Personality and Social
Psychology Bulletin
XX(X) 1–7

DOI: 10.1177/0146167212442229
http://pspb.sagepub.com

Empathizing With a Dissimilar Other: The Role of Self–Other Distinction in Sympathetic Responding

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Abstract

Can we empathize effectively with someone who has a different sensitivity to physical events from ours? Or, are we susceptible to an egocentric bias in overprojection, which may lead us to under- or overreact in such cases? In this study, participants with normal visual and auditory capacity observed a video clip in which a sighted or blind target was exposed to a strong flash or high-frequency sound, while their physiological arousals during the observation were recorded. On average, participants displayed a differential arousal pattern to the aversive stimuli, according to the target's ability to perceive them. Degrees of arousal control were also correlated with dispositional differences in empathy. Participants who scored higher on the Empathic Concern subscale of Davis's Interpersonal Reactivity Index were better at controlling arousals in accordance with the Target × Stimulus interaction. The authors' findings have important implications for helping disabled people while respecting their inherent dignity and individual autonomy.

Keywords

sympathy, self–other distinction, executive function, physiological arousal, dispositional differences

Received August 31, 2011; revision accepted January 19, 2012

Can we empathize effectively with someone who has a different sensitivity to social/physical events from ours (e.g., disabled people) and provide help that is truly needed by the person? Or when trying to empathize with a dissimilar other, are we susceptible to an egocentric bias to overproject ourselves onto the target, which may lead us to underreact (e.g., fail to help) or overreact (e.g., provide unnecessary or unwanted "help") in such cases? This article reports a psychophysiological experiment to examine our ability to control the egocentric bias when empathizing with a dissimilar other.

Appropriate self–other distinction in empathy is critical to respond to the suffering of another (Batson, 2009). Physicians who oversynchronize with patients cannot provide effective treatments (Cheng et al., 2007); parents who "own" problems of their child often fail to address the child's needs effectively (Gordon, 2000). Stotland (1969) argued that we could employ two different perspectives in these situations—the "imagine self" or the "imagine other" perspective. The "imagine self" perspective implies putting ourselves into the shoes of the target to imagine how *we* would perceive and feel about the situation, while the "imagine other" perspective maintains the self–other distinction to imagine how the situation is perceived and felt by the *target himself or herself*. Batson, Early, and Salvarini (1997) showed that participants who employed the "imagine self" perspective when learning about others' urgent needs exhibited not only empathic concern (EC; other-oriented feelings of sympathy) but also greater personal distress (PD; self-oriented feelings of personal anxiety) than did participants with the "imagine other" perspective. Batson (1991) argued that PD, which promotes self-focused attention, may prevent the observer from fully attending to the target's experience and providing adequate help.

As shown in the ingroup–outgroup research (Turner, Hogg, Oakes, Reicher, & Wetherell, 1987), a self–other distinction may be drawn naturally when we interact with someone "who does not feel like us." Yet somewhat paradoxically, we often have to rely on some kind of self-projection even more when we try to empathize with a dissimilar other than with a similar other (Nickerson, 1999). To illustrate, suppose that we notice a blind person with a white cane who

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appears to be in some distress on a dimly lit, filthy, and crowded subway platform. Even if we may reasonably infer that something about the external situation is causing the distress, we (as nondisabled persons) don't know how the situation is represented by the target. In situations like this, we have to invoke the "imagine self" perspective together with general knowledge about the target's specific condition (e.g., blindness), so as to activate relevant representations and emotions while inhibiting irrelevant ones. This process involves highly cognitive, executive functions, which are considered to be unique to humans and possibly apes (de Waal, 2009; Preston & de Waal, 2002). There are also likely to be substantive individual differences in our ability to execute cognitive control (Cheng et al., 2007; Eisenberg & Eggum, 2009).

To our knowledge, there have been few studies that addressed empathy with a dissimilar other, despite the centrality of this problem in empathy and helping (de Vignemont & Singer, 2006). A recent neuroimaging study by Lamm, Meltzoff, and Decety (2010) is an exception. These researchers used functional magnetic resonance imaging (fMRI) to examine how participants empathize with the feelings of "patients who reacted with no pain to needle injections but with pain to a soft touch by a Q-tip." Results indicated that empathy for the pain of such "dissimilar" patients activated the same brain regions (the pain matrix including insula and anterior cingulate cortex) as did empathy for similar patients who responded to the painful stimuli in the same way as the participants. Most importantly for our concerns, the results also showed that empathy in the situation that was aversive for the observing participants but was ostensibly neutral for the patient (i.e., needle injection) required greater cognitive control and self–other distinction for participants, as indicated by higher neural activities of right inferior frontal cortex and dorsomedial prefrontal cortex. This implies that, to empathize with a dissimilar other effectively, the preexisting emotional response tendencies (e.g., feeling pain from needle injections) must be overcome by cognitive, executive functions (de Vignemont & Singer, 2006; Eisenberg & Eggum, 2009).

