What are my friends really like? How we change our perceptions of familiar others' traits and actions

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Abstract:

In everyday life, our perceptions of others' traits are influenced by a combination of their actions and our relationship with them. We enrolled 142 participants in a virtual escape room to examine a) whether an unfamiliar task changed perceptions of friends' traits, b) which types of prior relationships influenced trait perceptions, and c) the relative importance of perceptions of actions in assessing traits. Higher pre-game similarity ratings led to increases in perceptions of competence, while higher pre-game liking ratings led to increases in perceptions of sociability. In addition, objective performance mattered for competence ratings, whereas subjective perceptions of performance mattered for sociability ratings. Our findings demonstrate the importance of real-world relationships not only for how we change our beliefs about others' traits, but also for perceptions of the very actions we use as evidence for those beliefs.

Keywords: Impression Formation, Person Perception, Social Cognition, Social Interaction, Multilevel Modeling

Word count: 9,738

In everyday life, we face numerous novel situations in which we work with friends and coworkers to overcome stressful challenges and achieve common goals. An important question is what we learn from such novel situations about the character of well-known others. For example, imagine you and several of your coworkers are working on a new, unfamiliar project. Perhaps one of your coworkers, whom you previously thought to be skilled at solving problems, was not able to successfully carry out the tasks associated with this new project. Perhaps another coworker, whom you previously thought to be standoffish and isolated, took on a leadership role and successfully managed the members of your team. In each of these scenarios, the co-worker's unexpected behavior may change how we interact with and rely on them in the future. Addressing this question is clearly important, as highlighted by evolutionary theories that suggest that learning to coordinate with kin was an essential driver of the development of human social intelligence (Hayes & Sanford, 2014; Tomasello et al., 2012).

Surprisingly however, experimental behavioral work has left this question largely unexplored, as the two most relevant social psychological research literatures – person perception and close relationships – tend to operate independently and seldom focus on how trait perceptions change. On one hand, person perception research typically examines perceptions of and/or interactions with novel (or hypothetical) people (Brannon & Gawronski, 2017; Fiske, 1993). As such, this work cannot tell us how pre-existing relationships, and the factors that define them (i.e., relational factors, such as liking, familiarity, and/or perceived similarity), influence perceptions of others. Conversely, work on pre-existing relationships typically asks about relationship satisfaction (Finkel et al., 2017; Lemay & Clark, 2015) or trait perception accuracy (Biesanz et al., 2007; Kenny & Acitelli, 2001; Körner & Altmann, 2023; Wessels et al., 2020), rather than asking about how trait perceptions of close others change in light of new

information. As such, the question of how we change our perceptions of a friend's traits after interacting in an unfamiliar context has received relatively little attention.

Here, we sought to address these issues by asking how our perceptions of friends may change when working with them to face unfamiliar challenges in a high-stakes environment. Specifically, we applied classic questions about person perception, which typically ask how we perceive novel or hypothetical people, to real pre-existing relationships, for which changes in trait perception are not typically examined. Although these lines of research are not commonly brought together in this way, we drew on previous person perception research to formulate the three inter-related hypotheses that we sought to address in this study.

First, we hypothesized that working with well-known others to accomplish a task would durably alter our perceptions of them. Group problem solving tasks require that someone has both the ability to accomplish the task and the ability to work well with other people (Akkerman et al., 2007; Hung, 2013). In our study, we operationalized these two abilities in terms of two well-studied dimensions of person perception: competence and sociability (Brambilla et al., 2021; Castelli et al., 2009; Landy et al., 2016). Competence broadly refers to one's ability to accomplish goals (Abele & Wojciszke, 2014) and, along with warmth, is considered one of the central dimensions of person perception in classic two-dimensional models (Fiske et al., 2007). More recently, it has been posited that the warmth dimension is an amalgamation of two other fundamental dimensions of person perception, morality and sociability, and that a morality-sociability-competence model is more accurate than a warmth-competence one (Brambilla et al., 2011, 2021; Landy et al., 2016). Sociability includes traits associated with one's ability to form relationships with others, such as extraversion and friendliness, but it also includes traits that are

more relevant to working with others on a task and have some overlap with the moral dimension, such as empathy and cooperativeness (Goodwin et al., 2014; Landy et al., 2016).

While there may be other traits that also are important for determining the nature of relationships with others, we focused on traits related to competence and sociability because they are particularly relevant to a group problem-solving context. In addition, how competence and sociability are updated in response to new information, and how long lasting or durable these updates might be, is understudied compared to updating perceived morality (Brambilla et al., 2019; Mende-Siedlecki et al., 2013; Silver & Ochsner, 2024). Some person perception work with unfamiliar or hypothetical targets suggests that interpersonal beliefs, in general, can be change-resistant (Cao & Banaji, 2016; Ferguson et al., 2019). In addition, we may be less likely to change our perceptions about well-known others' traits due to the large amount of evidence we already have about them (Kim et al., 2020). However, an uncommon environment that requires the use of those traits in unexpected ways may create opportunities to change our perceptions of well-known others, in both the immediate responses to the uncommon environment and several days later.

Second, we hypothesized that our relationship to a target would influence the way we make trait attributions about them (Brambilla et al., 2011, 2019; Goodwin et al., 2014; Landy et al., 2016). For people we know well, we hypothesized that at least three factors related to one's associations with, and relationship to, a target person could be important (Fiske, 1993; Kenny, 2004; Klein & Kunda, 1992; Zaki, 2014). The first is our liking of a target (Jussim et al., 1995; Leising et al., 2013; Wessels et al., 2020), which may motivate us to perceive them more favorably, thereby allowing us to maintain a view of ourselves as someone who has good judgment and likes others with positive traits. In the group problem solving example, when

someone we like acts in a way that could exemplify a positive trait – such as sociability – we may be motivated to perceive them as possessing that trait more strongly than we would for someone we liked less. A second factor is familiarity (Montoya et al., 2017; Saegert et al., 1973; Zajonc, 1968), which tends to promote liking, in general (Reis et al., 2011; Zajonc, 2001). Psychology has long documented our fear of the unknown and preference for the familiar, so it's possible that we are more likely to positively assess those we know well and negatively assess those less well known. Finally, a third important factor is perceived similarity to oneself (Alves et al., 2016; Ames, 2004; Moreland & Zajonc, 1982; Mussweiler, 2003). Research suggests that we are biased to have positive views of those we are similar to (Montoya & Horton, 2013), although other work suggests we may also do the reverse, enhancing perceived similarity for those we view positively (Morry et al., 2011). In addition, work on self-enhancement suggests that we view ourselves as better and/or more important than we actually are (Beer & Hughes, 2010; Sedikides & Gregg, 2008), and it is possible that these enhancement effects might more easily extend to people we consider to be similar, rather than dissimilar, to ourselves. Indeed, prior work suggests that we often enhance similar others at the same time that we enhance ourselves (Morry, 2007; Morry et al., 2010).

Taken together, these considerations sharpened our second hypothesis: all three of these relational factors – liking, familiarity, and perceived similarity – would shape perceptions of a target's trait-level competence and sociability. However, while these three relational factors are commonly studied in relation to each other in person-perception research (Alves et al., 2016; Moreland & Zajonc, 1982; Strauss et al., 2001), how they interact to affect perceptions of friends' traits is unclear. In that context, there are two types of effects we may observe. On one hand, we may see a global effect, in which all three relational factors influence trait perceptions.

