UC Merced

Proceedings of the Annual Meeting of the Cognitive Science Society

Title

How Empathy Promotes Socially Adaptive Behaviors in Interpersonal Conflicts?: An Exploratory Study on the Role of Intention Inference

Permalink

https://escholarship.org/uc/item/7qt9x244

Journal

Proceedings of the Annual Meeting of the Cognitive Science Society, 47(0)

Authors

Lee, Inju

Hahn, Sowon

Publication Date

2025

Copyright Information

This work is made available under the terms of a Creative Commons Attribution License, available at https://creativecommons.org/licenses/by/4.0/

Peer reviewed

eScholarship.org Powered by the California Digital Library
University of California

How Empathy Promotes Socially Adaptive Behaviors in Interpersonal Conflicts?: An Exploratory Study on the Role of Intention Inference

Inju Lee (ijlee37@snu.ac.kr)
Department of Psychology, Seoul National University
1, Gwanak-ro, Gwanak-gu, Seoul, 08826 Republic of Korea

Sowon Hahn (swhahn@snu.ac.kr)
Department of Psychology, Seoul National University
1, Gwanak-ro, Gwanak-gu, Seoul, 08826 Republic of Korea

Abstract

In interpersonal conflicts, empathy fosters socially adaptive behaviors that facilitate reconciliation, such as offering comprehensive and non-defensive apologies. Perceivers adjust their behaviors based on inferences about the intentions of social targets during social interactions. How do these inferences relate to perceivers' empathy and shape their adaptive behaviors in conflicts? This study examined two aspects of intention inference: inference accuracy (how accurately perceivers infer targets' intentions) and target-oriented inference (how much perceivers focus on targets' states). We investigated whether these inferences link the relationship between empathy and adaptive behaviors. Our results showed that empathetic perceivers focused more on targets' states when inferring their intentions, which was associated with offering more comprehensive apologies. Inference accuracy, however, did not influence the relationship between empathy and either the provision of comprehensive apologies or the reduction of defensive responses. Our study underscores the importance of considering others' states in promoting adaptive behaviors during interpersonal conflicts.

Keywords: empathy; adaptive behavior; intention inference; interpersonal conflict

Introduction

Individuals interact with a variety of people in their lives, including family members, friends, and colleagues. They sometimes encounter conflicts with other people, which carries the risk of damaging their relationships. Successfully resolving conflicts by responding in socially adaptive ways is a key to reconciliation and the maintenance of good relationships. Sincere apologies are particularly effective in resolving interpersonal conflicts, as they convey one's sincere effort in reflecting on their wrongdoing (Schumann, 2014) and encourage forgiveness (Kirchhoff, Wagner, & Strack, 2012).

Adaptive behaviors in social interactions are often facilitated by empathy. Empathy is a multifaceted construct that includes perceivers' understanding of the mental states of social targets (*cognitive empathy*), sharing their emotions (*affective empathy*), and experiencing care and concern for them (*compassion*) (Weisz & Cikara, 2021). Extensive literature has demonstrated the positive relationship between empathy and prosocial behavior in diverse contexts (e.g., Batson, 1991; Batson, Eklund, Chermok, Hoyt, & Ortiz, 2007; Eisenberg & Miller, 1987; Longmire & Harrison, 2018). In line with this, several studies indicate that empathy is also associated with adaptive responses in interpersonal conflicts. For example, De Wied, Branje, and Meeus (2007) found that individuals with high dispositional empathy use more effective strategies for managing interpersonal conflicts. Schumann and Dragotta (2021) also revealed that people provided more constructive responses (i.e., more comprehensive apologies and fewer defenses) to others in conflicts, when they felt greater empathy.

How does empathy contribute to adaptive behaviors? The existing literature offers two explanations (Batson et al., 1991; Batson, 2012). The first approach suggests that perceivers engage in helping behaviors as a way to alleviate their own negative feelings, which arise from internalizing the suffering of targets (Batson, Fultz, & Schoenrade, 1987). Another approach suggests that feelings of care and compassion motivate perceivers to act prosocially (Batson, O'Quin, Fultz, Vanderplas, & Isen, 1983; Dovidio, Allen, & Schroeder, 1990; Klimecki, Sander, & Vuilleumier, 2018). These explanations highlight the affective and motivational aspects of the relationship between empathy and adaptive behaviors.

