Collective Emotions: Appraisal-based similarity in emotion attributions to individuals and groups

Songzhi Wu[1] (songzhi.wu.gr@dartmouth.edu), Sean Dae Houlihan[1,3] (dae.houlihan@dartmouth.edu), Meghan L. Meyer[2] (mlm2378@columbia.edu), Jonathan Phillips[3] (jonathan.s.phillips@dartmouth.edu)

[1]Dartmouth College, Department of Psychological and Brain Sciences; [2]Columbia University, Department of Psychology; [3]Dartmouth College, Program in Cognitive Science

Abstract

Humans' capacity for Theory of Mind (ToM) allows us to reason about and infer others' mental states, including their emotions. While ToM has been extensively studied in interpersonal contexts, how people attribute mental states–particularly emotions–to collective entities (e.g., corporations) remains underexplored. The current work examines whether and how people ascribe emotions to collectives using the appraisal theory framework. Participants were randomly assigned to scenarios designed to elicit a specific emotional inference about either an individual (e.g., a lawyer) or a collective (e.g., a law firm). We then collected and compared emotion attributions and appraisal judgments of the situations across both conditions. Our results suggest that people attribute emotions to individuals and collectives in remarkably similar ways, with subtle differences in event appraisals. The results pave the way for a deeper understanding of collective ToM, with implications for studying moral judgments and decision-making in societal contexts.

Keywords: collective agents; emotion attribution; theory of mind; appraisal theory; social cognition

Introduction

In everyday life, people ascribe, reason about, and infer others' mental states, such as beliefs, desires, intentions, and emotions. This capacity to understand and predict the mental states of others–often referred to as theory of mind (ToM) in psychology–is a cornerstone for social interaction, judgments, and decision-making (Frith & Frith, 2005). While there is an extensive literature on interpersonal ToM or mind perception, much of this research focuses on interpersonal interactions (e.g., Rilling et al., 2004; Saxe & Kanwisher, 2003). Yet, in today's societies, collective entities like organizations, corporations, and governments play a critical role in shaping human lives. People routinely engage with these entities and form beliefs about their actions, capabilities, and even traits (e.g., Tang & Gray, 2023; Waytz & Young, 2012). For example, a researcher who has had pleasant experiences at Cognitive Science conferences may think that Cognitive Science Society as an organization drives innovation and genuinely cares about the development of affiliated researchers. Similarly, people often discuss collective agents as though they possess minds of their own (Knobe & Prinz, 2008). These perceptions, while often anthropomorphic, have profound implications for real-world situations, such as cooperation, trust, and accountability in societal systems.

Despite the ubiquity of these attributions, research on ToM and mind perception has largely focused on individuals as discussed above, leaving a critical gap in understanding how people attribute mental states to collective agents. The current research aims to address this gap by systematically exploring differences in how people assign mental states to individuals versus collectives, with a focus on emotions. Using the framework of appraisal theory (Scherer, 1999; Skerry & Saxe, 2015), we build upon recent advances in our understanding of emotion attribution. Appraisal theory offers a structured way to understand how people evaluate emotions based on contextual information, such as valence, novelty, goal relevance. This design allows us to utilize well-established emotion terms to draw intuitive and testable comparisons between individuals and collectives, and leverage the underlying appraisals to derive deeper insights into the mechanisms driving observed distinctions. By doing so, we examine not only which emotional states are ascribed to collectives, but also why these attributions align with or diverge from those made to individuals, contributing to a deeper understanding of collective ToM.

Experiment

Methods

Participants

A total of 150 participants (81 female, 66 male, 3 non-binary) were recruited from Prolific. All participants were at least 18 years old (M_{age} = 39.81, SD_{age} = 12.24), fluent in English, and successfully completed more than 97% of their previous tasks on the recruitment platform. Prior to analysis, four participants were excluded due to abnormally short completion times for the study.

Stimuli and Procedure

The current study aims to explore differences in the attribution of emotional states and underlying appraisals to individual versus collective agents. We operationalized this variable by either assigning participants to a condition involving a lawyer (individual agent condition) or a law firm (collective agent condition). For each condition, we built 15 scenarios to elicit attribution of one particular emotion. Participants were randomly assigned to one of the two experimental conditions (individual vs. collective) and

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started by reading background information about the agent to set the context. They were also informed that they would later encounter six independent scenarios that would describe how things would develop based on the context and that they should evaluate each scenario independent of other scenarios. These six scenarios were randomly selected from the fifteen we designed. Following each scenario was 15 emotion rating questions and 15 appraisal rating questions, where participants rated on a 7-point Likert scale (1 = not at all, 7 = extremely) the applicability of various emotions and appraisals, given the described circumstances.

