Following the Dog's Lead: Dogs as Meaningful Social Referents During First Impressions

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[1] The word count of this thesis exceeds the 4,000-6,000 word guideline. This has been discussed with and approved by the supervising researcher (Prof. Dr. Russell Spears).

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Abstract

Dogs are often perceived as socially meaningful companions whose behaviour people readily interpret, yet whether their reactions influence how people evaluate unfamiliar others remains unclear. Drawing on Self-Categorization Theory (SCT), the present study examines whether dogs' reactions shape people's first impressions of strangers and whether this influence depends on shared identity with the dog and situational uncertainty. A total of 290 participants completed a vignette-based experiment using a 2 (dog condition: own vs. neighbour's dog, manipulating shared identity) × 2 (situational context: morning vs. evening, manipulating situational uncertainty) × 2 (dog reaction: positive vs. negative) mixed factorial design. Results revealed that participants evaluated strangers considerably more positively following positive dog reactions than following negative ones. Contrary to expectations, this influence was not stronger in the own-dog condition and was, unexpectedly, more pronounced in the morning than in the evening. Exploratory analyses showed that a greater subjective sense of shared identity with the dog was associated with larger differences between positive and negative impression scores. This association was stronger for negative reactions, consistent with the negativity bias, suggesting that negative reactions may be perceived as especially informative cues. Overall, these results indicate that dogs may serve as meaningful social referents during impression formation, with exploratory findings pointing to the potential importance of a subjective sense of shared identity with the dog. Future research should further examine the mechanisms underlying dogs' social influence.

Keywords: dogs, impression formation, shared identity, social influence, Self-Categorization Theory, situational uncertainty

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No content generated by AI technologies has been presented as my own work. Grammarly (https://www.grammarly.com/) was used for grammar and spelling correction, as English is not my first language. In addition, I acknowledge the use of ChatGPT (https://chatgpt.com/) and Claude (https://claude.ai/) to generate materials that are included in my work in a modified form. Details regarding this use are provided in Appendix A.

Following the Dog's Lead: Dogs as Meaningful Social Referents During First Impressions

Sometimes, social influence requires no words at all. When someone gives us a gentle smile, or we see them suddenly tense up, it can quietly change how we interpret the situation. This reflects a key principle in social psychology: even without anything being said, people rarely form impressions in isolation. Especially when a situation is unclear, we tend to turn to others to make sense of it and figure out how to respond (Spears, 2021). However, not all others are perceived as equally relevant sources of information. This raises the question of how we determine whose reactions are seen as meaningful and whose are dismissed. A natural extension of this question is whether such influence is limited to humans, or whether non-human others (such as animals) can likewise shape our interpretation of a situation. The present study examines whether dogs, as particularly close animal companions, can shape people's impressions of strangers, and under which conditions this influence is strongest.

A useful perspective for understanding whose reactions influence us is offered by Self-Categorization Theory (SCT), which suggests that social influence increases when people perceive themselves and others as part of the same group (Turner et al., 1994). When others are seen as part of the same "we", their reactions carry more weight, because they are viewed as more relevant for interpreting the situation (Spears, 2021). Moreover, SCT argues that this feeling of "we" is not stable, but can shift according to the situation and which group identities are most salient (Turner et al., 1994). This implies that what counts as a meaningful "we" is flexible and can therefore be more inclusive or exclusive depending on the situation.

If social influence depends on being perceived as part of this "we", then in principle it may extend as far as this "we" extends. From this perspective, the relevance of a social influence source depends less on whether it is human and more on whether it is perceived as part of the same group (Turner et al., 1994). In line with this, Spears (2021) argued that social

influence may extend beyond species boundaries. He illustrated this with a simple thought experiment: if you picture yourself walking through a forest and notice a rabbit suddenly take off, you may instinctively become more vigilant. The rabbit's reaction thus seems to carry social meaning, yet it remains unclear through which mechanism. Its influence could reflect a shared sense of identity (with both you and the rabbit belonging to the same category of potential prey, vulnerable to whatever it fled from) or simply an informational inference (with you assuming that the rabbit, given its keener senses, detected something you did not). This example raises an interesting question: what happens when the reaction does not come from a wild animal we briefly encounter in a forest, but from an animal that lives alongside us every day, and thus may more easily be perceived as part of a shared "we"?

Dogs as Social Companions

For many people, the domestic dog is the animal that comes to mind most naturally when considering such everyday companions. Few other animals are as deeply integrated into human social life, possibly making dogs especially likely to be included in this sense of "we". Dog owners frequently report that the bond with their dog feels as close as that with other people, with some studies even suggesting that it is comparable to the parent-child bond (Turcsán et al., 2025). The dog-owner relationship mirrors the parent-child bond not only in its closeness, but also in its relational dynamic: in both cases, the "parental figure" is often perceived as more knowledgeable and authoritative (Turcsán et al., 2025). This power asymmetry could limit the extent to which people rely on their dog as a source of information in familiar situations, yet dogs may become especially relevant precisely when other sources of information provide less guidance. The closeness between dog and owner is also evident in the emotional support owners report receiving from their dogs, particularly during difficult times (Cassels et al., 2017; Kurdek, 2009). Although such support itself may not directly produce social influence, it may contribute to a sense of trust or the belief that the dog has the

owner's best interests at heart, which could make owners more likely to treat their dog's behaviour as informative. These points highlight that dogs are often perceived not merely as pets but as genuine social companions.

Dogs' social relevance is further reflected in their behaviour, as they are genuinely responsive to social signals typically associated with humans. For example, studies show that dogs notice whether someone is paying attention to them (Virányi et al., 2004) and can differentiate between various human emotions (Müller et al., 2015). Their sensitivity to this "human" social information may contribute to people perceiving dogs' behaviour as intentional and possibly communicative, rather than simply instinctual.

Such perceptions may also be shaped by anthropomorphism: the tendency to assign human-like qualities to non-humans (Epley et al., 2007). People may project such qualities onto dogs and interpret their behaviour in terms of human-like mental states; for example, a dog owner might believe that their dog "feels jealous" when it sees them petting another dog. These anthropomorphic interpretations draw on Theory of Mind (ToM), which reflects the more general tendency to attribute intentions and feelings to others, including animals (Plagemann, 2022; Premack & Woodruff, 1978). While we cannot be certain that dogs do not experience such mental states, interpreting their behaviour through an anthropomorphic lens may nonetheless facilitate perceiving it as purposeful and communicative. Together, these observations provide a framework for understanding why people may treat dogs as relevant social sources, although the underlying mechanisms remain unclear.

Dual Mechanisms of Dogs' Influence

Despite their perceived social relevance, empirical research directly examining dogs' influence on people's impressions of others remains limited. However, initial findings suggest that dogs' reactions can influence how people evaluate others. For example, Plagemann (2022) found that reactions from both cats and dogs influenced people's impressions of an

unfamiliar person. In this study, participants' impressions tended to shift more in response to dogs' reactions than to cats' reactions, and they also reported identifying more strongly with dogs.

Plagemann (2022) suggested that these differences may be explained by ToM assumptions about animals' understanding of situations. People may assume that dogs have a better understanding of what is happening around them than cats do, while also perceiving them as more socially attuned and oriented towards group loyalty. As such, people may be more likely to identify with dogs and regard their reactions as relevant for interpreting the situation. Yet this explanation does not specify whether identification genuinely accounts for this effect. Alternatively, ToM assumptions may shape interpretations more directly, with people being influenced by what they think the dog has detected, rather than by a sense of "we". As illustrated earlier with the rabbit example, these explanations reflect two conceptually distinct yet potentially overlapping mechanisms: one based on shared group identity, the other on informational influence.

If a dog influences people's impressions of others because it is perceived as part of their group, this implies that identity-based social influence (Turner et al., 1994) is not limited to human interactions but can also extend to human-animal relationships. Yet dogs' reactions may also shape people's impressions even when the dogs are not viewed as group members, instead reflecting a more general, informational form of social influence (Cialdini & Goldstein, 2004). In such cases, people may simply draw inferences about the dog's perception of a situation, partly drawing on common beliefs that dogs are loyal and social animals (Reid, 2009), and shift their impressions accordingly. For example, someone may generally believe that "dogs can sense danger" and therefore take a step back when a dog starts barking at an approaching stranger. Distinguishing between these explanations is important for understanding dogs' influence, but doing so remains challenging, as both may

operate simultaneously and share underlying processes such as perspective-taking and social inference. As the present study is grounded in SCT, the primary focus lies on the identity-based account, with informational inferences considered a plausible alternative.

Situational Uncertainty

Beyond the nature of the underlying process, the extent to which dogs shape people's impressions of others may also depend on contextual factors. More specifically, research suggests that social influence is stronger in uncertain situations, where people have less information available to guide their interpretations of events (Spears, 2021). Such situations may reduce the usefulness of prior knowledge and increase feelings of uncertainty and vulnerability. As a result, people may become more reliant on the few social cues that remain available, potentially increasing the relevance of dogs' reactions. Evening contexts may be particularly relevant in this regard, as the darkness reduces visibility and available social cues to help interpret the situation. Together, these theoretical perspectives suggest that dogs' influence on impressions may depend on both the broader situational context and identity-based factors.

The Present Study

Building on these perspectives, the present study examines whether dogs can shape people's impressions of strangers, through which mechanisms this influence may operate, and when it is strongest. To investigate this, participants read a short scenario describing two encounters while walking a dog. In this scenario, they imagined walking either their own or their neighbour's dog, either in the morning or the evening, with the dog reacting positively in one encounter and negatively in the other. Following each encounter, participants evaluated the stranger to determine how the dog's behaviour shaped their impressions.

Based on previous research suggesting that dogs' reactions can influence people's impressions (Plagemann, 2022), we hypothesised that participants' impressions of the

stranger would vary depending on the dog's reaction (H1). We expected positive dog reactions to result in more favourable impressions, whereas negative dog reactions would result in less favourable ones. Because people are inclined to be more attentive to negative information than positive information (Baumeister et al., 2001), we additionally explored whether negative reactions would have a comparatively stronger impact on impression formation.

How strongly a dog's reaction influences people's impressions of others may also depend on the extent to which people identify with the dog. As SCT highlights, social influence is stronger when people perceive others as being part of the same group (Turner et al., 1994). Accordingly, a dog's reaction may be seen as especially meaningful when the dog is viewed as part of the participant's own group, which may be more likely when walking one's own familiar dog instead of an unfamiliar one. We therefore hypothesised that the dog's reaction would have a stronger impact on impression formation in the own-dog condition compared to the neighbour-dog condition (H2).

Because social influence tends to be stronger under conditions of uncertainty (Spears, 2021) and situational uncertainty may be higher in the evening (due to darkness and fewer available social cues), we hypothesised that the dog's reaction would impact impression formation more strongly in the evening scenario compared to the morning scenario (H3).

Apart from their individual effects, we expected these factors to amplify each other. In situations of uncertainty (H3), a negative reaction (H1) from the dog may be especially influential, as it may be viewed as a sign of possible danger when few other cues are available. This influence may then become even stronger when the dog is also perceived as part of one's own group (H2). We therefore hypothesised a three-way interaction, with the effect of the dog's reaction being strongest in the own-dog, evening condition for a negative reaction (H4).

