotions (Ijzerman & Semin, 2009; Jiewen & Yacheng, 2012), it follows that emotional cognition correspondingly exerts influence on physical perceptions. Experiments pertaining to the latter direction provide robust support for this notion, illuminating the effects that social climates exert on corporeal experiences. In view of this, as well as evidence demonstrating that memories can alter perceptions of physical temperature (Zhong & Leonardelli, 2008; Zhou et al., 2012), study 2 examines the influence of experiences of envy on temperature perception.

Although malicious envy was associated with heat in study 1, participants in study 2 were expected to feel warmer in the benign condition than the malicious condition. In study 1, malicious accounts were prompted by heat-oriented concepts, which have been shown to induce aggressive or hostile responses. Study 1, therefore, delineated the hostile component of malicious envy that is largely absent in benign envy. In the context of aggression prompted by heat, envy may take a more malicious than benign shape.

The motivational component of benign envy reflects a sense of frustration and interpersonal warmth, though, which study 2 addressed. In study 2, rather than being given the open-ended ability to recall any situation of envy, participants specifically

recalled an account of either benign or malicious envy. The directed nature of these recalls required participants to choose a personally envied individual who filled specific requirements, or induced specific feelings. This task of matching a previous experience with an individual to a specific vignette was expected to make the social proximity of the envied individual salient to the participant. In light of the unsettling nature of malicious envy, participants in the malicious condition were expected to select individuals to whom they felt socially distant, and thus estimate cooler temperatures. Participants in the benign envy condition, on the other hand, were expected to recall experiences involving socially close individuals, which are associated with interpersonal warmth. Given that the benign envy vignette condition specified that the envied individual was motivational, this individual was assumed to be integrated into the participant's self, or represented aspects of the participant's ideals for themself. Discrepancies between the participant and their personal ideals, as represented by another individual, were presumed to induce frustration. The feelings of motivation in experiences of benign envy are associated with frustration, but frustration in benign envy is lesser and framed in a different context than that found in malicious envy. Thus, coupling the interpersonal warmth and motivational frustration of benign envy, the hypothesis that participants who recalled an experience of benign envy perceived the ambient temperature of the laboratory as warmer than those who recalled an experience of malicious envy was examined in study 2.

Chapter 8: Study 2

Method

Participants

70 students (59 female, 11 male) were recruited through introductory psychology courses at the University of Central Oklahoma. They received partial course credit in exchange for their participation. Participants were randomly assigned to either the benign (N = 35) or malicious condition (N = 35). All participants were proficient in English and were at least eighteen years of age.

Materials

The Rosenberg Self-Esteem scale (RSE; Rosenberg, 1965) was administered to all participants; see Appendix E. This uni-dimensional scale provided a measure of global self-esteem, consisting of 10 items formatted in such a way as to be responded to by means of a 4-point Likert scale. For each item, a response of A(1) indicated *Strongly Agree*, a response of B(2) indicated *Agree*, a response of C(3) indicated *Disagree*, and a response of D(4) indicated *Strongly Disagree*. Half of the scale (items 1, 2, 4, 6, and 7) measured positive feelings toward the self. An example of one such item was “I am able to do things as well as most other people.” The other half of the scale (items 3, 5, 8, 9, and 10) measured negative feelings toward the self. An example of one such item was “I wish I could have more respect for myself.” Items related to positive feelings must be reverse scored (e.g. 4 = 1) before all items are summated to generate a composite score, with a higher composite score being indicative of higher self-esteem.

The priming task involved two conditions, benign and malicious envy, to which participants were randomly assigned. In both conditions, participants were instructed to

read a description of an experience and provide a written account reflecting a personal occurrence of this experience. These descriptions were derived from the established components of benign envy and malicious envy, as determined through latent class analyses performed by van de Ven, Zeelenberg, and Pieters (2009). Both descriptions began with the following circumstance characteristic of an upward social comparison: "A person had a quality, had achieved something, or owned something that I wish I had." In this sentence, "person" was followed by "that I like" for the benign envy condition. The benign description highlighted that the individual was deserving of their circumstances, was inspiring, and that personal comparison to the individual was motivational; see Appendix F. The malicious description, on the other hand, highlighted that the individual was undeserving of their circumstances, that personal comparison to the individual was frustrating, that there was hope that the individual would lose or fail something, and that the individuals' circumstances were unfair; see Appendix G.

Participants were asked to estimate the room's temperature in degrees Fahrenheit; see Appendix I. No anchor points for estimation were provided, given that the inclusion of any temperature range could add an element of concern for accuracy on behalf of the participant. Rather than focusing upon how they feel, their attention could be directed to the accuracy of their judgment, or temperature approximation. The present concern was the phenomenological experience of the participant, rather than the accuracy of their approximation.

The State Self-Esteem Scale (SSES; Heatherton & Polivy, 1991) was administered to all participants following temperature estimation; see Appendix L. This scale provided an overall measure of state self-esteem, or self-esteem at that very

moment, as well as three subcomponent measures of self-esteem, including performance self-esteem, social self-esteem, and appearance self-esteem. All 20 items were formatted in such a way as to be responded to by means of a 5-point Likert scale. For each item, a response of 1 indicated *Not at all*, a response of 2 indicated *A Little Bit*, a response of 3 indicated *Somewhat*, a response of 4 indicated *Very Much*, and a response of 5 indicated *Extremely*. Items 1, 4, 5, 9, 14, and 18 provided the subcomponent measure of performance self-esteem, with an example of one such item being "I feel confident about my abilities." Items 2, 8, 10, 13, 15, 17, and 20 provided the subcomponent measure of social self-esteem, with an example of one such item being "I am worried about what other people think of me." Items 3, 6, 7, 11, 12, and 16 provided the subcomponent measure of appearance self-esteem, with an example of one such item being "I am pleased with my appearance right now." Items 2, 4, 5, 7, 8, 10, 13, 15, 16, 17, 18, 19, and 20 must be reverse scored (e.g. 5 = 1) before item scores are summated to generate a composite score, as well as subcomponent scores, with higher scores being indicative of higher self-esteem.

Temperature and humidity are inherently associated in terms of subjective experience (Sunwoo, Chou, Takeshita, Murakami, & Tochihara, 2006). In light of this, both the ambient temperature and relative humidity of the laboratory were measured with a hygro-thermometer after the departure of each participant from the laboratory.

Procedure

In order to assess global self-esteem at the time of arrival to the laboratory, all participants initially received the Rosenberg Self-Esteem Scale (RSE; Rosenberg, 1965). Following its completion, each participant was randomly assigned to either the benign or

malicious condition, subsequently receiving a vignette portraying a comprehensive description of either benign or malicious envy. Participants in both conditions were instructed to carefully read the provided vignette of either benign or malicious envy and reflect upon an occurrence during which they experienced such thoughts and emotional responses. They were then instructed to recall the occurrence of their experience of envy in writing.

Following this recall, participants were instructed to provide a written estimate of the ambient temperature in the laboratory. Participants then completed the State Self-Esteem Scale (SSES; Heatherton & Polivy, 1991) in order to assess possible variation between the effects of benign and malicious envy on self-evaluations. Ambient temperature and relative humidity were recorded immediately following the exit of each participant from the laboratory. These recordings served to control for subtle fluctuations in true ambient temperature and humidity.