For instance, a participant assigned to the individual condition would first read that:

"*A lawyer purchases a large number of very broad patents (e.g., storage of media files on a platform) for relatively low prices at intellectual property auctions, then starts using these patents to make infringement claims against all sorts of small organizations. Usually, the small organizations pay the lawyer to settle rather than going into extended litigation that is not only time-consuming but also expensive.*"

Then, the participant may encounter a scenario as below, intended to prompt the inference that the lawyer felt **guilty** for the way things unfolded.

"*Recently, the lawyer is contacted by the former head of a small non-profit organization that aimed to combat food waste, detailing how the infringement lawsuit initiated by the lawyer consumed a lot of their resources, drained funding and basically forced them to shut down. Since receiving the email, the lawyer stops making new claims and starts making donations to several relevant charities like food banks and homeless shelters.*"

Participants were then asked to rate the extent to which they believed the lawyer (or the law firm, depending on the condition) experienced each of the following emotions in Table 1.

Table 1: Emotion questions asked in each vignette.

Emotion Terms		
guilty	furious	apprehensive
ashamed	disappointed	fearful
jealous	depressed	surprised
joyful	proud	grateful
hopeful	excited	annoyed

Participants were also instructed to give ratings on event appraisals along the following dimensions in Table 2.

Table 2: Appraisal questions asked in each vignette.

Appraisal Dimensions
positive valence: the situation involved a hedonically positive or pleasant experience for the lawyer/law firm
negative valence: the situation resulted in a negative consequence for the lawyer/law firm
occurred suddenly: the situation occurred suddenly
situation unpredictable: the situation was unpredictable
required immediate response: the situation required an immediate response
had enough resources: the lawyer/law firm had enough resources to avoid or modify consequences
could live with consequences: the lawyer/law firm could live with the consequences of the situation
consequences predictable: the consequences were predictable to the lawyer/law firm
relevant for goals: the situation was important and relevant for the lawyer/law firm's goals
violated laws or norms: the lawyer/law firm violated laws or socially accepted norms in the situation
incongruent with ideals: the situation was incongruent with the lawyer/law firm's standards and ideals
caused by self: the situation was caused by the lawyer/law firm
caused by others: the situation was caused by someone or something else
no urgency: there was no urgency in the situation
could control: the lawyer/law firm could control the consequences of the event

It is worth noting that in selecting focal emotions and appraisal dimensions for the current study, we drew upon stimuli and materials from existing literature grounded in emotion appraisal theory, including Fontaine, Scherer, and Soriano (2013), Scherer and Meuleman (2013), and Skerry and Saxe (2015).

Results

Given that our primary experimental manipulation and hypothesis are designed to test for differences between individual agents and collective agents, we focus on comparing the emotion and appraisal spaces across the two conditions.

Emotion Ratings

We first examined the correlation between mean emotion ratings in the individual and collective conditions. Results

indicated a strong positive correlation, $r(223) = .97$, $p < .001$, indicating a high degree of alignment in emotion attributions across conditions. We also visually inspected a scatterplot in which individual condition mean emotion ratings were plotted along the x-axis and the corresponding collective condition ratings along the y-axis. The color of each point denotes the emotion in question. As shown in Figure 1, the data points cluster closely around the identity line, suggesting that emotion ratings in individual and collective conditions are highly similar.

Figure 1: Mean emotion ratings across scenarios in the individual and collective conditions. Colors denote different emotion questions. The clustering of data points along the identity line suggests that participants attributed emotions to individuals and collectives in a highly similar way.

To further examine the underlying structure, we conducted a principal components analysis with varimax rotation on the emotion ratings for both individual and collective conditions. Based on scree plot inspection and the eigenvalues from the covariance matrices, we selected three principal components which together account for 74% of variance in both individual and collective conditions.

As in Figure 2 and Table 3 (individual condition), Component 1 has strong loadings in emotion items of "joyful," "excited," "proud," and "grateful"; Component 2 captures "furious" and "jealous"; and Component 3 is mainly driven by "guilty" and "embarrassed." Notably, we discovered a nearly identical structure in the collective condition, suggesting a robust correspondence between the two (see Table 4 for component loadings in the collective condition).