This scenario would suggest that changes in perceptions of close others' traits were affected by merely the existence of a prior relationship, rather than the relationship's specific qualities. On the other hand, we may see a more selective effect, where some relational factors matter more than others. In this case, we would conclude that we value specific aspects of our relationships when re-assessing close others' traits.

Our third hypothesis posited that our perceptions of a target's competence and sociability would be related to the target's actions, as well as to our perceptions of their actions. Even when studies have examined perceptions of close others, they have rarely attempted to link perceptions of traits to perceptions of actions. To the extent that relational factors impact global trait perceptions, it's possible that these same relational factors might also impact perceptions of actions while working to achieve a common goal. For example, when working with others to solve a problem, individuals more adept at completing a task may be described as more competent, whereas people who collaborate better with others may be perceived as more sociable. In both cases, our *perceptions* of proximal behaviors – problem solving and group collaboration – may ultimately provide the impetus for updating judgments of relevant traits – competence and sociability. As such, we hypothesized that a) a target's objectively quantifiable actions during a group problem-solving task would impact perceptions of their traits, b) relational factors would bias perceptions of these actions, and c) biased perceptions of actions would bias perceptions of traits. If perceptions of in-the-moment actions and global traits are both influenced by relational factors, it is possible that there is overlap between the mechanisms that motivate trait and action perceptions. If, on the other hand, perceptions of global traits are influenced by relational factors, but perceptions of actions are not, it would suggest separate mechanisms for evaluating the actions and traits of close others.

To address these three hypotheses, we collected data from friends completing a virtual escape room game because it provided an unfamiliar and motivating environment that required people to work together to achieve a common goal. In addition, this activity allowed participants to freely interact with each other in a structured context with concrete performance metrics. Critically, the two traits of interest here – competence and sociability – are directly relevant to this type of activity: Competence is demonstrated by one's ability to find clues, solve puzzles, and ultimately "escape" a virtual room, whereas sociability is demonstrated by one's ability to coordinate with team members to solve puzzles that often require teamwork and communication.

Methods

All analysis scripts can be found on the study's github page. Model output for analyses, as well as the full surveys administered to participants, with all measures, can be found on the study's OSF page. All study procedures and data collection were performed in accordance and with the approval of the Columbia Institutional Review Board. The study was not preregistered.

Participants

142 participants completed the pre-game survey, across 30 groups of 3-5 friends (96 F, 44 M, 2 non-binary; mean age: 25.8; age range: 18-66, 32% under the age of 23). The breakdown of participant race is as follows: 0% American Indian/Alaska Native, 30% Asian, 0% Native Hawaiian/other Pacific Islander, 8% Black, 51% White, 5% other, 5% multiracial. Three groups were excluded from analyses involving the video recording due to technical errors saving the video, leaving 128 participants for those analyses. 136 participants completed the post-game survey (122 of these participants had video data), and 129 completed the one-week-later survey. No other participants were excluded. Participants were recruited through online advertisements,

email lists, and word of mouth and completed informed consent before starting the first survey. Recruitment typically began with one potential participant reaching out to the researchers to express interest in the study. Interested participants were informed of the study procedures and told to recruit four other people to participate in the study with them. Oftentimes, these were groups of friends, but sometimes certain people in the group were more familiar with each other than with others. A breakdown of relationship strength both within and between groups can be found in Supplemental Materials. Participants received $15 for participating and the costs of participating in the escape room game were covered.

Procedures

One week before the group's scheduled escape room game, each group member was sent a series of questionnaires on the Qualtrics survey platform. In addition to basic demographics, participants provided comprehensive evaluations about themselves and each group member, including their perceptions of their competence and sociability, as well as levels of familiarity, liking, and similarity (see "Definition of variables" section for how each variable was calculated). One week after receiving the questionnaires, the group participated in their virtual escape room game over Zoom. (See more information about the escape room experience in the following section.) All escape room games were recorded. Upon immediate completion of the escape room game, participants completed another series of questionnaires. They provided identical evaluations about each teammate, and also answered questions about the escape room experience. They also indicated how well they believed each teammate did in terms of solving puzzles and collaborating with teammates. An identical follow-up questionnaire was completed one week later to assess how durable changes in trait-ratings were, in line with other work that

treats one week as evidence of long-term change. (Denny et al., 2015; Roediger & Karpicke, 2006; Tompary & Davachi, 2017). See *Figure 1* for a schematic of the study design.

Escape Room game

The COVID-19 pandemic presented a unique opportunity to conduct our study, in which meaningful social interactions largely occurred online, where they could easily be recorded. In addition, many social activities that would typically be difficult or impossible to use as controlled experimental paradigms were translated to a more controlled, virtual space.

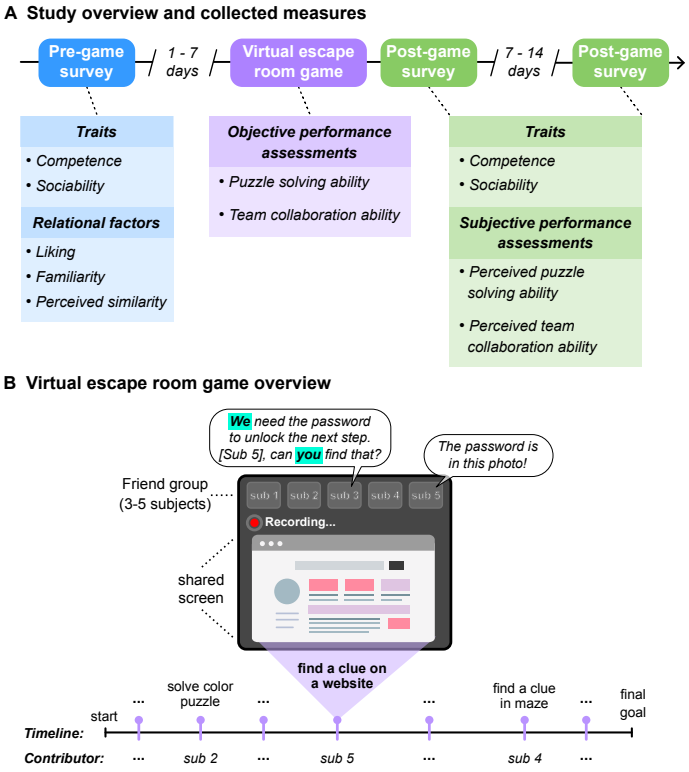

Figure 1. Experimental design. A) Participants first completed a pre-game survey to assess levels of similarity, liking, and familiarity between teammates, as well as perceptions of competence and sociability. The escape room was conducted on Zoom and required participants to work together to complete a series of puzzles. Immediately after the game, participants

completed a post-game survey about their game experience, as well as updated perceptions of competence and sociability. B) The Zoom recording allowed us to collect information on puzzle solving ability, and the transcript allowed us to score team collaboration.

