The Social Influence of Dogs: How Pet Reactions Shape First Impressions of Strangers

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Abstract

Dogs are often seen as loyal companions, and many owners feel emotionally close to them. This study investigated whether a dog's reaction to a stranger can influence the owner's impression of that person. Participants read two scenarios in which their dog either reacted positively or negatively to a stranger, who was described as either a uniformed person or a generic stranger. Beforehand, participants were primed to think either intuitively or rationally. Results showed that participants judged strangers more negatively when the dog reacted negatively. This effect was stronger in situations where the stranger was described ambiguously (i.e., without a clear social role). Intuitive thinking and shared identity with the dog did not significantly strengthen this effect. However, participants in the intuitive condition were more likely to see the dog's behavior as justified. These findings suggest that a dog's behavior can influence how people judge others, especially when the situation is unclear.

Keywords: Dogs, Pets, Impression formation, Social influence, Ambiguity, Intuition

The Social Influence of Dogs: How Pet Reactions Shape First Impressions of Strangers

Imagine meeting a stranger while out on a walk with your dog. The encounter seems ordinary: until your dog stiffens, growls, or wags its tail enthusiastically. Almost instinctively, you adjust your perception of the stranger based on your dog's reaction. But does this adjustment reflect a genuine form of social influence? This study examines whether, and under what conditions, people are influenced by their pet's behavior when forming impressions of others.

Humans often rely on external cues when forming impressions of others, particularly in ambiguous situations. According to Spears (2021), such influence processes are moderated by shared group identity and theory-of-mind assumptions, which guide whether we trust another's perspective as valid. While this has been extensively studied in human-to-human interaction, less is known about how such mechanisms extend to non-human agents, such as pets (Plagemann, 2022). Pet owners often develop strong emotional bonds with their animals, treating them as protective companions and social allies (Plagemann, 2022). Given this deep connection, a pet's behavioral response to a stranger may serve as an additional, yet underexplored, source of social information that influences human impression formation.

Empirical evidence on whether pet reactions influence social judgment remains scarce (Plagemann, 2022). However, research shows that pet owners often interpret their animals' behaviors as social signals, especially in ambiguous contexts (Borgi & Cirulli, 2016; Spears, 2021). Spears (2021) further argues that even non-human social agents can exert influence, particularly when external cues become more salient.

To test this, we manipulated participants' cognitive framing style by priming either intuitive or rational thinking. This manipulation was not intended to change participants' information processing in a way that would directly influence their impressions. Rather, it was

used to induce a sense of shared or unshared identity with the dog: intuitive thinking reflects a cognitive style commonly associated with both humans and dogs, while rational thinking reflects a uniquely human trait. As such, the framing was meant to either strengthen or weaken perceived shared identity with the dog, which in turn was expected to moderate the influence of the dog's reaction on impression formation. This study investigates whether a dog's reaction affects the owner's evaluation of a stranger, and whether this influence is moderated by perceived shared identity with the dog, as manipulated through cognitive framing.

While traditional social influence research has focused on human interactions, Spears (2021) theorizes that even non-human agents, such as animals, might influence human perception in certain contexts, particularly when they are perceived to share relevant perspectives. This shift is especially relevant in ambiguous situations, where external cues, human or non-human, become more salient. Research suggests that dogs are perceived as highly social animals, often forming strong bonds with humans and exhibiting behaviors that align with group-oriented species. Their role as companions and protectors is reflected in their perceived social intelligence and their ability to respond to human cues (Plagemann, 2022). This raises the question of whether people subconsciously treat their dog's response to a stranger as a valid informational cue, much like they would with human companions.

Studies show that dogs respond to human emotions, follow gaze direction, and adjust their behavior based on human social signals (Borgi & Cirulli, 2016). Given these deeply ingrained social relationships, it is plausible that humans, in turn, attribute meaning to their dogs' reactions in social situations. The human-dog bond has even been compared to parent-child attachment, with research indicating that oxytocin release during human-dog interactions strengthens emotional connections (Borgi & Cirulli, 2016). Furthermore, studies on dog-assisted interventions show that dogs play an active role in facilitating social

interactions and influencing human emotional states (Borgi et al., 2018). If dogs can positively impact human social engagement and perception in structured intervention settings, it is plausible that they also influence their owners' spontaneous social judgments in everyday situations. This suggests that dog owners may internalize their pet's reactions as meaningful social cues, particularly in ambiguous scenarios where external guidance is most needed. Self-Categorization Theory (Turner, 1987) suggests that social influence is strongest when individuals perceive the influencer as part of their ingroup. This emotional closeness may lead owners to interpret their dog's reactions as meaningful social feedback, internalizing them as part of their own judgment process (Borgi & Cirulli, 2016; Plagemann, 2022).

Despite theoretical support for the idea that dogs influence their owner's first impressions, there are reasons to question the extent of this effect. Social influence typically relies on shared social identity, which may not exist between humans and animals. Previous studies on pet-assisted therapy, for example, show that while pets can enhance emotional well-being, their direct influence on cognitive evaluations remains inconclusive (Borgi et al., 2018). Spears (2021) argues that social influence is strongest when the influencing agent shares a shared social identity with the perceiver, suggesting that effective social influence requires an understanding of context and intent: something dogs likely lack. While a dog's response to a stranger may be instinctual rather than a conscious social judgment, owners may still attribute intention or meaning to it, drawing on their own theory of mind. To manipulate situational ambiguity, we varied the social role of the stranger. In the ambiguous condition, the stranger was simply described as a person encountered in the street. In the clear condition, the stranger was described as wearing a recognizable uniform (e.g., a postman or delivery worker), which provided a clear social identity that should be reassuring (i.e. the stranger presents no threat). We hypothesized that ambiguous descriptions would increase reliance on external cues such as the dog's behavior, to interpret the stranger's intentions.