The focus of this study is the cognitive component of the link between empathy and adaptive behavior: inferences about the intentions of social targets. In social interactions, the emotional expressions of social targets function as information that reflects their inner states, including their intentions, and perceivers infer this information and adjust their behaviors accordingly (Van Kleef, 2009). In line with this approach, Shuman, Clark-Polner, Meuleman, Sander, and Scherer (2017) found that people can reliably interpret the information that others intend to convey through their emotional expressions. As empathy is associated with focusing on others' inner states (Cuff, Brown, Taylor, & Howat, 2016), how perceivers infer targets' intentions from their emotional expressions might differ depending on their level of empathy, which in turn influences how they respond to the targets.

One aspect of intention inference that can vary with the perceiver's level of empathy and shape their behaviors is inference accuracy. Accurate inferences are closely related to cognitive empathy, which refers to the ability to understand and infer targets' mental states (Blair, 2005). Furthermore, research shows the link between accurate inference of others' mental states and prosocial behaviors. Lehmann, Böckler, Klimecki, Müller-Liebmann, and Kanske (2022) found that when people correctly mentalized the others' states, they were more willing to help them. Similarly, accurate inference of others' feelings was related to helping behaviors (Eckland, Huang, & Berenbaum, 2020).

In D. Barner, N.R. Bramley, A. Ruggeri and C.M. Walker (Eds.), *Proceedings of the 47th Annual Conference of the Cognitive Science Society* ©2025 the author(s). This work is licensed under a Creative Commons Attribution 4.0 International License (CC BY).

Another aspect of intention inference to be considered is whether perceivers focus on targets' states, the target-oriented inference. When interpreting targets' intentions from their emotional expressions, perceivers can focus on what the targets are feeling and the situations the targets are in (target-oriented), or alternatively, they can focus on how the target perceives them or what the targets are asking them to do (self-oriented). Focusing on others' states is a crucial component of engaging in adaptive behaviors. Compassion, which is strongly associated with prosocial behaviors (DeSteno, 2015; Longmire & Harrison, 2018), refers to a tendency to exhibit greater attention and concern for others (Davis, 1983; Goetz, Keltner, & Simon-Thomas, 2010). Yaden et al. (2024) also found that compassionate people more frequently used other-focused language, reflecting their heightened attention toward others, and engaged more often in helping behaviors.

In the present study, we aimed to explore whether intention inference from targets' emotional expressions varies depending on the perceivers' level of empathy and whether the differences in the inference are related to the perceivers' engagement of adaptive behaviors. We first investigated the relationship between dispositional empathy and adaptive behaviors. In our study, based on previous research (Schumann & Dragotta, 2021; Schumann & Orehek, 2019), adaptive behaviors represent the provision of sincere apologies in interpersonal conflicts—specifically, responses that include comprehensive apologies (i.e., those with more apology elements) without defenses. Responses including more comprehensive apologies and fewer defenses are considered more adaptive. We hypothesized that perceivers with high dispositional empathy provide more comprehensive apologies and fewer defenses.

Hypothesis 1-1. Perceivers with high dispositional empathy provide targets with responses containing more comprehensive apologies.

Hypothesis 1-2. Perceivers with high dispositional empathy provide targets with responses containing fewer defenses.

We then explored whether empathy is linked to adaptive behaviors through inference accuracy and target-oriented inference. Specifically, we examined whether accurately inferring targets' intentions varies with one's level of empathy and whether these differences are associated with engaging in adaptive behaviors. Inference accuracy represents the degree of similarity between the actual targets' intentions and the intentions inferred by perceivers.

Hypothesis 2-1. The relationship between empathy and apology comprehensiveness is mediated by inference accuracy.

Hypothesis 2-2. The relationship between empathy and defensiveness is mediated by inference accuracy.

We also investigated whether empathy is related to adaptive behaviors through target-oriented inference. Target-oriented inference indicates the extent to which perceivers focus on targets' states when inferring their intentions. To measure this, we adopted a text analysis approach, as individuals' language can reflect their psychological experiences, including the focus of their attention (Mihalcea, Biester, Boyd, et al., 2024; Tausczik & Pennebaker, 2009). Accordingly, target-oriented inference is defined as the number of words describing targets' states that perceivers use when inferring the targets' intentions. We hypothesized that target-oriented inference mediates the relationship between empathy and adaptive behaviors.

Hypothesis 3-1. The relationship between empathy and apology comprehensiveness is mediated by target-oriented inference.

Hypothesis 3-2. The relationship between empathy and defensiveness is mediated by target-oriented inference.

Method

Experimental Procedure

Adapting Icke's paradigm (Ickes, Stinson, Bissonnette, & Garcia, 1990), which is widely used for measuring empathic accuracy (i.e., the accurate inference for others' feelings), our experiment comprised two phases, which were the target phase and the perceiver phase. Figure 1 shows the overall procedure of our experiment. The experimental procedure was approved by our university's institutional review board (IRB No. 2311/002-029).