Beyond this, two exploratory hypotheses examined individual differences in responsiveness to the dog's reaction. As dog owners interact with dogs daily, they may be more familiar with and attentive to dogs' behaviour than non-owners, potentially making them more likely to rely on cues like a dog's reaction when forming impressions of others. Therefore, it was explored whether dog owners would be more strongly influenced by the dog's reaction than non-owners (H5).

Second, the role of gender was explored, as prior research suggests that women tend to be more sensitive and responsive to social and emotional stimuli (Proverbio et al., 2008). This heightened sensitivity to communicative cues may make women more attuned to dogs' reactions as socially meaningful signals. Therefore, it was explored whether women would be more strongly influenced by the dog's reaction than men (H6).

Method

Participants and Design

Participants were recruited through the University of Groningen SONA participant pool and through the researchers' personal social networks. First-year psychology students who participated through SONA received 0.7 SONA credits as compensation. Participants recruited outside SONA participated voluntarily and received no compensation. On the basis of a checklist developed by the EC-BSS at the University of Groningen, this study was exempt from full ethical review. All participants provided informed consent before participating.

The questionnaire was in English, and participants were required to have sufficient English proficiency to understand the survey. Before data collection, a target sample size was determined to ensure sufficient power to detect medium-sized effects across the experimental conditions. Given the experimental design, the aim was to recruit approximately 50 participants per between-subject condition ($N = 200$ in total). In the end, a total of 363

participants accessed the survey. Incomplete responses were excluded from the analyses (n = 73), resulting in a final sample of N = 290.

The study employed a vignette-based approach, with a 2 (dog condition: own dog vs. neighbour's dog) × 2 (situational context: morning vs. evening) × 2 (dog reaction: positive vs. negative) mixed factorial design with repeated measures on the last factor. Participants were randomly assigned to one of the four between-subject conditions. Each participant encountered two different strangers sequentially, with the dog reacting positively during the first encounter and negatively during the second encounter. The order of the within-participant manipulation (dog reaction) was fixed to ensure a coherent scenario within the vignette in which all participants experienced the same sequence of events.

Materials and Procedure

The study was conducted online using Qualtrics. After accessing the survey link, participants first read an introductory text explaining the study procedure and were asked to provide informed consent. Participants were informed about the voluntary nature of participation, the data processing procedures, and that the study aimed to examine how individuals form impressions of others. They were not told about the specific hypotheses or the content of the other experimental conditions. The full questionnaire and vignette materials can be found in Appendix C.

After providing consent, participants read a scenario in which they were asked to imagine going for a walk with a dog. Based on the assigned condition, the scenario described participants either walking their own dog or a neighbour's dog, either in the morning or the evening. In both the morning and the evening conditions, participants walked an unfamiliar route due to construction in their neighbourhood, which reduced familiarity with the surroundings, thereby likely increasing situational uncertainty. The morning and evening conditions were designed to differ in the availability of additional social cues. In the morning

condition, the scenario described daylight conditions in which the surroundings and approaching people were clearly visible. In the evening condition, visibility was reduced, making the approaching stranger only visible as a silhouette, thereby further reducing available social cues and likely increasing situational uncertainty. Apart from these differences, the scenarios were kept as similar as possible across conditions to reduce potential confounds.

During their walk, participants encountered two strangers. In the first encounter, the dog reacted positively by wagging its tail as the stranger approached, whereas in the second encounter, the dog reacted negatively by growling and positioning itself between the participant and the stranger. After each encounter, participants reported their impressions of the stranger and answered several questions regarding the dog's behaviour. They also answered questions assessing their perceived connection with the dog, their level of uncertainty about the surroundings during the walk, and their demographics. The survey also included several attention checks. Finally, all participants were asked for their thoughts on the purpose of the study before receiving a full debriefing.

Measures

To investigate the hypotheses, participants' impressions of the two strangers and their interpretation of the dog's emotional response towards the stranger were measured. Together, the measures allowed us to assess both participants' impressions of the strangers and potential processes underlying dogs' influence. Unless otherwise specified, responses were given on a seven-point Likert scale ranging from 1 (*not at all)* to 7 (*extremely)*. Perceived shared identity and perceived uncertainty regarding the situation served as manipulation checks, and several attention checks were employed to ensure the validity of the collected data.

Impressions of the Strangers

Following each vignette, several questions were asked to assess participants' impressions of the stranger in the scenario. These evaluations served as the main dependent variable in the present study and measured participants' impressions of the stranger in terms of friendliness, trustworthiness, perceived threat, suspicion, preferred distance, and fear. Participants also rated the extent to which they considered the dog's reaction to be justified.

Perception of the Dog's Emotions

The second section of questions assessed participants' interpretations of the dog's emotions within the vignette they had just read. The measures included participants' overall perception of the dog's emotional state (positive or negative) as well as six specific emotions: "happy", "angry", "fearful", "positive", "negative", and "friendly". To prevent leading effects, three positive and three negative emotion words were presented in alternating order. More generally, these items thus served as a manipulation check of the dog's reaction across the two scenarios.

Shared Identity Manipulation Check

To assess perceived shared identity with the dog, and as a manipulation check for dog condition (own vs. neighbour's dog), participants completed several adapted versions of the Overlap of Self, Ingroup, and Outgroup Scale (OSIO; Schubert & Otten, 2002). The OSIO is a single-item measure of perceived closeness, used here as an indicator of shared identity. It consists of a series of increasingly overlapping circles representing the self and the group (group being "self and the dog"), with greater overlap indicating stronger perceived closeness.

Participants completed three adapted versions of this measure: one assessing perceived closeness between the participant and the dog in the scenario, one measuring perceived closeness from the dog's perspective (i.e., how the dog would view its relationship with the

participant), and one assessing perceived closeness between humans and dogs in general (ingroup being humans, outgroup being dogs). Beyond the experimental manipulation itself, these measures allowed us to assess participants' subjective experiences of shared identity with the dog.

Following these measures, two additional exploratory items measured the extent to which participants felt their impressions of others aligned with the dog's reactions and how much they trusted the dog's judgement of unfamiliar people.

Situational Uncertainty Manipulation Check

To assess perceived situational uncertainty, which also served as a manipulation check for the morning/evening manipulation, participants completed several items regarding how they felt about their surroundings during the walk described in the vignette. These items assessed feelings of uncertainty, security, threat, reassurance provided by the dog, and vulnerability.

Demographics and Attention Checks

Participants reported gender, nationality, and age. They were also asked whether they (had) owned a dog themselves, as familiarity with dogs may influence how people interpret dogs' behaviour. Dog owners were then asked about their dog's typical behaviour and to report its size (small, medium, or large).

Three attention checks and a final seriousness check were included throughout the survey to encourage attentive responding. These items were unrelated to the study material and instructed participants to select a specific response option (e.g., "select 'somewhat'").

Data Analysis

Statistical analyses were conducted using IBM SPSS Statistics (Version 28). For all analyses, a significance level of $\alpha = .05$ was used. To examine the effects of dog condition, situational context, and dog reaction on impressions of the stranger, a mixed factorial

ANOVA was performed. In this design, dog reaction was treated as a within-subjects factor, while situational context and dog condition served as between-subjects factors. Additional correlational analyses and exploratory ANOVAs were conducted to examine the roles of dog ownership, gender, and perceived shared identity. Given the exploratory nature of these analyses, no multiple comparison corrections were applied. Therefore, the exploratory findings should be treated as preliminary and interpreted with caution.

Results

Preliminary Analyses

Scale Construction and Reliability

Before constructing the composite scales, items were recoded where necessary so that higher scores consistently reflected the intended direction of each construct. To evaluate the primary variables of interest, composite scale scores were computed for impressions of the stranger (impression), perceived emotional state of the dog towards the stranger (perceived dog emotion), and perceived situational uncertainty (surroundings). Items with low item-total correlations were excluded: "justification" from the impression scale, and "reassurance" from the surroundings scale. Internal consistency coefficients for the resulting scales are presented in Table 1.

Table 1

Reliability Analyses

Scale	Positive Reaction α	Negative Reaction α
Impression	.89	.85
Perceived Dog Emotion	.89	.71
Surroundings	.81	.83

Note. $N = 290$. α = Cronbach's alpha. Impression scale = 5 items; perceived dog emotion scale = 6 items; surroundings scale = 4 items.

Descriptive Statistics of the Main Measures

The final sample consisted of 290 participants, ranging in age from 16 to 87 years (M_{Age} = 22.46, SD_{Age} = 8.15). Sample characteristics are presented in Table 2. Descriptive statistics indicated that impression scores were generally higher following positive dog reactions (M = 3.98, SD = 1.21) than negative dog reactions (M = 2.53, SD = 0.99).

Table 2

Sample Characteristics

Variable	*n*	%
Gender		
Female	221	76.2
Male	62	21.4
Other/prefer not to say	7	2.4
Dog Ownership		
Current/former owner	151	52.1
Never owned a dog	139	47.9
Experimental Condition		
Own dog – Morning	71	24.5
Own dog – Evening	72	24.8
Neighbour's dog – Morning	72	24.8
Neighbour's dog – Evening	75	25.9

Note. N = 290.

Manipulation Checks

To examine whether participants' perception of the dog's emotions aligned with the intended scenario valence, a paired-samples t-test compared perceived emotional state of the dog following positive and negative reactions. Participants perceived the dog's emotional

response as significantly more positive following positive dog reactions ($M = 5.80$, $SD = 0.94$) than following negative dog reactions ($M = 1.91$, $SD = 0.66$), $t(289) = 48.49$, $p < .001$, $d = 2.85$, indicating a successful manipulation of the dog's response.

Similarly, to assess the shared identity manipulation, independent-samples t-tests compared the own-dog and neighbour-dog conditions on perceived shared identity measures. Participants in the own-dog condition reported significantly higher levels of perceived shared identity with the dog ($M = 4.57$, $SD = 1.35$) than those in the neighbour-dog condition ($M = 4.14$, $SD = 1.17$), $t(288) = 2.91$, $p = .004$, $d = 0.34$. They also perceived the dog as viewing its relationship with them as closer ($M = 5.78$, $SD = 1.47$) than those in the neighbour-dog condition ($M = 5.00$, $SD = 1.50$), $t(288) = 4.46$, $p < .001$, $d = 0.52$. These findings indicate that the shared identity manipulation worked as intended.

Finally, an independent-samples t-test revealed that participants in the evening condition reported significantly higher levels of uncertainty ($M = 4.72$, $SD = 1.05$) than those in the morning condition ($M = 4.16$, $SD = 1.11$), $t(288) = 4.43$, $p < .001$, $d = 0.52$, indicating a successful situational context manipulation.