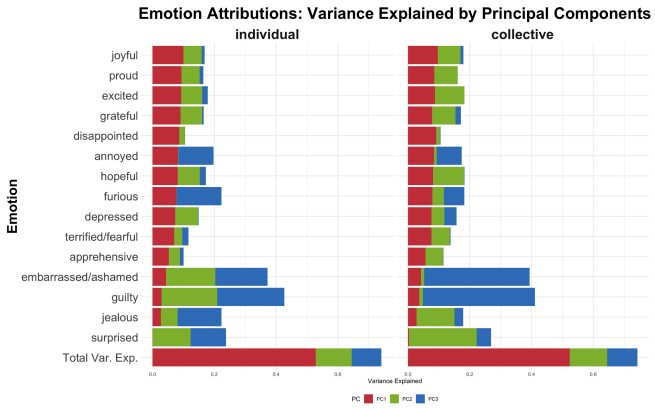

Figure 2: Proportion of variance explained by the first three principal components for attribution of each emotion in individual and collective conditions. Emotions are ordered (top to bottom) by descending PC1 variance explained in the individual condition. The bottom row shows the total variance explained in each component.

Table 3: Varimax-rotated principal component loadings for emotion ratings in the individual condition.

Emotion	RC 1	RC 2	RC 3
guilty	-0.12	0.06	0.92
furious	-0.58	0.70	-0.01
apprehensive	-0.34	0.52	0.33
ashamed	-0.21	0.15	0.89
disappointed	-0.54	0.49	0.42
annoyed	-0.61	0.66	0.02
fearful	-0.44	0.58	0.32
jealous	-0.12	0.70	0.09
depressed	-0.40	0.48	0.57
surprised	0.27	0.55	0.07
joyful	0.91	-0.18	-0.21
proud	0.89	-0.16	-0.21
grateful	0.89	-0.17	-0.16
hopeful	0.87	-0.09	-0.19
excited	0.90	-0.12	-0.21

Table 4: Varimax-rotated principal component loadings for emotion ratings in the collective condition.

Emotion	RC 1	RC 2	RC 3
guilty	-0.16	0.09	0.90
furious	-0.50	0.73	0.10
apprehensive	-0.32	0.60	0.30
ashamed	-0.20	0.11	0.89
disappointed	-0.53	0.52	0.43
annoyed	-0.61	0.65	0.05
fearful	-0.39	0.67	0.33
jealous	-0.10	0.68	0.10
depressed	-0.36	0.51	0.59
surprised	0.21	0.67	-0.04
joyful	0.91	-0.21	-0.18
proud	0.83	-0.14	-0.25
grateful	0.86	-0.18	-0.11
hopeful	0.88	-0.10	-0.20
excited	0.89	-0.12	-0.24

To quantify the structural similarity, we used Tucker's congruence coefficients to compare the principal components derived from the two experimental conditions (see Table 5). The coefficients are extremely high in the two conditions ($\geq$ 0.99), indicating near-identical component structures. Overall, our results show that emotion attribution is highly consistent across individual and collective scenarios.

Table 5: Congruence coefficients for emotion components between conditions.

	RC 1	RC 2	RC 3
RC 1	1.00	-0.56	-0.53
RC 2	-0.56	1.00	0.48
RC 3	-0.51	0.47	0.99

Appraisal Ratings

We began by examining the correlation between mean appraisal ratings in the individual and collective conditions. Results showed a robust positive correlation, $r(223) = .94$, $p < .001$, indicating a high similarity in appraisal attributions across conditions. We also made a scatterplot where individual condition mean appraisal ratings were plotted on x-axis and their collective condition counterparts on the y-axis. The color of each point represents the appraisal item in question. As in Figure 3, the data points closely align with the diagonal identity line, suggesting similar appraisal ratings across individual and collective conditions.

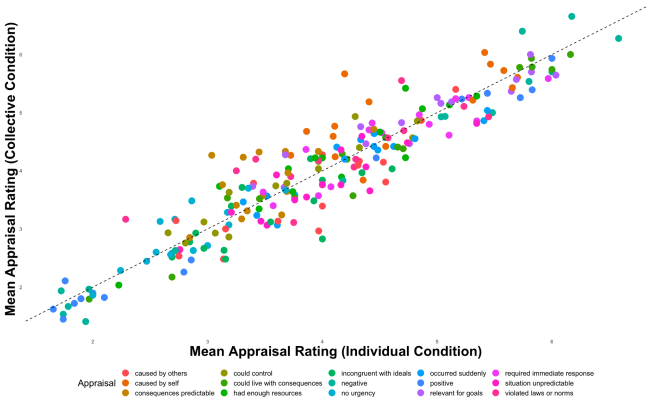

Figure 3: Mean appraisal ratings across scenarios in the individual and collective conditions. Colors denote different appraisal questions. The clustering of data points along the identity line suggests that participants evaluated the underlying situational appraisals about individuals and collectives in a highly similar way.