This study aims to conceptually replicate and extend the Lamm et al. (2010) experiment in the following ways. First, different from Lamm et al.'s (2010) examination of neural correlates of empathy, we focus on participants' physiological arousals. More specifically, in the following experiment, nondisabled participants observe a video clip in which a sighted (similar) or a blind (dissimilar) target is exposed to a strong flash or high-frequency sound, while changes of blood volume pulse (BVP) in their peripheral blood vessels are recorded (Levenson & Ruef, 1992; Stotland, 1969). BVP reflects acute changes in sympathetic nervous system (SNS) arousal, providing a noninvasive physiological measure of empathy during the video presentation. The focal question is whether participants can differentiate such physiological responses during the video observation in accordance with the Target × Stimulus-Modality interaction, that is, lower arousal in the blind/flash condition as compared with the blind/sound, sighted/flash, and sighted/sound conditions. Second, to highlight the expected role of executive control in overcoming the preexisting emotional response tendency to the aversive stimulus (strong flash), participants in our experiment are provided additional opportunities to experience the aversive stimuli themselves prior to the video presentation. Recent direct experiences of the aversive stimuli are expected to make the cognitive control during the video observation even more challenging than in Lamm et al.'s setup. Third, such cognitive control (including proper self–other distinction) may be a key to responding to the suffering of another with sensitivity and care (Batson, 2009). Eisenberg, Valiente, and Champion (2004) argued that individuals' tendencies to experience sympathy rather than PD (and thus respond according to others' needs rather than their own) may vary as a function of differences in individuals' abilities to regulate their emotions. The following experiment thus focuses on how the degree of cognitive control, as indexed by participants' differential physiological responses to the Target × Stimulus-Modality, may be related to their dispositional differences in empathy (Davis, 1994).

Method

Participants and design. A total of 51 female undergraduate students with normal visual-auditory capacities were recruited from introductory psychology classes at Hokkaido University. They were paid 1,000 yen (about US$12) for participation. We used a 2 (stimulus modality: flash or sound) × 2 (target: blind or sighted) factorial design, in which the first factor was within-participants and the second factor was between-participants.

Experimental task. Participants watched a video clip about scenes from "a previous experiment to examine people's psychophysiological responses to sensory stimuli." In the clip, a female target "participant" (actress) was exposed to strong *flash* or high-frequency *sound*. There were two video versions in which the same actress played either a role of a *blind* person or a role of a *sighted* person. Both versions started with a scene in which the target arrived at the laboratory. In the blind version, the target was carrying a white cane, walking slowly into the laboratory while probing her way by the cane, and so forth, whereas these cues were absent in the sighted version. After being seated, the target was instructed verbally about procedure of the experiment. The target responded to the verbal instructions properly, which established the impression that her *auditory* capacity was intact. After the instructions were finished, the experimenter started a countdown ("5, 4, 3, . . . ") to the onset of the respective stimulus to the target. A photo strobe-light was flashed 20 inches away from the target's face, or high-frequency noise was administered through a headset that she was wearing.[1] The video stopped immediately after onset of the stimulus, and thus viewers did not see the target's reactions to the stimulus.[2] Presentation orders of the flash and the sound scenes were counterbalanced. (No effect involving the stimulus order was significant in the analyses. Thus, the stimulus order will not be highlighted hereafter.) We thus had four video-clip versions in total: the "sighted" or "blind" target received the flash first (second) and the high-frequency sound second (first). One of the four versions was assigned randomly to each participant.