Assumption Checks

Prior to performing the mixed ANOVA with impression scores as the dependent variable, the data were screened for outliers and tested for relevant assumptions (see Appendix B for detailed assumption tables and figures). Although Shapiro-Wilk tests indicated significant deviations from normality ($p < .05$), visual inspection of Q-Q plots and histograms did not reveal notable departures from normality, nor were any extreme outliers observed. Given the large sample size ($N = 290$) and general robustness of ANOVA, these deviations were not considered problematic. Levene's tests were non-significant for impression scores following both positive and negative dog reactions, indicating homogeneity of variance. The assumption of sphericity was automatically met, as the within-subjects factor

(dog reaction) consisted of only two levels. Overall, the assumptions for mixed ANOVA were considered sufficiently met to proceed with the analyses. A comparable assumption-checking procedure was performed for the exploratory analyses (detailed in Appendix B).

Main Analyses: Testing the Hypotheses

A 2 (dog condition) × 2 (situational context) × 2 (dog reaction) mixed factorial ANOVA, with repeated measures on the last factor, was conducted to examine the hypothesised effects of dog reaction (H1), dog condition (H2), situational context (H3), and their three-way interaction (H4) on impressions of the stranger (see Table 3).

Table 3

Mixed ANOVA Results for Impressions of the Stranger

Effect	$F(1, 286)$	p	η^2_p
Main Effects			
Dog's Reaction (Positive vs. Negative)	482.83	< .001	.63
Dog Condition (Own vs. Neighbour's Dog)	0.02	.899	< .001
Situational Context (Morning vs. Evening)	37.96	< .001	.12
Two-Way Interactions			
Dog's Reaction × Dog Condition	0.07	.798	< .001
Dog's Reaction × Situational Context	7.97	.005	.03
Dog Condition × Situational Context	0.07	.795	< .001
Three-Way Interaction			
Dog's Reaction × Dog Condition × Situational Context	0.02	.884	< .001

Note. $N = 290$. η^2_p = partial eta squared.

Hypothesis 1: Effect of Dog Reaction

In support of H1, a significant main effect of the dog's reaction on impression formation was observed (see Table 3): participants' impression scores were significantly higher following positive dog reactions than negative dog reactions, reflecting a large effect ($\eta^2_p = .63$).

Hypothesis 2: Effect of Dog Condition

No significant main effect of dog condition or interaction between dog reaction and dog condition was observed (see Table 3), indicating that the influence of the dog's reaction did not differ between the own-dog and neighbour-dog conditions. Thus, H2 was not supported.

Hypothesis 3: Effect of Situational Context

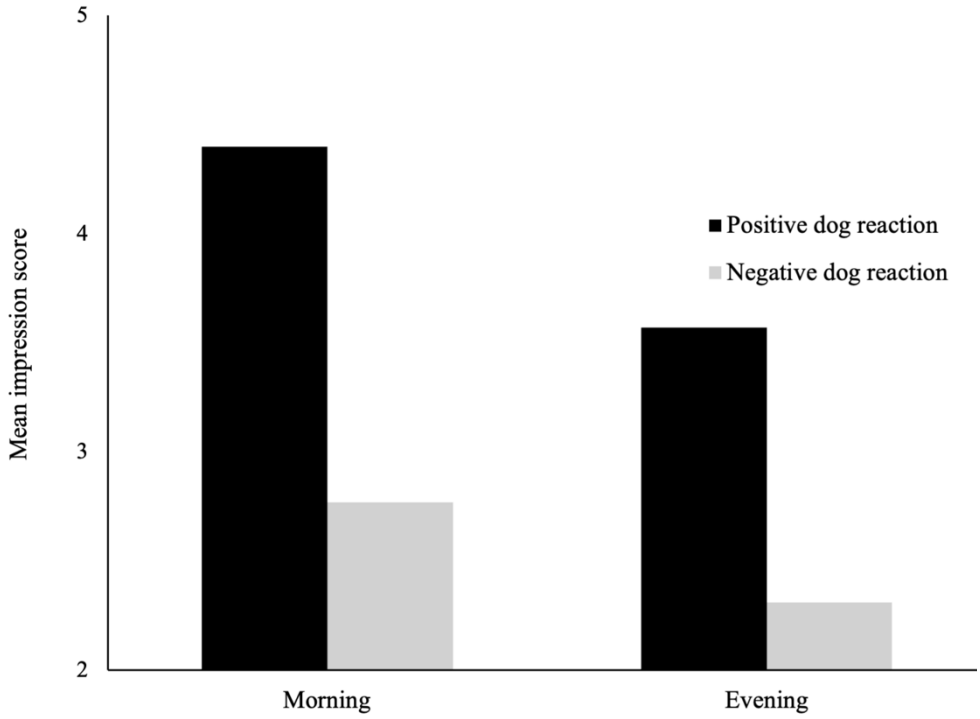
A significant main effect of situational context was observed (see Table 3), indicating that participants generally formed less positive impressions of the stranger in the evening condition ($M = 2.94$, $SD = 0.90$) than in the morning condition ($M = 3.59$, $SD = 0.89$). However, the significant interaction between dog reaction and situational context emerged in the opposite direction to what was hypothesised: the difference between positive and negative impression scores was larger in the morning ($M_{Positive} = 4.40$ vs. $M_{Negative} = 2.77$; $\Delta M = 1.63$) than in the evening ($M_{Positive} = 3.57$ vs. $M_{Negative} = 2.31$; $\Delta M = 1.26$). This indicates that the dog's reaction influenced impression scores more strongly in the morning than in the evening. Thus, H3 was not supported (see Figure 1 for a visual representation of the interaction).

Hypothesis 4: Three-Way Interaction Between Dog Reaction, Dog Condition, and Situational Context

The three-way interaction between dog reaction, dog condition, and situational context was not significant (see Table 3), providing no evidence in support of H4.

Figure 1

Mean Impression Scores by Situational Context and Dog Reaction



Note. Higher scores indicate more positive impressions of the stranger. The *y*-axis starts at 2 to better display the interaction pattern.

Hypothesis 5: Effect of Dog Ownership

Dog ownership was exploratorily included as an additional between-subjects factor. The main effect of ownership was not significant, $F(1, 282) = 0.25$, $p = .616$, $\eta^2_p < .001$, showing no overall differences in impression scores between dog owners and non-owners. However, a significant interaction emerged between dog reaction and ownership, $F(1, 282) = 5.50$, $p = .020$, $\eta^2_p = .02$: dog owners showed a larger difference between impression scores ($M_{\text{Positive}} = 4.09$ vs. $M_{\text{Negative}} = 2.50$; $\Delta M = 1.60$) than non-owners ($M_{\text{Positive}} = 3.89$ vs. $M_{\text{Negative}} = 2.60$; $\Delta M = 1.29$). These results suggest that dog ownership may moderate responsiveness to dogs' reactions, which is in line with H5.

Hypothesis 6: Effect of Gender

To examine gender differences, an exploratory ANOVA was performed; participants who selected "other" or "prefer not to say" were excluded due to small cell sizes. Although women generally reported lower impression scores than men, $F(1, 275) = 30.51$, $p < .001$, $\eta^2_p = .10$, the interaction between gender and dog reaction was not significant, $F(1, 275) = 0.48$, $p = .489$, $\eta^2_p < .01$. This indicates that the effect of the dog's reaction did not differ between men and women, providing no support for H6.

Additional Exploratory Analyses

To further explore potential processes underlying dogs' influence on impression formation, additional exploratory analyses were performed.

Stronger Association for Negative Reactions

Separate correlations revealed that perceptions of the dog's emotional response were significantly associated with impression scores for both positive and negative reactions. Consistent with the intended manipulation, perceiving the dog's emotional response as more positive was associated with more positive impressions, while more negative perceptions were associated with more negative impressions. Notably, this association was significantly stronger for negative reactions ($r = .42$, $p < .001$) than for positive reactions ($r = .17$, $p = .004$), as confirmed by a formal comparison of these dependent, non-overlapping correlations, $z = 3.05$, $p = .002$, 95% CI [.09, .41] (computed using the cocor package; Diedenhofen & Musch, 2015).

Justification of the Dog's Reaction

An exploratory mixed ANOVA examined perceived justification of the dog's reaction as the dependent variable. Results revealed a significant main effect of dog reaction, $F(1, 286) = 43.67$, $p < .001$, $\eta^2_p = .13$, with negative dog reactions being perceived as more justified than positive reactions. Moreover, a significant interaction between dog reaction and

situational context emerged, $F(1, 286) = 10.87$, $p = .001$, $\eta^2_p = .04$, indicating that negative reactions were rated as more justified relative to positive reactions in the evening ($M_{Positive}$ = 3.50 vs. $M_{Negative}$ = 4.55; $\Delta M = 1.05$) than in the morning ($M_{Positive}$ = 3.77 vs. $M_{Negative}$ = 4.12; $\Delta M = 0.35$).

Perceived Shared Identity

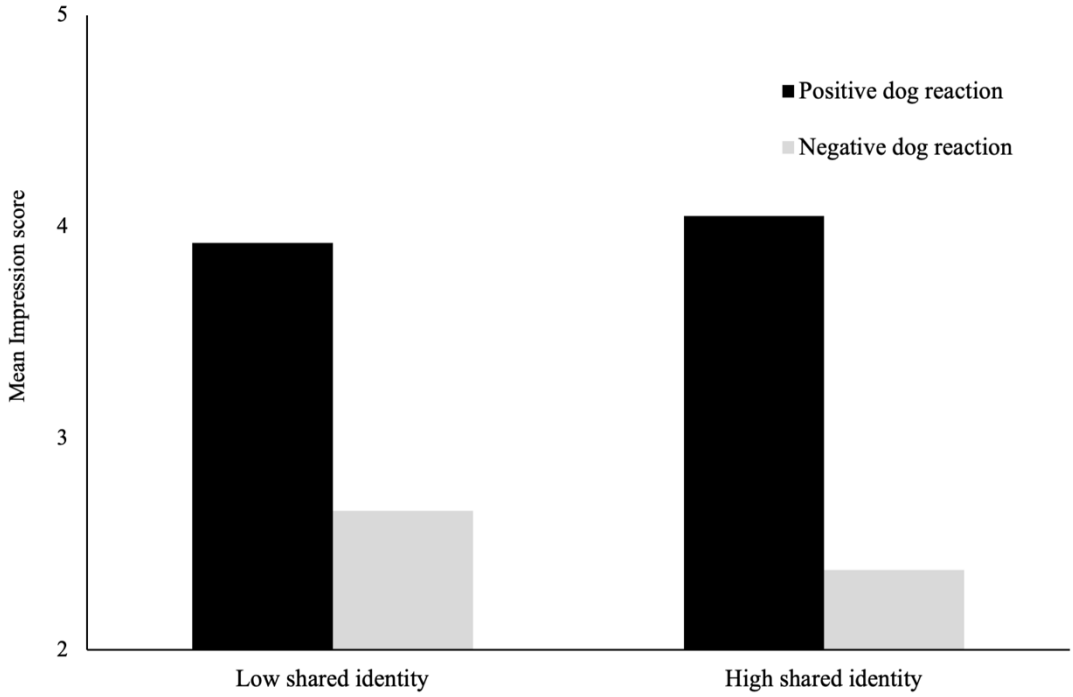
To further examine perceived shared identity as a measured variable beyond the experimental dog condition, we first computed correlations with impression scores, followed by an analysis testing its interaction with dog reaction.