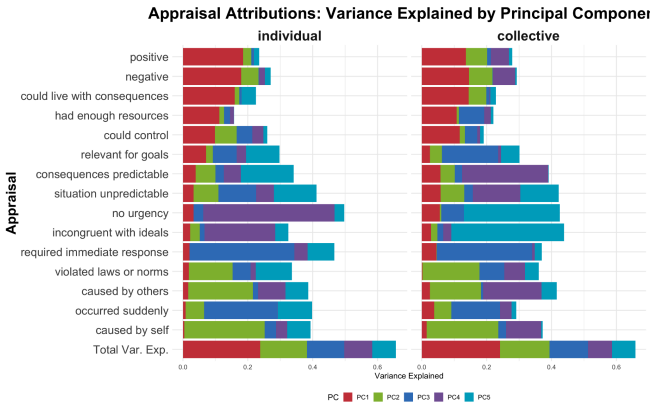

Figure 4: Proportion of variance explained by the first five principal components for responses to each appraisal question in individual and collective conditions. Appraisals are ordered (top to bottom) by descending PC1 variance explained in the individual condition. The bottom row shows the total variance explained in each component.

Next, we conducted principal components analysis with varimax rotation on appraisal ratings for both individual and collective conditions. Based on scree plot inspection and eigenvalues of the covariance matrices we retained the first five principal components which account for 66% of variance in both experimental conditions.

As shown in Figure 4, in the individual condition, Component 1 has strong loadings on appraisal items of "the situation involved a positive experience," "the situation involved a negative experience," and "the agent could live with the consequences"; Component 2 is primarily associated with "caused by self," "caused by others," as well as "the agent violated laws or social norms"; Component 3

accounts for “consequences were predictable” and “the agent could control the consequences”; Component 4 is mainly characterized by “the situation occurred suddenly" and “the situation was predictable”; and Component 5 is driven by “the situation required immediate response” and “there was no urgency.” A similar component structure emerged in the collective condition (right panel of Figure 4), with a few differences. In Component 3, “situation was unpredictable” has a strong loading, whereas “the agent could control the consequences” does not. In Component 5, “the consequences were incongruent with the agent’s ideals” exhibits high loading in the collective condition but not in the individual condition. Additionally, “occurred suddenly” has less weight in the collective condition compared to the individual condition.

We again used Tucker’s congruence coefficients to compare and quantify similarities between component structures across experimental conditions (Table 6). The first two components show high congruence in the two conditions ($\geq$ 0.96). The third (0.76) and fourth (0.56) components maintain moderate alignment, showing some structural differences at the same time. Notably, not only does the fifth component in the individual condition not align with its counterpart in the collective condition (-0.17), it aligns more closely with the fourth component in the other condition (0.87), suggesting a structural rearrangement between the two conditions. Overall, the appraisal space exhibits comparable component structures across conditions, with some differences emerging in the lower-variance dimensions.

Table 6: Congruence coefficients for appraisal factors between conditions.

	RC 1	**RC 2**	**RC 3**	**RC 4**	**RC 5**
RC 1	0.96	-0.06	0.28	-0.09	-0.44
RC 2	0.00	0.98	0.28	-0.05	0.05
RC 3	0.45	0.27	0.76	0.09	0.42
RC 4	-0.07	-0.19	-0.63	0.56	0.61
RC 5	-0.25	0.01	-0.07	0.87	-0.17

Predicting Emotions from Appraisals

Finally, we conducted a permutation test (n = 1000) to examine differences in emotion attribution as predicted by the 15 appraisal dimensions across the two experimental conditions (individual vs. collective). Specifically, we fit linear mixed-effects models predicting each emotion using the 15 appraisals, including a random intercept for distinct participants, separately for each condition. We then computed the between-condition difference in fixed-effects coefficients for each appraisal within each emotion. To generate a null distribution of these differences, we randomly permuted condition labels at the participant level, preserving within-subject structure, and computed the coefficient differences for each permutation. With the null distribution, we calculated two-tailed p-values by comparing the observed differences with the null distribution. As shown in Table 7, only a small subset of appraisals showed statistical significance in predicting condition-level difference in emotion attribution.

