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ORIGINAL RESEARCH REPORT

The Effects of Minimal Group Membership on Young Preschoolers' Social Preferences, Estimates of Similarity, and Behavioral Attribution

Nadja Richter^{*†‡}, Harriet Over[§] and Yarrow Dunham^{||}

We investigate young children's sensitivity to minimal group membership. Previous research has suggested that children do not show sensitivity to minimal cues to group membership until the age of five to six, contributing to claims that this is an important transition in the development of intergroup cognition and behavior. In this study, we investigated whether even younger children are sensitive to minimal cues to group membership. Random assignment to one of either of two color groups created a temporary, visually salient minimal group membership in 3 and 4-year-old study participants. Using explicit measures, we tested whether children preferred minimal group members when making social judgments. We find that, in the absence of any knowledge regarding the two groups, children expressed greater liking for ingroup than outgroup targets. Moreover, children estimated that ingroup members would share their preferences. Our findings demonstrate that from early in development, humans assess unknown others on the basis of minimal cues to social similarity and that the perception of group boundaries potentially underlies social assortment in strangers.

Keywords: child development; social preferences; minimal group membership; explicit minimal group bias; social assortment

Introduction

Humans have evolved to live within large and complex social systems and they are exceptional in the extent to which they engage in cooperative exchange [1, 2]. Indeed, in the modern world, people often spend significant amounts of time interacting with others that are not well known to them. In the absence of information about a prospective social partner, what cues guide individuals to select certain social partners over others? One social cue that can influence social assortment is the perceived level of similarity to the self. Social psychological research has demonstrated that adults and adolescents preferentially engage in acts of cooperation and support towards those who they consider to be "like them" [3]. For example, adults

prefer individuals they perceive to be similar to themselves in terms of demographics, personal beliefs and attitudes, or physical appearance [4–8].

Perhaps more strikingly, even without any prior interaction experiences or specific knowledge about the other, adults show consistent tendencies to prefer those with whom they share even a slight, seemingly arbitrary feature that can serve as the basis for social categorization. Such minimal similarities are related to ingroup favoritism, i.e. the tendency to identify with social groups and to favor members of one's own group (the "ingroup") over those of a different group (the "outgroup"). Researchers coined the term '*minimal group phenomenon*' following Henri Tajfel's development of a study paradigm to test the emergence of intergroup biases [9, 10]. In minimal group research, abstract shared markers based on, for example, simple preferences are used to define two contrasting social groups and various behavioral responses (i.e. evaluations of others, resource allocation or helping) are measured. In early work using this paradigm, participants were grouped based on similar, seemingly arbitrary preferences (such as a preference for Kandinsky over Klee paintings) or even by random assignment (e.g. a coin toss). Remarkably, even entirely meaningless groupings were sufficient to elicit favoritism for ingroup members, a robust finding across a variety of measures (see [11] for a meta-analytic review).

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One key advantage of the minimal group paradigm is that it allows us to measure intergroup preferences in any given cultural context in the absence of confounding variables such as familiarity or pre-existing cultural stereotypes about the groups in question. This is important as it allows us to assess when *merely belonging* to a group begins to influence children's intergroup cognition. We know that the origins of intergroup preferences appear very early in development. For example, even infants prefer individuals who speak their native language [12]. However, these early preferences may be driven by familiarity rather than by an understanding of how different individuals relate to the self.

Research with somewhat older children has shown that, at least by five years of age, children self-stereotype, i.e. conceive of the self in group-relevant terms [13]. Furthermore, around the same age children are sensitive to minimal group membership and show a tendency to prefer previously unfamiliar and meaningless (i.e. "minimal") groups [14–16]. However, published findings in younger children have so far been largely negative. Fawcett and Markson [17] report that while 3-year-olds prefer a puppet playmate with physical appearance similar to their own in terms of hair color, they do not do so based on an arbitrary group marker (stickers assigned by the experimenter). Further, in a follow-up experiment the authors found that only the stable trait of similar hair color, but not the transient trait of a matching shirt color triggered initial liking in 3-year-olds ([17], Experiment 1b). In a laboratory demonstration Dunham and colleagues [14, 15] further found that 5- and 6-year olds, but not 3-year-olds, favored unfamiliar peers wearing a same-color group shirt as measured by their implicit attitudes, behavioral attribution, and expectation of reciprocity. Consistent with this, a recent study by Plötner and colleagues [18] revealed that while 3-year-olds did not reliably differ in their behavior, 5-year-olds preferentially came to help those who shared their own minimal group membership. Other work has demonstrated robust minimal group biases around age 5, including sensitivity to such aspects as within-group fairness norms and loyalty [19, 20], reputation management [21], or positive affect [15].