Perceived shared identity with the dog was positively associated with the influence of the dog's reaction on impressions (operationalised as the difference score between positive and negative reactions; $r = .19$, $p < .001$). When examined separately by reaction type, perceived shared identity was negatively associated with impression scores following negative dog reactions ($r = -.15$, $p = .009$), indicating that stronger perceived shared identity was associated with more negative impressions of the stranger. No significant association emerged for positive reactions ($r = .06$, $p = .339$).

To explore this relationship further, the original mixed ANOVA model was rerun with perceived shared identity included as a mean-centred covariate, along with its interactions with the experimental factors. This analysis revealed a significant interaction between dog reaction and perceived shared identity, $F(1, 285) = 12.80$, $p < .001$, $\eta^2_p = .04$, indicating that the effect of perceived shared identity on impression scores differed depending on the dog's reaction. Specifically, participants with higher perceived shared identity showed larger differences between positive and negative impression scores. Figure 2 illustrates this interaction for participants with low and high perceived shared identity, defined relative to the sample mean ($M = 4.36$).

Figure 2

Mean Impression Scores by Perceived Shared Identity and Dog Reaction



Note. Higher scores indicate more positive impressions of the stranger. The *y*-axis starts at 2 to better display the interaction pattern. Low and high shared identity represent scores below and above the sample mean ($M = 4.36$), respectively. Although treated as a continuous variable in the analysis, perceived shared identity is displayed here as two categories for illustrative purposes.

Discussion

This study examined whether dogs can influence how people form impressions of strangers, and whether this influence depends on shared identity with the dog and situational uncertainty. Overall, participants evaluated strangers more positively following a positive reaction from the dog than following a negative one, indicating that dogs can meaningfully shape impressions. Contrary to expectations, this influence was not stronger in the own-dog

condition and was, unexpectedly, more pronounced in the morning than in the evening. Exploratory analyses also revealed that a stronger subjective shared identity with the dog was associated with larger differences between positive and negative impression scores. While the results thus establish that dogs can serve as meaningful social referents during impression formation, they also suggest that the processes underlying this influence are likely more complex than initially hypothesised.

Dogs as Social Sources and the Stronger Role of Negative Reactions

The findings support the hypothesis that dogs' reactions can influence how people form impressions of others, as participants consistently formed more favourable impressions of the stranger after a positive reaction from the dog than after a negative one (H1). These results are consistent with initial findings suggesting that animals can function as relevant social sources (Plagemann, 2022). They reinforce the idea that subtle reactions from dogs can meaningfully shape how people evaluate others, even within relatively brief interactions.

Exploratory analyses showed that the association between perceptions of the dog's emotional response and impressions of the stranger was significantly stronger for negative reactions than for positive ones. This pattern aligns with the negativity bias, which suggests that people generally attend more closely to, and are more strongly influenced by, negative cues rather than positive ones (Baumeister et al., 2001). In this context, a negative reaction from the dog may have been perceived as especially informative, since it could indicate danger or a lack of trustworthiness of the stranger. This heightened sensitivity to negative reactions may also reflect an evolutionary advantage, as detecting possible threats early is theorised to be adaptive for survival (Baumeister et al., 2001).

These findings should, however, be interpreted tentatively, as the present study did not include a neutral baseline. Therefore, it remains unclear whether the observed pattern

genuinely reflects a stronger effect of negative reactions, a comparatively weaker effect of positive reactions, or whether both processes operated simultaneously.

Identity and Information as Two Pathways to Dogs' Influence

Contrary to expectations, the dog's reaction did not have a stronger influence in the own-dog condition compared to the neighbour-dog condition (H2). Although participants in the own-dog condition reported a stronger sense of shared identity with the dog, this did not translate into differences in overall impression scores or in the extent to which positive and negative dog reactions shaped these impressions.

From a Self-Categorization perspective, at least two explanations may account for this. First, participants in the neighbour-dog condition may already have experienced a similar degree of shared identity with the dog, based on common perceptions of dogs as loyal and close companions (Reid, 2009; Turcsán et al., 2025). If dogs are generally perceived as ingroup members regardless of ownership, both conditions may have reached a similar ingroup threshold, making it difficult for meaningful differences between them to emerge.

Alternatively, the own-dog manipulation alone may not have been sufficient to evoke identity-based social influence. This effect may depend more on whether individuals subjectively experienced a sense of shared identity with the dog, rather than on the objective relationship to the dog (Hogg, 2000; Turner et al., 1994). Exploratory analyses were consistent with this interpretation, as stronger subjective shared identity was associated with a more pronounced influence of the dog's reaction. This may highlight the importance of subjective experiences of group membership over objective categorisation in identity-based influence. Notably, the association between subjective shared identity and impression scores appeared to be stronger for negative dog reactions than for positive ones. This suggests that participants who reported a greater sense of shared identity with the dog may have been more likely to perceive its negative reactions as particularly informative when evaluating the

stranger, further aligning with the previously mentioned negativity bias. It should be emphasised that this identity-based interpretation rests on exploratory, correlational analyses with modest effect sizes rather than on the planned manipulation, and should therefore be interpreted cautiously.

The current findings also suggest that identity-based processes alone may not fully explain dogs' influence on impression formation. Instead of being guided primarily by a sense of "we" with the dog, participants may have more generally trusted the dog's judgement as an informational cue, inferring what the dog perceived about the stranger rather than relying on a sense of shared identity. After all, dogs are widely perceived as socially attuned companions that are sensitive to typically human social cues (Kotrschal, 2023; Reid, 2009), and people tend to attribute intentions and feelings to their behaviour rather than dismissing it as merely instinctive (Molinaro & Wynne, 2025; Tami & Gallagher, 2009).

These perspectives do not necessarily rule each other out. Rather than reflecting a purely identity-based or informational mechanism, the findings suggest that dogs' influence on impression formation may reflect an interplay between both processes. Separating these two mechanisms therefore remains challenging, as both may be at play simultaneously and rest on overlapping processes when making sense of the dog's reaction.

Situational Context and the Salience of Dogs' Reactions

The hypothesis that the dog's reaction would influence impressions more strongly in the evening condition than the morning condition was not supported (H3). Although participants generally evaluated the stranger more negatively in the evening, the influence of the dog's reaction was, unexpectedly, larger in the morning.

Rather than strengthening the effect of the dog's reaction, the evening context itself may have already elicited greater caution and vigilance, leaving less room for the dog to further influence participants' impressions. This aligns with prior research suggesting that

nighttime contexts alone are generally associated with increased fear and threat perception (Kummeneje & Rundmo, 2019; McGlashan et al., 2021). Another possibility is that in the evening, participants may have been more likely to attribute the dog's reaction to the potentially threatening environment. For example, they may have interpreted the dog's growling as a sign that it was unsettled by the dark, or as a reaction to something in the environment that they themselves could not see (e.g., a cat crossing the street), rather than as a reaction specifically aimed at the stranger.

However, the exploratory justification analyses challenge this environmental-attribution interpretation, as negative dog reactions were perceived as more justified relative to positive reactions in the evening than in the morning. If participants had dismissed the negative reaction from the dog as a mere response to the threatening surroundings, this pattern would arguably not have emerged. It seems more likely that the evening threat itself was already so salient that the dog's reaction merely confirmed what participants already felt, instead of providing new information to shape their impressions. Conversely, in the morning, a negative reaction may have represented a clearer violation of expected safety. Consistent with research on expectancy violations, unexpected cues tend to receive more attention during impression formation (Van der Zanden & Schouten, 2024). Applied to the present study, a negative reaction from the dog may have been more noticeable and unexpected in a low-threat morning context, possibly explaining the larger difference between positive and negative impression scores observed.

Together, these interpretations suggest that the situational context played a broader role than initially expected. Rather than simply making participants more reliant on the dog's reaction under uncertain conditions, the context may have more generally influenced how noticeable and informative that reaction appeared in the first place.

Collectively, these findings also provide little support for the proposed three-way interaction, which predicted that the influence of the dog's reaction would be strongest for a negative reaction when participants were walking their own dog in the evening (H4). Since neither the own-dog condition nor the evening context alone increased the influence of the dog's reaction, it is not surprising that their combination also did not produce a stronger effect. Instead, the findings suggest that dogs' influence on impression formation depends less on this specific combination of shared identity and situational uncertainty than initially hypothesised.

Individual Differences in Responsiveness to Dogs' Reactions

Exploratory analyses revealed that dog owners were more strongly influenced by the dog's reaction when forming impressions of the stranger, as shown by the larger differences between positive and negative impression scores (H5). A possible explanation is that owners may become more attentive to dogs' behavioural cues through frequent and emotionally meaningful interactions with their own dogs. Since dog owners tend to perceive their dogs as close social companions, comparable to family members (Turcsán et al., 2025), they may generally be more likely to interpret dogs' reactions as salient social cues when forming impressions.

Contrary to expectations, no gender differences were observed in the influence of the dog's reaction (H6). Although women generally formed more negative impressions of the strangers, the impact of the dog's reaction itself did not differ significantly between genders. This may suggest that women approached the stranger with greater overall caution, rather than relying more strongly on the dog's reaction when forming impressions. This aligns with broader research suggesting that women generally perceive unfamiliar individuals and situations as more threatening and unsafe than men do (Rotem-Mindali, 2025). However, both

individual-difference findings should be interpreted cautiously, given their exploratory nature, relatively small effect sizes, and the small proportion of male participants (21.4%).

Strengths and Limitations

A strength of the present study was the controlled experimental design, which allowed the direct manipulation of the dog's reaction, situational context, and relation to the dog to examine their effects on impression formation. This kept conditions consistent and minimised possible confounding variables, while the successful manipulation checks further supported the study's internal validity. Additionally, the relatively large sample size increased statistical power and strengthened the robustness of the findings.

Despite these strengths, the vignette-based design relied on hypothetical written scenarios rather than real-life interactions. Participants may respond differently during actual encounters involving dynamic social cues or immediate feelings of threat that are difficult to capture in text. Moreover, the sample consisted predominantly of women and young psychology students, which may further limit the generalisability. Additionally, the within-subjects factor (dog reaction) order was fixed rather than counterbalanced in the present study. While this created a coherent narrative within the scenario, it also prevented dog reaction effects from being fully disentangled from order effects. Specifically, always encountering the positive reaction first may have made the subsequent negative reaction stand out more strongly in comparison, possibly influencing impression scores.

A final important limitation concerns the operationalisation of shared identity. Although the "own dog" manipulation increased reported shared identity, it did not result in a stronger impact of the dog's reaction on impression formation. Merely labelling a dog as one's "own" may thus have been insufficient to evoke a strong enough sense of shared identity, or both conditions reached comparable levels of shared identity regardless of

ownership. The lack of an effect of the own-dog condition may therefore reflect limitations of the manipulation itself, rather than an overall absence of identity-based influence processes.