Additionally, Plagemann (2022) highlights that some individuals anthropomorphize their pets, treating them as decision-making partners, whereas others view them in a more instrumental or detached manner. Individuals who view their pets as extensions of themselves, and thus perceive them as part of their ingroup, are more likely to integrate their pet's reaction into their own impression, which aligns with Self-Categorization theory (Turner, 1987). In line with Self-Categorization Theory, the present study focuses on shared identity between the owner and pet as the key mechanism through which the dog's reaction may shape social judgment.

In addition to emotional closeness, shared identity with animals may also arise from ethical beliefs, such as in veganism and vegetarianism. Given that veganism and vegetarianism often stem from ethical concerns about animal welfare, it is plausible that individuals who adhere to these dietary lifestyles may experience a stronger psychological alignment with their pets. Weitzenfeld (2015) argues that humans categorize animals in ways that shape their moral treatment of them, with pets often receiving a privileged status compared to farm animals. Since vegans and vegetarians actively reject the consumption of animals based on ethical grounds, they may be more likely to extend moral consideration to all animals – including their dogs – strengthening their perception of pets as part of their social ingroup. This also aligns with Self-Categorization Theory (Turner, 1987), because if vegans and vegetarians view their pets as moral equals, they may be more inclined to integrate their pet's reactions into their own decision-making process when forming first impressions of strangers.

While existing research provides theoretical and empirical support for the idea that dogs can shape their owner's perception of strangers, contradictory evidence suggests that this influence is not universal and depends on multiple moderating factors. By examining the role of dogs in human impression formation, this study expands the field of social cognition

beyond human-to-human interactions. Understanding whether and when pet reactions influence judgment has implications not only for social psychology but also for practical applications in security, therapy, and everyday decision-making. Based on the theoretical framework of Self-Categorization Theory (Turner, 1987) and recent research on social influence in human–animal interactions (Spears, 2021; Plagemann, 2022), we propose that a dog's reaction to a stranger can shape how owners form social judgments. However, this influence may not occur uniformly. Instead, we expect that the dog's impact is moderated by both cognitive processing style and situational ambiguity, and that these factors interact to shape impression formation. Based on these theoretical considerations, the current study tested the following hypotheses:

Hypothesis 1. When the dog reacts negatively to a stranger, it will have a stronger impact on impression formation than when the dog reacts positively.

Hypothesis 2. Participants exposed to the intuitive framing (intended to foster shared identity with the dog) will be more influenced by the dog's reaction than those exposed to the rational framing (which implies less shared identity with the dog).

Hypothesis 3. The influence of the dog will be stronger in ambiguous situations (complete stranger condition) than in clearly defined situations (uniformed stranger condition).

Hypothesis 4. The influence of the dog's reaction will be strongest when participants rely on intuitive processing, the situation is ambiguous, and the dog reacts negatively – suggesting a multiplicative rather than an additive effect.

Method

Participants & Design

This study recruited 74 first year's bachelor's students from the Faculty of Behavioral and Social Sciences at the University of Groningen. Participants were recruited through the SONA-system, a participant pool management software provided by the University of Groningen. Additionally, we collected data from 223 participants that were directly invited by the researchers through other platforms such as social media. A total of 130 responses were eliminated because the respondents either did not complete the questionnaire, took less than five minutes, admitted they did not respond seriously, and/or failed the attention checks. The final sample for the analysis consisted of 167 participants. Demographic variables such as gender and dog ownership status were recorded. Of these, 40 identified as male, 126 as female, and one participant preferred not to say. Of all participants, 97 own or had owned a dog, while 70 participants never owned a dog. Furthemore, 32 participants expressed their dietary preference as vegan/vegetarian.

Before the study commenced, participants provided informed consent. This consent form included information about data collection, data processing, data handling after the study, voluntary participation, and privacy. The study and its procedures were approved by the ethics committee of the University of Groningen.

Direct invites or the SONA-system were used to recruit participants. First-year University of Groningen psychology bachelor's students who took part in the SONA-system were compensated with (0.6) SONA credits. Both the Dutch and international tracks were eligible to participate, with the only requirement being an understanding of English, as the questionnaire was conducted in English. The study is based on a convenience sample as a result of these recruitment techniques.

The study employed a mixed 2x2x2 factorial design: 2 (Framing: Human/animal differences in impression formation emphasized vs. similarities emphasized) × 2 (Type of stranger encountered: uniformed vs. not) × 2 (Dog's reaction to stranger: positive vs. negative), with the first two factors being between-subjects and the last factor within-subjects. The participants were randomly assigned to the experimental conditions.

In the intuitively stranger condition there were 45 participants, the same applies to the rational stranger cluster. The intuitively uniformed condition contained a total of 44 participants and the rational uniformed had the lowest rate with 33 participants. Data will be analyzed using SPSS to test for main and interaction effects between the experimental conditions.

Materials & Procedure

The study was administered via Qualtrics, an online survey tool that allows one to build surveys, distribute surveys, and analyze responses. Via the platform, SONA participants had access to the questionnaire. Before the experiment started, participants were provided with an informed consent form and informed about the general aim of the study, namely how people form impressions. Subsequently, we randomly assigned them to one of four between-participants conditions. The first between-subjects condition was the rational vs. intuitive framing, which served to activate relevant mental representations that influenced responses in meaningful ways. In the rational framed condition, they received a text of how thoughtful and elaborate impression formation and decision-making can be much more accurate than relying on instinct (see the full text in Appendix A). This was used to subtly activate rational (slow, analytical) thinking before participants encountered the main experimental task, in order to draw attention to the cognitive differences between humans and dogs, given that dogs are unable to engage in this form of rational processing. In the intuitively framed condition, to encourage reliance on fast and automatic thinking, other participants received a text highlighting the life-saving and evolutionary benefits of instinct and gut feelings in

impression formation and decision-making (see the full text in the appendix B). In this case, dogs and humans are considered similar, as both species rely heavily on intuitive processes for rapid decision-making. This was followed by a manipulation check to assess whether the participants read the texts.