Results

A one-way analysis of covariance (ANCOVA) was computed in order to determine whether there were significant differences in estimates of ambient temperature between conditions. Before proceeding with the primary analysis, the homogeneity-of-regression assumption was examined in a preliminary analysis. This analysis demonstrated that the interaction between self-esteem (RES) and condition, $F(1, 64) = 1.66$, $p = .201$, and between humidity and condition, $F(1, 64) = .736$, $p = .394$, did not differ as a function of the dependent variable, or temperature estimates, thus the homogeneity-of-regression assumption was met.

In order to control for natural variations in self-esteem amongst participants, global self-esteem (RSE) was entered as a covariate in the primary analysis. Humidity was also included as a covariate in the analysis, given the association between humidity and temperature in terms of subjective experience. Participants in the benign condition were expected to estimate the ambient temperature of the laboratory as significantly warmer than participants in the malicious condition. In order to take true ambient temperature into account, a variable was calculated in which the temperatures of the laboratory, recorded following each participant's departure, were subtracted from temperature estimates. Using this as an adjusted measure of temperature estimates, the analysis revealed that participants' temperature estimates significantly varied as expected between conditions, $F(1, 66) = 5.58$, $p = .021$, see Figure 3.

A subsequent ANCOVA, with global self-esteem and humidity again entered as covariates, revealed that state-self esteem scale (SSES) scores did not differ between conditions. In order to determine the extent of the relationship between global self-esteem and state self-esteem, a Pearson correlation was computed between these two variables. The correlation revealed that self-esteem (RSE) scores were positively correlated with state self-esteem scale (SSES) scores, Pearson's $r(68) = .777$, $p < .001$. Regarding subcomponent measures, self-esteem (RSE) was positively correlated with performance self-esteem, Pearson's $r(68) = .560$, $p < .001$, social self-esteem, Pearson's $r(68) = .730$, $p < .001$, and appearance self-esteem, Pearson's $r(68) = .578$, $p < .001$.

Discussion

The finding that participants who recalled experiences of benign envy felt significantly warmer than those who recalled experiences of malicious envy is consistent

with previous research demonstrating that experiences of malicious envy are associated cold feelings toward the envied individual. Specifically, van de Ven, Zeelenberg, and Pieters (2009) found that endorsement of "I felt cold toward the person whom I envied" was more characteristic of experiences of malicious than benign envy. The feeling of "cold" in this context is presumed to be metaphorical, but numerous links have been made between metaphors involving temperature-related words and feelings of physical temperature. Benign envy may therefore feel less physically cold as the result of interpersonal, emotional warmth with the envied individual.

Although frustration in experiences of benign envy is lower than in experiences of malicious envy, frustration is more variable in experiences of benign envy. Furthermore, in comparison to the related emotion of admiration, benign envy is vastly more frustrating. The frustration characteristic of benign envy is largely associated with the motivation to improve oneself in comparison to the envied individual. In contrast, motivational frustration is absent in admiration due to feelings that the attainment of that which the other individual has, or has accomplished, is impossible (van de Ven, Zeelenberg, & Pieters, 2011). Nonetheless, admiration and benign envy are distinctly related. In light of evidence that admiration is associated with judgments of warmth (Fiske, Cuddy, & Glick, 2007), yet lacks the frustration present in both benign and malicious envy, examining whether benign envy induces warmer perceptions of ambient temperature than admiration will highlight the distinct association between perceived warmth and motivational frustration in the context of upward comparison. Study 3 will investigate the hypothesis that participants who recollect an experience of benign envy

will perceive the ambient temperature as warmer than those who recollect an experience of admiration or malicious envy.

Additionally, while it was supposed that part of the mechanism underlying the warmth of benign envy involved with the integration of the motivational other into the self, or social proximity, and conversely that the cold feelings of malicious envy were associated with lesser social proximity, this was not directly addressed in study 2. The effect of the extent of overlap between the self and other in experiences of benign envy, malicious envy, and admiration will, therefore, be examined in study 3. Taking into account findings that increased similarity is associated with heightened feelings of envy (van de Ven, Zeelenberg, & Pieters, 2009), it is hypothesized that participants who recall experiences of benign envy will report greater overlap between the self and other than those who recall an experience of malicious envy or admiration. Although increased similarity also increases malicious envy, benign envy involves aspects of the participant's ideals for themselves. Discrepancies between the participant and their personal ideals are thus thought to be integral to frustration in experiences of benign envy, with this increasing as the extent of overlap between the self and other increases. Importantly, it is hypothesized that participants who report the greatest amount of overlap between the self and other following a recall of an experience of benign envy will estimate the warmest ambient temperatures. In other words, that increases in overlap between the self and other in the benign envy condition will be predictive of increases in perceived temperature.

The finding that state self-esteem did not differ between conditions suggests that experiences of envy exerted no effect on the stability of self-esteem, or the correlation between state self-esteem and global self-esteem (Cole, 2001). In order to better

understand the stability of self-esteem in experiences of envy, study 3 will integrate a measure of collective self-esteem. This form of self-esteem is associated with an individual's social identity, based on Social Identity Theory (Tajfel & Turner, 1986). This theory holds that an integral part of self-perception is grounded in perceptions of group membership. Consequently, individuals are motivated to judge others within their own social groups in a more positive light than those less similar. Considering that similarity with another is a predictor of feelings of envy, the individual written of in accounts of benign and malicious envy are likely to be of the same social groups as the participant. Admiration is less related to similarity, thus the participant is likely to share fewer, if any, group memberships with the individual they choose to write of. Higher collective self-esteem, therefore, is hypothesized to be associated with greater instability between global and state self-esteem following experiences of both benign and malicious envy, but not admiration.

In consideration of the negative views of the self that are associated with depression, a measure of depressive symptoms will be integrated in study 3, with the expectancy being that higher levels of depression will be predictive of greater perceptual differences amongst envy conditions. Specifically, more depressive symptoms are expected to be predictive of higher temperature estimates in the benign envy condition and lower temperature estimates in the malicious envy condition. Higher levels of depression are also expected to predictive of greater correlations between global and state-esteem scores, or greater self-esteem stability.

Chapter 9: Study 3

Method

Participants

67 students were recruited through introductory psychology courses at the University of Central Oklahoma. They received partial course credit in exchange for their participation. Participants were randomly assigned to the benign envy (N = 23), malicious envy (N = 24), or admiration (N = 20) condition. All participants were proficient in English and were at least eighteen years of age.

Materials

The Rosenberg Self-Esteem Scale (RSE; Rosenberg, 1965), outlined in the previous study, was again used as a measure of global self-esteem; see Appendix E. The Collective Self-Esteem Scale (CSES; Luhtanen, & Crocker, 1992) was subsequently administered to all participants in order to measure self-evaluations regarding their social identities. This scale provided an overall measure of collective self-esteem, as well as four subcomponent measures of self-esteem, including membership self-esteem, private collective self-esteem, public collective self-esteem, and importance to identity. All 16 items were formatted in such a way as to be responded to by means of a 7-point Likert scale. For each item, a response of 1 indicated *Strongly disagree*, a response of 2 indicated *Disagree*, a response of 3 indicated *Somewhat disagree*, a response of 4 indicated *Neutral*, a response of 5 indicated *Somewhat agree*, a response of 6 indicated *Agree*, and a response of 7 indicated *Somewhat agree*. Items 1, 5, 9, and 13 provided the subcomponent measure of membership self-esteem, with an example of one such item being “I feel I don't have much to offer to the social groups I belong to.” Items 2, 6, 10

and, 14 provided the subcomponent measure of private collective self-esteem, with an example of one such item being “In general, I'm glad to be a member of the social groups I belong to.” Items 3, 7, 11, and 15 provided the subcomponent measure of public collective self-esteem, with an example of one such item being “Most people consider my social groups, on the average, to be more ineffective than other social groups.” Items 4, 8, 12, and 16 provided the subcomponent measure of importance to identity, with an example of one such item being “The social groups I belong to are an important reflection of who I am.” Items 2, 4, 5, 7, 10, 12, 13, and 15 were reverse scored (e.g. 7 = 1) before item scores were summated to generate a composite score, as well as subcomponent scores, with higher scores indicating higher self-esteem; see Appendix M.