Implications and Future Research

Despite these limitations, the present study offers theoretical insights into how social influence may extend beyond exclusively human interactions. The findings indicate that, in situations with limited information, individuals may rely not only on "human" social cues but also on dogs' behavioural responses. Additionally, the exploratory results point to subjective experiences of shared identity as a potentially meaningful factor in dogs' influence on impression formation. This suggests that such identification processes are worth studying to better understand social influence involving animals, as the way people experience their relationship with an animal may be more critical than the objective nature of that relationship itself. Should these exploratory patterns hold in real-world settings, they may also have practical implications for working or assistive human-animal partnerships. Specifically, fostering a strong psychological bond with the animal may shape the extent to which people notice and rely on its behavioural responses in social situations.

At the same time, the findings suggest that dogs influence impression formation through mechanisms beyond shared identity. Rather, subjective shared identity and informational interpretations of the dog's behaviour may work together in shaping social evaluations. Future research should examine these mechanisms more directly. In particular, studies could aim to separate identity-based and informational mechanisms by independently manipulating shared identity with the dog and the extent to which the dog's reaction is presented as a reliable source of information about the stranger. To manipulate the latter, researchers could explicitly describe the dog as good at sensing danger versus as easily distracted and unreliable. Such research could help clarify under which conditions people rely on animals as informative cues and when animals become included in a shared sense of "we".

Finally, extending the current research to different animal species, such as cats, may help determine whether the observed effects were specific to dogs or whether they reflect broader dynamics underlying human-animal social cognition. Given that Plagemann (2022) initially found that cats tended to be less influential than dogs, such comparisons could further shed light on which characteristics, such as perceived social responsiveness or group loyalty, make certain animals more likely to function as social referents.

Conclusion

The present study indicates that dogs' reactions can influence how people form impressions of others. Although the hypothesised effects of walking one's "own" dog and situational uncertainty were not supported, the findings highlight that subjective identification processes may play an important role, possibly operating alongside more general informational interpretations of dogs' behaviour. Ultimately, while the underlying mechanisms are complex, the findings suggest that dogs can indeed function as socially meaningful referents that shape how people perceive others and navigate their social world.

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Appendix A

Use of AI

This appendix details the use of AI tools during the preparation of this thesis, following the BSS faculty guidelines. No content generated by AI was presented as the author's own work. All arguments, analyses, interpretations, and conclusions were developed independently by the author. Table A1 provides an overview of the AI use.

Language Correction (Grammarly)

Grammarly was used for grammar and spelling correction, as English is not the author's first language.

Feedback on Writing (Claude, Anthropic)

Claude was used to provide feedback on the structure and wording of the abstract, introduction, results, and discussion sections, including suggestions to improve overall flow and clarity. All arguments and content were developed independently by the author. Suggestions were critically reviewed and, where used, integrated in a modified form rather than copied.

SPSS Syntax Assistance (ChatGPT, OpenAI)

ChatGPT was used to assist with SPSS syntax during data preparation, including recoding variables and troubleshooting syntax errors. No data were entered into the tool; the assistance concerned syntax and coding logic in general. All decisions regarding which variables to recode and how they were recoded were made by the author. AI tools were not used to generate conclusions or interpretations of results. Each suggestion was critically reviewed and verified before use.

Table A1

Overview of AI Tool Use

Example prompt	Used AI tool	Summary of the output	Processing of output
"Could you give critical feedback on this section according to the grading form"	Claude	General feedback on the clarity of sentences and correctness of APA style. Additionally, the AI tool pointed out weaker or unclear parts per section.	This output was used to check for weak or missing points. Some suggestions were used in a modified form, after critical review. For example, the AI tool indicated that an argument in the introduction was not yet clear to someone new to the topic, after which the author agreed and decided to further elaborate on the section.
"Can you help make this paragraph shorter without losing important content?"	Claude	A shortened version of the paragraph.	The author decided what to keep and reworded the shortened version. For example, a paragraph in the discussion was condensed after the AI tool indicated that it was too long, while the author's own argument and phrasing were retained.
"What could produce this type of error in a recode command, and what should I check?"	ChatGPT	General explanation of common causes of the error and what to look for in the syntax, without access to the data itself.	No data were entered into the tool; questions concerned the syntax and coding logic in general. The author checked the suggestions against the actual data in SPSS and made all recoding decisions independently.

Note. All arguments, analyses, interpretations, and conclusions were developed independently by the author.

Appendix B

Assumption Checks

Table B1

Normality Tests for Standardised Residuals - Main Analysis

Reaction scenario	Shapiro-Wilk *W*	*df*	*p*
Positive reaction	.99	290	.029
Negative reaction	.97	290	< .001

Note. Visual inspection of Q-Q plots and histograms indicated no notable deviations from normality.

Figure B1

Histogram of Standardised Residuals for Positive Reaction Impression Scores

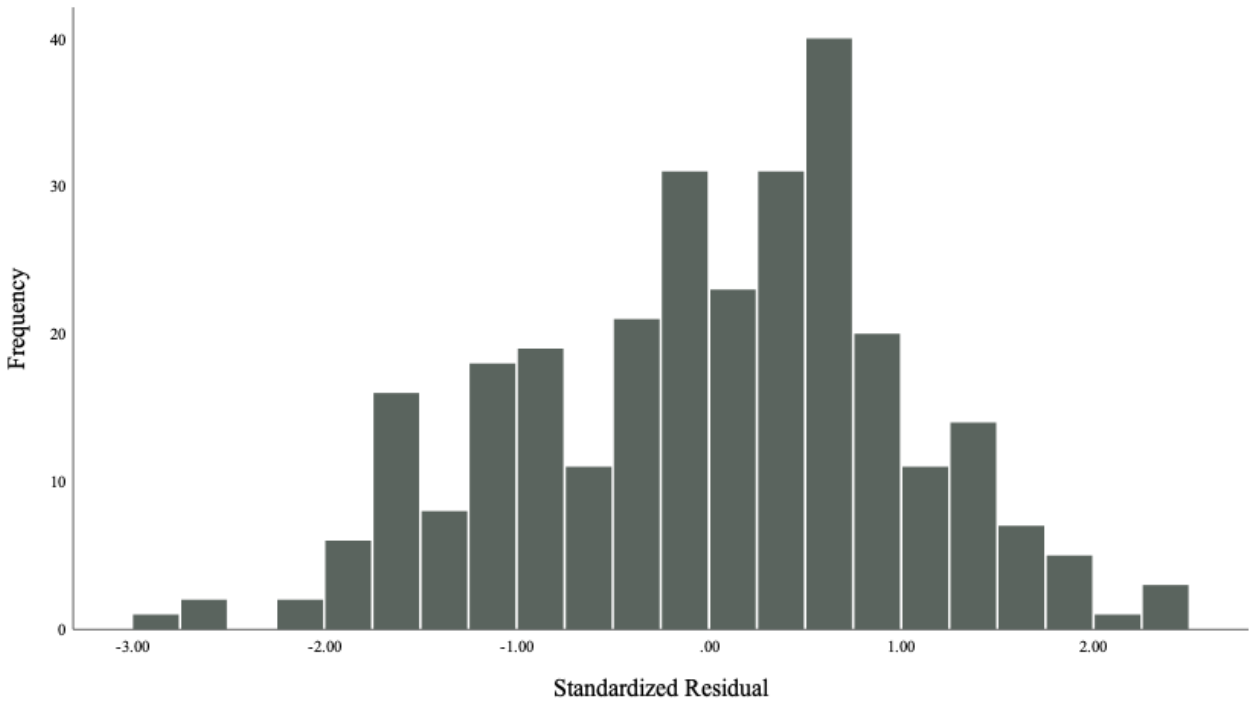


Figure B2

Normal Q-Q Plot of Standardised Residuals for Positive Reaction Impression Scores