Next, each participant was presented with two scenarios, depending on the second between-subjects condition. They could either be randomly placed in the uniform condition or the regular stranger condition. When participants are placed in the uniform condition, they first encounter a postman and, in the second scenario, they encounter a police man. This is a clear condition, because the participants could easily recognize a postman or a policeman and know that they are working for example, whereas a dog is not likely to know this. Participants who were placed in the regular stranger condition encountered two different strangers with a few subtle details about clothing and appearance. This is meant to serve as the unclear situation, since the human and the dog both cannot make use of additional social cues to understand the situation. Except for crucial information for both conditions, the scenarios were made to be very similar. In each scenario, the reader was outdoors on a walk with their dog, encountering only one stranger who crossed their path, with no other people around (see Appendix C for the full texts).

In the first scenario, the dog reacted positively and in the second one, the dog reacted negatively to the stranger. The dog's reaction served as a within-subject manipulation. After each scenario the participant's feelings towards the stranger, towards the dog, and affective and cognitive empathy were measured.

Afterwards, participants were presented with questions about shared identity to measure how they may see themselves and their pet as part of a shared social group. These were followed by a further manipulation check, which serves to confirm that the framing worked as intended. In the end, participants were asked about their gender, their diet (vegetarian/vegan),

and dog ownership. These were followed by a strong attention check, the funnel debrief which gave participants the option to tell us what they think the study is about, and the debrief.

Measures

This study investigated whether humans can be socially influenced by dogs because of shared identity processes.

Judgement

After each vignette, several questions were asked. These questions were the same for each scenario. The first section of questions was about how participants judge the stranger. This judgment section was composed of 7 questions regarding the following variables: trust, suspiciousness, friendliness, threat perception, fear, distance, and reaction justification. Participants rated their level of judgement on a 7-point scale, from 1 “not at all” to 7 “extremely” (See Appendix D).

Emotion perception

Next, participants were asked to answer some questions about how they think the dog feels towards the stranger in the scenario they just read. These questions were the same for each scenario. Participants were asked to rate their emotional perception of the dog’s feelings on a 7-point scale from 1 “not at all” to 7 “extremely”. The emotions were: “Happy”, “Angry”, “Fearful”, “Positive”, “Negative”, and “Friendly” (see Appendix E).

This was followed by questions about the participant’s feelings towards the dog, using the 7-point scale from 1 “not at all” to 7 “extremely”. In this section, the emotions were “Happy”, “Disappointed”, “Worried”, “Curious”, “Surprised”, and “Angry” (see Appendix F).

Cognitive and Affective Empathy

To assess participants' cognitive and affective empathy with their dogs, two more items were administered. Participants were asked to rate (1) how well they understood the feelings of their dog, and (2) the extent to which they shared their dog's feelings. Responses were again recorded on a 7-point scale ranging from 1 ("Not at all") to 7 ("Extremely") (see Appendix F). To test whether participants were paying attention, they were instructed to select "Somewhat" (corresponding to 3 on the scale).

Shared Identity

Afterwards, participants were presented with the Inclusion of Others in Self scale (IOS; Schubert & Otten, 2002) to measure each individual's level of group identity. Seven images with two circles were introduced. In the first image there was no overlap between the two by the seventh image, they were completely aligned with one another (see Appendix G). To capture group identity further, two questions followed. "How aligned do you feel your own impressions of people are with your dog's reactions to them?" and "To what extent do you trust your dog's judgment of new people?'' using the 7-point scale from 1 "Not at all" to 7 "Extremely" to assess the participants feelings/beliefs. Non-dog owners were asked to imagine the dog.

Attention and Seriousness Check

To test whether participants were paying attention while reading the scenarios and framing texts, control questions regarding the content were integrated. Furthermore, control checks like "Select 'Somewhat'" were used as well for a better assessment of seriousness. In the very end participants had to indicate whether they answered the questionnaire truthfully. To encourage an honest response it was stated that there would be no consequences for the participants and that the SONA credits would still be received.

Results

Prior to analysis, data were screened for quality. Participants were excluded if they did not provide informed consent, completed the survey in under two minutes, or failed one or more attention checks. After applying these criteria, the final sample (N = 167) consisted of 75.4% female participants (n = 126), 24.0% male (n = 40), and 0.6% who preferred not to say (n = 1). A majority of participants reported owning or having owned a dog (58.1%, n = 97), and 19.2% identified as vegan or vegetarian (n = 32).

To ensure consistent interpretation of participants' evaluations across conditions, all judgement items were recoded to align with the emotional valence of the scenario. For the positive dog scenario, negative judgement items (e.g., threat, suspicion) were reverse coded so that higher scores reflected a more favorable impression. For the negative dog scenario, positive judgement items (e.g., trust, friendliness) were reverse coded so that higher scores indicated a less favorable impression. As a result, higher mean scores in both conditions represent stronger alignment with the dog's behavior, and thus greater influence of the dog on participants' impression formation.

Assumption Checks

Prior to the main analyses, assumption checks were conducted. Shapiro-Wilk tests indicated that normality was violated for the positive impression scale, but not for the negative impression scale. Levene's tests showed that homogeneity of variance was violated for the positive impression scale (p = .047), but not for the negative impression scale (p = .374). Although these assumption violations require caution, the analyses proceeded given the robustness of ANOVAs to moderate violations, especially with a relatively large sample.

Manipulation Checks

A chi-square test of the framing manipulation check showed a significant linear-by-linear association, $\chi^2(1) = 5.07$, p = .024, indicating that participants in the rational condition

more often reported rational thinking compared to participants in the intuition condition. However, overall more participants selected intuitive options, suggesting a general intuitive bias. A univariate ANOVA tested the effect of the priming condition on perceived shared identity using the Inclusion of Other in the Self (IOS) scale (Schubert & Otten, 2002). The results revealed no significant difference between conditions, $F(1, 163) = 0.048$, $p = .828$. Participants in the intuitive framing condition reported similar levels of perceived overlap with their dog ($M = 4.48$) as those in the rational condition ($M = 4.53$).