The depression quotient of each participant was determined using the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977). This scale consisted of 20 items formatted in such a way as to be responded to by means of a 4-point Likert scale. Item response involved indicating how often particular feelings were experienced during the past week. For each item, a response of 0 indicated *Rarely or none of the time*, a response of 1 indicated *Some or a little of the time*, a response of 2 indicated *Occasionally or a moderate amount of time*, and a response of 3 indicated *All of the time*. An example of a negatively valenced statement was “I was bothered by things that usually don’t bother me,” while an example of a positively valenced statement was “I felt I was just as good as other people.” Items 4, 8, 12, and 16 were reverse scored (e.g. 3 = 0) before all scores were summated to generate a composite score, with higher scores being indicative of more depressive symptomatology; see Appendix N.

The priming task included the three conditions of admiration, benign envy, and malicious envy to which participants were randomly assigned. In each condition, participants were instructed to read a description of an experience and provide a written account reflecting a personal occurrence of this experience. These descriptions were derived from the results of a content analysis of experiences of admiration, benign envy, and malicious envy, performed by van de Ven, Zeelenberg, and Pieters (2009).

Both envy descriptions began with the following circumstance characteristic of an upward social comparison: “A person has a quality, has achieved something, or owns something that I wish I had.” In this sentence, “person” was followed by “that I like” for the benign envy condition. The benign description highlighted that the individual is deserving of their circumstances, is inspiring, and that personal comparison to the individual is motivational; see Appendix F. The malicious description, on the other hand, highlighted that the individual is undeserving of their circumstances, that personal comparison to the individual is frustrating, that there is hope that the individual will lose or fail something, and that the individual’s circumstances are unfair; see Appendix G. The admiration description began with the following general characterization of the experience: “A person has a quality or has achieved something that I admire.” The description highlighted that feelings toward the individual are positive and that although the individual is not personally compared to, being near them is liked. Further, there is hope that the individual will have success, or continued success; see Appendix H.

Participants were asked to estimate the room’s temperature in degrees Fahrenheit; see Appendix I. A 9-point Likert-type type item followed this estimation. This item instructed participants to indicate their level of comfort with the current temperature of

the laboratory, with -4 indicating *Very comfortable*, 0 indicating *Neutral*, and 4 indicating *Very comfortable*; see Appendix J.

The Inclusion of Other in the Self scale (IOS; Aron, Aron, & Smollan, 1992) was used as a means of determining the participant's perception of personal overlap, or closeness, with the individual written of. This pictorial scale presented 7 pairs of overlapping circles, with the extent of overlap progressively increasing from no overlap at all to almost complete overlap; see Appendix K. The State Self-Esteem Scale (SSES; Heatherton & Polivy, 1991), outlined in the previous study, was again used as a measure of state self-esteem in order to examine self-esteem stability; see Appendix L.

The Buss-Perry Aggression Questionnaire (BPAQ; Buss & Perry, 1992) was employed as a means of measuring participants' aggressive tendencies. This scale provided an overall measure of aggression, as well as four subcomponent measures, including physical aggression, verbal aggression, anger, and hostility. All 29 items were formatted in such a way as to be responded to by means of a 5-point Likert scale. For each item, a response of 1 indicated *Extremely uncharacteristic of me*, a response of 2 indicated *Somewhat uncharacteristic of me*, a response of 3 indicated *Neither uncharacteristic nor characteristic of me*, a response of 4 indicated *Somewhat characteristic of me*, and a response of 5 indicated *Extremely characteristic of me.* Items 2, 5, 8, 11, 13, 16, 22, 25, and 29 provided the factor measure of physical aggression, with an example of one such item being "I have become so mad that I have broken things." Items 4, 6, 14, 21, and 27 provided the factor measure of verbal aggression, with an example of one such item being "I can't help getting into arguments when people disagree with me." Items 1, 9, 12, 18, 19, 23, and 28 provided the factor measure of anger, with an example of one such

item being “When frustrated, I let my irritation show.” Items 3, 7, 10, 15, 17, 20, 24, and 26 provided the factor measure of hostility, with an example of one such item being “I am suspicious of overly friendly strangers.” Items 9 and 16 were reverse scored (e.g. 5 = 1) before item scores were summated to generate a composite score, as well as subcomponent scores, with higher scores indicating greater propensities for aggression; see Appendix O.

Procedure

In order to assess global self-esteem at the time of arrival to the laboratory, all participants initially received the Rosenberg Self-Esteem Scale (RSE; Rosenberg, 1965). All participants were then administered the Collective Self-Esteem Scale (CSES; Luhtanen, & Crocker, 1992), which assessed the positivity of participants’ social identities, as well as the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977), which assessed participants in terms of depressive symptomology. Following completion, each participant was randomly assigned to the admiration, benign envy or malicious condition, receiving a vignette portraying a comprehensive description of admiration, benign envy, or malicious envy. Participants in both conditions were instructed to carefully read the provided vignette of admiration, benign envy, or malicious envy and reflect upon an occurrence during which they experienced such thoughts and emotional responses. They were then instructed to recall the occurrence of their experience in writing.

Following this recall, participants were instructed to provide a written estimate of the ambient temperature in the laboratory. Participants then indicated their level of current comfort on a 9-point Likert type item (-4 = *Very uncomfortable*, 4 = *Very*

comfortable). In order to measure the extent of self-other overlap between the participant and the individual, participants were subsequently administered the Inclusion of Other in the Self scale (IOS; Aron, Aron, & Smollan, 1992). Participants were administered the State Self-Esteem Scale (SSES; Heatherton & Polivy, 1991) in order to examine the stability of their self-esteem in experiences of admiration, benign envy, and malicious envy, and more specifically how this linearly related to collective self-esteem subscales. In light of the hostility characteristic of malicious envy, participants completed the Buss-Perry Aggression Questionnaire (BPAQ; Buss & Perry, 1992) prior to exiting the laboratory. Ambient temperature and relative humidity were recorded immediately following the exit of each participant from the laboratory. These recordings served to control for subtle fluctuations in true ambient temperature and humidity.

Results

Initially, an adjusted temperature estimate variable was computed in order to take actual ambient temperature in the laboratory at the time of experiment into consideration. This involved subtracting each participant's temperature estimate from the ambient temperature recorded following his or her participation. A multivariate analysis of variance (MANOVA) was used as a means of determining whether adjusted temperature estimates and interpersonal overlap varied significantly between conditions. Prior to this analysis, linear relationships with temperature estimates and interpersonal overlap were assessed, and although self-esteem and humidity were not significantly correlated with temperature estimates, there was a strong negative relationship between temperature estimate and level of comfort, Pearson's $r(65) = -.402$, $p = .001$; see Figure 4. Level of comfort was not entered as a covariate, though, as the homogeneity-of-regression

assumption was not met, meaning that the interaction between condition and comfort differed as a function of the dependent variable, $F(3, 63) = 6.80$, $p = .001$, $\eta_P^2 = .245$.