The Target Phase We only included emotionally expressive individuals as targets in our study to control for the potential confounding effects of their expressivity on perceivers' inferences (Zaki, Bolger, & Ochsner, 2008). Participants were recruited from a local university and a local online community. In the pre-screening phase, participants completed the Emotional Expressivity Scale (Kring, Smith, & Neale, 1994), of which 10 participants who scored 68 and above (half of the scale's maximum score) were selected as the target group. The targets received monetary compensation (8 female; M_{age} = 27.5, SD_{age} = 5.4, range = 23 – 38).

In the main experiment, the targets recalled two emotional events in which another person caused them to experience negative emotions. They recounted these events as if speaking directly to that person, which was videotaped. Afterward, the targets watched their videos and paused them whenever they experienced specific emotions. They reported their intentions at the moment, especially the messages they intended to convey. After reporting, they resumed watching the videos and repeated this task until the videos ended. Incomplete responses and unsuitable emotional events (e.g., events related to sensitive issues) were excluded. Consequently, five emotional events from five participants were selected as stimuli for the perceiver phase (3 female; M_{age} = 26, SD_{age} = 3.5, range = 23 – 32).

Three emotional events included a single reported target intention, while two events included two reported target intentions. The events concerned conflicts with friends, a romantic partner, and a colleague.

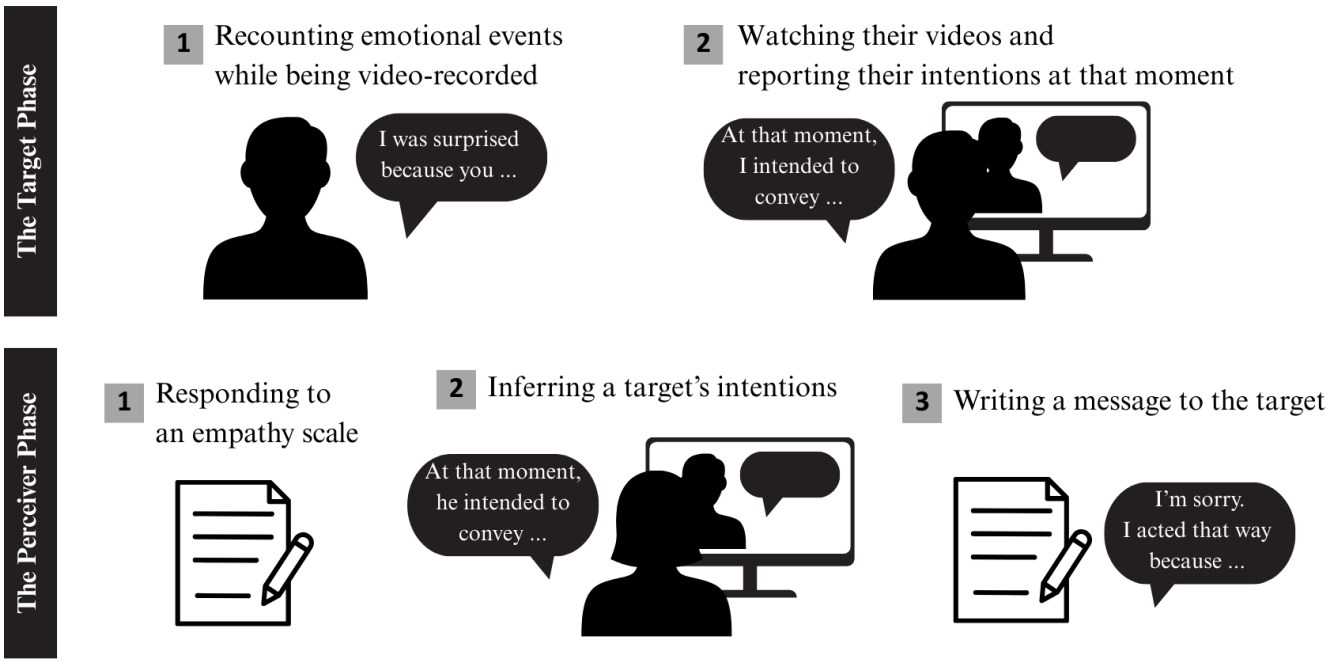


Figure 1: Overall Experimental Procedure

The Perceiver Phase For the perceiver group, 94 independent participants were recruited from a local university and were compensated with either course credits or monetary payment for their participation. Three participants were excluded due to incomplete data, resulting in a final sample of 91 individuals (56 female; M_{age} = 22.4, SD_{age} = 4.4, range = 18 – 47). Post-hoc power analyses conducted at $\alpha = .05$ showed that the current study had 95% power to detect medium effects ($f^2 = 0.15$) and 79% power to detect small-to-medium effects ($f^2 = 0.085$).