Table 7: Appraisal dimensions that showed statistical significance in predicting difference in emotion attribution between individual and collective experimental conditions in the permutation test (n = 1000). Negative values indicate stronger association in the collective condition than the individual condition, and asterisks denote significance levels ($p < .05$*, $p < .01$**).

Emotion	**Appraisal**	**Observed Difference**
apprehensive	violated laws or norms	-0.18**
excited	occurred suddenly	-0.16*
grateful	could control	0.17*
guilty	required immediate response	-0.18*
disappointed	violated laws or norms	-0.13*
ashamed	positive valence	-0.18*

Discussion

Our findings suggest that emotion attributions are highly aligned between individual and collective agents, with similar patterns in event appraisals as well, in addition to some differences. Using real-life scenarios designed to elicit specific emotion inferences, we observed that participants consistently attributed emotions to both individuals and collectives in comparable ways. These results indicate that theory of mind (ToM) capabilities that have been primarily studied in the context of interpersonal interactions, may also be extended to ascribing mental states—including emotions—to collective entities.

However, our study has several limitations that warrant further investigation. First, we used a single experimental setup and a limited set of contrasting agents, which may restrict the generalizability of our findings. Future research should incorporate a broader range of situations to determine whether the observed individual-collective alignment in emotion attribution holds across diverse contexts. Expanding our study design to include a more varied set of acting agents will also help refine our understanding of how ToM operates differently for individuals versus collectives.

Second, while the core dimensions of emotion attribution and appraisal evaluations appear highly aligned across conditions, differences in certain components suggest meaningful distinctions that should be further explored. For example, the finding that incongruence between reality and ideals played a stronger role in the collective condition than in the individual condition may reflect prior research

suggesting that collective entities are perceived to have greater agency and a more unified goal (Rai & Diermeier, 2015). We initially expected more pronounced differences in emotion attributions and situational appraisals between individual and collective targets. The observed high alignment may be a reflection of people's general tendency to anthropomorphize collective entities, assigning them humanlike characteristics, reasoning, and emotional responses when given the opportunity. It is worth noting that we did not include measures of bodily responses such as "got pale," "heartbeat getting faster," which may have revealed a clearer divergence between individual and collective agents (Scherer et al., 2013). Incorporating a broader range of appraisal dimensions would provide a more comprehensive understanding of how emotion attributions differ across conditions.

Third, we aim to further investigate the relationship between appraisal ratings and emotion attributions to better understand the cognitive mechanisms underlying these evaluations. Our results indicate that appraisal ratings differ more between experimental conditions than emotion assignment, which could pose a challenge to appraisal theory or suggest that the relationship between emotions and appraisals operates differently for collectives compared to individuals.

Beyond the scope of our current work, these findings have the potential to contribute to broader discussions in social cognition, moral psychology, and organizational behavior. For instance, research has documented people's tendency to anthropomorphize organizations and groups (Epley, Waytz, & Cacioppo, 2007; Waytz, Gray, & Wegner, 2010), yet its broader implications remain mostly underexplored. In addition, understanding how people assign mental states to collective entities is essential as such perceptions shape public attitudes, moral judgments, and even behavioral responses. Specifically, people may express love, hate, disdain, or trust toward corporations based on how they perceive the organization's intent and character. In turn, these attitudes influence the actions of the collective itself, as public perceptions can shape how members of the organization view their roles and responsibilities.

A particularly critical downstream effect of collective ToM lies in moral judgments. Assigning praise and blame to collective entities often hinges on perceived intentionality, a central dimension of mind perception (Gray, Young, & Waytz, 2012; Knobe, 2003). If a company is seen as deliberately polluting the environment, it is more likely to be blamed and sanctioned than if the harm is believed to be accidental. Similarly, in philanthropic efforts, organizations are judged not only by the outcome but also on their intentions: did they genuinely aim to help citizens, or were they motivated by ulterior motives like reputation improvement and financial gains in the future? The extent to which people perceive collective agents as intentional moral actors and moral patients has significant implications for corporate accountability and consumer behavior.

By examining how emotions are attributed to collective entities, our work provides a first step toward understanding the cognitive processes underlying collective theory of mind. We aim to build on these findings by exploring their implications across broader domains.

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