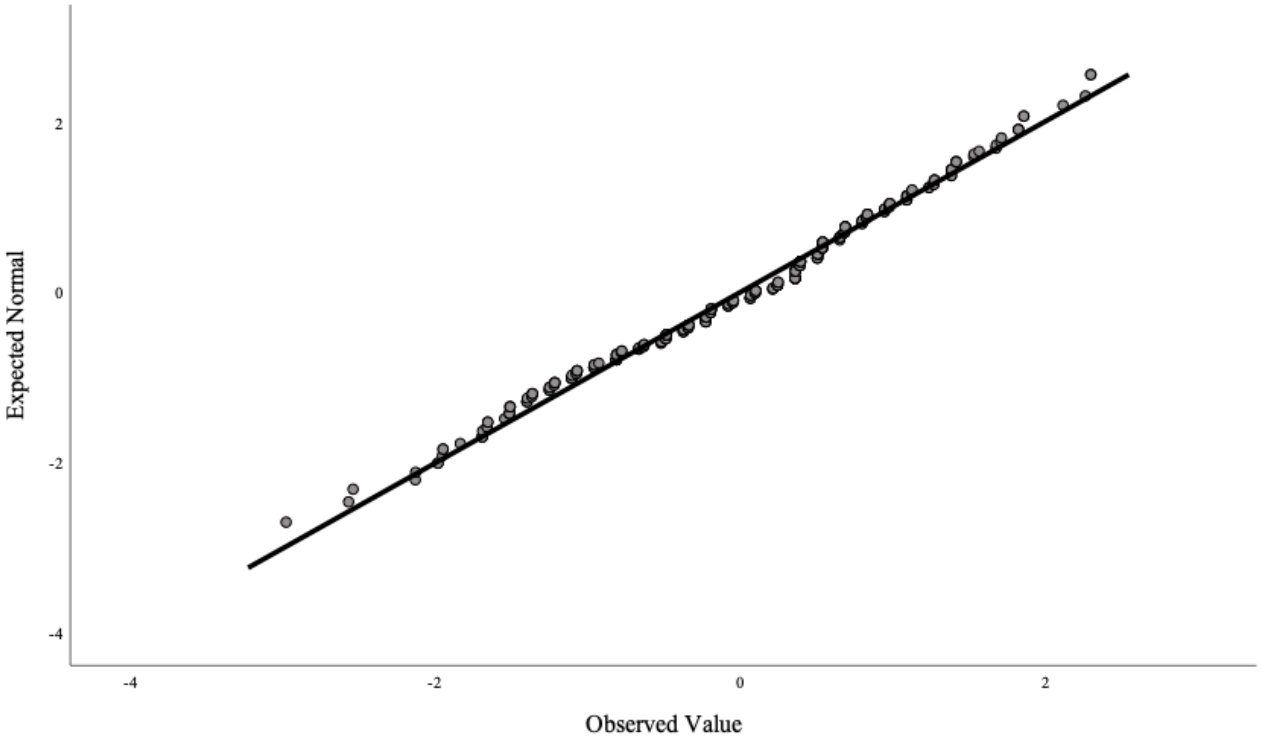


Figure B3

Histogram of Standardised Residuals for Negative Reaction Impression Scores

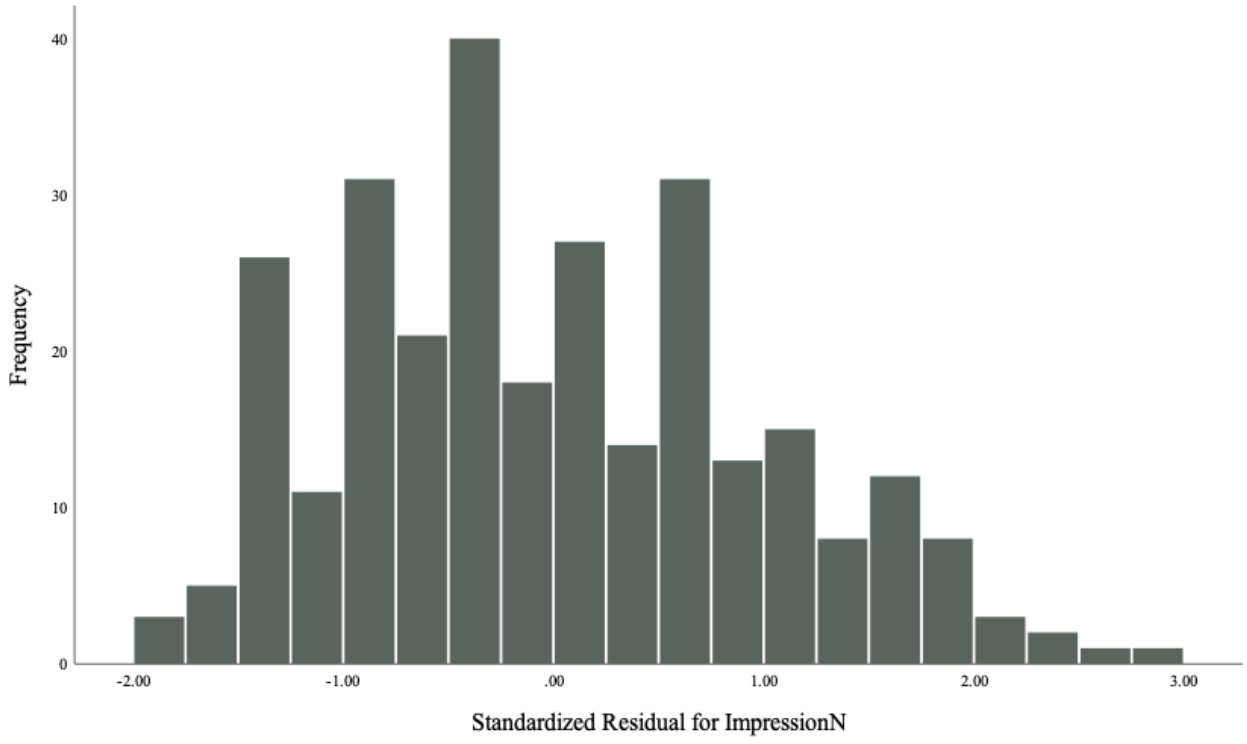


Figure B4

Normal Q-Q Plot of Standardised Residuals for Negative Reaction Impression Scores

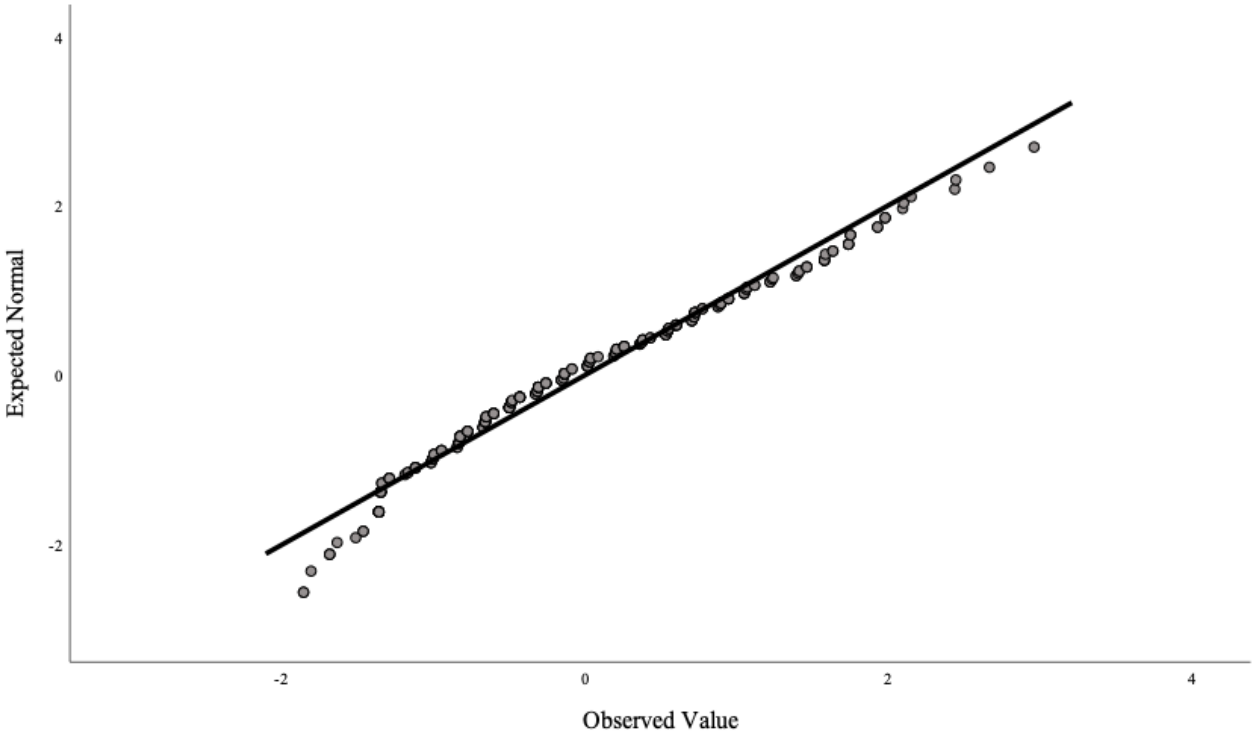


Table B2

Levene's Test for Homogeneity of Variance - Main Analysis

Reaction scenario	*Levene Statistic*	*df1*	*df2*	*p*
Positive reaction	0.42	3	286	.736
Negative reaction	0.50	3	286	.681

Note. Homogeneity of variance was met for impression scores in both the positive and negative reaction scenarios.

Table B3

Normality Tests for Standardised Residuals - Ownership Exploratory Analysis

Reaction scenario	Shapiro-Wilk *W*	*df*	*p*
Positive reaction	.98	290	< .001
Negative reaction	.97	290	< .001

Note. The Shapiro–Wilk test indicated departures from normality for the impression scores in the ownership exploratory analysis. However, visual inspection of the histograms and Q-Q plots did not reveal severe deviations from normality or problematic outliers. Given the large sample size and the robustness of ANOVA to tolerate mild violations, the analysis was considered appropriate.

Table B4

Levene's Test for Homogeneity of Variance - Ownership Exploratory Analysis

Reaction scenario	*Levene Statistic*	*df1*	*df2*	*p*
Positive reaction	0.22	1	288	.635
Negative reaction	0.02	1	288	.895

Note. Homogeneity of variance was met for impression scores in both the positive and negative reaction scenarios.

Table B5

Normality Tests for Standardised Residuals - Gender Exploratory Analysis

Reaction scenario	Shapiro-Wilk *W*	*df*	*p*
Positive reaction	.98	283	< .001
Negative reaction	.98	283	< .001

Note. The Shapiro–Wilk test indicated departures from normality for the impression scores in the gender exploratory analysis. However, visual inspection of the histograms and Q-Q plots did not reveal severe deviations from normality or problematic outliers. Given the relatively large sample size and the robustness of ANOVA to tolerate mild violations, the analysis was considered appropriate.

Table B6

Levene's Test for Homogeneity of Variance - Gender Exploratory Analysis

Reaction scenario	*Levene Statistic*	*df1*	*df2*	*p*
Positive reaction	1.09	1	281	.298
Negative reaction	0.16	1	281	.695

Note. Homogeneity of variance was met for impression scores in both the positive and negative reaction scenarios.

Table B7

Normality Tests for Standardised Residuals - Justification Exploratory Analysis

Reaction scenario	Shapiro-Wilk *W*	*df*	*p*
Positive reaction	.97	290	< .001
Negative reaction	.98	290	< .001

Note. The Shapiro–Wilk test indicated departures from normality for the justification scores in the exploratory analysis. However, visual inspection of the histograms and Q-Q plots did not reveal severe deviations from normality or problematic outliers. Given the relatively large sample size and the robustness of ANOVA to tolerate mild violations, the analysis was considered appropriate.

Table B8

Levene's Test for Homogeneity of Variance - Justification Exploratory Analysis

Reaction scenario	*Levene Statistic*	*df1*	*df2*	*p*
Positive reaction	0.62	3	286	.600
Negative reaction	0.32	3	286	.809

Note. Homogeneity of variance was met for justification scores in both the positive and negative reaction scenarios.

Table B9

Normality Tests for Standardised Residuals - Shared Identity Covariate Analysis

Reaction scenario	Shapiro-Wilk *W*	*df*	*p*
Positive reaction	.99	290	.023
Negative reaction	.98	290	< .001

Note. The Shapiro–Wilk test indicated departures from normality for the impression scores in the covariate analysis. However, visual inspection of the histograms and Q-Q plots did not reveal severe deviations from normality or problematic outliers. Given the relatively large sample size and the robustness of ANOVA to tolerate mild violations, the analysis was considered appropriate.

Table B10

Levene's Test for Homogeneity of Variance - Shared Identity Covariate Analysis

Reaction scenario	*Levene Statistic*	*df1*	*df2*	*p*
Positive reaction	0.50	3	286	.680
Negative reaction	0.56	3	286	.642

Note. Homogeneity of variance was met for impression scores in both the positive and negative reaction scenarios.

Appendix C

Full Questionnaire[2]

Informed consent & research information

Information and Informed Consent for the Study:

"Pet Detective: A Walk on the Dog's Side."

Research Code: PSY-2526-S-0247

You received this information because you are invited to participate in a research study investigating how people form impressions of others, based on little available information. For this study, it is recommended that you use a desktop computer or a laptop, as those devices ensure that the contents will be appropriately displayed, but it is also possible to participate via a mobile phone.

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Aim of the study:

The study aims to better understand impression formation of others, based on little available

[2] This questionnaire is an adapted version of one developed by a previous thesis group supervised by Prof. Dr. Russell Spears. The original was provided by our supervisor, who approved its use and adaptation, and it was subsequently modified to align with the design and research aims of the present study.

information.

Procedure:

You will be presented with two scenarios and answer a few questions about these situations (e.g. what you would feel in those situations). It is crucial to the successful completion of the study that you read the short descriptions of the situations completely and carefully. In the end, you are asked to provide some demographic information (e.g. your gender).

You should complete this study in one go (without interruptions) when you are on your own.

We kindly ask you to respond to all questions by providing the answer that best represents your opinion, thoughts, or feelings. There are no right or wrong answers.

This study takes approximately 20 minutes.

There are no risks associated with participating in this study.

Compensation:

If you are participating in the SONA programme as a student, you will receive 0.7 SONA Credits for participating in this study.