Levene's test for equality of variance accompanying the primary analysis was non-significant for temperature estimates, $F(2, 64) = .728$, $p = .487$, and interpersonal overlap, $F(2, 64) = .105$, $p = .901$, indicating that the assumption of homogeneity of variance was met. The primary analysis revealed that the multivariate main effect for condition was significant, Wilks' $\lambda = .706$, $F(2, 126) = 5.99$, $p < .001$, $\eta_P^2 = .160$. Examining univariate main effects in the primary analysis, participants in the benign envy condition perceived significantly warmer ambient temperatures ($M = -.409$, $SD = 2.75$) than those in the admiration ($M = -2.76$, $SD = 2.90$) and malicious envy ($M = -3.50$, $SD = 2.89$) conditions, $F(2, 64) = 7.43$, $p = .001$, $\eta_P^2 = .188$; see Figure 5. Additionally, participants in the benign envy condition reported significantly greater interpersonal overlap ($M = 4.57$, $SD = 1.97$) with the envied individual than those in the admiration ($M = 4.40$, $SD = 1.98$) and malicious ($M = 2.83$, $SD = 1.93$) conditions, $F(2, 64) = 5.49$, $p = .006$, $\eta_P^2 = .146$; see Figure 6.

Interpersonal overlap with the envied individual was positively related to state self-esteem (SSES), Pearson's $r(65) = .241$, $p = .05$ and negatively related to hostility (BPAQ subscale), Pearson's $r(65) = -.402$, $p = .001$. To examine the stability of self-esteem over the course of the experiment, a variable was computed in which standardized global self-esteem scores (RSE) were subtracted from standardized state self-esteem scores (SSES). This measure of self-esteem stability was positively related to membership self-esteem (CSE subscale), Pearson's $r(65) = .268$, $p = .029$, and negatively related to comfort, Pearson's $r(65) = -.241$, $p = .049$.

Discussion

As expected, the benign condition resulted in significantly higher temperature estimates than the admiration or malicious envy conditions. This is consistent with results from Study 2, demonstrating again that experiences of malicious envy are associated with colder perceptions of temperature following a comparison with the envied individual, while experiences of benign envy result in warmer perceptions of temperature. The warmer temperature assessments were also negatively correlated to comfort, indicating the experience of benign envy was more uncomfortable for the participant in addition to resulting in a higher temperature estimate. This result contrasts with the admiration condition, in which temperature estimates were significantly lower than those found in the benign envy condition. Given that admiration is less frustrating and generally less interpersonally involved than benign envy, this was expected.

Those in the benign envy condition also reported significantly higher overlap with the envied individual. This helps to explain the higher temperature estimate in this condition, as the comparison with an individual with which a participant has substantial overlap may result in feelings of not only inferiority but also shame at feeling envy itself towards a liked other. Envy is culturally associated with shame, a "hot emotion," and this can deter open expression or admittance of the felt emotion is most contexts. Society tells us we ought not covet what our friends or family have, and thus there is often negative affect coupled with the desire for that which belongs to a close other. This negative affect evoked by shame manifests as the perception of warmer temperatures, and results in increased feelings of discomfort as noted previously.

Chapter 10: General Discussion

Study 2 and Study 3 directed participants to recall a specific form of envy, in contrast to Study 1 in which participants were only asked to recall a general description of a time at which they experienced "envy." Heat primes, previously shown to heighten aggressive tendencies, coupled with the fact that there were fewer constraints on the recall task in Study 1, resulted in malicious envy being recalled spontaneously by participants. By first priming heat, participants were more likely to experience aggression, and this resulted in the recall of malicious envy. Conversely, tightening the instructions in studies 2 and 3 required thoughtful contemplation on the part of the participant, resulting in a more explicit comparison being made. This explicit comparison, especially when the comparison is to a close other, results both in both feelings of inferiority and shame, the latter of which produced perceptions of warmth. Overlap with others was also positively correlated with state self-esteem and negatively correlated with aggression. After viewing a high overlap other in such an explicitly positive light the feelings of closeness associated with that overlap may serve to bolster state self-esteem after the comparison is made. The negative correlation with aggression is intuitively explained as well, as the less overlap you have with another the easier it is to aggress against them.

These results fall neatly in line with Tesser's Self-Esteem Maintenance Model (SEMM) (Tesser, 1988). In it, he proposes two processes that maintain a positive self-concept governed by three variables. The first process is self-reflection, in which an individual benefits from closeness to another due to the other individual's achievements, while the second process is comparison, based on improving self-esteem through doing

better than another. These two processes are governed by *performance*, how well the other person does; *closeness*, the degree of connection between the two individuals; and *relevance*, the importance of the other's performance to the individual's self-concept. In the benign envy condition, an explicit comparison is evoked to an individual that is close to the participant. This comparison highlights a stark contrast in performance that is on dimensions highly relevant to the self-concept of the participant, a constellation of factors that SEMM predicts would result in negative affect in the participant, here manifesting as increased discomfort coupled with a perception of warmth that was likely fueled by shame.

Although there is an assumption that we all experience temperature similarly, it is important to remember temperature estimates are subjective in nature and that these estimates can be heavily swayed by participants' individual characteristics. Participants from colder climates may have a far different perception of temperature than those hailing from warmer climates. Individual home thermostat preferences may also have an effect on estimates of temperature, as the normal indoor setting could be thought of as the "normal temperature" for the individual participant. Feelings of warmth or coldness could be relative to this "normal temperature." Seasonal effects may also be beneficial to take into consideration given the natural variability in outdoor humidity and ambient temperature. Future studies would not only attempt to control for the aforementioned possibly extraneous variables, but also integrate a thermal imaging device to capture temperature changes in the face and body. Measuring the changes in surface temperature of the participant over the course of the experiment could provide greater insight into the phenomenological experience of the given emotion. Coupling the current self-report

method of ambient temperature estimation with information concerning skin surface temperature change would allow for both an objective measure of bodily response and a subjective measure of temperature perception, thus heightening the interpretability of results.

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Appendix A

Instructions: Please construct a grammatically correct sentence using **only four** of the five words you are given.

1. sunburn he has a riding _____
2. boils eggs she the bricks _____
3. roasted he the lamb beached _____
4. hot Judy felt very cleans _____
5. a lot sweats Joe lamps _____
6. burning Rebecca is up wall _____
7. chirped loudly robin the phone _____
8. plant water gravy needs the _____
9. staples the paper she relaxed _____
10. the hat big is wooded _____
11. window cracked is the televisions _____
12. carpet vacuumed he pan the _____
13. green the grass is pusher _____

Appendix B

Instructions: Please construct a grammatically correct sentence using **only four** of the five words you are given.

1. frostbite he has severe riding _____
2. freezes eggs she the bricks _____
3. defrosted he the lamb cooking _____
4. cold Judy felt very cleans _____
5. a lot shivers Joe lamps _____
6. frozen Rebecca outside feels _____
7. chirped loudly robin the phone _____
8. plant water gravy needs the _____
9. staples the paper she relaxed _____
10. the hat big is wooded _____
11. window cracked is the televisions _____
12. carpet vacuumed he pan the _____
13. green the grass is pusher _____

Appendix C

Instructions: In one or two sentences, write about a situation in which you experienced envy.

_____

_____

_____

_____

_____

Appendix D

Instructions: Based upon the situation in which you experienced envy, respond to each statement by indicating how much you agree or disagree with it. Use the following rating scale:

Not at all Very much so

0 1 2 3 4 5 6 7 8

1. I liked the other.
2. I felt inspired by the other.
3. I tried harder to achieve my goals.
4. The experience felt frustrating.
5. I wanted to hurt the other.
6. I hoped that the other would fail something.
7. I considered the situation to be unfair.