As further manipulation validation, participants' perceptions of the dog's emotional state were assessed. Paired samples t-tests revealed that participants perceived the dog as happier in the positive condition ($M = 5.18$) than in the negative condition ($M = 1.17$), $t(166) = 30.69$, $p < .001$, and angrier and more fearful in the negative compared to the positive condition (all $p < .001$). These results confirm that the scenarios effectively conveyed the intended emotional valence.

Main Analyses

All hypotheses were tested using a single 2 (priming condition: intuitive vs. rational) × 2 (clothing condition: uniform vs. non-uniform) × 2 (dog reaction: positive vs. negative) mixed-design ANOVA, with dog reaction as the within-subjects factor and the other two as between-subjects factors.

Hypothesis 1

To test the hypothesis that a negative dog reaction would have a stronger impact on impression formation than a positive one, a repeated measures ANOVA was conducted. A repeated measures ANOVA showed a significant effect of dog reaction on impression formation, $F(1, 163) = 11.98$, $p < .001$, $\eta^2 = .068$ Participants' impressions were significantly affected by the dog's reaction. On average, participants' impressions aligned more strongly with the dog's behavior in the positive reaction condition ($M = 4.98$) than in the negative

reaction condition (M = 4.52), indicating that the dog exerted greater influence in the positive scenario. This suggests that the dog's reaction influenced impression formation. Interestingly, the shift in judgment was numerically larger in the positive dog condition, contrary to our prediction that negative reactions would have a stronger effect. This pattern is addressed in more detail in the discussion section. See Table 1 for descriptive statistics.

Table 1

Descriptive statistics for impression formation by dog reaction condition

Dog reaction	*M*	*SE*
Positive	4.98	0.08
Negative	4.52	0.09

Hypothesis 2

To test the hypothesis that participants exposed to the intuitive framing (which was designed to increase perceived similarity with the dog) would be more influenced by the dog's reaction than those exposed to the rational framing, we examined the interaction between priming condition and dog reaction within the overall 2×2×2 ANOVA model. The analysis revealed no significant effect of priming condition, $F(1, 163) = 0.97$, $p = .33$, $\eta^2 = .006$. Although the mean impression score was slightly higher in the intuitive condition (M = 4.80, SE = 0.07) than in the rational condition (M = 4.70, SE = 0.07), this difference was not statistically significant and therefore does not support Hypothesis 2. See Table 2 for descriptive statistics.

Table 2

Descriptive statistics for impression formation by priming condition

Priming condition	*M*	*SE*
Intuition	4.80	0.07
Rational	4.70	0.07

Hypothesis 3

Hypothesis 3 predicted that situational ambiguity would moderate the dog's influence on impression formation. Specifically, we expected that participants would be more influenced by the dog's reaction when the stranger was described as a generic, unidentifiable person (i.e., ambiguous context), compared to when the stranger was wearing a uniform (i.e., unambiguous context). However, this effect was expected to emerge primarily in the negative dog reaction condition, where the incongruity between a trustworthy uniform and a suspicious dog reaction may reduce the influence of the dog. Thus, although the hypothesis was initially formulated as a main effect of clothing, the expected pattern more precisely implies a two-way interaction between dog reaction and clothing condition.

The between-subjects ANOVA tested the main effect of clothing condition (stranger vs. uniform) on impression formation. The analysis revealed no significant main effect, $F(1, 163) = 0.46$, $p = .497$, $\eta^2 = .003$. Participants evaluated the stranger similarly regardless of whether they were described as a complete stranger or wore a uniform. See Table 3 for descriptive statistics.

Table 3

Descriptive statistics for impression formation by clothing condition

Clothing condition	*M*	*SE*
Complete stranger	4.78	0.07
Uniform stranger	4.72	0.07

Hypothesis 4

To test the hypothesis that the influence of the dog's behavior would be strongest when participants relied on intuitive processing, the situation was ambiguous, and the dog reacted negatively, a repeated measures ANOVA was conducted with dog reaction (positive vs. negative) as a within-subjects factor and priming condition (intuition vs. rational) and clothing condition (stranger vs. uniform) as between-subjects factors. This hypothesis posited a multiplicative effect: that the combination of intuitive processing and situational ambiguity would amplify the influence of the dog's reaction on impression formation.

The three-way interaction between dog reaction, priming condition, and clothing condition was not significant, $F(1, 163) = 0.12$, $p = .727$, $\eta^2 = .001$. Although descriptive means showed small differences across cells, there was no statistical evidence that the dog's reaction had a uniquely strong influence in the intuitive + ambiguous (stranger) + negative condition.

However, a significant two-way interaction between dog reaction and clothing condition (reported above under Hypothesis 3) did emerge, indicating that the influence of the dog was moderated by the ambiguity of the situation. Specifically, the dog's behavior had a greater impact in the ambiguous "stranger" condition than in the unambiguous "uniform" condition. This suggests that situational clarity can buffer against external social cues, such as

a dog's emotional reaction. Taken together, these results provide partial support for the underlying logic of Hypothesis 4, but not for the full three-way interaction.

To further clarify the significant two-way interaction between dog reaction and situation type, Table 5 presents a simplified model excluding the priming manipulation (so collapsed over that factor). As shown, the effect of the dog's behavior was particularly pronounced in the uniform condition: participants rated the uniformed stranger much more positively following a positive dog reaction (M = 5.24) than a negative one (M = 4.19). This difference (ΔM = 1.05) was considerably larger than in the stranger condition, where impressions were more similar across dog reactions (ΔM = 0.15). This suggests that the dog's emotional signal had the strongest social influence in the uniform condition, but only when the dog reacted positively. These results support the interpretation that situational clarity (e.g., a uniformed stranger) interacts with the emotional valence of the dog's behavior in shaping impression formation.