Participation is voluntary:

Participating in this study is completely voluntary. It is your choice whether to participate or not. You have the right to decline to participate and withdraw from the research at any time without having to provide any reasons. Withdrawing from this research does not entail any negative consequences.

Types of data collected

This is a list of sensitive measures you will encounter in this survey. Note that you can always leave the study at any time.

Personal data

Directly identifiable personal data:

- location data (i.e., IP addresses)

Indirectly identifiable personal data:

- SONA Number, Gender, Dog Ownership, Age

Your privacy and personal data:

The data that will be collected during this study will be treated confidentially. Data processing takes place for education/training purposes, to write a Bachelor thesis. The data will only be handled by the Researchers. Your SONA number will be recorded in this study to allow compensation. Information that could identify you as a person, such as your SONA number, will be removed after assigning you the credit and won't be shared with other researchers. Thus, only anonymized data might be disseminated such that your anonymity is guaranteed. This means that research data that may be published, for example in scientific journals, cannot identify you.

In sum: as soon as you have received your credit we will remove the SONA identifier so that your data are no longer practically traceable to you (i.e. as far as possible anonymous).

More information:

If you have any questions about this research, you can contact the researchers: Danique Ritsema, (d.ritsema@student.rug.nl), Minxuan Wang (m.wang.39@student.rug.nl), Pola Michnowska (p.michnowska@student.rug.nl), Veerle (g.t.a.bril@student.rug.nl), Yva de Kroon, (y.a.de.kroon@student.rug.nl), Annick Vorstenbosch (a.s.vorstenbosch@student.rug.nl). If you have any complaints about this research, you can contact the Ethics Committee of the Psychology department of the University of Groningen via ecp@rug.nl mentioning the research code PSY-2526-S-0247.

By participating in this research, you indicate that you are doing this on a voluntary basis. You also consent to the use of your data for the purposes that have been mentioned here.

If you have read the above and agree to participate in the study, please answer "Yes" to

begin the study. If you do not consent or want to withdraw, you can quit the questionnaire without any consequences.

- Yes, I have read the information and consent to the processing of my data as mentioned in the research above. (1)

Introduction

Dear participant,

Welcome to our research!

In this study, we aim to better understand how people form impressions of others. We live in a world surrounded by people, of whom we often form impressions. These impressions are often based on little information, yet they shape our interactions and influence our daily experiences. To gain a better understanding of the underlying processes of this, we are researching different aspects of impression formation. Throughout the study, you will receive scenarios to read through, then some questions based on them.

For a meaningful contribution, we kindly ask you to **read all the information carefully** before answering the questions.

Thank you for your time and cooperation.

Conditions

Scenario 1: Own dog/Morning (positive reaction from the dog)

Please read the following text in depth.

Imagine that you are going on a walk with your own dog, as you've done countless times before. As you walk to the door, it is already excited for your walk together. Your dog waits patiently as you put on your shoes and coat, knowing your routine. You get the leash and the two of you head out together.

You step out the door and look outside. It is quite early in the morning; the sun is already up and there are people out and about. Because of construction in your neighbourhood, you are unable to take the usual route you take when going for a walk. Wanting to not get lost, you decide to use Google Maps, which generates a new route that you've never taken before. After walking for a while, you realise that the route has taken you to a much less populated area. There seems to be no one around. As you round the corner, you notice a man walking straight towards you. You've never seen this person before. It's easy to see his face in the daylight. When he gets close, your dog perks up and starts wagging its tail, bowing down in a show of playfulness.

Scenario 2: Own dog/Evening (positive reaction from the dog)

Please read the following text in depth.

Imagine that you are going on a walk with your own dog, as you've done countless times before. As you walk to the door, it is already excited for your walk together. Your dog waits patiently as you put on your shoes and coat, knowing your routine. You get the leash and the two of you head out together.

You step out the door and look outside. It is quite late in the evening; the sun has gone down and from what little you can see, very few people are still outside. Because of construction in your neighbourhood, you are unable to take the usual route you take when going for a walk. Wanting to not get lost, you decide to use Google Maps, which generates a new route that you've never taken before.

After walking for a while, you realise that the route has taken you to a much less populated area. There seems to be no one around. As you round the corner, you notice a man walking straight towards you. Because of the lack of light, you can only really make out his silhouette, but you don't think you've seen this person before.

When he gets close, your dog perks up and starts wagging its tail, bowing down in a show of playfulness.

Scenario 3: Neighbour's dog/Morning (positive reaction from the dog)

Please read the following text in depth.

Your neighbour has injured their leg and asked you to walk their newly adopted dog. You've never met this dog before, but you've walked other dogs before and you want to help your neighbour, so you agree. Your neighbour gives you the leash and you go on your walk.

You step out the door and look outside. It is quite early in the morning; the sun is already up and there are people out and about. Because of construction in your neighbourhood, you are unable to take the usual route you take when going for a walk. Wanting to not get lost, you decide to use Google Maps, which generates a new route that you've never taken before.

After walking for a while, you realise that the route has taken you to a much less populated area. There seems to be no one around. As you round the corner, you notice a man walking straight towards you. You've never seen this person before. It's easy to see his face in the daylight.

When he gets close, the dog perks up and starts wagging its tail, bowing down in a show of playfulness.

Scenario 4: Neighbour's dog/Evening (positive reaction from the dog)

Please read the following text in depth.

Your neighbour has injured their leg and asked you to walk their newly adopted dog. You've never met this dog before, but you've walked other dogs before and you want to help your neighbour, so you agree. Your neighbour gives you the leash and you go on your walk.

You step out the door and look outside. It is quite late in the evening; the sun has gone down and from what little you can see, very few people are still outside. Because of construction in your neighbourhood, you are unable to take the usual route you take when going for a walk.

Wanting to not get lost, you decide to use Google Maps, which generates a new route that you've never taken before.

After walking for a while, you realise that the route has taken you to a much less populated area. There seems to be no one around. As you round the corner, you notice a man walking straight towards you. Because of the lack of light, you can only really make out his silhouette, but you don't think you've seen this person before.

When he gets close, the dog perks up and starts wagging its tail, bowing down in a show of playfulness.

Questions After Each Scenario

Control question - How does the dog react?

- Positively (1)
- Negatively (2)

Judgement	Please answer how you feel towards the stranger in this situation. (7-point scale: not at all to extremely) • Would you trust the stranger? • Would you be suspicious of the stranger? • Would you perceive the stranger to be friendly? • Would you feel threatened by the stranger? • Would you be afraid of the stranger? • Would you keep your distance from the stranger? • Would you think your dog's reaction to the stranger is justified?

Perceived emotion of the dog towards the stranger	How do you think your dog feels towards the stranger in this situation? (7-point scale: not at all to extremely) • Happy • Angry • Fearful • Positive • Negative • Friendly
Perceived emotion of the participant towards the dog	How do you feel towards your dog in this situation? (7-point scale: not at all to extremely) • Happy • Disappointed • Worried • Curious • Surprised • Angry
Perception of Dog's Feelings	Please answer the following questions regarding your perception of the dog's feeling (7-point scale: not at all to extremely) • Do you understand the feelings of the dog? • Do you share the feelings of the dog? • How easy is it for you to take the perspective of the dog in this situation?

Perception of Your Surroundings	During this part of your walk, how do you feel about your surroundings? (7-point scale: not at all to extremely) • I feel uncertain • I feel secure • I feel threatened • I feel reassured by the dog • I feel vulnerable

Intermission (introduction of the negative reaction from the dog, text for your dog's condition)

The man briefly glances at your dog but does not interact and continues walking. Your dog looks at him as he walks away, still wagging its tail. After this encounter, the two of you continue your walk along the route. You look around and still see no other people. Being unfamiliar with this route, you open Google Maps to check where to go next.

After a few more minutes, you notice another man you've never seen before walking towards you. When he gets close, your dog starts growling. You notice your dog's hairs stand upright as it gets closer to you, standing in between you and the stranger. It does not leave your side.

Intermission (introduction of the negative reaction from the dog, text for the neighbour's dog condition)

The man briefly glances at the dog but does not interact and continues walking. The dog looks at him as he walks away, still wagging its tail. After this encounter, the two of you continue your walk along the route. You look around and still see no other people. Being unfamiliar with this route, you open Google Maps to check where to go next.

After a few more minutes, you notice another man you've never seen before walking towards you. When he gets close, the dog starts growling. You notice the dog's hairs stand upright as it gets closer to you, standing in between you and the stranger. It does not leave your side.

Questions After Each Scenario

How does the dog react?

- Positively (1)
- Negatively (2)

Judgement	Please answer how you feel towards the stranger in this situation. (7-point scale: not at all to extremely) • Would you trust the stranger? • Would you be suspicious of the stranger? • Would you perceive the stranger to be friendly? • Would you feel threatened by the stranger? • Would you be afraid of the stranger? • Would you keep your distance from the stranger? • Would you think your dog's reaction to the stranger is justified?
Perceived emotion of the dog towards the stranger	How do you think your dog feels towards the stranger in this situation? (7-point scale: not at all to extremely) • Happy • Angry • Fearful • Positive • Negative • Friendly

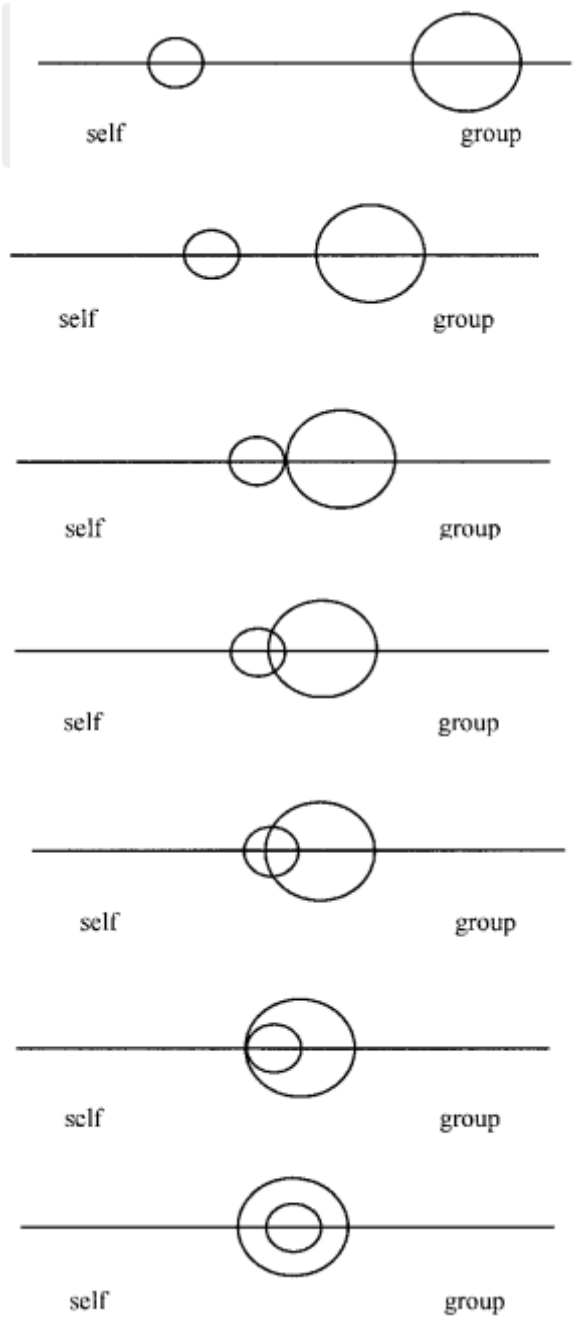
Perceived emotion of the participant towards the dog	How do you feel towards your dog in this situation? (7-point scale: not at all to extremely) • Happy • Disappointed • Worried • Curious • Surprised • Angry
Perception of Dog's Feelings	Please answer the following questions regarding your perception of the dog's feelings (7-point scale: not at all to extremely) • Do you understand the feelings of the dog? • Do you share the feelings of the dog? • How easy is it to you to take the perspective of the dog in this situation?
Perception of Your Surroundings	During this part of your walk, how do you feel about your surroundings? (7-point scale: not at all to extremely) • I feel uncertain • I feel secure • I feel threatened • I feel reassured by the dog • I feel vulnerable