Appendix E

RSE

For the following questions, please indicate how strongly you agree or disagree.

A = Strongly Agree

B = Agree

C = Disagree

D = Strongly Disagree

1. I feel that I'm a person of worth, at least on an equal basis with others. _____
2. I feel that I have a number of good qualities. _____
3. All in all, I am inclined to feel that I am a failure. _____
4. I am able to do things as well as most other people. _____
5. I feel I do not have much to be proud of. _____
6. I take a positive attitude toward myself. _____
7. On the whole, I am satisfied with myself. _____
8. I wish I could have more respect for myself. _____
9. I certainly feel useless at times. _____
10. At times, I think I am no good at all. _____

Appendix F

Instructions: Please carefully read the description below and reflect upon an occurrence during which you experienced such feelings:

A person that I like has a quality, has achieved something, or owns something that I wish I had. This person is deserving of this quality, achievement, or possession, though, and I can say that he or she inspires me. When I compare myself to this person, I am motivated to achieve my goals.

Write about the occurrence of this experience. Be as detailed as possible.

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Appendix G

Instructions: Please carefully read the description below and reflect upon an occurrence during which you experienced such feelings:

A person has a quality, has achieved something, or owns something that I wish I had. I feel that this person is undeserving of this quality, achievement, or possession. When I compare myself to this person, I feel frustrated. I might hope that this person loses or fails something. Their circumstances are not fair.

Write about the occurrence of this experience. Be as detailed as possible.

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Appendix H

Instructions: Please carefully read the description below and reflect upon an occurrence during which you experienced such feelings:

A person has a quality or has achieved something that I admire. I feel very positively about this person, and may compliment or talk positively about them. I don't really compare myself to this person, but I like to (or would like to) be near this person. I hope that this person does well (or continues to do well).

Write about the occurrence of this experience. Be as detailed as possible.

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Appendix I

Provide an estimate of this room's current temperature in degrees Fahrenheit: _____

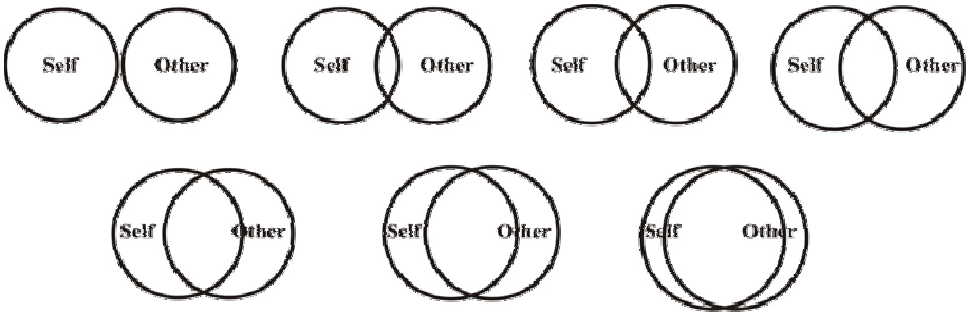
Appendix J

Instructions: Please indicate how you feel RIGHT NOW on the following scale.

Very Uncomfortable								*Very comfortable*
-4	-3	-2	-1	0	1	2	3	4

Appendix K

Instructions: Please circle the picture that best describes your relationship with the individual that you wrote about.



Appendix L

SSES

This is a questionnaire designed to measure what you are thinking at this moment. There is of course, no right answer for any statement. The best answer is what you feel is true of yourself at the moment. Be sure to answer all of the items, even if you are not certain of the best answer. Again, answer these questions as they are true for you RIGHT NOW.

1 = Not at All

2 = A Little Bit

3 = Somewhat

4 = Very Much

5 = Extremely

1. I feel confident about my abilities. _____
2. I am worried about whether I am regarded as a success or failure. _____
3. I feel satisfied with the way my body looks right now. _____
4. I feel frustrated or rattled about my performance. _____
5. I feel that I am having trouble understanding things that I read. _____
6. I feel that others respect and admire me. _____
7. I am dissatisfied with my weight. _____
8. I feel self-conscious. _____
9. I feel as smart as others. _____
10. I feel displeased with myself. _____
11. I feel good about myself. _____

12. I am pleased with my appearance right now. _____

13. I am worried about what other people think of me. _____

14. I feel confident that I understand things. _____

15. I feel inferior to others at this moment. _____

16. I feel unattractive. _____

17. I feel concerned about the impression I am making. _____

18. I feel that I have less scholastic ability right now than others. _____

19. I feel like I'm not doing well. _____

20. I am worried about looking foolish. _____

Appendix M

CSE

INSTRUCTIONS: We are all members of different social groups or social categories. Some of such social groups or categories pertain to gender, race, religion, nationality, ethnicity, and socioeconomic class. We would like you to consider your memberships in those particular groups or categories, and respond to the following statements on the basis of how you feel about those groups and your memberships in them. There are no right or wrong answers to any of these statements; we are interested in your honest reactions and opinions. Please read each statement carefully, and respond by using the following scale from 1 to 7:

		Strongly Disagree	Disagree	Disagree Somewhat	Neutral	Agree Somewhat	Agree	Strongly Agree
1.	I am a worthy member of the social groups I belong to.	1	2	3	4	5	6	7
2.	I often regret that I belong to some of the social groups I do.	1	2	3	4	5	6	7
3.	Overall, my social groups are considered good by others.	1	2	3	4	5	6	7
4.	Overall, my group memberships have very little to do with how I feel about myself.	1	2	3	4	5	6	7
5.	I feel I don't have much to offer to the social groups I belong to.	1	2	3	4	5	6	7
6.	In general, I'm glad to be a member of the social groups I belong to.	1	2	3	4	5	6	7
7.	Most people consider my social groups, on the average, to be more ineffective than other social groups.	1	2	3	4	5	6	7
8.	The social groups I belong to are an important reflection of who I am.	1	2	3	4	5	6	7
9.	I am a cooperative participant in the social groups I belong to.	1	2	3	4	5	6	7
10.	Overall, I often feel that the social groups of which I am a member are not worthwhile.	1	2	3	4	5	6	7
11.	In general, others respect the social groups that I am a member of.	1	2	3	4	5	6	7
12.	The social groups I belong to are unimportant to my sense of what kind of a person I am.	1	2	3	4	5	6	7
13.	I often feel I'm a useless member of my social groups.	1	2	3	4	5	6	7
14.	I feel good about the social groups I belong to.	1	2	3	4	5	6	7
15.	In general, others think that the social groups I am a member of are unworthy.	1	2	3	4	5	6	7
16.	In general, belonging to social groups is an important part of my self image.	1	2	3	4	5	6	7

Appendix N

CES-D

Below is a list of the ways you might have felt or behaved. Please tell me how often you have felt this way during the past week.