Index of psychophysiological arousal. Activation of the SNS, as observed when one encounters a threatening or aversive stimulus, is known to cause increases in peripheral cardiovascular resistance through constriction of the peripheral blood vessels (Martini, Nath, & Bartholomew, 2011). These effects can be assessed noninvasively by monitoring the amount of blood perfusion in a peripheral region of the body. We therefore recorded the photoplethysmographic BVP in each participant's fingertip using a Biopac TSD200/PPG100C. The recorded data were transformed to BVP amplitude data. Decrease in BVP amplitude from a baseline in response to a stimulus implies peripheral vasoconstriction in the finger and is known to be associated with arousal due to the stimulus (Iani, Gopher, & Lavie, 2004; Salimpoor, Benovoy, Longo, Cooperstock, & Zatorre, 2009). We used rates of constriction in BVP amplitude from the baseline as an index of acute arousal due to observing the target exposed to an aversive stimulus (Allen, 2007).

Procedure. The experiment was run with one participant for each session. Participants were ushered into a soundproof room and were seated in front of a computer monitor at a distance of about 20 inches. Participants were instructed that they would watch a videotape about "a previous psychophysiological experiment" and later be asked questions about the "participant" appearing in the video. They were instructed to imagine the feelings of the target so as to share and evaluate her affective states. Participants were told that their physiological responses while watching the video would be recorded and that their bodily movements would also be videotaped. The finger plethysmograph device was then placed on the third finger of the left hand. The experimenter then left the soundproof room, and all instructions thereafter were given on the computer screen.

Before the video was started, participants were provided opportunities to directly experience the same stimulus that was used in "the previous experiment." The photo strobelight (32GN) was flashed, or the high-frequency noise (about 4000 Hz) was administered briefly through a headset. After the direct experience, participants had a 2-min rest period, which allowed for their BVP amplitudes to return to a normal level (Allen, 2007). Then, the first video scene was started.

These steps (i.e., direct experience of the stimulus, a 2-min rest, followed by the video presentation) were repeated for the second stimulus. After both video scenes were presented, participants answered a brief questionnaire including manipulation checks and a scale for dispositional individual differences in empathy (Interpersonal Reactivity Index [IRI]; Davis, 1983). Participants were then debriefed, paid, and dismissed.

Results

Calculation of the acute arousal index. From the BVP amplitude data, we obtained indices for participant's arousal levels at two points: (a) during the rest period prior to presentation of each video scene (baseline) and (b) during the observation of the target exposed to the flash or sound. For the baseline, we used an average of BVP amplitudes for the last 10 s of the 2-min rest period. For the arousal during observation, we used an average for 10 s after the countdown ("5, 4, 3, . . . ") was started in the video. Because decrease in BVP amplitude from a baseline implies peripheral vasoconstriction in response to a stimulus, we calculated percentage constriction from the baseline (= 100 × [1 − the average amplitude during observation/the baseline amplitude]) as an index of acute arousal. A larger value implies higher physiological arousal due to observing the target exposed to the aversive stimulus.

Acute arousal in response to the observed events. To verify that the flash and sound stimuli were in fact arousing, we checked participants' average BVP amplitudes during 10 s after they *directly* experienced each stimulus. Mean percentage constriction in BVP amplitude from the baseline was 33% for the flash and 41% for the sound, both of which were significantly greater than zero at $p < .001$ by Wilcoxon signed-rank test. A 2 (stimulus modality) × 2 (target) repeated-measure ANOVA on the percentage BVP constriction (after logarithmic transformation to correct skewness of the distribution) yielded a significant main effect for the stimulus modality, $F(1, 49) = 4.61$, $p < .05$. No other effects were significant. It was thus confirmed that, when directly experienced, both stimuli were physiologically arousing, more so for the sound ($M = 41\%$) than for the flash ($M = 33\%$) in the current experiment.

How did participants react when they observed the target exposed to the same sensory stimulus? If participants who had normal visual-auditory capacities overprojected themselves in the scenes, they should be aroused irrespective of the target's characteristics in relation to the sensory stimulus. Figure 1 displays mean percentage constriction in BVP amplitude from the baseline when participants observed the target exposed to the flash or the sound.