Thus, five years is often cited as an important period for the development of intergroup cognition and behavior [22, 23]. While past research is consistent with the possibility that sensitivity to minimal group cues does not emerge until around age 5, it is possible that even younger children will show sensitivity to the minimal group paradigm under the right circumstances, and in particular when the experimental paradigm makes the group distinction clearer or more salient. If so, this would lead us to reevaluate the age at which children first show biased group-mindedness and thus reconsider the social contexts necessary for the development of intergroup cognition and behavior.

The objective of the current study was to investigate the effects of minimal group membership in children as young as three years old on a range of explicit attitude measures. Specifically, we investigated the consequences of a random color group assignment, and whether this

type of minimal group membership affects explicit social preferences.

A central goal was to adjudicate between two possible interpretations for prior failures to observe minimal group preferences in early preschoolers. One possibility is that the mechanism(s) underlying such preferences in older children is not yet present in younger children. Another possibility is that, while the mechanism(s) itself is in place, younger children do not as reliably attend to, or otherwise concern themselves with, group boundaries such that the mechanism(s), while operative, is not as readily engaged. In the latter case, but not the former case, a paradigm that draws additional attention to group boundaries and the social relevance of group membership (while still avoiding attaching any evaluative meaning to the groups) might lead to the emergence of minimal group preferences in younger children.

In a within-participant design, children were randomly assigned to either the green or the orange group [14]. Shared visual group markers and explicit group labels were used to enhance the perceptual salience of group membership. In a forced-choice manner, children were then asked to select their preferred choice from pictures contrasting in- and outgroup targets; this categorization component has not generally been used in past studies of this sort, and served to call additional attention to the group boundary prior to the primary dependent measures [24]. We employed the following measures: First, we assessed participant's explicit attitudes ("Who do you like better?"). Second, we determined whether behaviors of either positive or neutral behaviors were attributed differently to in- and outgroup targets ("Who made cookies for their friends?"). In a third task, we further measured whether young children expected more similar preferences between ingroup members. ("You like vanilla, which of these kids also likes vanilla?"). Using this range of dependent measures enabled us to examine the breadth of explicit minimal group attitudes in young preschoolers.

Materials and Methods

Participants

The 48 participants (22 female) were primarily 3-year-old children but also included nine older 4-year-olds (mean age = 3.7; range from *min* = 3;1 to *max* = 4;8 years). The reason we had included 4-year-olds is that we had decided on the sample size prior to data collection. During data collection it became apparent that to reach this sample size we would need to include a few 4-year-olds. Children were recruited from laboratory maintained databases at Princeton and Yale University, were primarily middle-class and of diverse ethnic backgrounds (55% European American, 16% Indian American, 8% African American, 6% Asian American, 6% Hispanic), and were tested in their local preschools. Written informed parental consent was ensured in advance of all testing. All research reported here was approved by the respective Institutional Review Boards at Princeton and Yale University.

An additional 11 children (4 female) were tested but excluded from the final sample, one due to an experimenter error and the others because they failed to recall

which group they had been assigned to at the end of the study (see procedure details below).

Materials

For the minimal group manipulation materials were sets of orange and green group markers consisting of armbands, stickers, and scarves. To randomly assign the participating children to one of the two color groups, a small bucket containing green and orange plastic chips was used. Test stimuli were drawings of children matching the participant in gender and wearing orange and green group markers (see S2 Fig for an example). Stimuli were presented in counterbalanced order across participants and trials were presented on a 13-inch laptop screen.

Procedure

All participants were tested individually by one of two research assistants who recorded their responses on a laptop. The overall study procedure took approximately 20 minutes and included a minimal group assignment procedure, followed by three different tasks of group affiliation, and ended with a manipulation check.