	During the Past Week			
	Rarely or none of the time (less than 1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of time (3-4 days)	Most or all of the time (5-7 days)
1. I was bothered by things that usually don't bother me.	☐	☐	☐	☐
2. I did not feel like eating; my appetite was poor.	☐	☐	☐	☐
3. I felt that I could not shake off the blues even with help from my family or friends.	☐	☐	☐	☐
4. I felt I was just as good as other people.	☐	☐	☐	☐
5. I had trouble keeping my mind on what I was doing.	☐	☐	☐	☐
6. I felt depressed.	☐	☐	☐	☐
7. I felt that everything I did was an effort.	☐	☐	☐	☐
8. I felt hopeful about the future.	☐	☐	☐	☐
9. I thought my life had been a failure.	☐	☐	☐	☐
10. I felt fearful.	☐	☐	☐	☐
11. My sleep was restless.	☐	☐	☐	☐
12. I was happy.	☐	☐	☐	☐
13. I talked less than usual.	☐	☐	☐	☐
14. I felt lonely.	☐	☐	☐	☐
15. People were unfriendly.	☐	☐	☐	☐
16. I enjoyed life.	☐	☐	☐	☐
17. I had crying spells.	☐	☐	☐	☐
18. I felt sad.	☐	☐	☐	☐
19. I felt that people dislike me.	☐	☐	☐	☐
20. I could not get "going."	☐	☐	☐	☐

Appendix O

BPAQ

Instructions:

Using the 5 point scale shown below, indicate how uncharacteristic or characteristic each of the following statements is in describing you. Place your rating in the box to the right of the statement.

1 = extremely uncharacteristic of me
2 = somewhat uncharacteristic of me
3 = neither uncharacteristic nor characteristic of me
4 = somewhat characteristic of me
5 = extremely characteristic of me

1.	Some of my friends think I am a hothead	☐
2.	If I have to resort to violence to protect my rights, I will.	☐
3.	When people are especially nice to me, I wonder what they want.	☐
4.	I tell my friends openly when I disagree with them.	☐
5.	I have become so mad that I have broken things.	☐
6.	I can't help getting into arguments when people disagree with me.	☐
7.	I wonder why sometimes I feel so bitter about things.	☐
8.	Once in a while, I can't control the urge to strike another person.	☐
9.*	I am an even-tempered person.	☐
10.	I am suspicious of overly friendly strangers.	☐
11.	I have threatened people I know.	☐
12.	I flare up quickly but get over it quickly.	☐
13.	Given enough provocation, I may hit another person.	☐
14.	When people annoy me, I may tell them what I think of them.	☐
15.	I am sometimes eaten up with jealousy.	☐
16.*	I can think of no good reason for ever hitting a person.	☐
17.	At times I feel I have gotten a raw deal out of life.	☐
18.	I have trouble controlling my temper.	☐
19.	When frustrated, I let my irritation show.	☐
20.	I sometimes feel that people are laughing at me behind my back.	☐
21.	I often find myself disagreeing with people.	☐
22.	If somebody hits me, I hit back.	☐
23.	I sometimes feel like a powder keg ready to explode.	☐
24.	Other people always seem to get the breaks.	☐
25.	There are people who pushed me so far that we came to blows.	☐
26.	I know that "friends" talk about me behind my back.	☐
27.	My friends say that I'm somewhat argumentative.	☐
28.	Sometimes I fly off the handle for no good reason.	☐
29.	I get into fights a little more than the average person.	☐

Table 1

Descriptives

		M	*SD*
Benign Score	Hot	13.15	6.83
	Cold	15.75	4.13
Malicious Score	Hot	10.65	5.71
	Cold	7.05	3.97
Perceived Unfairness	Hot	4.40	3.00
	Cold	3.35	3.01

Note. The Benign Score is a composite of items one through three on the Envy Scenario questionnaire. Items one through three are most closely associated with benign envy. The Malicious Score is a composite of items four through six on Envy Scenario questionnaire. Items four through six are most closely associated with malicious envy. Perceived Unfairness is item seven on the Envy Scenario questionnaire. High perceptions of unfairness are closely associated with malicious envy, whereas low perceptions are closely associated with benign envy (van de Ven, Zeelenberg, & Pieters, 2009; see Appendix E).

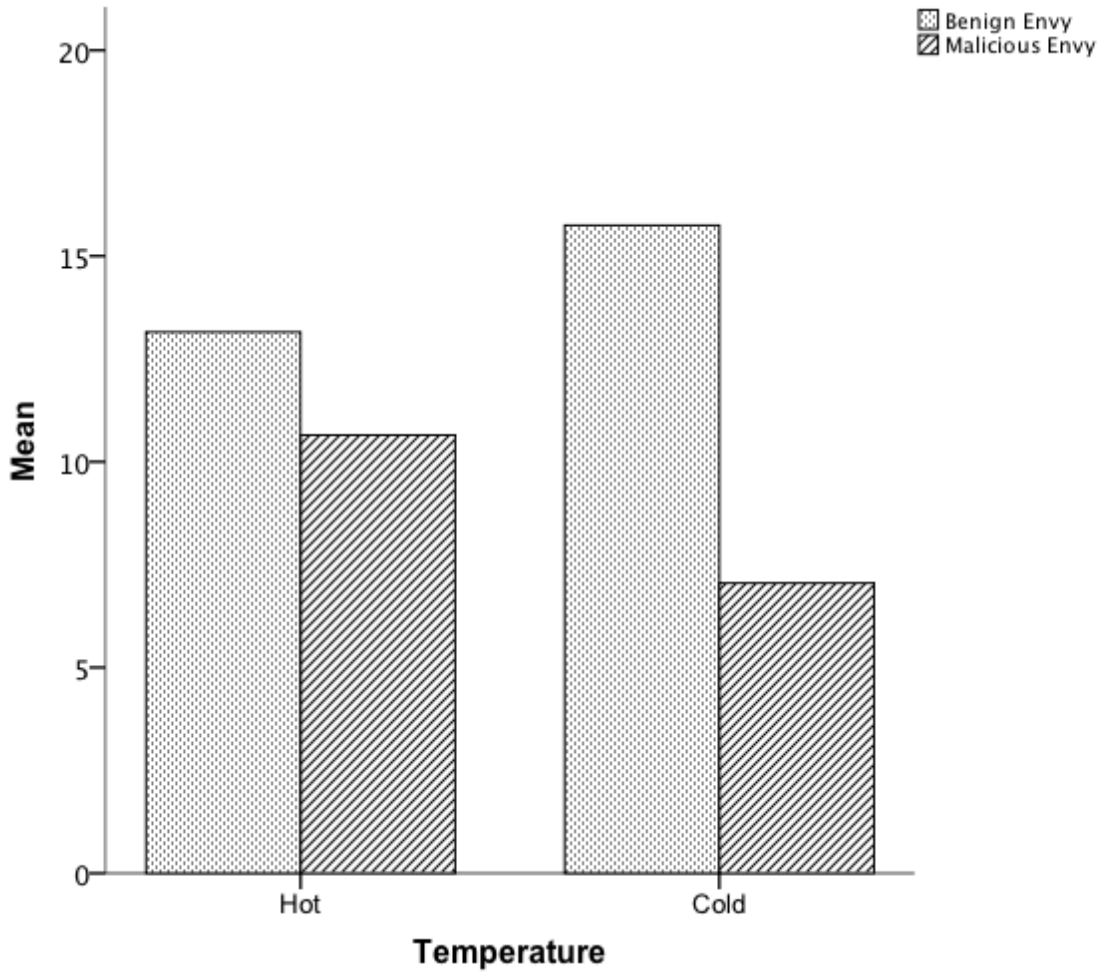


Figure 1. Participants in the hot prime condition exhibited the highest mean malicious scores and the lowest mean benign scores, whereas participants in the cold prime condition exhibited the highest mean benign scores and the lowest mean malicious scores. Neutral prime condition means fell in between those of hot and cold conditions.