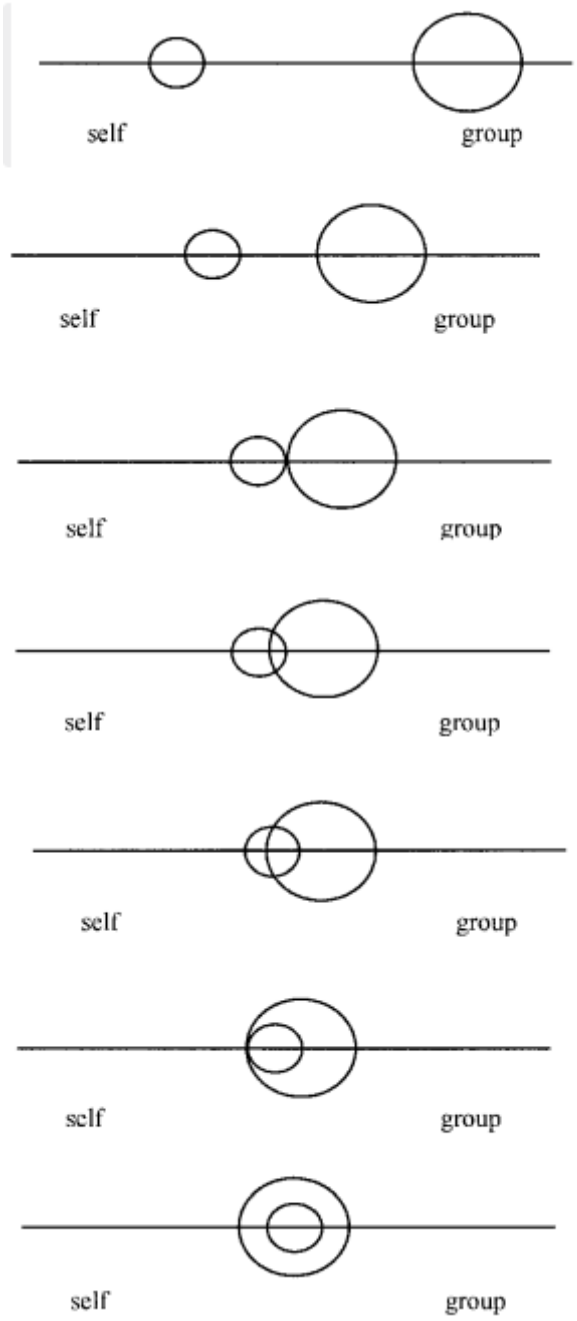
Text afterwards

The man briefly glances at the dog but does not interact and continues walking. The dog looks back at the man until he is a good distance away. Then the dog relaxes, and you continue walking. After a while, you reach the end of the route and walk back to your neighbour's house. You give the dog back to your neighbour and return home.

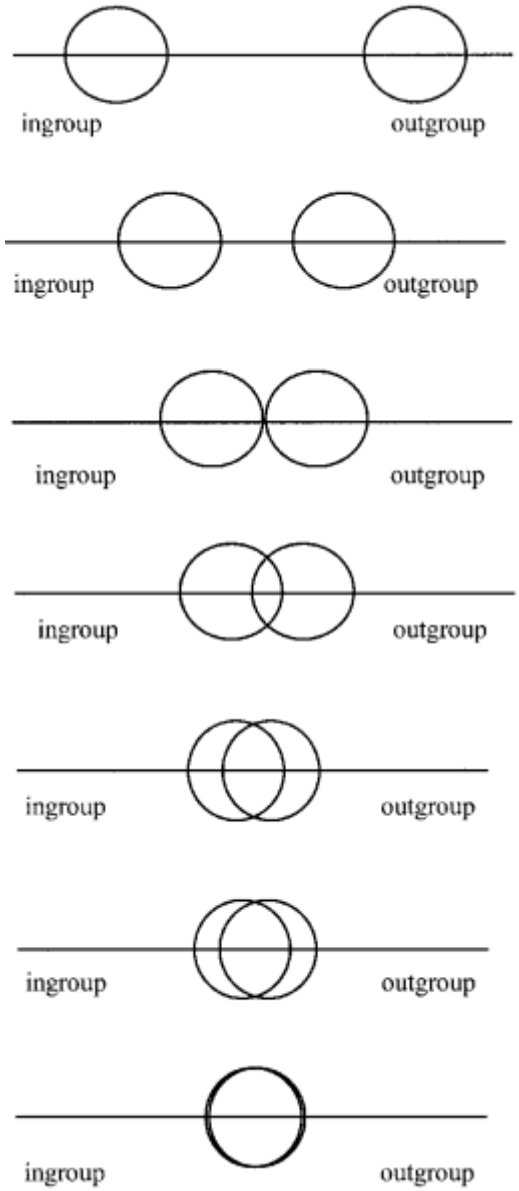
Shared identity and ToM

Shared Identity Question 1	People who have a dog often develop a close bond with them. In this sense, they may see themselves and the dog as part of a shared social group (e.g., "me and the dog"). The images below represent different levels of closeness in a human-dog relationship, with greater overlap symbolizing a stronger sense of closeness. In the context of the scenarios you just read, how would you best describe the relationship between you and the dog? Self being *you*, Group being *you and the dog*. Please choose the image that best describes **your relationship with the dog** in this scenario. Self being *you*, Group being *you* and *the dog*.

	
ToM question 1	We now want you to take **the dog's perspective** and imagine how they think. The images below represent different levels of closeness in a human-dog relationship, with greater overlap symbolizing a stronger sense of closeness. In the context of the scenarios you just read, how would you

	best describe how **the dog** views the relationship between itself and you? Self being *the dog*, Group being *the dog and you*. From the dog's perspective, how do you think **the dog** views the relationship between itself and you? Self being *the dog*, Group being *the dog and you* 

Shared Identity Global Question 2	Some people consider dogs to be quite close to humans while others do not. The images below represent different levels of closeness in a human-dog relations, with greater overlap symbolizing a stronger sense of closeness between the two species. This time, think about humans and dogs **in general.** What is your perception of the closeness between humans and dogs? Ingroup being *Humans*, and Outgroup being *Dogs.* Please choose the image that best describes how you perceive the relationship between humans and dogs in general, with a greater overlap indicating more closeness. Ingroup being *Humans*, and Outgroup being *Dogs*.

	
Shared Identity Question 2	Please answer the following question. (7-point scale: not at all to extremely) • How aligned do you feel your own impressions of people are with the dog's reactions to them • To what extent do you trust the dog's judgment of new people?

Demographics

Gender	Please indicate your gender. • Female • Male • Non Binary/Third-Gender • Prefer not to say
Age	How old are you? (Please write your age in numbers)
Nationality	What is your nationality? • Dutch (1) • Non-Dutch (2)
If what is your nationality? = non-Dutch	What continent are you from? • Europe (1) • North America (2) • South America (3) • Asia (4) • Africa (5) • Australia/Oceania (6) • Antarctica (7)

Ownership	Do you currently own a dog or have you owned a dog? • No • Yes
If Do you currently own a dog or have you owned a dog = yes	If you have a dog, does it commonly react… Sliding scale (Slider) from -5 to +5 with the following anchor points: -5 tot -2: Negatively to strangers -1 tot 1: No common patterns 2 tot 5: Positively to strangers
If Do you currently own a dog or have you owned a dog = yes	Dog size What size category does your dog fit into? • Small (e.g. Chihuahua, Pomeranian) (1) • Medium (e.g. Border Collie, Shiba Inu) (2) • Large (e.g. Labrador Retriever, Golden Retriever) (3)

Attention & Seriousness checks

Attention Check	Regarding the two scenarios you read please indicate whether you were alone with the stranger and your dog

	• Yes • No
Seriousness Check	To protect the quality of our data, please answer whether you answered all the questions truthfully, there are no consequences if you answer no and you will still receive your SONA credits. • Yes, I answered truthfully • No, I did not answer truthfully

Debrief

Dear participant, Thank you for your participation in our study. **After reading the debrief, please click the >> arrow to save your answers.**

You can read the debrief below:

You have just participated in a study about forming impressions of others with little information. This was not the whole story. Our study actually aims to explore whether and how pets, specifically dogs, can influence humans, our feelings, and our impression formation. Our hypothesis is: "A shared identity between dogs and humans leads to dogs influencing human impression formation." Prior research shows that shared identity increases susceptibility to social influence. Shared identity is the feeling of "we" or "us" that comes from belonging to a group. The Social Identity Theory (Tajfel & Turner)[3] suggests that when people perceive others as members of their group, they are more likely to trust and rely on

[3] The debrief refers to Social Identity Theory as a simplified explanation for participants. The present study draws more specifically on Self-Categorization Theory (SCT), a closely related theory within the social identity approach

them. We were curious to see if this applied only to humans or to animal companions as well. In our study, we tried to influence a shared identity between you and the dog to see under which conditions people can be influenced more strongly by their canine companion. In total, there were four scenarios that you could have been allocated to. You either walked your own dog or a neighbour's dog that you didn't know well. We estimated that a person walking their own dog would feel a stronger connection (shared identity) with them than a person walking the neighbour's unfamiliar dog. Additionally, the walk took place in either the early morning or late evening. The late-evening condition, in contrast to the morning one, makes the situation more uncertain. The darkness of the surroundings markedly reduce one's capability of properly using their senses, especially vision, which is widely considered to be our most dominant sense. Such uncertainty about one's environment often leads to a greater sense of vulnerability and, hence, a greater perceived susceptibility to threat. According to previous research, being in an uncertain environment increases your susceptibility to social influence. This is where our study culminates in the assumption that when we are in a more vulnerable scenario, we will rely most on those we perceive as part of our own social group (our own dog). All the information we collected in today's study will be confidential, and there will be no way of identifying your responses in the data archive. We are not interested in any one individual's responses; we want to look at the general patterns that emerge when the data are aggregated together. Thank you for your participation in this study! We kindly ask you not to disclose any information about the process to others, as this could compromise future participation.

Please make sure to press the >> arrow one final time to make sure your responses are recorded correctly.