For the minimal group assignment, participants first heard stories about two children from different groups who had each “blindly” drawn a colored coin from a bucket which determined their color group membership. Next, participants were asked to likewise draw a coin without looking from a bucket containing multiple orange and green coins. Depending on the color of the coin selected, the experimenter (E) told the child that within this game context he or she would be assigned to the green ($n = 22$) or orange ($n = 26$) group. To make membership salient, children were given three group markers to put on, an armband, a sticker, and a scarf in their respective group color, and were told they would now view other children in the green and orange groups on the computer. To further reinforce the salience of the groups, children looked at several drawings of children wearing either green or orange group markers (armbands, stickers, and scarves). On each round, E asked the participant which color group the presented individuals belonged to. If children failed to ascribe the correct group membership, E guided them towards the correct answer, e.g. by pointing out the colors of the respective group markers. The minimal group induction ended once children had correctly identified group membership without any help from E on four consecutive rounds (two per color group). Children were then taken through the group affiliation measures described in the next section. At the completion of the study, E announced the end of the game, assisted the child in taking off their group markers. Finally, a research assistant casually approached the child, asked them whether they did have a fun time and, as a manipulation check, what color group the child had belonged to in the game.

Measures

The following group affiliation measures were undertaken in counterbalanced order.

Explicit Attitude. Children were told that they were going to look at several rounds of pictures of peers on the

screen and that they had to point at which child they liked better. Five successive trials were presented. On each trial, two stimuli, one belonging to the participant’s ingroup and the other to the participant’s outgroup, appeared next to each other and children were asked to point at their favorite.

Shared Preference. On each of the five trials, children were first presented, on computer, with vignettes showing a pair of objects belonging to the same category, e.g. a pet animal (cat vs. dog) or a food type (vanilla vs. chocolate ice cream) and asked to point out which one they liked better. On the next screen, the child’s preferred choice appeared in the center juxtaposed with a stimuli pair depicting an ingroup and outgroup member, respectively. While pointing at the two options E was asking, “So you like (cats) better. Who do you think also likes (cats) better?”. Again participants were asked to indicate their choice by pointing at one of the two individuals.

Behavioral Attribution. Children were told that they would hear “about something that somebody did”, and their job was to decide who had done it. On each trial, a short behavior was described and pictured on the computer, with either positive or neutral valence (five each). Positive items included questions like “Who made cookies for all their friends?” and neutral items included questions like “Who drove to school this morning?” This distinction allowed us to explore whether the valence of the described behavior predicted children’s ingroup attributions. We did not include items of negative valence because previous work suggests that outgroup negativity develops later than ingroup positivity and that negatively valenced items of this sort do not produce differential responding by group even in 5-year-olds [14, 22, 25]. Next, children saw a pair of targets, contrasting group color (orange vs. green) and were asked to point to their choice.

Additionally, we tested a fourth measure that we had devised as a novel approach to examine intergroup attitudes via spatial distance assessment [26]. More precisely, we employed a task where participants were to actively arrange target stimuli on a magnetic whiteboard and we recorded the outcomes via digital photographs, with the hope of measuring whether children placed an avatar representing the self nearer to other members of the ingroup versus the outgroup. However, technical issues of measurement and image quality prevented accurate coding of the whiteboard images. Hence, we do not consider this measure further.

Statistical analysis

Participants completed three tasks (Explicit Attitude, Shared Preference, Behavioral Attribution), with multiple trials per task. We treated trial-level data as a repeated measure and analyzed the fraction of trials in which children favored the ingroup. Our primary analysis focused on whether choices favored the ingroup target and whether choices differed as a function of task; a secondary analysis focused on whether children’s preferences varied as a function of age (using age correlations computed separately for each task).

Within our data analysis we employed non-parametric tests including unequal variance t-tests based on rank

transformations of the data [27–29]. We used exact tests throughout [28, 30] or, in the case of rank correlations, p -values estimated from 10000 permutations. All reported p -values are two-tailed. Analyses were performed using R 3.1.0 [31], including the R packages *exactRankTests* [32], *gtools* [33], *coin* [34], and *ggplot2* [35].

To ensure that our experimental manipulation was equally effective among participants, we excluded the responses of ten out of 59 children (17%, 3 female, mean age = 3.5; range from $min = 3;1$ to $max = 3;8$ years) that failed to correctly recall at the end of the study which group they had been assigned to. The rationale for this pre-planned exclusion was that if a child failed to encode their group membership at all they would not be capable of manifesting an intergroup preference. Additionally, we did not include the responses of one child that did not complete the post-test manipulation check due to an experimenter error. However, we note that including these children in our analysis does not alter our primary conclusions (S1 Fig).