A 2 × 2 repeated-measure ANOVA on the percentage BVP constriction (after logarithmic transformation) yielded a main effect for the stimulus, $F(1, 49) = 4.20$, $p < .05$; a main effect for the target was also marginally significant, $F(1, 49) = 3.28$, $p = .08$. However, these main effects were qualified by a Stimulus-Modality × Target Interaction, $F(1, 49) = 5.35$, $p < .05$. As seen in Figure 1, the mean percentage constriction was significantly greater than zero in the sighted/flash, sighted/sound, and blind/sound conditions (all ps $< .05$ by Wilcoxon

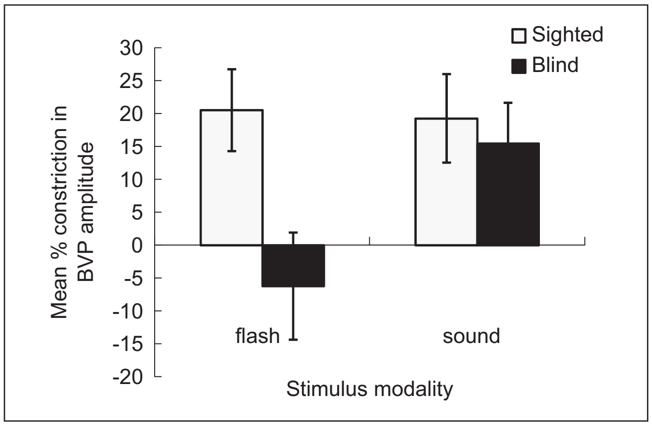

Figure 1. Acute arousal in response to the observed events.
Note: BVP = blood volume pulse.

Table 1. Spearman Rank Correlation Coefficients Between Participants' Acute Physiological Arousal (Percentage Constriction in BVP Amplitude) in Response to Observing the Blind Target Exposed to the Flash, and Their Scores on Four Subscales of Davis's (1983) IRI

	BVP	PT	EC	PD	FS
Physiological arousal (BVP)	—				
Perspective taking (PT)	.03	—			
Empathic concern (EC)	$-.43^{**}$	.17	—		
Personal distress (PD)	.19	−.08	.11	—	
Fantasy (FS)	$-.40^{*}$	.00	$.41^{**}$	.06	—

Note: $N = 25$.
$^{*}p < .10$. $^{**}p < .05$.
Davis (1983) defined the four components of IRI as follows: perspective taking (PT) as the tendency to spontaneously adopt the psychological view of others, empathic concern (EC) as "other-oriented" feelings of sympathy and concern for unfortunate others, personal distress (PD) as "self-oriented" feelings of personal anxiety and unease in tense interpersonal settings, and fantasy (FS) as the tendency to imaginatively transpose oneself into the feelings and actions of fictitious characters in books, movies, and plays.

signed-rank test), but not in the blind/flash condition. Participants who observed the blind target exposed to the flash showed no increase in peripheral vasoconstriction from the baseline.[3] The overall interaction suggests that average participants controlled the egocentric self-projection bias (Batson, 2009), accommodating their perspectives to the target's characteristics in relation to the sensory stimulus.[4]

The self–other distinction and dispositional differences in empathy. The self–other distinction in perspective taking as implicated above has been considered to be a key component that can facilitate appropriate helping behavior in a stressful situation. Batson et al. (1997) argued that confusion between self and other induces not only EC (other-oriented feelings of sympathy or compassion) but also PD (an aversive, self-focused emotional reaction), which may preclude sympathetic action to help the target (Lamm, Batson, & Decety, 2007). Given these points, it is important to examine how participants' dispositional empathy related to their physiological responses. Although average participants were able to control the egocentric self-projection bias in the blind/flash condition (see Figure 1), their degree of control in the focal condition may differ in relation to their dispositional empathy (Eisenberg & Eggum, 2009).

As a measure for dispositional differences in empathy, we used Davis's (1983) IRI. Table 1 shows Spearman rank correlation coefficients between participants' acute physiological arousals in response to observing the *blind* target exposed to the *flash*, and their scores on four subscales of the IRI (see Table 1 for explanations of the subscales). Mean scores and standard deviations of the IRI subscales were within published normative values. The observed correlation pattern among the four subscales was also comparable with that reported in Davis (1983). Of particular interest here is that participants' acute arousals (BVP) were *negatively* correlated with their scores on the EC subscale, $\rho = -.43$, $p < .05$, which implies that participants who reported experiencing "other-oriented" feelings of sympathy for unfortunate others more often in everyday life were aroused *less* when observing the blind target exposed to the flash (a negative correlation with the Fantasy subscale [FS] was also marginally significant, $\rho = -.40$, $p = .054$).