During the experiment, the perceivers first completed an empathy scale that included the perspective-taking and compassion subscales from the Interpersonal Reactivity Index (IRI; Davis, 1983) and the empathy subscale from the Empathy Index (Jordan, Amir, & Bloom, 2016). These subscales measured cognitive empathy, compassion, and affective empathy, respectively, and the perceivers answered the items using a 5-point Likert scale. Subsequently, the perceivers were asked to watch the five targets' videos while imagining that the targets were talking directly to them. The order of videos was randomized for each perceiver. The videos paused at the points when the targets reported their intentions, and the perceivers inferred the messages the targets intended to convey. After each video ended, they wrote a message to each target while imagining themselves as the person the target was speaking to.

Inference Accuracy

Inference accuracy was calculated by adapting Icke's guidelines for assessing empathic accuracy (Ickes, 2001). Two trained raters evaluated the degree of similarity between the targets' reported intention and the perceivers' inferred intention using a scale from 0 to 2. A score of 0 refers to *fundamentally different content*, where the perceiver's inference did not reflect the core content of the target's report at all. A score of 1 refers to *similar but not identical content*, where the perceiver's inference included content similar to the core aspects of the target's report, or included the core content of the target's report but did not capture its nuance. Lastly, a score of 2 refers to *fundamentally identical contents*, where the perceiver's inference reflected both the core content and the nuance of the target's report. The Cronbach's α score for inter-rater reliability was .97, indicating excellent agreement. The average score from the two raters was used as the inference accuracy score. For the emotional events where the targets reported their intentions at multiple points, the intention accuracy was calculated by averaging the accuracy scores across all points.

Target-Oriented Inference

To evaluate the target-orientedness of the perceivers' inferences, we counted the number of words reflecting the targets' states. The analysis involved three phases: (1) constructing a dictionary of target state words for our data, (2) automatically counting target state words, and (3) manually refining the result from automated counting. We utilized a custom dictionary, as no validated Korean text analysis tool—such as LIWC (Linguistic Inquiry and Word Count; Pennebaker, Boyd, Jordan, & Blackburn, 2015) in English—was available at the time of our research, and we aimed to capture target state words specific to our experimental stimuli, including those reflecting the unique situations of the targets.

In the first phase, we first tokenized the perceivers' inference texts using a Korean tokenizer, *Mecab*. We constructed

a set of tokens in which part-of-speech tags were nouns, adnominals, verbs, adjectives, and adverbs. From this set, we selected tokens that reflected the targets' states and included them in our target state dictionary. The tokens comprised two types of target states, which were the targets' emotions and situations. Examples of the target emotion words included "*feel*," "*mood*," "*bad*," "*angry*," "*sad*," "*embarrassed*," and "*hurt*," while examples of the target situation words included "*situation*," "*part-time*," "*exam*," and "*transfer*." In the second phase, we used the same tokenizer to tokenize each inference text and automatically counted the frequency of tokens from the target state word dictionary. Finally, in the third phase, the automated counts were reviewed and manually refined to correct any miscounting or omissions, ensuring the accuracy of the results. The number of target-state words in each inference indicated its target-orientedness. For the emotional events with multiple target intentions, the target-orientedness of inferences was calculated by averaging the target-orientedness of each intention inference.

Perceiver's Message

We evaluated the adaptability of the perceivers' messages to the targets along two dimensions—apology comprehensiveness and defensiveness. Each dimension represents the extent to which apology elements and defensive strategies were used, respectively, in the messages. Based on previous research (Schumann & Dragotta, 2021; Schumann & Orehek, 2019), two trained raters counted the presence of eight apology elements (*remorse, acceptance of responsibility, repair, explanation, forbearance, acknowledgment of harm, admission of wrongdoing, request for forgiveness*) and four defensive strategies (*justification, victim blaming, excuse, denial*) for each perceiver's message. The average Cohen's kappa score for inter-rater reliability was .82, indicating excellent agreement. Discrepancies between raters were resolved through discussion. For each message, apology comprehensiveness was calculated by summing the number of apology elements, and defensiveness was calculated by summing the number of defensive strategies.