Results

Preliminary analyses revealed no differences with regard to participant gender or the randomly assigned ingroup color, so we collapsed across these factors in all subsequent analyses. We further note that restricting our analysis to only 3-year-olds yields similar results.

There was an overall difference in responses as a function of test task (Explicit Attitude, Shared Preference, or Behavioral

Attribution; Friedman $\chi^2 = 8.71$, $df = 2$, $p = 0.013$). We had no prior prediction regarding whether the different measures would elicit different behaviors in our participants, but visual inspection of the data (see **Fig. 1**) suggested this effect was driven by higher frequencies of ingroup choices in the Explicit Attitude and Shared Preference tasks, but not in the Behavioral Attribution task. Pairwise comparisons confirmed that children chose the ingroup targets significantly more frequently in the Shared Preferences and Explicit Attitude tasks than in the Behavioral Attribution trials (exact Wilcoxon tests: $T^{\text{SharedPref}} = 556.5$; $N = 39$ (9 ties), $p = 0.019$, $r = 0.40$ & $T^{\text{ExpAtt}} = 557.5$; $N = 39$ (9 ties), $p = 0.018$, $r = 0.37$). Moreover, children opted for the ingroup targets in similar ways on the former two measures (exact Wilcoxon test: $T^{\text{}} = 355$, $N = 34$ (14 ties), $p = 0.33$; **Fig. 1**). Given the diverging results across tasks, we now report results for each task considered independently.

Explicit Attitude

Children expressed greater liking for members of their own minimal group and opted for the ingroup over the outgroup target in a median of 60% of trials. Crucially, the fraction of ingroup choices was significantly higher than 0.5, which would be expected by chance distribution (Exact Wilcoxon signed rank test: $T^{\text{}} = 844$, $N = 47$, $p = 0.002$). This minimal group preference was not correlated with age (Spearman's rank correlation: $r_s = 0.073$, $N = 47$, $p = 0.621$) suggesting that even the younger children in the sample showed ingroup preference.