To examine this relationship further, we split participants in the blind condition by the median, those who scored higher ($n = 13$) or lower ($n = 12$) on the EC subscale. Figure 2 displays mean percentage constriction in BVP amplitude when these participants observed the *blind* target exposed to each of the stimuli. A 2 (EC: high or low) × 2 (stimulus: flash or sound) repeated-measure ANOVA on the percentage BVP constriction (after logarithmic transformation) yielded a significant interaction effect, $F(1, 23) = 4.26$, $p < .05$, and a main effect for the stimulus, $F(1, 23) = 6.32$, $p < .05$. As seen in Figure 2, participants who scored higher on the EC subscale showed differential arousal levels between the flash and the sound conditions ($p < .01$), whereas the lower scoring participants' responses in the two conditions were both positive and indistinguishable.[5] In other words, participants who reported experiencing feelings of sympathy for unfortunate others more often in everyday life seem to have controlled the egocentric bias better, accommodating to the blind target's perspective more closely (Eisenberg & Eggum, 2009).[6]

Discussion

Empathizing with others who are not like us is of central importance in modern societies in which people who have diverse opinions, who belong to different age cohorts with different needs, and who have different ethnicities and socioeconomic backgrounds live together. This study examined our ability to control the egocentric self-projection bias when empathizing with a dissimilar target, whose sensitivities to sensory stimuli were different from our own.

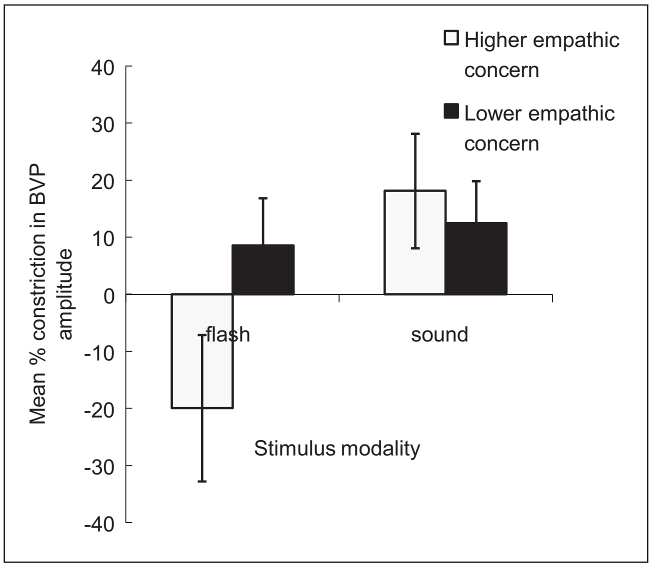

Figure 2. Dispositional empathic concern and acute arousal when observing the blind target exposed to the flash or the high-frequency sound.
Note: BVP = blood volume pulse.

The results replicated Lamm et al.'s (2010) findings conceptually, revealing that average participants with normal visual-auditory capacity reacted to the aversive situations differentially, in accordance with the Target × Stimulus-Modality interaction (Figure 1). It should be noted that, besides the difference in measures (neurological or physiological), there were two modifications in our procedure that could make executive control of emotions even more challenging than in Lamm et al. (2010). First, participants in our study were provided opportunities to directly experience the aversive stimuli prior to the observation phase, whereas no such opportunity was provided in Lamm et al. (2010). The preceding direct experience could make the stimulus-response association more salient in memory and make it even harder for participants to overcome the preexisting emotional response tendency during observation. Second, in Lamm et al. (2010), the target's key dissimilarity was highlighted by instructions ("patients suffering from a rare neurological disease who feels no pain when being pricked by a needle"). In our setting, the dissimilar features were embedded seamlessly in a sequence of the target's actions (e.g., entering the laboratory slowly while carrying a white cane), and participants were not prompted to make the self–other distinction explicitly on specific dimensions. It is thus notable that, despite these procedural changes, average participants were still able to control the self-projection bias (Batson, 1991; Nickerson, 1999) and accommodate their reactions to the target's characteristics in relation to the sensory stimulus.