The virtual escape room game that we used in our study was created and administered by an escape room company called Puzzle Break LLC. The goal of the escape room, called Hackfiltration, was to solve a series of puzzles in order to hack into a company's computer system and prevent them from enacting world domination. The escape room was completed online and over Zoom. Each group completed the escape room game with the guidance of a "game manager," a Puzzle Break employee who explained the rules of the game to the participants and was available to provide hints to the group if needed. Completing the escape room required the participants to work together to find clues, solve logic puzzles, and follow a storyline across several different websites, videos, and virtual games. Typically, one group member would share their screen, and the other group members would follow along. Group members were free to speak to each other and interact as much as they wanted. Upon completion of the game, the game manager walked the group through the game solution. On average, groups took 48.9 minutes to complete the game, with completion times ranging from 26.2 minutes to 87.6 minutes. If a team was struggling to complete the game, the game manager would provide progressively helpful hints in order to move the team along and ensure that all groups completed the entire game.

Definition of variables

Our primary predictor variables were liking, familiarity, and perceived similarity for each group member, as measured before the escape room game. Liking and similarity were assessed

with single questions ("How much do you like this person?" "How similar do you believe you are to this person?") on a 0-10 scale, from "Not at all" to "Extremely." In the relationship literature, familiarity is often defined in terms of both relationship longevity and interaction frequency (Berscheid et al., 1989; Fitzsimons et al., 2015; Sels et al., 2020). In the current study, we average these two dimensions together to gain a more robust measure of familiarity. Specifically, we average a question about the length of time the participant had known the target (on a 1-6 scale, from "one month" to "more than 5 years,") with a question about the frequency of interactions with them (on a 1-6 scale, from "less than several times per year" to "every day").

Trait-level competence and sociability perceptions for each group member were also measured via survey questions, both before and after the escape room game. Each dimension was the average of four component traits, indexed via descriptions of relevant behaviors, from 0 ("Strongly disagree") to 10 ("Strongly agree"). We used descriptions rather than asking about traits directly because we didn't want participants to be overtly biased against providing unfavorable ratings of their friends, especially friends with whom they were about to complete a task. Each description/behavior indexed onto a trait that previous work has shown to be related to either competence or sociability (Goodwin et al., 2014; Landy et al., 2016). For competence, the described traits were capable, effective, skillful, and talented; the questions were: 1) "[Group member] is able to succeed when faced with challenging situations." 2) "[Group member] is able to solve difficult problems." 3) "[Group member] is good at getting what they want." 4) "[Group member] is good at adapting to unfamiliar situations." For sociability, the described traits were cooperative, empathetic, humble, and kind; the questions were: 1) "[Group member] works well with other people." 2) "[Group member] is quick to understand the experiences and feelings of others." 3) "[Group member] doesn't act like they are better than other people." 4) "[Group

member] is generous and considerate of others." The sociability traits were rated in previous work as being components of sociability that had some overlap with the moral dimension and were chosen for this study because they were deemed more relevant to working with others on a task than more warmth-focused sociability traits such as friendliness and extraversion. Our decision to average the four ratings came from our desire to create summary variables of competence and sociability, rather than testing effects of each specific component trait. Prior work has similarly averaged these component traits to create summary variables for competence and sociability (Goodwin et al., 2014), and our data demonstrated a high degree of reliability for both the competence trait descriptions ($\alpha = 0.88$) and the sociability trait descriptions ($\alpha = 0.90$).

We also created two different measures of performance during the escape room: puzzle solving and team collaboration. Both measures of performance were calculated using the Zoom recordings of the escape room game.

For puzzle solving performance, the escape room game was broken into 50 steps. These steps were highly specific occurrences that nearly every team needed to experience in order to complete the escape room. Each step was time-stamped, and "attributed" to a specific participant, based on which participant verbally contributed the most crucial information to complete that step, as determined by an independent coder. For example, one of the steps was figuring out the password to log into a computer system. At the exact moment that a participant indicated they knew what the password was, the time was recorded and that participant was marked as contributing to that step. If multiple participants contributed to the same step – say, by saying the answer at the same time – they split the point. Once the video was fully coded, each participant received a puzzle solving performance score, according to how many steps they

contributed over the course of the entire game. We hypothesized that puzzle solving performance would be related to trait-level competence perceptions.

For team collaboration performance, we ran a linguistic analysis of the transcripts from the Zoom recordings. For each participant, we calculated a team collaboration performance score, which was the number of times they used words that focused on the group – specifically, first-person plural and second-person pronouns – over the number of total words spoken by the entire group. This approach is based on prior work using pronouns as signifiers of psychological traits and phenomena (Doré et al., 2017; Kross & Ayduk, 2011; Lyons et al., 2018; Pennebaker & Chung, 2013; Tausczik & Pennebaker, 2010), and, more specifically, studies that have used first and second person pronouns as indicators of group dynamics, such as group cohesiveness and group-focus (J. E. Driskell et al., 1999; T. Driskell et al., 2013; Gonzales et al., 2010; Kane & Van Swol, 2023; Wegner & Giuliano, 1980). Our use of pronouns to indicate team collaboration was in line with these prior uses in the group problem-solving literature. We calculated this value in Python, using words from the Linguistic Inquiry and Word Count (Pennebaker et al., 2015). First-person plural and second-person pronouns signified an attention to others and to the group as a whole. In addition, by creating a percentage that relied on both words spoken by individuals and the total number of words spoken by the group, we were able to standardize team collaboration performance scores within each group, while also taking into account how much that participant spoke. We hypothesized that team collaboration performance would be related to trait-level sociability perceptions.

Analyses

To address our three questions, we constructed a series of Bayesian multi-level models. We used Bayesian models because previous work shows that, in comparison to frequentist

models, they better estimate multi-level effects models (Gelman, 2005). Each analysis consisted of two separate models: one for competence, and one for sociability. For all models, participant and team were treated as random effects, and each rating of a teammate was a repeated measure. Including team as a random effect allowed us to control for group-specific effects, which helped ensure that our results were reflective of individual perceptions. Although the participants completed the escape room in discrete groups, our questions primarily concerned evaluations and perceptions at the *interpersonal* level, rather than the group level. All models had random slopes and intercepts for the predictor variables, which were rescaled and grand mean-centered around 0.

Our first question was whether competence and sociability ratings after the game significantly differed from pre-game ratings. Specifically, our predictor variable was a Time variable consisting of pre-game ratings, post-game ratings, and one-week later ratings. Our outcome variable was the trait rating. We set up our model so that we could compare ratings at all three timepoints to each other. We also created a model with absolute change between timepoints as an outcome variable, and timepoint comparison (pre vs post or post vs one week) as the predictor variable in order to investigate rating change at the individual level.

For our second question, we asked how liking, familiarity, and perceived similarity, as measured in a pre-escape room questionnaire, interacted to affect post-game ratings of competence or sociability. Importantly, these models controlled for pre-game ratings, ensuring that any change observed from the pre- to post-game ratings was a result of the escape room game specifically. We controlled for pre-game ratings instead of using the pre-post difference as the outcome variable in order to account for potential ceiling effects in the ratings.

Our third question concerned performance during the game. We first ran a model that asked how objective puzzle solving performance (as measured from the Zoom recordings in the ways defined in the previous section) affected post-game trait-level competence perceptions. We then ran an identical model that asked how objective team collaboration performance affected post-game trait-level sociability perceptions.