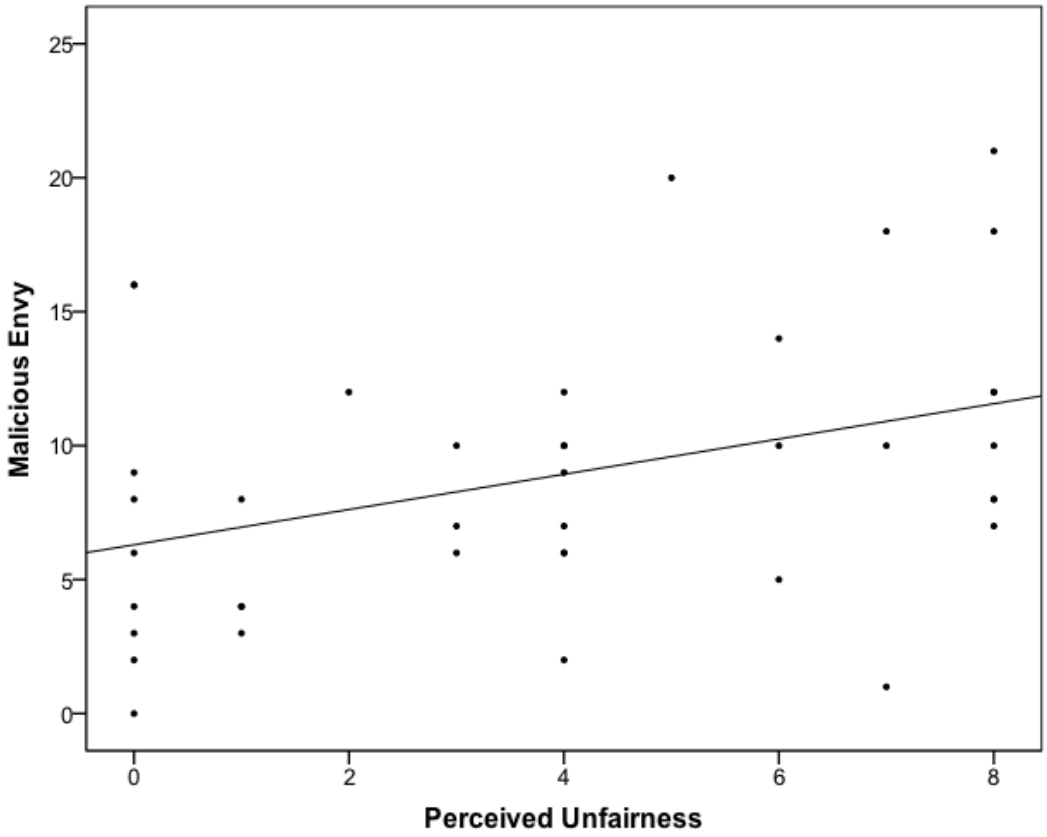


Figure 2. High levels of perceived unfairness are thought to be a central component of malicious envy (van de Ven, Zeelenberg, & Pieters, 2009). In line with this notion, perceived unfairness scores were positively correlated with malicious scores. Participants are depicted individually, along with a line of fit.

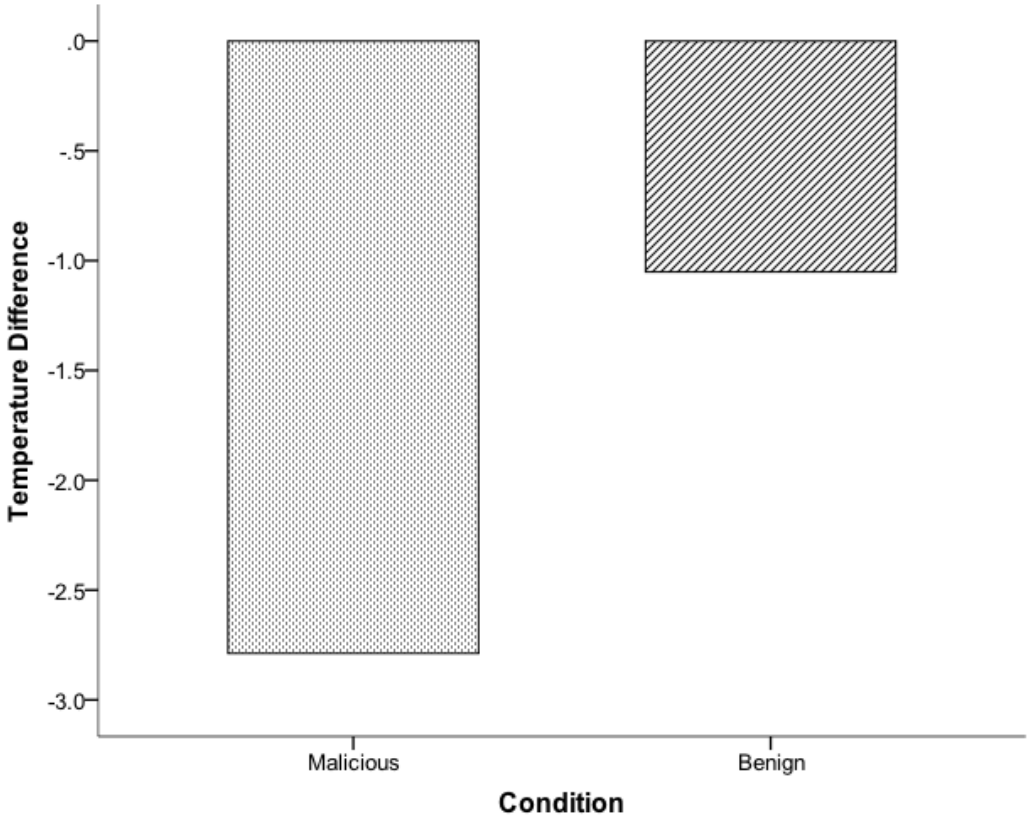


Figure 3. As a means of taking actual ambient temperature in the laboratory into consideration, the ambient temperature measured at the time of each participant's departure was subtracted from his or her respective temperature estimates. Participants in the malicious envy condition estimated significantly lower temperatures relative to the actual temperature than those in the benign envy condition.