Analyses

We first performed linear regression analyses to investigate whether empathy levels are related to adaptive behaviors, specifically apology comprehensiveness and defensiveness. We then conducted linear regression analyses and bootstrapped causal mediation analyses with 5,000 samples to examine whether the relationships are mediated by intention inferences. In these analyses, the total scores of each variable across five emotional events, except for dispositional empathy, were used. For a more thorough examination, we further analyzed the relationship between intention inference and adaptive behavior at the level of each emotional event using linear mixed-effects models. For each model, either inference accuracy or target-oriented inference was included as the fixed effect, and the participants were included as the random effect. The intercept was allowed to vary randomly across participants. We employed bootstrapped linear mixed-effect models with 5,000 samples when the normality assumption was violated. The *lm*, *mediation*, and *lme4* packages in *R* were used for the analyses. The descriptive statistics and correlations are presented in Table 1.

Table 1: Descriptive Statistics and Correlations

	1	2	3	4	5
1. Emp	-				
2. ApCom	.33**	-			
3. Def	-.26*	-.40***	-		
4. InfAcc	.15	.18	-.18	-	
5. TarInf	.21*	.33**	-.18	.20	-
M	69.5	14.3	0.7	2.4	3.6
SD	12.4	5.9	1.1	1.3	2.2

$*p < .05, **p < .01, ***p < .001$; *Emp*: Dispositional Empathy, *ApCom*: Apology Comprehensiveness, *Def*: Defensiveness, *InfAcc*: Inference Accuracy, *TarInf*: Target-Oriented Inference. Except for Emp, each variable represents the total score across five emotional events.

Results

Empathy and Adaptive Behavior

Empathy was positively related to adaptive behavior. Dispositional empathy was positively associated with apology comprehensiveness ($\beta = 0.32, SE = 0.10, t(89) = 3.25, p = .002$, 95% CI = [0.12, 0.51]), but negatively with defensiveness ($\beta = -0.25, SE = 0.10, t(89) = -2.59, p = .011$, 95% CI = [-0.44, -0.06]). Therefore, our Hypotheses 1-1 and 1-2 were supported.

Inference Accuracy As a Mediator

Inference accuracy did not mediate the relationship between empathy and apology comprehensiveness. Linear regression analyses revealed that empathy was not significantly associated with inference accuracy ($\beta = 0.14, SE = 0.10, t(89) = 1.44, p = .152$, 95% CI = [-0.05, 0.34]), and inference accuracy was also not significantly related to apology comprehensiveness ($\beta = 0.18, SE = 0.11, t(89) = 1.72, p = .090$, 95% CI = [-0.03, 0.40]). Likewise, results from the linear mixed-effects model indicated that inference accuracy was not significantly associated with apology comprehensiveness ($\beta = -0.06, SE = 0.04, t(397.66) = -1.39, p = .164$, 95% CI =[-0.14, 0.02]). Consistent with these results, the mediation analysis revealed that the indirect effect was not significant ($\beta = 0.02, SE = 0.02, p = .285$, 95% CI = [-0.01, 0.07]), whereas the direct effect was significant ($\beta = 0.30, SE = 0.10, p = .002$, 95% CI = [0.11, 0.49]). Thus, Hypothesis 2-1 was not supported.

Inference accuracy did not mediate the relationship between empathy and defensiveness as well. The results of the linear regressions showed that empathy level did not significantly predict inference accuracy ($\beta = 0.14, SE =$

$0.10, t(89) = 1.44, p = .152, 95\%$ CI = [-0.05, 0.34]), nor did inference accuracy significantly predict defensiveness ($\beta = -0.18, SE = 0.10, t(89) = -1.72, p = .089, 95\%$ CI = [-0.38, 0.03]). Consistently, the bootstrapped linear mixed-effects model demonstrated no significant relationship between inference accuracy and defensiveness ($\beta = 0.06, SE = 0.05, 95\%$ CI = [-0.03, 0.15]). In accordance with these findings, the mediation analysis revealed a non-significant indirect effect ($\beta = -0.02, SE = 0.02, p = .167, 95\%$ CI = [-0.06, 0.01]) alongside a significant direct effect ($\beta = -0.23, SE = 0.10, p = .017, 95\%$ CI = [-0.42, -0.04]). Hence, Hypothesis 2-2 was not supported.

Target-Oriented Inference As a Mediator

Target-oriented inference partially mediated the relationship between empathy and apology comprehensiveness. Results from linear regressions demonstrated that empathy was positively associated with target-oriented inference ($\beta = 0.20, SE = 0.10, t(89) = 2.04, p = .044, 95\%$ CI = [0.01, 0.40]), and target-orientedness was positively related to apology comprehensiveness ($\beta = 0.33, SE = 0.10, t(89) = 3.31, p = .001, 95\%$ CI = [0.13, 0.53]). The linear mixed-effects model also supported the positive relationship between target-oriented inference and apology comprehensiveness ($\beta = 0.13, SE = 0.04, t(420.35) = 2.97, p = .003, 95\%$ CI = [0.04, 0.21]). The mediation analysis revealed that the indirect ($\beta = 0.06, SE = 0.03, p = .032, 95\%$ CI = [0.00, 0.12]) and direct ($\beta = 0.26, SE = 0.09, p = .004, 95\%$ CI = [0.08, 0.45]) were all significant. Therefore, Hypothesis 3-1 was supported (see Figure 2).