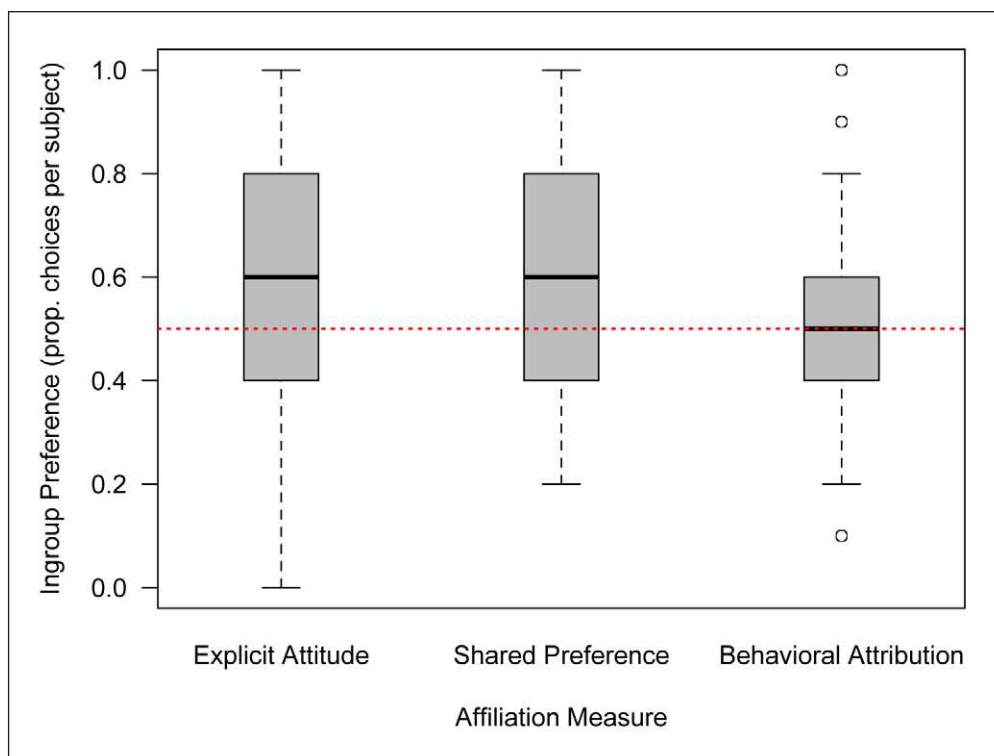


Figure 1: Response distribution demonstrating minimal group preferences in 3-year-olds. The box-and-whisker plots show children's responses across the three administered group affiliation measures. The boxes indicate the first and fourth quartiles. The solid lines inside the boxes represent the medians. The dashed lines capture the location of extreme values, with the exception of outliers (shown as circles) that exceeded the inter-quartile distance by more than 1.5. The horizontal, red dashed line indicates the chance level (50%).

Shared Preferences

Children extended their own preferences to members of their own minimal group. More specifically, in a median of 60% of trials children ascribed similar preferences as their own to those individuals belonging to the same color group rather than to those individuals belonging to the other color group, a figure that exceeds chance expectation (Exact Wilcoxon signed rank test: $T^+ = 981$, $N = 48$, $p = 0.001$). There was a trend for this effect to decrease with age but this correlation failed to reach statistical significance (Spearman's rank correlation: $r_s = -0.269$, $N = 48$, $p = 0.065$).

Behavioral Attribution

We found no evidence of biased behavioral attribution on the basis of minimal group membership. Children made ingroup-favoring attributions in a median of 50% of trials, which is chance performance. There was no relationship between age and biased behavioral attribution (Spearman's rank correlation: $r_s = -0.170$, $N = 47$, $p = 0.259$). Further, there was no effect of group membership when examining positive and neutral items separately, ($Mdn_{pos} = 0.60$, $Mdn_{neut} = 0.60$; exact Wilcoxon test: $T^+ = 282$, $N = 29$ (18 ties), $p = 0.166$).

Discussion

In the current study, we investigated whether random assignment to minimal social groups elicits biased preferences for ingroup members in 3- and 4-year-old children. Like older children, these young children explicitly prefer members of their own group. This shows that the minimal group paradigm exerts an influence over preferences considerably earlier in development than previously thought. Previous research has not found minimal group effects in children younger than around age 5 [14, 15, 18].

The children in our study estimated that ingroup members will be more similar to themselves in their preferences thus extending superficial similarities based on arbitrary and randomly chosen markers to psychological traits. This result might be considered a simple form of group identification, in which children form the expectation that they are more likely to be similar to ingroup members than outgroup members [3]; it can also be interpreted as a form of category-based induction in which children assume that, if one known exemplar of the social category has a particular property (i.e. the child herself), that property can be extended to other members of the same category (i.e. the ingroup).

Interestingly, these same younger children do not attribute more positive (or, for that matter, neutral) behaviors to the ingroup. This suggests an interesting developmental change. Older children in Dunham et al. (2011), at least in experiment 2, did not show this bias [14]. This difference between the measures points to the importance of using multiple dependent measures and investigating, in a more fine-grained way, the nature of intergroup biases at different ages. Future work should aim to disentangle the various range and magnitudes of biases in younger children. More broadly, however, the weaker results with this measure are interesting: children manifest preferences for

members of their minimal ingroup but do not appear to reliably use those preferences to make inferences about the unobserved behavior of ingroup members. It is possible that doing so requires a subsequent inferential step, for example reasoning that positive behavior is more consistent with how a preferred ingroup member will behave, and this subsequent step is not readily made in children this young. The lack of an effect on this measure is in another sense reassuring, however: Children did not have a simple tendency to opt for the ingroup on all measures, i.e. they did not mindlessly choose the ingroup on all tasks or simply link the ingroup with positive things on all tasks (as could come about, for example, as a result of experimenter expectancy effects). Rather the group distinction was meaningful to children when judging preference and similarity but not when judging behavior.

A few limitations and uncertainties should be acknowledged. First, there was a relatively high failure rate (17%) in encoding one's own group membership, especially in our younger participants. Even with our attempt to ramp up salience of the group manipulation, a modest proportion of our participants thus seemed not to consider group membership particularly relevant. Future work could fruitfully explore the sorts of cues that might enhance the salience of group membership for younger children. Second, while our work (and other minimal group research with children) assumes that children construe their group assignment as random due to the random process that determined membership, it is possible that children imbue the procedure with greater meaning, e.g. via teleological forms of reasoning that are characteristic of this age range [36]. If so, part of the power of minimal groupings for children could be a result of thinking that the group assignment was *revelatory* rather than *random*, i.e. that it revealed something about their nature. More work would be necessary to explore this possibility.