Table 4

Mean impression scores by dog reaction, clothing condition, and priming condition

	Stranger – Intuition	Stranger – Rational	Uniform – Intuition	Uniform – Rational
Positive dog	5.05	4.92	4.79	4.15
Negative dog	4.57	4.59	4.32	4.15

Table 5

Impression formation means by dog reaction and situation (stranger vs. uniform)

Condition	Dog Reaction	*M*	*SE*
Stranger	Positive	4.71	.11
Stranger	Negative	4.86	.12
Uniform	Positive	5.24	.12
Uniform	Negative	4.19	.13

Exploratory Analyses

An exploratory independent samples t-test was conducted to assess whether vegans were more strongly influenced by the dog's behavior. A difference score was calculated by subtracting participants' ratings of the stranger in the negative dog condition from their ratings in the positive dog condition, to reflect the degree to which impressions changed based on the dog's behavior. Results showed no significant difference between vegans ($M = 0.28$, $SD = 1.26$) and non-vegans ($M = 0.43$, $SD = 1.86$), $t(67.32) = 0.57$, $p = .568$. This suggests that vegans and non-vegans were similarly responsive to the dog's behavior. See Table 6 for descriptive statistics.

Table 6

Dog impact scores by dietary group (positive – negative judgment)

Group	*M*	*SD*	*SE*
Vegan/vegetarian	0.28	1.26	0.22
Non-vegan/vegetarian	0.43	1.86	0.16

Justified Reaction

An exploratory analysis was conducted to examine whether the type of cognitive processing (intuition vs. rational thinking) influenced how justified participants perceived the dog's behavior to be. Participants were asked whether they thought the dog's reaction was appropriate in both the positive and negative condition. A repeated measures ANOVA with priming condition (intuition vs. rational) as a between-subjects factor and dog reaction (positive vs. negative) as a within-subjects factor was conducted. The analysis revealed a significant main effect of priming condition, $F(1, 163) = 6.23$, $p = .014$, $\eta^2 = .037$. Participants in the intuitive condition rated the dog's behavior as more justified overall ($M = 4.01$, $SE = 0.13$) than those in the rational condition ($M = 3.54$, $SE = 0.13$). This suggests that intuitive processing may increase the perceived appropriateness of the animal's actions, regardless of whether the reaction was positive or negative. No significant interaction was found between priming and the dog's reaction, indicating that the effect of priming was consistent across both positive and negative dog behavior. Descriptive statistics for the priming conditions are presented in Table 7.

Table 7

Perceived justification of the dog's behavior by priming condition

Priming condition	*M*	*SE*
Intuition	4.01	0.13
Rational	3.54	0.13

Affective Empathy

Participants were asked to indicate the extent to which they shared the dog's emotional state. A 2 (priming) × 2 (clothing) × 2 (dog reaction) repeated measures ANOVA revealed no significant main effects or interactions (*all p*s > .05). However, descriptive means showed that

participants reported higher affective empathy in the negative dog reaction condition ($M \approx 3.4$) than in the positive condition. Additionally, empathy scores were descriptively higher in the intuitive condition ($M = 3.44$) than in the rational condition ($M = 2.60$), although this difference did not reach significance.

A two-way interaction between dog reaction and clothing condition was observed descriptively: in the stranger condition, participants reported more affective empathy in the negative reaction than the positive; this pattern was not observed in the uniform condition. These findings suggest that participants may feel more emotionally attuned to the dog in ambiguous or socially uncertain situations. See Table 8 for means.

Table 8

Affective Empathy means by condition

	Stranger		Uniform	
	Positive	Negative	Positive	Negative
Intuition	2.40	3.22	3.00	3.18
Rational	2.60	3.44	2.58	2.64

Cognitive vs. Affective Empathy

To test whether participants reported different levels of cognitive (understanding) and affective (sharing) empathy, a paired-samples *t*-test was conducted. Results showed a significant difference, $t(166) = 9.25$, $p < .001$, indicating that participants reported more understanding ($M = 3.72$) than sharing ($M = 2.90$) of the dog's emotions. Although this supports the theoretical distinction between cognitive and affective empathy in human-animal interactions, this result should be interpreted with caution. Given the exploratory nature of this comparison and the complexity of interpreting empathy in cross-species contexts, further

research is needed to clarify the psychological meaning of this distinction. See Table 9 for descriptive statistics.

Table 9

Cognitive vs. affective empathy comparison

Empathy type	*M*	t(166)	*P*
Cognitive (understand)	3.72		
Affective (share)	2.90	9.25	<.001

Discussion

The present study examined whether a dog's behavior could influence impression formation about a stranger, and whether this effect is moderated by perceived shared identity with the dog (as manipulated via intuitive vs. rational framing) and situational ambiguity (uniformed vs. unidentifiable stranger). The findings partially support the proposed hypotheses and contribute to a growing body of literature suggesting that social influence can extend beyond human-to-human interactions to include non-human social agents, such as pets (Plagemann, 2022; Spears, 2021).

Participants' evaluations were influenced by the dog's reaction, supporting the general idea behind Hypothesis 1. However, contrary to the specific prediction that negative reactions would exert stronger influence, the pattern of results indicated that the positive reaction had a more pronounced effect. This discrepancy is addressed further below. This main effect of dog behavior on impression formation aligns with theoretical perspectives emphasizing the role of emotional cues in social judgment, especially in uncertain or ambiguous situations (Spears, 2021).

The fact that a dog's behavior alone could shift participants' evaluations of a stranger underscores the intuitive and immediate nature of impression formation, even when the social signal originates from a non-human source. Interestingly, although negative reactions were expected to exert stronger influence, the opposite pattern emerged: participants appeared more responsive to the dog's positive behavior. One possible explanation is that clear positive cues may be more easily translated into social judgments, especially in uncertain contexts.