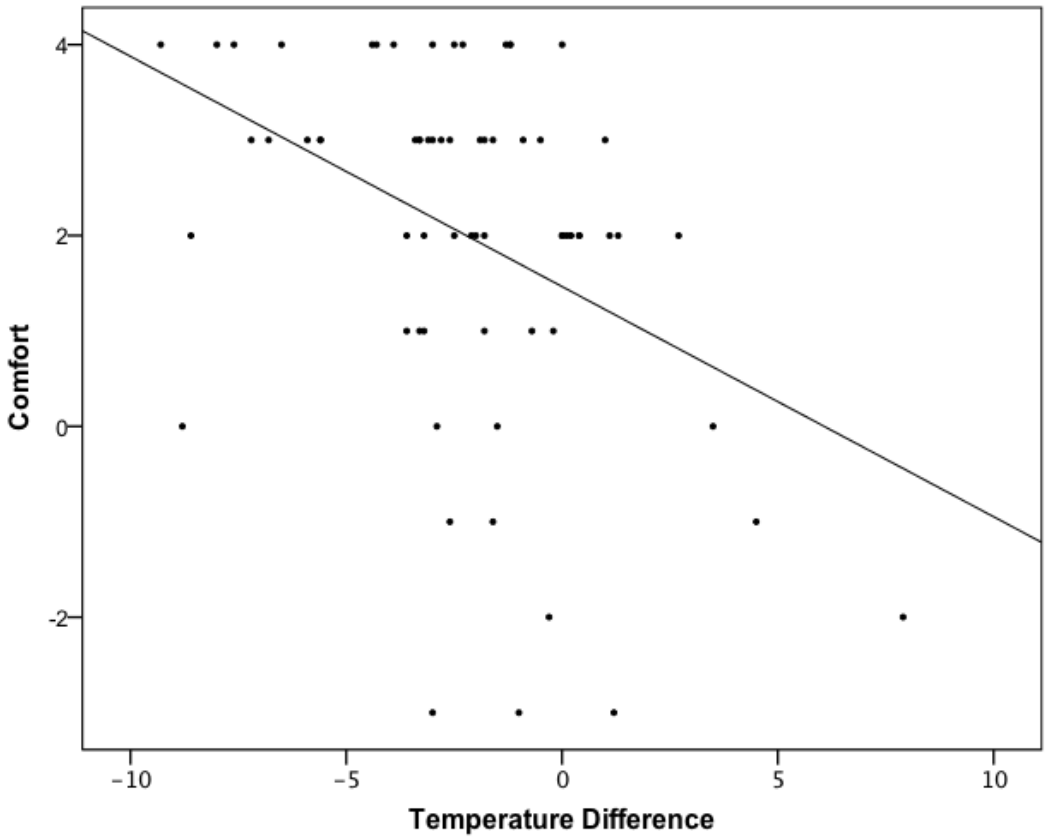


Figure 4. Difference between temperature estimate and actual temperature was negatively related to comfort, indicating that warmer perceptions of the ambient environment during the course of the experiment were characteristically less comfortable.

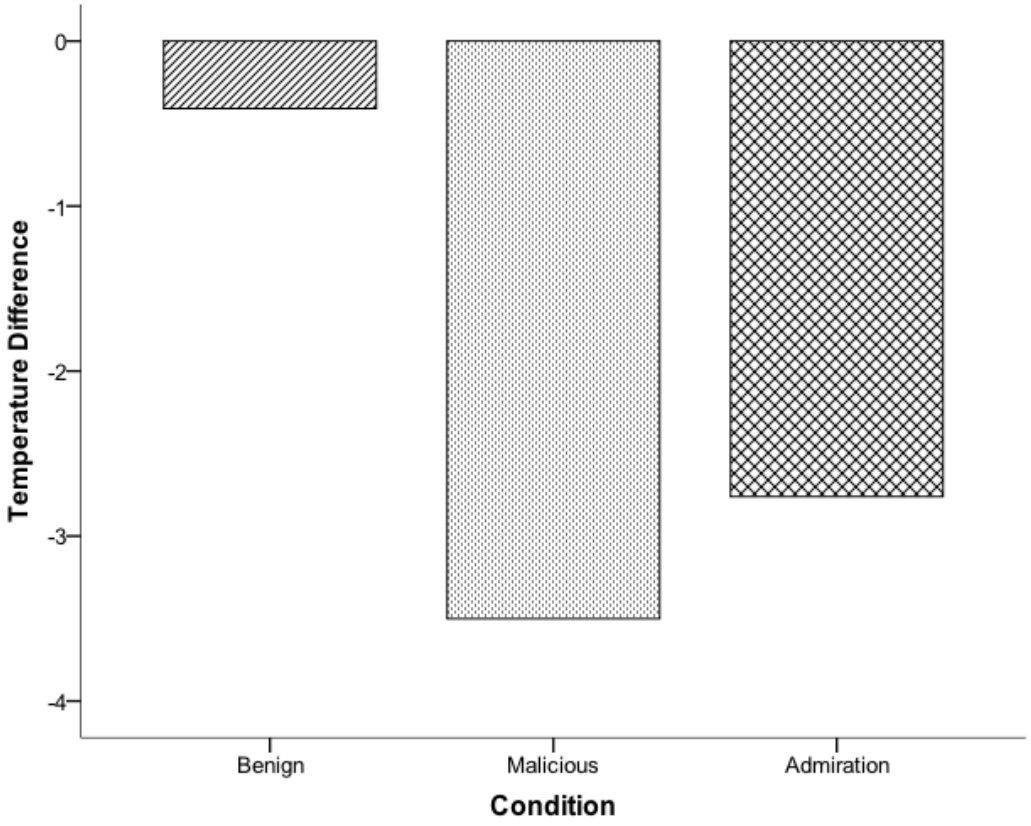


Figure 5. As a means of taking actual ambient temperature in the laboratory into consideration, the ambient temperature measured at the time of each participant's departure was subtracted from his or her respective temperature estimates. Participants in the benign envy condition estimated significantly warmer temperatures relative to the actual temperature than those in the malicious envy and admiration conditions.

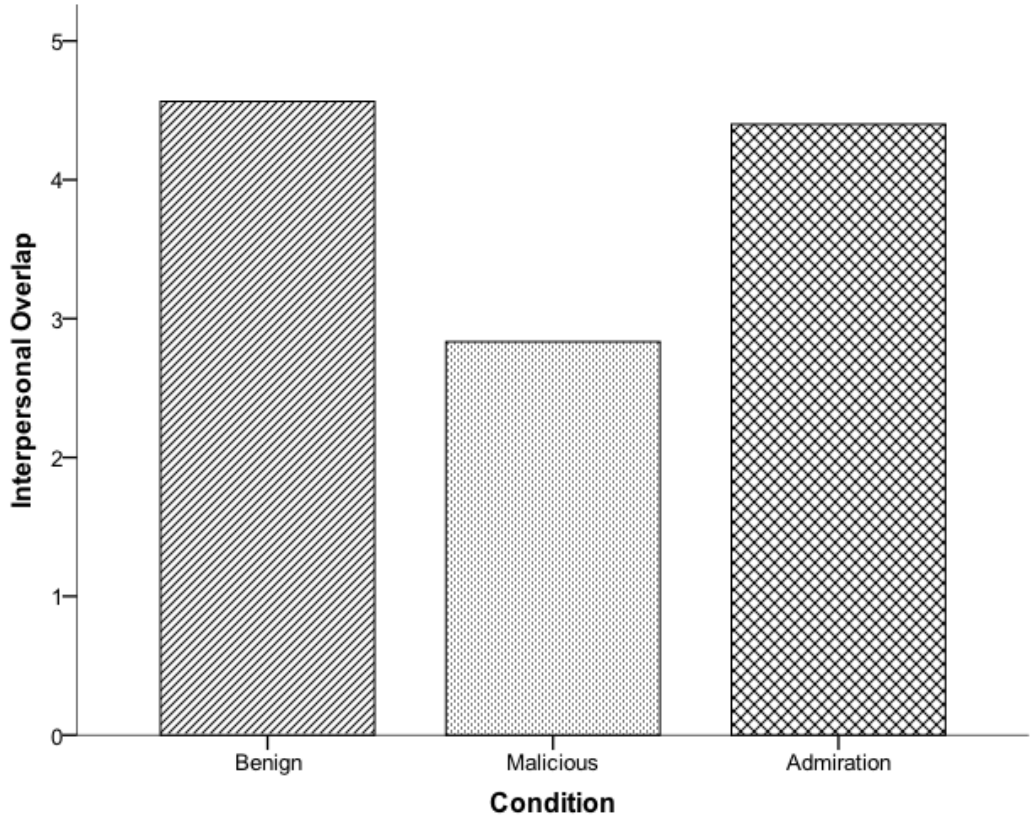


Figure 6. Amount of interpersonal overlap with the envied individual varied between conditions, involving significantly less overlap in the malicious condition than in the benign envy and admiration conditions.