We then asked whether subjective perceptions of performance were related to relevant trait perceptions. We called this subjective perception of performance a Performance Assessment Bias (PAB). PABs were calculated by subtracting the *objective* puzzle solving and team collaboration scores – as calculated in the manner described in the previous section – from *subjective* puzzle solving and team collaboration scores, as determined by participant ratings of teammates on the post-game questionnaire. Thus, we calculated one PAB for puzzle solving, and a separate PAB for team collaboration. To answer this question, we first ran models that asked how the same three relational factors predicted both PABs. We then ran a model with PAB as a predictor variable and post-game trait ratings as an outcome variable to see if biased perceptions of actions and biased perceptions of traits were related. (A table summarizing all statistical models can be found in Supplemental Materials.)

Results

Descriptive statistics

Pre-game liking and similarity ratings were on 0-10 scales. Average pre-game liking was 8.32 (SD = 1.96) and average pre-game similarity was 5.73 (SD = 2.27). Pre-game familiarity was the product of how long the participant had known the target and how frequently they interacted, converted into 1-6 scales. Average score for time since first met was 4.36, which is in

between the answers "in the past 3 years" and "in the past 5 years." Average score for interaction frequency was 4.08, which is in between several times per month and several times per week. (A visualization of the spread of each of these scores, both within and between groups, can be found in the Supplemental Materials.) Therefore, average familiarity was 4.22 on a 6-point scale. We also calculated partial collinearity between the three relational factors, accounting for group means. The correlation coefficient values were well below values that might cause concern about collinearity: liking x similarity: 0.32; liking x familiarity: 0.09; similarity x familiarity: 0.06.

We had two independent raters code the escape room game videos to determine puzzle solving ability scores. 10% of the videos were coded by both raters. We were not able to calculate kappa values to determine agreement between the raters because our data were not binary; at every event timepoint, up to five teammates could be awarded points for contribution. Instead, we calculated how often the contributor at each event was identical between the two raters. We observed a high degree of overlap (84% of all events) between the two raters.

Question 1: Does an unfamiliar and challenging group activity lead to altered perceptions of friends' traits?

For all results, we discuss effects on competence first, followed by effects on sociability. Using Bayesian multi-level models, we examined whether post-game ratings of competence and sociability were significantly different from pre-game ratings. The average of the pre-game competence ratings was 7.58 (SD = 1.61), while for sociability ratings, it was 7.78 (SD = 1.72). When comparing ratings before the escape room game to ratings immediately after the game, we found that completing the escape room game on average led to enhanced perceptions of both competence (Post-game mean = 8.07, SD = 1.34; B = 0.48, SE = 0.09, 95% CI = [0.30, 0.67]) and sociability (Post-game mean = 8.17, SD = 1.49; B = 0.38, SE = 0.08, 95% CI = [0.22, 0.54])

(*Figure 2A, C*). In other words, given that the ratings were on a 0-10 scale, competence and sociability ratings exhibited a post-game increase of 4.8% and 3.8%, respectively. These increases were equivalent to an increase of 0.29 standard deviations for competence and 0.22 standard deviations for sociability. In addition, we found that 61% of competence ratings increased, 26% decreased, and 13% remained the same. For sociability, 53% of ratings increased, 30% decreased, and 17% remained the same. Furthermore, ratings remained on average above baseline when trait perceptions were reassessed one week later, for both competence (One week later mean = 7.79, SD = 1.39; B = 0.33, SE = 0.08, 95% CI = [0.18, 0.48]) and sociability (One week later mean = 7.94, SD = 1.58; B = 0.18, SE = 0.08, 95% CI = [0.02, 0.34]). In other words, competence ratings were 3.3% higher one week later as compared to baseline (an increase of 0.20 standard deviations), while sociability ratings were 1.8% higher (an increase of 0.10 standard deviations). A post-hoc sensitivity analysis with this model using the *pwr* package in R (Champely, 2020) revealed that our sample size provided over 80% power to detect the effect we actually observed ($f^2 = 0.16$), on the assumption that it was the true effect in the population.

Despite an average increase for both trait dimensions, there was also a high degree of heterogeneity in the amount and direction of rating change between timepoints. In order to test for lasting effects at the individual level, we calculated the absolute value of the rating change between both the pre-game ratings and the post-game ratings, and between the post-game ratings and the one-week later ratings. We found parallel results for both competence and sociability. Specifically, we found that ratings meaningfully changed (the range of our model's estimates of change did not include 0) as a result of the escape room game (Competence: B = 0.97, SE = 0.05, 95% CI = [0.87, 1.07]; Sociability: B = 0.88, SE = 0.06, 95% CI = [0.75, 1.00]). Furthermore,

although there was also a rating decrease between the post-game ratings and the one-week later ratings (Competence: B = 0.64, SE = 0.05, 95% CI = [0.54, 0.74]; Sociability: B = 0.63, SE = 0.06, 95% CI = [0.52, 0.74]), this change was *smaller* than the change between the pre and post-game surveys (Competence: B = -0.32, SE = 0.06, 95% CI = [0.21, 0.43]; Sociability: B = -0.25, SE = 0.06, 95% CI = [0.13, 0.37]). These results suggest that both competence and sociability ratings at the individual level were different from baseline ratings up to one week after the escape room game.

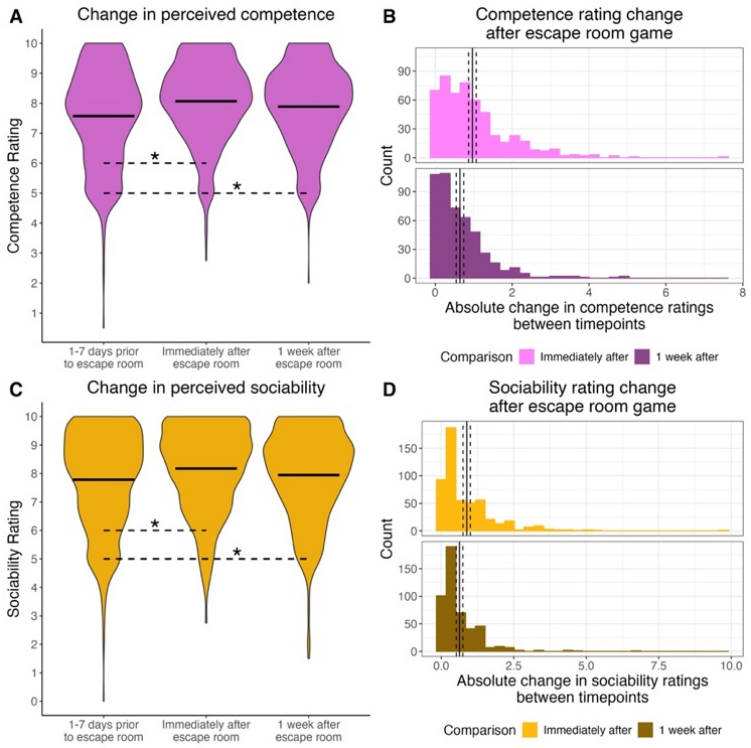

Figure 2. A) Competence ratings on average increased after the escape room game and were still higher than baseline one week later. B) We calculated the absolute value of rating change for each individual participant-teammate dyad. These individual changes were on average larger between baseline and immediately post-game than between immediately post-game and one week later. We found similar results for sociability ratings, where average sociability ratings

increased post-game and were maintained one week later (C), and individual-level absolute changes were larger post-game than one week later (D).

Question 2: How are perceptions of a friend's traits influenced by aspects of our relationship to them (i.e., relational factors)?