Contrary to Hypothesis 2, participants primed with intuitive framing were not significantly more influenced by the dog's reaction than those in the rational framing condition. Although the intuitive group rated strangers slightly more extremely depending on the dog's behavior, this difference did not reach statistical significance. This suggests that the

framing manipulation may not have successfully increased perceived shared identity with the dog, which was its intended purpose. Alternatively, the dog's behavior may have been sufficiently salient to influence judgments directly, regardless of shared identity cues activated through framing.

The results for Hypothesis 3 provide more nuanced insights. Although the main effect of clothing condition (uniform vs. stranger) was not significant, a two-way interaction between dog behavior and clothing condition did emerge. Specifically, the dog's reaction had a greater impact on impression formation in the ambiguous (stranger) condition than in the uniformed (clear) condition. This interaction suggests that social influence from non-human agents is amplified in uncertain contexts, consistent with the notion that ambiguity increases reliance on external cues (Spears, 2021). These findings also point to the limitations of framing the clothing variable as a simple main effect and underscore the theoretical importance of examining interactions. This pattern may reflect the increased reliance on emotionally salient cues when other contextual information is lacking. In ambiguous situations, people may look to the dog's reaction as a substitute for social meaning, attributing intentionality or trustworthiness to the pet's behavior in the absence of clearer human signals. This aligns with Self-Categorization Theory, which suggests that external cues become more influential when category-based judgments are difficult to apply. While Hypothesis 3 was initially framed as a main effect of situational ambiguity, the observed interaction pattern indicates that a more precise prediction would have involved the interaction between dog behavior and situation. This post hoc insight underscores the value of modeling contextual and behavioral cues in combination, rather than in isolation. The finding highlights that even non-human agents can significantly shape social evaluations when uncertainty is high.

Hypothesis 4 proposed a three-way interaction between dog reaction, cognitive processing style, and clothing condition, predicting that the dog's influence would be

strongest in the intuitive + ambiguous + negative condition. This interaction was not statistically supported. However, as mentioned, the significant two-way interaction between dog behavior and clothing condition lends partial support to the logic behind this hypothesis. It appears that situational ambiguity amplifies the impact of the dog's behavior, regardless of the framing manipulation intended to activate shared identity with the dog. This interaction highlights that in the absence of clear social cues, individuals may rely more heavily on their pet's behavior to interpret the situation. In ambiguous scenarios, the dog's reaction functions as a stand-in for social meaning, whereas in clear situations, such as a uniformed figure, the dog's behavior may be discounted or judged against expectations. This suggests that the influence of non-human agents is context-sensitive and depends in part on whether their reactions are perceived as informative or appropriate given the broader situation.

Several exploratory findings offer additional perspectives. First, intuitive participants rated the dog's behavior as more justified overall, regardless of whether the behavior was positive or negative. This suggests that intuitive processing may foster a greater tendency to interpret a pet's behavior as socially meaningful or appropriate. Second, while affective empathy scores were not significantly affected by any single factor, descriptive trends indicated higher affective empathy in ambiguous situations and under intuitive processing, particularly when the dog reacted negatively. This may suggest a greater emotional attunement to the dog in contexts of uncertainty.

Interestingly, no significant differences were observed between vegan/vegetarian participants and others in terms of their responsiveness to the dog's behavior. This was somewhat unexpected given theoretical considerations about moral alignment and group identification based on ethical dietary choices (Weitzenfeld, 2015). However, the limited power and exploratory nature of this comparison precludes strong conclusions.

Overall, these findings suggest that non-human social cues, such as a dog's emotional reaction, can meaningfully shape impression formation, particularly in ambiguous situations. This aligns with theoretical frameworks such as Self-Categorization Theory (Turner et al., 1987), which emphasize the role of perceived shared identity and contextual uncertainty in determining susceptibility to social influence. Our study extends these insights to the domain of human-animal interaction, revealing that social signals from pets are not merely background noise but can function as central informational cues.

Limitations and Future Directions

One limitation of the current study is the relatively modest strength of the manipulations. The framing task may not have reliably induced differences in cognitive processing style, as reflected by the manipulation check and absence of interaction effects involving this variable. Future research should consider more robust experimental manipulations, such as time pressure or cognitive load, to elicit more distinct processing styles.

Another limitation concerns the generalizability of the findings. The sample primarily consisted of university students, most of whom were female and had experience with dogs. These demographic factors may limit the extent to which the findings apply to other populations. Moreover, participants responded to hypothetical vignettes rather than real-life interactions, which may reduce ecological validity. Future studies could incorporate behavioral measures or live interactions to assess how dog behavior influences social perception in naturalistic settings.

Finally, the operationalization of situational ambiguity via clothing (uniform vs. non-uniform) may have oversimplified the construct. While the uniform likely provided a clear cue of social identity, the absence of a uniform may not have uniformly induced ambiguity across all participants. Further refinement of this manipulation, perhaps by including

scenarios that systematically vary in levels of ambiguity, could strengthen the validity of future research.

Theoretical and Practical Implications

Theoretically, the current findings extend existing work on social influence and impression formation to include non-human agents. That a dog's emotional response can shape human judgments, especially under ambiguous conditions, highlights the importance of broadening our conceptualization of social influence beyond human communicators. This has implications for theories of group identity and theory of mind, which must account for how individuals attribute meaning and intentionality to non-human entities.

Practically, these insights may be relevant in contexts where dogs are used in public-facing roles, such as therapy, policing, or security. If people adjust their impressions of others based on how a dog reacts, then handlers and institutions should consider the broader social influence that these animals exert. Understanding the mechanisms of such influence could inform training protocols and public communication strategies. More broadly, the findings suggest that people may rely on pets for guidance in social situations, which has implications for how trust and threat are communicated in everyday life.

Conclusion

This study provides empirical support for the idea that a dog's behavior can influence human impression formation, particularly in ambiguous social contexts. While the expected three-way interaction was not supported, a key two-way interaction showed that situational clarity moderates the dog's impact. These results contribute to a growing body of research on non-human social influence and highlight the need for further investigation into how pet-owner relationships shape perception and decision-making in social environments.