Past research with children in a similar age range and using similar paradigms has failed to reveal evidence of minimal group preferences in children [14, 15, 18]. Why are our results different? Note that there are at least two reasons younger children might not show minimal group preferences. First, they might simply not yet possess the socio-cognitive tendency to affiliate with novel social groups. Second, they might possess any such tendency but not employ it as rapidly or flexibly in the face of "minimal" grouping cues. We were particularly interested in ruling in or ruling out the latter hypothesis. We therefore took pains to increase the salience of the group boundary by employing and emphasizing multiple cues to group membership (an armband, a sticker, and a scarf) and by including a categorization task in which children actively employed the groups to classify social targets prior to completing the dependent measures. By contrast, most past studies have used a single cue and have not asked children to actively employ the category prior to attitude assessment [14, 15]. For example, in one past study that found minimal group preference in 6-yr-olds but not in 3-yr-olds [15], children were assigned to groups based on a single cue (shirt color) and then proceeded directly to the dependent measures. Our results suggest that rather

than lacking the cognitive capacities to affiliate rapidly with novel social groups, younger children were simply less attentive to, or concerned with, the social groups. Put differently, that manipulation may have been too weak to activate automatic ingroup preference in the younger age group. However, this still leaves open questions concerning what our salience manipulation actually accomplished. For example, did it simply heighten attention to the group boundaries themselves, or did it provide a socio-cultural cue concerning the importance of the group in the context of the study? The present work is unable to speak to these possibilities.

Taken together, our findings extend previous minimal-group research and establish that biased preferences based on minimal cues of group membership are present at least by the age of three. Our findings thus provide evidence that, from early in development, humans are sensitive to clearly marked and contextually prominent cues that demarcate social categories. Soon after such cues have been brought to children's attention they begin to guide social preferences and inferences about shared traits. While there appears to be age-related change in the extent to which children are sensitive to subtle cues that demarcate social groups, the underlying tendency to prefer such groups once they have been made salient appears to be relatively continuous from age 3 onward. An important project for future work will be to connect this finding to infant research, which has suggested that by the end of the first year of life infants prefer others who share their social preferences, but not others who share an externally assigned property with them [37]. Based on the present work, a fascinating question becomes whether that externally assigned property could begin to generate social preferences if it was rendered more salient or socially relevant, or if infants were given more experience with it.

Preferences based on minimal cues indicating a circle of potentially similar others provide a strong guide to social assortment, especially when any other useful information about the potential interaction partner is missing. This early-emerging aspect of human psychology appears to be a key ingredient to the more complex forms of intergroup reasoning that emerge later in life.

Supplementary Files

- **Supplementary File 1:** <http://dx.doi.org/10.1525/collabra.44.s1> **S1 Fig. Response distribution as a function of the pre-planned data exclusion criteria (group manipulation check).** Displayed are, individually for each administered test task, the linear relationships (blue, solid lines) between participant response (prop. ingroup preference) and participant age. Grey shades indicate the 95% confidence intervals of the respective linear regressions. Red points indicate data from participants who failed the group manipulation check (post-test), i.e. they failed to recall which group they had belonged to during the test, and were therefore excluded from final data analysis ($n = 10$). Green points comprise the final dataset, i.e. responses from the 48 participants that

passed the group manipulation check and were thus included in final data analysis. The horizontal, black dashed line marks the chance level threshold (50%).

- **Supplementary File 2:** <http://dx.doi.org/10.1525/collabra.44.s2> **S2 Fig. Examples of test stimuli (with orange and green group markers).** Stimuli were presented in counterbalanced order across participants and trials and matched the participant in gender.
- **Supplementary File 3:** <http://dx.doi.org/10.1525/collabra.44.s3> **S3 Dataset. Data collected in the tasks (within-subject design).** Note that this dataset includes responses from the ten participants that were excluded from final data analysis due to not recalling their own group membership (see S1 Fig).

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Competing Interests

The authors declare that they have no competing interests.

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Peer review comments

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