Given the increases in competence and sociability, we next wanted to investigate how relational factors between the perceiver and the target prior to the game – liking, familiarity, and similarity – would affect the degree of change in competence and sociability ratings immediately after the game. All three relational factors were rescaled and mean-centered around 0 with a standard deviation of 1, and all models controlled for pre-game ratings of competence and sociability.

When examining how relational factors affected post-game competence, we found an effect of similarity (B = 0.16, SE = 0.07, 95% CI = [0.01, 0.30]), where participants rated targets that they viewed as more similar to themselves as more competent. In other words, an increase of one standard deviation of similarity led to a 1.6% increase in perceived competence. There was no effect of liking (B = 0.09, SE = 0.09, 95% CI = [-0.08, 0.27]) or familiarity (B = 0.05, SE = 0.08, 95% CI = [-0.11, 0.20]), and there were no interactions between relational factors whose estimates excluded an effect size of 0 (*Figure 3A*). A post-hoc sensitivity analysis with this model with only random intercepts revealed that our sample size provided over 80% power to detect the effect of similarity that we observed ($f^2 = 0.61$), on the assumption that it was the true effect in the population.

When examining perceptions of trait-level sociability, we found that liking was the most important relational factor (B = 0.24, SE = 0.11, 95% CI = [0.03, 0.45], with more well-liked

targets perceived as more globally sociable after completing the escape room game. In other words, a one-standard deviation increase in liking led to a 2.4% increase in perceived sociability. There was no effect of familiarity (B = 0.09, SE = 0.08, 95% CI = [-0.08, 0.23]), or similarity (B = -0.01, SE = 0.07, 95% CI = [-0.14, 0.14]), and no interactions with effect sizes that excluded 0 between relational factors (*Figure 3B*).

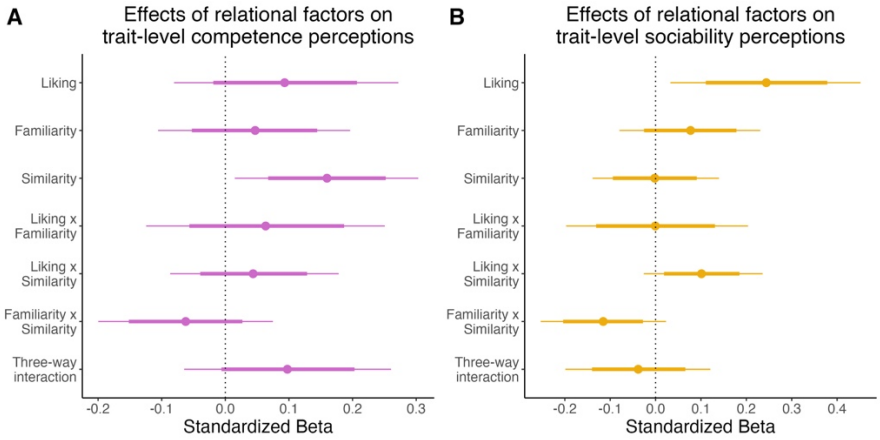

Figure 3. Plots showing the magnitude of the effects of relational factors on perceptions of teammates' trait-level competence (A) and sociability (B). X-axis is the standardized beta from a multilevel model with liking, familiarity, and similarity as predictor variables, and post-game trait ratings as the outcome variable, while controlling for pre-game trait ratings. For each variable, thick bars represent 80% credibility intervals and thin bars represent 95% credibility intervals. Competence ratings are influenced by similarity, while sociability ratings are influenced by liking.

Question 3: What is the relationship between perceptions of actions and perceptions of traits?

A friend's actions may be related to how we perceive their traits in at least two different ways. First, their *objective* actions – in this case, how they actually performed during the escape room – might have an effect on global trait perceptions. To answer this question, we ran a model

with escape room game performance as a predictor variable, and post-game trait ratings as the outcome variable. Second, the *subjective perceptions* of a friend's actions might be impacted by relational factors, and in turn might predict global trait perceptions. We operationalized this bias, which we call the Performance Assessment Bias, or PAB, as the difference between the subjective rating of a friend's performance during the escape room via a questionnaire, and an objective score for their performance as determined from a Zoom recording or transcript. To answer this question, we first ran a model with our three relational factors as predictor variables, and PAB as the outcome variable. We then ran a model with PAB as the predictor variables and post-game trait ratings as the outcome variable to determine whether PAB was directly related to trait perceptions.

Effect of escape room game behavior on trait perception: When considering how perceived trait-level competence was predicted by puzzle solving performance during the escape room (specifically, the number of steps for which each participant contributed solutions), we found a main effect of puzzle solving (B = 0.14, SE = 0.03, 95% CI = [0.07, 0.21]), meaning that teammates who solved more puzzles were rated as more competent after the game. We defined team collaboration performance during the escape room game as the frequency of group-focused words (first-person plural and second-person pronouns) over total words spoken by all members of the group. When considering the effects of team collaboration performance on perceived global sociability, we found no effect of team collaboration score on trait-level sociability ratings (B = -0.05, SE = 0.04, 95% CI = [-0.12, 0.02]) (*Figure 4)*.

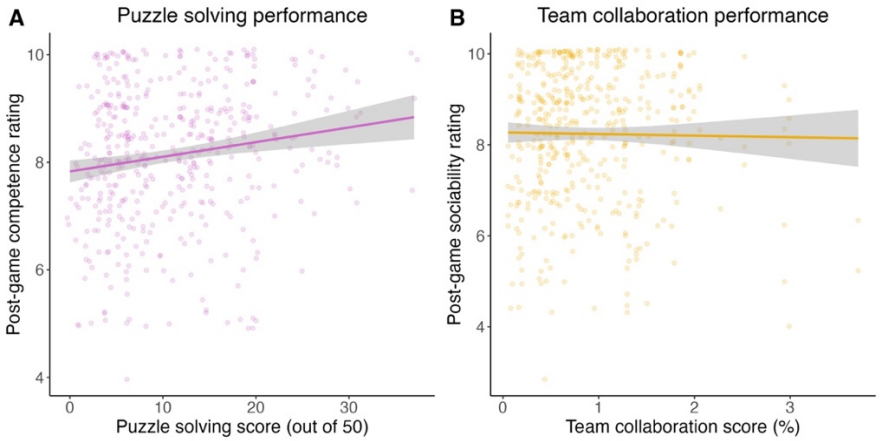

Figure 4. Graphs relate measures of escape room game behavior to post-game perceptions of general traits. A) The effect of puzzle solving score, calculated from the Zoom recording as the number of contributions each participant made to solving a puzzle, on post-game competence ratings. B) The effect of team collaboration score, calculated from the transcript of the Zoom recording as the number of group-focused words each participant used relative to the total words spoken, on post-game sociability ratings. The ribbons around the regression line represent 95% credibility intervals. Puzzle solving performance predicted competence ratings, but team collaboration performance did not predict sociability ratings.

Effect of relational factors on Performance Assessment Bias (PAB): We next asked whether biased perceptions of the target's actions – the PAB, as defined in Methods – were similarly impacted by the same relational factors.

The participant's *objective* performance scores were rescaled to a range of 0-10 to align with the range of the *subjective* performance questions. Since the PAB was the difference between these two scores, a positive score indicated that participants reported their teammates as having performed better than they actually did, while a negative score indicated that participants reported teammates as having performed worse than they actually did. There were two PABs:

One that was a measure of how well the participant did on solving puzzles, which we hypothesized would be related to trait-level competence, and one that was a measure of how well the participant collaborated with members of the team, which we hypothesized would be related to trait-level sociability.