On the contrary, for defensiveness, target-oriented inference did not mediate its relationship with empathy. The linear regression analyses revealed that empathy level was positively associated with target-oriented inference ($\beta = 0.20, SE = 0.10, t(89) = 2.04, p = .044, 95\%$ CI = [0.01, 0.40]); however, target-oriented inference was not significantly related to defensiveness ($\beta = -0.17, SE = 0.10, t(89) = -1.72, p = .089, 95\%$ CI = [-0.37, 0.03]). Results from the bootstrapped linear mixed-effects models also showed that target-oriented inference was not significantly related to defensiveness ($\beta = -0.06, SE = 0.05, 95\%$ CI = [-0.15, 0.03]). In accordance with these results, the mediation analysis revealed that the indirect effect was not significant ($\beta = -0.03, SE = 0.03, p = .244, 95\%$ CI = [-0.09, 0.02]) while the direct effect was significant ($\beta = -0.22, SE = 0.10, p = .028, 95\%$ CI = [-0.42, -0.02]). Thus, Hypothesis 3-2 was not supported.

Discussion

How does empathy facilitate adaptive behaviors in interpersonal conflicts? In the current study, we investigated whether perceivers' empathy contributes to their engagement in adaptive behaviors through the inference of targets' intentions. We first examined the relationship between empathy and adaptive behaviors. Consistent with previous research (Schumann & Dragotta, 2021), perceivers with higher dispositional empathy provided targets with messages that included more comprehensive apologies and fewer defenses.

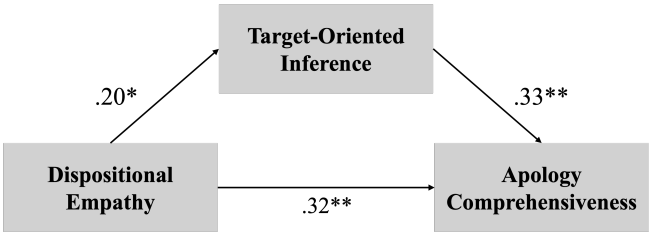


Figure 2: Mediation model in which the relationship between dispositional empathy and apology comprehensiveness is mediated by target-oriented inference. The numbers represent standardized coefficients. $*p < .05, **p < .01$.

These relationships, however, were not linked by perceivers' inference accuracy. The perceivers' level of empathy did not predict how accurately they inferred the targets' intentions, nor did this inference accuracy predict whether the perceivers engaged in more adaptive behaviors. These results might reflect the claim that understanding others' mental states itself is not sufficient to elicit prosocial behaviors. Several studies show that one's higher ability to mentalize others does not guarantee their prosocial behaviors (e.g., Richell et al., 2003; Winter, Spengler, Bermpohl, Singer, & Kanske, 2017). Another possible explanation is that the targets' intentions in our study were relatively difficult to infer, potentially resulting in a floor effect and limiting the examination of their relationship with adaptive behaviors. The average accuracy across the five emotional events was 0.48 out of 2. The targets' intentions for two specific emotional events were particularly challenging to infer, with average accuracies of 0.01 and 0.23, respectively. Considering the observed tendencies in the relationship between empathy and inference accuracy ($r = .15$) and between inference accuracy and adaptive behaviors ($r = .18$ for apology comprehensiveness and $r = -.18$ for defensiveness), the non-significant results may have been influenced by the floor effect in inference accuracy. To better understand the role of inference accuracy, future research should be conducted using emotional event stimuli with a balanced range of easy, moderate, and difficult levels for inferring target intentions.

In contrast, target-oriented inference partially mediated the relationship between empathy and apology comprehensiveness. The perceivers with high dispositional empathy more frequently used words that reflected the targets' emotions and situations when inferring their intentions, which, in turn, was associated with providing the targets with more comprehensive apologies. This finding is consistent with the previous literature which demonstrates that empathetic individuals are more attuned to others' states and engage in adaptive behaviors (Cuff et al., 2016; Batson, 1991; Batson et al., 2007; Eisenberg & Miller, 1987; Longmire & Harrison, 2018). It also suggests that intention inference, partic-

ularly its target-orientedness, is another key factor in explaining the relationship between empathy and adaptive behavior. This result underscores the role of inferring others' intentions from their emotional expressions in shaping one's behavior during social interactions, as indicated in previous literature (Van Kleef, 2009).