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Appendix A: *Framing Text – Rational Thinking*

One of humanity's best attributes is its ability for careful thought. Humans, in contrast to other animals, possess the valuable capacity to stop, think, and make thoughtful judgments. Cognitive psychology research continuously demonstrates that people who take the time to consider a problem make more accurate and trustworthy decisions than those who only follow their instincts.

According to research in cognitive neuroscience (Kahneman & Klein, 2009), gut instincts can help in decision-making, but their accuracy depends on the context. While they allow for quick judgments, they can be misleading in unpredictable situations or when individuals lack experience. This is particularly evident in research on thin slices of behavior (Ambady et al., 2000), which shows that first impressions, though often intuitive, are shaped by emotional biases, automatic associations, and incomplete information. As a result, relying solely on instinct can lead to quick but biased conclusions and stigmatization of others. Whether in everyday interactions or high-stakes decisions, those who take the time to question their initial reactions and process additional information tend to make more well-reasoned and unbiased judgments As psychologist Daniel Kahneman once explained: "A split-second reaction can save your life—but a well-reasoned decision can change the world. The greatest minds in history weren't the fastest thinkers, but the ones who questioned their first instincts." By engaging in deliberate reasoning, we can minimize errors in judgment and ensure that our decisions are not just quick—but correct.

Appendix B: *Framing Text – Intuitive Thinking*

For thousands of years, the ability to respond quickly to dangers was essential to human existence. Delays may have resulted in death for our forefathers, who did not have the luxury of time when they heard a rustle in the bushes. While those who paused to assess the situation frequently became prey, those who fought or bolted out of instinct had a much higher chance of surviving. Our decisions are still influenced by this deeply rooted impulse.

According to research in cognitive neuroscience (Kahneman & Klein, 2009), gut instincts are not random; rather, they are the consequence of the brain's quick processing of minute contextual information, frequently more quickly than conscious thought permits. Studies on high-stakes occupations like firefighters, soldiers, and doctors have demonstrated that in crucial situations, quick, instinctive decisions frequently beat lengthy, deliberate ones. Similarly, research on thin slices of behavior (Ambady et al., 2000) shows that people form first impressions within seconds, based on subtle but telling cues such as body language and tone of voice. These brief excerpts of expressive behavior can reveal emotions, personality traits, and social dynamics—often before we are consciously aware of them. Gut instincts allow us to make rapid and effective judgments about others, particularly in unpredictable or high-pressure situations. This way, gut instinct quickly helps us determine whom to trust, or whom to avoid. As psychologist Daniel Kahneman once famously stated: "Hesitation is a relic of luxury. In moments of uncertainty, our instincts are often our most powerful and reliable guides." Trusting one's gut instinct has always been a vital survival skill, whether one is managing contemporary social relationships or evading predators in the wild.

Appendix C: *Scenarios*

C1: *Negative Dog Reaction – Uniformed Condition (Policeman)*

You are outside with your dog, taking your usual walk in the park. It's early evening, and the sun is setting, there are no people in sight - it's getting quiet.

As you continue along a narrow path, you notice a uniformed police officer approaching from the opposite direction at a steady pace.

As the officer gets closer, your dog suddenly stops in its tracks. Its ears flatten, and its tail tucks tightly between its legs. Its body stiffens, and a low growl rumbles in its chest. As he passes, your dog bares its teeth and lets out a sharp bark, pulling backward on the leash as if hesitant to continue forward.

The police officer briefly glances down, his expression neutral, his pace unchanged. But your dog remains tense, its eyes fixed on him until he disappears further down the path. Even after he's gone, your dog still seems on edge, looking back occasionally in the direction he went.

C2: *Positive Dog Reaction – Uniformed Condition (Postman)*

You are out for an early morning walk with your dog, following a familiar route through an urban green space. The sky is just beginning to lighten, the surroundings are quiet. There are no people around- the city still seems to be asleep and empty.

As you walk along a path along a line of trees, you notice a uniformed postman a little way ahead with a bag slung over his shoulder. He walks towards you at a steady pace.

As the postman gets closer, your dog suddenly perks up. Its ears stand tall, its tail starts wagging, and it gently pulls forward on the leash, as if eager to greet him. As he passes by,

your dog sniffs the air, wags its tail more enthusiastically, and even takes a small step toward him, showing clear signs of friendliness.

The postman briefly glances down before continuing on his way. Your dog watches him for a moment before returning its focus on the walk, still appearing relaxed and content.

C3: *Positive Dog Reaction – Stranger*

You are out for an early morning walk with your dog, following a narrow dirt trail through the woods. The sky is just beginning to lighten, and the surroundings are quiet. There are no people around— the city still seems to be asleep, and the woods feel empty.

As you walk along the narrow path, you notice a tall man approaching from the opposite direction. He is dressed casually in jeans and a jacket, walking at a relaxed pace.

As the man gets closer, your dog suddenly perks up. Its ears stand tall, its tail starts wagging, and it gently pulls forward on the leash, as if eager to greet him. As the man passes by, your dog sniffs the air, wags its tail more enthusiastically, and even takes a small step toward him, showing clear signs of friendliness.

The man briefly glances down before continuing on his way. Your dog watches him for a moment before returning its focus to the walk, still appearing relaxed and content.

C4: *Negative Dog Reaction – Stranger*

You are outside with your dog, taking your usual walk in the park. It's early evening, and the sun is setting, there are no people in sight - its getting quiet.

As you walk along a narrow path, you notice a tall man approaching from the opposite direction. He is dressed in casual clothing, walking at an even pace towards you.

As the man gets closer, your dog suddenly stops in its tracks. Its ears flatten, and its tail tucks tightly between its legs. Its body stiffens, and a low growl rumbles in its chest. As he passes, your dog bares its teeth and lets out a sharp bark, pulling backward on the leash as if hesitant to continue forward.