We ran two models with the same three relational factors – liking, familiarity, and similarity – as predictor variables and each PAB as an outcome variable. We did not find that any relational factor predicted puzzle solving PAB. However, with a positive intercept of 5.07, we found that familiarity was the strongest predictor of puzzle solving PAB (B = 0.26, SE = 0.16, 95% CI = [-0.05, 0.56]), with smaller effects for liking (B = 0.20, SE = 0.17, 95% CI = [-0.14, 0.54]) and similarity (B = 0.17, SE = 0.15, 95% CI = [-0.12, 0.46]) (*Figure 5A*). A post-hoc sensitivity analysis with this model with only random intercepts revealed that our sample size provided over 80% power to detect these effects ($f^2 = 0.16$). For team collaboration PAB, which had a positive intercept of 6.16, we found an effect of familiarity (B = 0.44, SE = 0.21, 95% CI = [0.03, 0.85]). The effects of liking (B = 0.35, SE = 0.18, 95% CI = [-0.00, 0.72]) and similarity (B = -0.20, SE = 0.16, 95% CI = [-0.51, 0.11]) were smaller (*Figure 5B*).

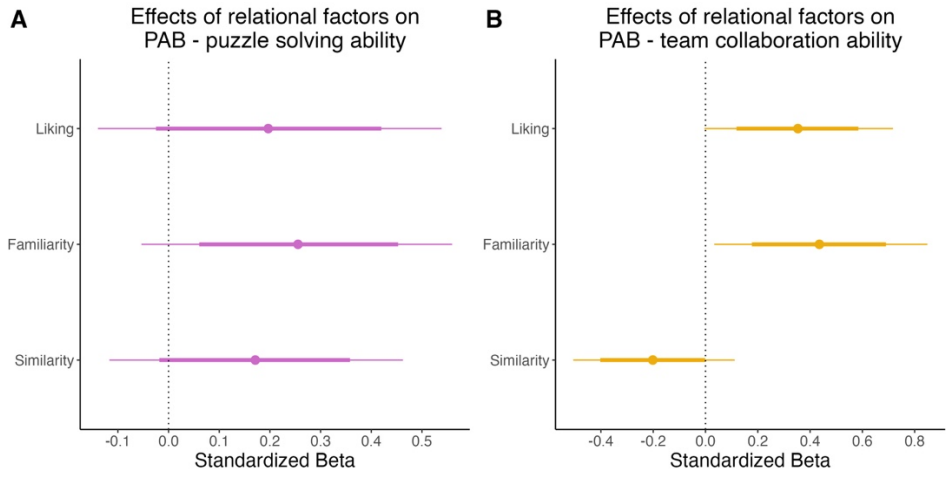

Figure 5. Plots showing the magnitude of the effects of relational factors on Performance Assessment Bias (PAB) for puzzle solving (A) and team collaboration (B). PAB is the difference

between perceived performance as reported by teammate ratings and actual performance as determined by a video recording or video transcript of the escape room game. The X-axis is the standardized beta from a multilevel model with liking, familiarity, and similarity as predictor variables, and PAB as the outcome variable. For each variable, thick bars represent 80% credibility intervals and thin bars represent 95% credibility intervals. (A) For competence, task performance is defined as ability to solve puzzles. No relational factor predicted puzzle solving ability PAB. (B) For sociability, task performance is defined as ability to collaborate with one's team. Familiarity and liking are the strongest predictors of team collaboration PAB.

Effect of PAB on trait perception: We followed up these results with an additional Bayesian multi-level model that included the relevant PAB as a fixed and random effect in order to determine if PAB was related to the relevant trait perception. Since our predictor variable was a difference score, we included the sum of the difference components (subjective and objective performance) as a control variable in our model. We found that PAB was indeed related to post-game trait ratings, for both competence (B = 0.15, SE = 0.02, 95% CI = [0.11, 0.19]) and sociability (B = 0.15, SE = 0.02, 95% CI = [0.11, 0.20]).

It was also possible that the size of the bias may have been more meaningful at different performance levels. If a participant overestimated a poor-performing teammate's performance, it may have had more of an impact on post-game trait perceptions than if a participant overestimated a well-performing teammate's performance. On the flip side, overestimations of performance may have been equally meaningful across the spectrum of objective performance levels, meaning that greater overestimation always led to greater bias in perceptions of traits. To address this issue, we conducted an exploratory analysis testing whether the effect of PAB on

post-game traits depended on the objective performance levels. We found that puzzle solving PABs made more of an impact on impressions for poor performers than high performers (B = -0.14, SE = 0.04, 95% CI = [-0.22, -0.05]). The interaction effect for team collaboration PABs trended in the same direction, although the range of estimates did not exclude 0 (B = -0.07, SE = 0.04, 95% CI = [-0.15, 0.01]).

We followed up these models with a model that had separate terms for the objective and subjective scores (sometimes termed a condition-based regression analysis) so that we would be able to determine if the impact of PAB was driven more strongly by one term in the difference score (Humberg et al., 2018). According to condition-based analysis, the difference score is the "true" predictor, rather than being driven by one component, if the effects for the subjective and objective scores are in opposite directions. For trait-level ratings of competence, we found a positive effect of subjective performance ratings (B = 0.29, SE = 0.03, 95% CI = [0.23, 0.34]) and no effect of objective performance score (B = -0.02, SE = 0.02, 95% CI = [-0.05, 0.02]). A follow-up analysis using the lavaan package in R (Rosseel, 2012) revealed that the effect of puzzle solving PAB on competence ratings was not significant (B = 0.07, SE = 0.05, p = 0.09). For trait-level ratings of sociability, we found a positive effect of subjective performance (B = 0.27, SE = 0.04, 95% CI = [0.20, 0.34]) and a trending negative effect of objective performance (B = -0.05, SE = 0.03, 95% CI = [-0.9, -0.01]). A follow-up analysis using the lavaan package revealed that the effect of team collaboration PAB on sociability ratings was significant (B = 0.13, SE = 0.07, p = 0.03). In sum, the condition-based regression analysis revealed that PAB predicted trait-level sociability ratings (over and above each individual component of PAB, which was a difference score), but that PAB did not predict trait-level competence ratings.

Discussion

In this study we investigated how one's prior relationship to a target – in terms of liking, familiarity, and perceived similarity – influenced perceptions of friends' traits and actions as they worked together to overcome a shared problem. Previous person perception research has not been able to adequately address this question because it has traditionally focused on novel targets who are not motivationally significant to the participant, while close relationships work that does focus on motivationally relevant friends/close others has not typically asked how trait perceptions change over time. Here we bridged these research traditions using a novel method: participants completed a virtual escape room game conducted on Zoom that allowed them to freely interact and solve puzzles for approximately one hour in a novel environment. Three key findings were obtained.

First, we found that ratings of friends' trait-level competence and sociability increased as a result of an unfamiliar experience – in this case, the escape room game – and that these changes persisted to some degree up to one week after the game. Second, we found that pre-existing relationships *selectively*, rather than globally, impacted trait perceptions. For competence, we found that higher baseline similarity led to higher post-game competence ratings, and for sociability, we found that higher baseline liking led to higher post-game sociability ratings. Third, we found that a teammate's performance during the game, as well as how one perceives that performance, also predicts post-game trait perceptions, but that relational factors do not consistently bias performance perceptions. Below, we unpack each of these findings.