However, the target-orientedness did not mediate the relationship between empathy and defensiveness. This result may be attributed to the overall lower frequency of defenses in perceivers' messages (the average number of defensive sentences across the five emotional events was 0.7). Since the perceivers were not actually involved in the interpersonal conflicts, but imagined themselves in those situations, this limitation may have reduced their desire for self-protection, which, in turn, reduced the use of defensive strategies. Future work should consider employing actual conflict situations to elicit more realistic responses from perceivers.

Our research has some additional limitations. First, we utilized a custom-built dictionary to measure the target-orientedness of the inferences. Future research should replicate our study using a validated dictionary to examine the robustness of our findings. Another limitation is that the emotional events used in our study were not diverse enough to encompass contexts where various target states could be inferred. When inferring the targets' intentions, the perceivers mentioned the targets' emotions across all emotional event stimuli. However, they referred to the targets' situations in only two of the emotional events. In addition, the target states observed in our perceivers' inferences were limited to the targets' emotions and situations, which might not capture the full range of possible states. Future research should be conducted using emotional events that include a more diverse array of target states to further validate our results. Lastly, we only considered two aspects of intention inference (inference accuracy and target-oriented inference), which are not exhaustive. Future research can explore other aspects of inference that may influence a person's adaptive behaviors.

Acknowledgments

This work was supported by the Ministry of Education of the Republic of Korea and the National Research Foundation of Korea (NRF-2023S1A5B5A19093935).

References

Batson, C. D. (1991). *The Altruism Question: Toward A Social-psychological Answer* (1st ed.). Psychology Press.

Batson, C. D. (2012). The Empathy–Altruism Hypothesis: Issues and implications. In J. Decety (Ed.), *Empathy: From bench to bedside.* Cambridge, MA: MIT Press.

Batson, C. D., Batson, J. G., Slingsby, J. K., Harrell, K. L., Peekna, H. M., & Todd, R. M. (1991). Empathic Joy and the Empathy-Altruism Hypothesis. *Journal of Personality and Social Psychology*, *61*(3), 413–426.

Batson, C. D., Eklund, J. H., Chermok, V. L., Hoyt, J. L., & Ortiz, B. G. (2007). An Additional Antecedent of Empathic Concern: Valuing the Welfare of the Person in Need. *Journal of Personality and Social Psychology*, *93*(1), 65–74.

Batson, C. D., Fultz, J., & Schoenrade, P. A. (1987). Distress and Empathy: Two Qualitatively Distinct Vicarious Emotions with Different Motivational Consequences. *Journal of Personality*, *55*(1), 19–39.

Batson, C. D., O'Quin, K., Fultz, J., Vanderplas, M., & Isen, A. M. (1983). Influence of Self-Reported Distress and Empathy on Egoistic Versus Altruistic Motivation to Help. *Journal of Personality and Social Psychology*, *45*(3), 706–718.

Blair, R. J. (2005). Responding to the emotions of others: Dissociating forms of empathy through the study of typical and psychiatric populations. *Consciousness and Cognition*, *14*(4), 698–718.

Cuff, B. M. P., Brown, S. J., Taylor, L., & Howat, D. J. (2016). Empathy: A Review of the Concept. *Emotion Review*, *8*(2), 144–153.

Davis, M. H. (1983). Measuring Individual Differences in Empathy: Evidence for a Multidimensional Approach. *Journal of Personality and Social Psychology*, *44*(1), 113–126.

DeSteno, D. (2015). Compassion and altruism: how our minds determine who is worthy of help. *Current Opinion in Behavioral Sciences*, *3*, 80–83.

De Wied, M., Branje, S. J., & Meeus, W. H. (2007). Empathy and Conflict Resolution in Friendship Relations Among Adolescents. *Aggressive Behavior*, *33*(1), 48–55.

Dovidio, J. F., Allen, J. L., & Schroeder, D. A. (1990). Specificity of Empathy-Induced Helping: Evidence for Altruistic Motivation. *Journal of Personality and Social Psychology*, *59*(2), 249–260.

Eckland, N. S., Huang, A. B., & Berenbaum, H. (2020). Empathic Accuracy: Associations With Prosocial Behavior and Self-Insecurity. *Emotion*, *20*(7), 1306–1310.

Eisenberg, N., & Miller, P. A. (1987). The Relation of Empathy to Prosocial and Related Behaviors. *Psychological Bulletin*, *101*(1), 91–119.