The man briefly glances down, his expression neutral, his pace unchanged. But your dog remains tense, its eyes fixed on him until he disappears further down the path. Even after he's gone, your dog still seems on edge, looking back occasionally in the direction he went.

Appendix D: *Judgment Items*

After each scenario, participants rated their impression of the stranger using the following seven items, measured on a 7-point Likert scale (1 = Not at all, 7 = Extremely):

1. Would you trust the stranger?
2. Would you be suspicious of the stranger?
3. Would you perceive the stranger to be friendly?
4. Would you feel threatened by the stranger?
5. Would you be afraid of the stranger?
6. Would you keep your distance from the stranger?
7. Would you think your dog's reaction to the stranger is justified?

Appendix E: *Emotion Perception: Dog's Emotions*

Participants were asked to assess the dog's emotional reaction to the stranger. They responded on a 7-point scale (1 = Not at all, 7 = Extremely) for the following emotions:

- Happy
- Angry
- Fearful
- Positive
- Negative
- Friendly

Appendix F: *Empathy Measures*

Participants reported their own emotions toward the dog after each scenario, using the same 7-point scale. Emotions included:

- Happy
- Disappointed
- Worried
- Curious
- Surprised
- Angry

Two items were used to assess empathy toward the dog:

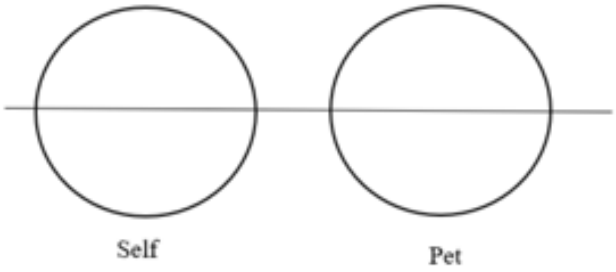
1. “Do you understand the feelings of your dog?” (Cognitive empathy)
2. “Do you share the feelings of your dog?” (Affective empathy)

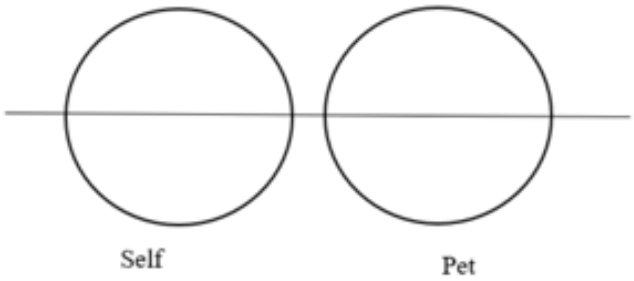
Responses were recorded on a 7-point scale (1 = Not at all, 7 = Extremely).

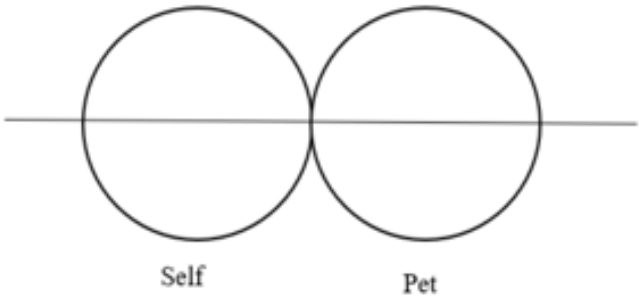
To check attentiveness, participants were instructed to select “Somewhat” (scale point 3) on one of these items.

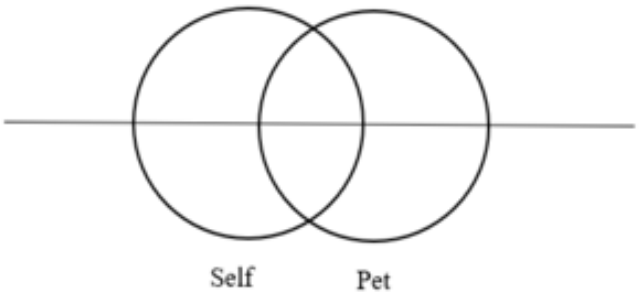
Appendix G: *Shared Identity*

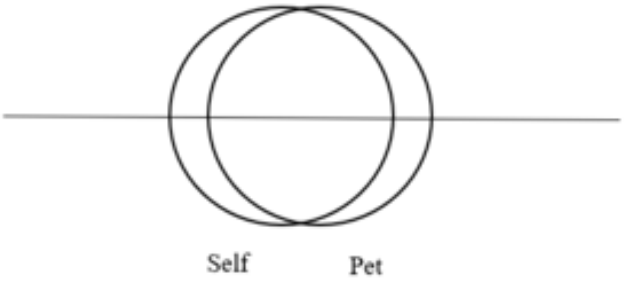
Participants completed the Inclusion of Other in the Self Scale (IOS; Schubert & Otten, 2002). This pictorial scale consists of 7 pairs of circles with varying degrees of overlap, representing the relationship between “you” and “your dog.” Higher overlap indicates stronger perceived shared identity.

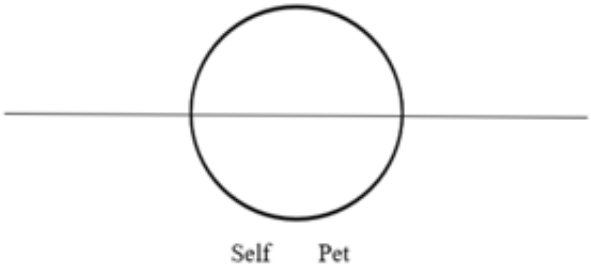












Following the IOS measure, participants answered two additional items (1 = Not at all, 7 = Extremely):

1. “How aligned do you feel your own impressions of people are with your dog's reactions to them?”
2. “To what extent do you trust your dog’s judgment of new people?”

Non-dog owners were instructed to imagine a dog they knew or owned in the past.