Changes in perceptions of trait competence and sociability

First, the escape room game elicited updated trait ratings that – to some degree – lasted for at least a week. Belief updating work demonstrates that we typically only update our beliefs when faced with information that disconfirms those beliefs (Kim et al., 2020; Kube & Rozenkrantz, 2021). In daily life, we don't often witness our friends and close others in unfamiliar situations where they will act in ways that we are unable to predict. A virtual escape room presented an opportunity to study belief updating because it presented many unfamiliar elements: Most of our participants likely had not previously participated in a virtual escape room before with this specific group of friends (and even if they had, it likely wasn't a particularly common occurrence). In addition, we also thought that an escape room was an opportunity for an impression update because people's actions during the game would be perceived as *meaningful*: The time pressure might have been revealing of one's "true" traits, as time pressure is often used to reveal implicit attitudes (Karpinski & Hilton, 2001; Stepanikova, 2012), and the competitive nature might have caused participants to become more invested, as they do in minimal groups paradigms (Dunham, 2018; Otten, 2016). These aspects of the game could have created a high-stakes environment, in which people were perceived as behaving authentically and not hypothetically. Thus, the escape room offered a combination of controlled and dynamic elements that – as our data show – was able to elicit impression updates.

Second, we saw that both competence and sociability ratings increased overall as a result of the escape room game. Previous work has shown a positivity bias for competence (Reeder et al., 1977; Wojciszke et al., 1993), in that it's easier to update competence beliefs in the positive direction than the negative direction. Our study is to our knowledge the first to demonstrate a parallel effect in the sociability dimension, since sociability is often lumped in with morality in studies of impression updating. It has been hypothesized that the reason for this asymmetry is

that competent actions are more "diagnostic" than incompetent ones (Mende-Siedlecki et al., 2013).

Finally, the increases in competence and sociability ratings were maintained to some degree one week later, as evidenced by the smaller rating changes between the post-game ratings and the one-week later ratings than between the pre-game ratings and the post-game ratings. Work investigating the maintenance of impression updates is sparse and mixed, and limited by the fact that many impression updating studies examine short timescales (i.e., less than one day) and use strangers, whose behavior is hypothetical, as targets (Kurdi & Charlesworth, 2023). Some have argued that an action needs to be both diagnostic and believable to elicit an impression update that lasts beyond an immediate effect (Ferguson et al., 2019). Our participants interacted with each other in a real (not hypothetical) and high-intensity environment, which may be why we see increases in competence and sociability persist for at least one week.

For at least two reasons it is meaningful that change was maintained to some degree one week later. First, the persistence beyond immediate effects seems to preclude typical explanations for temporary fluctuations in impressions related to variability in contexts (Geukes et al., 2017) or mood inductions (Forgas & Bower, 1987). Second, many studies of impression updating fail to show any updates at all, and when they do, the update is often assessed only in the immediate-term (Cone & Ferguson, 2015; Gregg et al., 2006; Kurdi et al., 2023). The fact that we saw maintenance of change at all beyond the immediate-term is noteworthy, especially because the changes we observed were a result of a one-hour interaction, amidst relationships that on average spanned 3-5 years. This demonstrated that the escape room game was perceived as meaningful enough by our participants that it continued to play a role in trait perceptions at least one week beyond immediate assessments.

That said, it is worth acknowledging that in the current study, we did not assess impressions farther out than one week after the game, so it is possible that impressions may revert to baseline after this time point. In addition, we did not track how often escape room teammates interacted between completing the game and the one week later-assessment, so it is unclear whether additional meaningful interactions between the two timepoints might have influenced the presence or absence of effects observed at the one-week follow-up.

How relationships impact trait perceptions

For both competence and sociability, specific components of one's prior relationship with a target impacted perceptions of that target's traits after working together to solve an unfamiliar challenge. What the competence and sociability findings share is an emphasis on prior relationships, which motivate our perceptions. Even for those we know well, relative degrees of motivation continue to impact our assessments of others. This is in line with previous work that goes above and beyond investigating changes in impressions for strangers, and instead uses in-group members and close friends (Hughes et al., 2017; Park & Young, 2020). However, even this work is still comparing friends to strangers, or an ingroup to an outgroup. Our study demonstrated that within a close group, our beliefs are biased about some friends more than others.

Where the competence and sociability findings differed, however, was in the type of relational factor that matters. When controlling for baseline (i.e., pre-game) ratings of competence and sociability, we found that higher perceived similarity led to higher post-game competence ratings, and higher liking led to higher post-game sociability ratings.

This similarity-competence connection might have been related to the self-enhancement effect. Long documented in psychology (Alicke & Sedikides, 2009; Sedikides & Gregg, 2007,

2008), self-enhancement theories posit that we have a motivation to view ourselves positively or favorably. Given that competence is a desired quality for oneself (Anderson et al., 2012; Heck & Krueger, 2016), it makes sense that we would be motivated to perceive people who are similar to us as more competent as well, even if we might still enhance perceptions of our own competence more than we enhance perceptions of the competence of similar others (Morry, 2007; Morry et al., 2010). The liking-sociability connection, on the other hand, may have been because sociability signifies a person's ability to maintain a successful relationship. If we like someone, we'll want to maintain a successful relationship with them, which would motivate us to view them as more sociable. Sociability is also a trait more desired in others than the self (similar to morality (Wojciszke, 2005)), although there is limited work in this area (Soral & Kofta, 2020). Our results demonstrated a separability between the desired qualities in oneself and the desired qualities of others (Brambilla & Leach, 2014; Wojciszke, 2005), and extended previous work into the sociability domain.

How actions and action perceptions relate to trait perceptions

In addition to being affected by relationships, our perceptions of others' traits are likely also based on their actions, as well as perceptions of those actions. We found mixed evidence for the role of actions on trait perceptions and the role of relationships on action perceptions, both within the competence and sociability dimensions, and between them. For competence, objective puzzle-solving performance and subjective ratings of puzzle-solving performance both independently predicted post-game competence ratings, but a condition-based regression analysis revealed that the difference between objective and subjective scores – what we term the performance assessment bias (PAB) – did not. These results imply that estimates of competence

were impacted by instantiations of that competence in a particular situation, and that estimates of situation-specific competence were tied to actual, objective demonstrations of it.

Conversely, we found that sociability ratings were predicted by subjective ratings of team-collaboration performance and by team collaboration PAB, but not by objective team collaboration scores, suggesting that biased perceptions of sociability are more swayed by biased perceptions of sociability-specific actions than by actual, objective demonstrations of those actions. In other words, how sociable someone actually was in a specific situation was less important for perceptions of their trait than how sociable *we perceived them to be* in that situation.

These results might be partially explained by state-trait models of person perception. State-trait models distinguish between qualities a person is deemed to possess generally and qualities they display in a particular situation (Hamaker et al., 2007; Trope, 1998). Judgments of each can converge or diverge depending on the context and the type of judgment one is being asked to make (Gilbert et al., 1988; Kruse & Degner, 2021). In the current study, participants who demonstrated state-like competence were more likely to be rated as possessing trait-like competence, but such a relationship did not exist between state- and trait-sociability.