Goetz, J. L., Keltner, D., & Simon-Thomas, E. (2010). Compassion: An Evolutionary Analysis and Empirical Review. *Psychological Bulletin*, *136*(3), 351–374.

Ickes, W. (2001). Measuring empathic accuracy. In J. A. Hall & F. J. Bernieri (Eds.), *Interpersonal sensitivity: Theory and measurement* (pp. 219–241). Lawrence Erlbaum Associates Publishers.

Ickes, W., Stinson, L., Bissonnette, V., & Garcia, S. (1990). Naturalistic Social Cognition: Empathic Accuracy in Mixed-sex Dyads. *Journal of Personality and Social Psychology*, *59*(4), 730–742.

Jordan, M. R., Amir, D., & Bloom, P. (2016). Are empathy and concern psychologically distinct? *Emotion*, *16*(8), 1107–1116.

Kirchhoff, J., Wagner, U., & Strack, M. (2012). Apologies: Words of magic? The Role of Verbal Components, Anger Reduction, and Offence Severity. *Peace and Conflict: Jour-*

nal of Peace Psychology, *18*(2), 109–130.

Klimecki, O. M., Sander, D., & Vuilleumier, P. (2018). Distinct Brain Areas involved in Anger versus Punishment during Social Interactions. *Scientific Reports*, *8*(1), 10556.

Kring, A. M., Smith, D. A., & Neale, J. M. (1994). Individual Differences in Dispositional Expressiveness: Development and Validation of the Emotional Expressivity Scale. *Journal of Personality and Social Psychology*, *66*(5), 934–949.

Lehmann, K., Böckler, A., Klimecki, O., Müller-Liebmann, C., & Kanske, P. (2022). Empathy and correct mental state inferences both promote prosociality. *Scientific Reports*, *12*(1), 16979.

Longmire, N. H., & Harrison, D. A. (2018). Seeing Their Side Versus Feeling Their Pain: Differential Consequences of Perspective-Taking and Empathy at Work. *Journal of Applied Psychology*, *103*(8), 894–915.

Mihalcea, R., Biester, L., Boyd, R. L., et al. (2024). How developments in natural language processing help us in understanding human behaviour. *Nature Human Behaviour*, *8*, 1877–1889.

Pennebaker, J. W., Boyd, R. L., Jordan, K., & Blackburn, K. (2015). *The Development and Psychometric Properties of LIWC2015* (Tech. Rep.).

Richell, R. A., Mitchell, D. G., Newman, C., Leonard, A., Baron-Cohen, S., & Blair, R. J. (2003). Theory of mind and psychopathy: can psychopathic individuals read the 'language of the eyes'? *Neuropsychologia*, *41*(5), 523–526.

Schumann, K. (2014). An affirmed self and a better apology: The effect of self-affirmation on transgressors' responses to victims. *Journal of Experimental Social Psychology*, *54*, 89–96.

Schumann, K., & Dragotta, A. (2021). Empathy as a predictor of high-quality interpersonal apologies. *European Journal of Social Psychology*, *51*(6), 896–909.

Schumann, K., & Orehek, E. (2019). Avoidant and defensive: Adult attachment and quality of apologies. *Journal of Social and Personal Relationships*, *36*(3), 809–833.

Shuman, V., Clark-Polner, E., Meuleman, B., Sander, D., & Scherer, K. R. (2017). Emotion perception from a componential perspective. *Cognition and Emotion*, *31*(1), 47–56.

Tausczik, Y. R., & Pennebaker, J. W. (2009). The Psychological Meaning of Words: LIWC and Computerized Text Analysis Methods. *Journal of Language and Social Psychology*, *29*(1), 24–54.

Van Kleef, G. A. (2009). How Emotions Regulate Social Life: The Emotions as Social Information (EASI) Model. *Current Directions in Psychological Science*, *18*(3), 184–188.

Weisz, E., & Cikara, M. (2021). Strategic Regulation of Empathy. *Trends in Cognitive Sciences*, *25*(3), 213–227.

Winter, K., Spengler, S., Bermpohl, F., Singer, T., & Kanske, P. (2017). Social cognition in aggressive offenders: Impaired empathy, but intact theory of mind. *Scientific Reports*, *7*(1), 670.

Yaden, D. B., Giorgi, S., Jordan, M., Buffone, A., Eichstaedt, J. C., Schwartz, H. A., ... Bloom, P. (2024). Characterizing Empathy and Compassion Using Computational Linguistic Analysis. *Emotion*, *24*(1), 106–115.

Zaki, J., Bolger, N., & Ochsner, K. (2008). It Takes Two: The Interpersonal Nature of Empathic Accuracy. *Psychological Science*, *19*(4), 399–404.