The results also revealed that degrees of control over emotional responses were correlated with dispositional differences in empathy (Table 1). In particular, participants who scored higher on the EC subscale of the IRI showed differential levels of physiological arousal in response to whether the blind target was exposed to flash or to sound, whereas those who scored lower were equally aroused by both scenes (Figure 2). It has been demonstrated that individuals who can regulate their emotions are more likely to experience sympathy and interact with others in morally desirable manners (Eisenberg et al., 1994; Ochsner & Gross, 2005). Eisenberg and Eggum (2009) argued that well-regulated people who have control over their ability to focus and shift attention are prone to sympathy by maintaining an optimal level of emotional arousal, whereas people who are easily aroused and unable to regulate their emotions are low in dispositional sympathy and prone to PD. These arguments are in line with our results that participants, who reported experiencing sympathy (EC) more often in everyday life, were actually better at controlling physiological arousals in accordance with the Target × Situation interaction (see also an fMRI study by Spinella, 2005, for related results). Yet, it should also be noted that correlations between participants' PD scores and their arousals in the blind/flash condition failed to reach significance, although the direction was positive as in Eisenberg's argument (ρ = .19, Table 1). Decety and Lamm (2009) pointed that scores on the PD subscale of the IRI tend to yield no significant correlations with brain activations. Although our experiment measured physiological responses, this point may be relevant. Also, given the self-reporting nature, results based on the questionnaire measures should generally be treated with some caution. A future study that combines field observations of empathic behavior by event-sampling (Reis & Gable, 2000) with laboratory measurements of physiological and neurological responses will be useful to better understand how individual dispositions in empathy modulate self- versus other-centered responding in stressful situations.

As exemplified by skilled physicians and other professional caretakers, making appropriate self–other distinctions is essential to responding appropriately to the suffering of another. Empathy with dissimilar others provides a rich context in which the key theoretical issues about empathy, including how the self–other distinction is maintained and how emotions are regulated by executive functions (Batson, 2009; Decety & Lamm, 2009), can be assessed in a crystallized manner. It also provides an ecologically valid context, as many important helping situations require understanding others whose physical or mental conditions are different from our own. It is critical in such situations to provide necessary help while respecting the inherent dignity and individual autonomy of those in need, and empathy plays a fundamental role in this process.

Acknowledgments

We are grateful to Thomas Wisdom and Seth Frey for their helpful comments on an earlier version of this manuscript.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This study was supported by the Grant-in-Aid for Scientific Research 17330133 from the Ministry of Education, Culture, Sports, Science and Technology of Japan to the first author.

Notes

1. Notice that neither of the stimuli was objectively as strong to viewers as to the ("sighted") target in the video clip. When viewers watched the video, the flash light was moderated by computer monitor with normal brightness. The high-frequency sound was administered to the target via the headset that she was wearing, and was not actually heard by viewers.
2. We followed Lamm et al.'s (2010) procedure in our choice not to provide opportunities for participants to observe overt affective displays of the target. Previous research has shown that empathic responses can be generated in the absence of direct perception of the target's emotional responses. See Decety and Lamm (2009) for elaborated discussions on this point.
3. To control for potential individual differences in sensitivity/reactivity to the aversive stimuli, we also conducted an analysis in which participants' blood volume pulse (BVP) constriction during their own experiences were used as covariates. Consistent with the results reported in the main text, a 2 × 2 repeated ANOVA on residuals, whereby effects from the covariates were partialled out, yielded a significant Stimulus-Modality × Target interaction effect, $F(1, 49) = 5.19$, $p < .05$.
4. An obvious strategy to regulate emotion in the aversive situations is closing the eyes or averting the gaze from the screen. However, analysis of the videotape that recorded participants' facial movements during the critical observation period indicated that this strategy was almost never used.
5. However, in the *sighted* condition where cognitive control was not especially important, this interaction pattern was not observed. Both higher and lower scoring participants were aroused by the flash or the sound stimulus indistinguishably, in accordance with the overall pattern as shown in Figure 1; the Empathic Concern (EC) × Stimulus interaction effect was not significant, $F(1, 24) = 0.52$, *ns*. These statistical results are unchanged if we retain the EC score as a continuous variable in the analysis. The EC (continuous) × Stimulus interaction effect was significant in the blind condition, $F(1, 23) = 4.35$, $p = .05$, but not in the sighted condition, $F(1, 24) = 2.00$, *ns*.
6. Participants' EC scores were not significantly related to their physiological responses when experiencing the aversive stimuli themselves. Spearman rank correlations coefficients between the EC score and the BVP constriction during the direct experience were $\rho = .15$, *ns*, for the flash, and $\rho = .08$, *ns*, for the sound ($n = 51$). Thus, the moderating effect of the dispositional differences (EC) is unlikely to be attributable to individual differences in sensitivity/reactivity to the aversive stimuli per se.

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