Why the discrepancy between the competence and sociability findings? Or more specifically, why did perceptions of competence performance appear to be more strongly tied to reality than they were for sociability performance, and why did perceptions matter more than reality for sociability than for competence? Prior research has focused less on how sociability is updated, but we can put forth several potential reasons for this discrepancy. First, prior work suggests that demonstrations of competence are more accurately perceived than other dimensions of person perception, such as morality (Abele et al., 2021; Yzerbyt, 2018). In addition, we know

that there is a bias towards updating competence impressions in the positive direction (Mende-Siedlecki et al., 2013), but it is not clear if this same bias exists for sociability. As such, it is possible that objective demonstrations of competence led to larger revisions of trait-level competence perceptions than did occur for sociability. Finally, it's also possible that puzzle solving was simply perceived as either more important or more variable during the escape room game than was team collaboration. If so, then we might have expected people would tether their trait-level competence perceptions to reality more than they would for trait-level sociability perceptions.

How relationships impact action perceptions

Our study demonstrated that relationships and actions both motivate trait perceptions, albeit in different ways. However, the question remains: What motivates perceptions of actions? In our study, we saw that performance was often overestimated, so we next must ask why, and what causes the amount of overestimation to vary. We believe there are several potential interpretations of our findings that can help answer this question.

First, most of our estimates for the impact of relational factors on PABs included 0; the one that didn't (familiarity for team collaboration PAB) was a small effect. This would suggest that perceptions of actions were largely biased by different factors than the relational factors that biased traits. These might have been other relational factors (such as social closeness or trust), or external factors, such as one's mood or overall group cohesion.

Second, for both puzzle solving PAB and team collaboration PAB, familiarity was the strongest predictor. This would suggest that while trait perceptions are motivated by specific relational factors that differ by dimension, action perceptions are largely motivated by familiarity, regardless of the action type. This might be because it's easier to remember the

contributions of teammates who are more familiar (Koriat & Levy-Sadot, 2001; Poppenk et al., 2010), or because we are more likely to make intentional attributions to teammates who are more familiar (Idson & Mischel, 2001; Malle et al., 2007; Malle & Pearce, 2001).

Finally, many of the effect sizes were relatively close in size, so we may also wish to consider overlap between the mechanisms that motivate trait updating and the mechanisms that motivate action perceptions. Under this explanation, relational factors may impact both trait perceptions and perceptions of performance, as opposed to simply altering trait-based assessments. This distinction is important because it sheds light on the mechanisms by which motivations may indirectly shape perceptions of others' traits (Zaki, 2013). In addition, while our study wasn't set up to conduct formal mediation analyses, partially due to the cross-sectional nature of one component of the PAB calculation and the post-game trait ratings (Maxwell & Cole, 2007), it's possible that subjective perceptions of actions actually mediated the relationship between relational factors and trait updating. (For example, liking may have biased perceptions of collaborative behavior during the game, which would then in turn have led to altered perceptions of trait-level sociability.) Future studies should directly test whether biased perceptions of actions and biased perceptions of traits are independently affected by relational factors, or whether action perceptions mediate the impact of relational factors on trait ratings.

Limitations and future directions

The majority of the analyses in this paper concern the beliefs one person (the observer) holds about another person (the target). As dyadic interactions unfold across time, however, individuals may alternate between the target and observer roles. Future studies may wish to take this into account and ask how an observer's perceptions of a target impact the target's perceptions of the observer, and vice versa (Back & Kenny, 2010; Human et al., 2020). More

broadly, the actions of any individual may be embedded within the actions of a larger group. In a complex and collaborative problem-solving environment (like an escape room game), we may wish to ask how group dynamics, such as the structure of the social network and the nature of social interactions between group members, impact group performance and group well-being. Organizational psychology has long investigated the factors that create successful groups in a workplace context (Cannon-Bowers & Bowers, 2011; Hesse et al., 2015; Mathieu et al., 2019; Neubert et al., 2015), but there has been comparatively little work in social psychology that seeks to understand how group dynamics, relationships between people, and/or feelings towards others affect a group's ability to accomplish a goal.

It's also worth noting that a virtual escape room is an uncommon environment to interact with friends, and it's possible that some of our effects are specific to this distinctive environment. Future studies may wish to utilize other types of events beyond a virtual escape room, and test other dimensions of person perception, such as morality, in order to determine how well our findings generalize across contexts. In addition, it's important to keep in mind that this study was conducted in 2021; thus, all effects should be interpreted within the context of the COVID-19 pandemic. The pandemic is partially what made this research project possible, as escape room companies deployed complex games to be completed over Zoom during this time. However, baseline social activity was much lower than typical, which may have skewed participant responses. A virtual escape room may have been perceived as a more meaningful event than it would be outside of the pandemic, and participants may have been biased towards perceiving others as sociable after the game, given that other social activities were so much less frequent. It will be important to replicate these results outside of the context of the pandemic, when people were starved for social interaction.

Finally, we made several decisions about how to define certain variables in our study, and future work should seek to compare the impacts of these decisions on outcomes. For example, while previous work has assessed group processes by measuring pronoun use (J. E. Driskell et al., 1999; T. Driskell et al., 2013; Gonzales et al., 2010), additional features of group transcripts can also be used to predict group cohesion, such as verb tense (T. Driskell et al., 2013), language style matching (Kane & Van Swol, 2023), and bottom-up machine learning approaches (Stewart et al., 2019). In addition, future work should continue to explore the relationship between competence, sociability, and morality, and how susceptible each one is to an impression update. Our study relied on a narrow definition of sociability to ensure relevance to a group problem solving task. Future studies may wish to test the likelihood of an impression update for purer sociability traits, as has been done for morality (Mende-Siedlecki et al., 2013). Relatedly, although we hypothesized that overall competence would be expressed via puzzle solving performance and that overall sociability would be expressed via team collaboration performance, it's possible that the component traits of our summary competence and sociability dimensions mapped onto our performance measurements to varying degrees. Future work might seek to examine these within-dimension variations, and their relations to specific actions.

Finally, we define durable or meaningful change as change that persists for one week. While one week has been used in other domains, such as memory (Meltzoff, 1988; Roediger & Karpicke, 2006; Tompary & Davachi, 2017) and emotion regulation strategies (Denny et al., 2015), to indicate long-term change, it’s possible that evidence for durability would be strengthened by evaluating impressions after more than one week has passed. Future studies that wish to focus on durability of impression updates should evaluate impressions periodically, for at least six months after the update occurs.

When people work together to achieve a common goal, they draw conclusions about each other's traits based on how each person performed during their shared experience. In the present study, we showed that perceptions of a target's traits are impacted by one's prior relationship with that target *and* one's in-the-moment actions that demonstrate that trait. When groups of friends completed a virtual escape room together, prior perceived similarity and one's ability to solve puzzles both impacted perceptions of trait-level competence, while prior liking and one's *perceived* ability to collaborate with others both impacted perceptions of trait-level sociability. How we are perceived by another person is consistently impacted by our relationship to them, but the role of subjective vs objective actions is dependent on the trait being perceived. In some cases, we're not only biased in our perceptions of others' traits, but also in our subjective perceptions of their actions. It's these biased perceptions of individual actions that add up to global trait assessments inextricably tied to our relationships.

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