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A comparison of minimal group induction procedures

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Abstract
For 40 years researchers have studied minimal groups using a variety of induction procedures which, surprisingly, have never been formally evaluated. This article reports two experiments that compared minimal group induction procedures based on: (1) memorization of novel ingroup names; (2) an imagination instruction; (3) random assignment; and (4) false feedback from painting preferences. The memorization procedure produced the largest ingroup favoritism effects on implicit measures of attraction and identification, whereas all procedures produced comparable ingroup favoritism effects on explicit measures of attraction and identification and bonus money allocation. The memorization procedure is recommended as a practical and effective minimal group induction procedure, particularly in cases in which implicit assessments are of primary interest.

Keywords
ingroup–outgroup, intergroup, minimal groups, social identity

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Many years ago, a laboratory experiment produced curious findings: participants who were arbitrarily categorized into one of two novel groups subsequently displayed prejudicial attitudes and discriminatory behavior favoring ingroup members. Those initial findings from what has become known as the minimal group paradigm (MGP; Tajfel, Billig, Bundy, & Flament, 1971; Rabbie & Horwitz, 1969) have led to numerous theoretical advances in the study of groups, including social identity theory (Tajfel & Turner, 1986) and self-categorization theory (Turner, Hogg, Oakes, Reicher, & Wetherell, 1987). Of course, new demonstrations of MGP effects no longer provoke surprise. However, what perhaps should be surprising is that in the 40 years since the first MGP experiment, very little work has focused on refining the methods used to study intergroup bias and discrimination.

Contemporary researchers use minimal group induction procedures that are remarkably unchanged from the procedure developed in the

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late 1960s. In the classic procedure, participants complete one of a number of trivial tasks (e.g., estimating the number of dots briefly displayed on a screen, or rating a series of paintings) and then are ostensibly assigned to novel groups based on their performance. Later, participants evaluate or allocate money to ingroup and outgroup members, with the typical result being that participants significantly favor their ingroups. That this procedure is correctly designated as "minimal" is underscored by the further constraints that participants do not interact with ingroup or outgroup members and cannot directly affect their own outcomes, and that the novel groups share no prior history (Hewstone, Rubin, & Willis, 2002).

Theoretical controversies and methodological concerns

The literature on MGP reveals significant controversy over the interpretation of ingroup favoritism effects. Tajfel and Turner (1986) viewed ingroup discrimination as flowing from participants' attempts to bolster their social identities. This perspective, central to social identity theory, has remained an important explanation for ingroup favoritism (Hewstone et al., 2002). However, alternative perspectives have emphasized explanations as to why participants discriminate that have little to do with image-bolstering, including the influence of norms (Hertel & Kerr, 2001) and expectations of reciprocity (e.g., Gaertner & Insko, 2000; Rabbie, Schot, & Visser, 1989; cf. Bourhis, Turner, & Gagnon, 1997; Perreault & Bourhis, 1998). In addition, researchers have questioned the interpretation of ingroup bias effects on attitudinal measures, proposing alternative explanations that reflect cognitive consistency (Gramzow & Gaertner, 2005; Greenwald, et al., 2002a) rather than the motivational account of social identity theory.

Moreover, the MGP literature reflects concerns regarding the measurement of ingroup favoritism effects. The traditional method for assessing intergroup discrimination – the Tajfel matrices – has participants distribute money to ingroup and outgroup members by choosing among a set of allocation strategies that vary in the absolute amount given to each group as well as the relative advantage given to each group. The Tajfel matrices have been criticized for confounding the different allocation strategies (Brewer, 1979) and for providing limited or ambiguous response options (Bornstein et al., 1983a, 1983b): criticisms which have received attention in numerous reviews concerned with illuminating the advantages and disadvantages of the matrices (e.g., Bourhis, Sachdev, & Gagnon, 1994; Diehl, 1990; Turner, 1983a, 1983b).

Controversy regarding the Tajfel matrices prompted the creation of an alternative MGP discrimination assessment, the Multiple Alternative Matrices (MAMs; Bornstein et al., 1983a). Although similar in many respects to the Tajfel matrices, the MAMs notably provide distinct response options to represent favoring the ingroup over the outgroup (max rel own) and maximizing the absolute value for the ingroup (max own). Interestingly, Bornstein et al. did not find consistent evidence of ingroup favoring allocations using the MAMs, and so concluded that typical MGP discrimination findings are produced by characteristics distinctive to the Tajfel matrices. However, Gaertner & Insko (2001) subsequently showed that the MAMs do reliably measure intergroup discrimination, provided that the allocation task does not evoke normative prohibitions against discrimination, such as when the allocation task is framed as providing payment, rather than a bonus.

More recently, as work on implicit social cognition has exploded (Bargh, 2007; Greenwald, Poehlman, Uhlmann, & Banaji, 2009; Wittenbrink & Schwartz, 2009), groups researchers increasingly have employed implicit measures of ingroup favoritism with success (e.g., Ashburn-Nardo, Voils, & Monteith, 2001; Gregg, Seibt, & Banaji, 2006).

Alternative minimal group induction procedures

In addition to the classic MGP procedure described above, researchers have developed and used a number of alternative induction procedures for creating minimal groups. One familiar

alternative in the MGP literature is the random assignment procedure. For example, Brewer and Silver had participants complete the standard painting preference task and subsequently informed them that their scores "were too similar to provide a basis for grouping, so they would have to be split into two groups randomly" (1978, pp. 395–396). They found that discrimination with this random procedure was similar to that of a comparison condition using the classic procedure (see also Allen & Wilder, 1975). Perreault and Bourhis (1999) had participants simply flip a coin to determine their novel group memberships. Results showed that this use of a random procedure produced less discrimination than a comparison condition in which participants chose their novel groups. Similarly, Gaertner and Insko (2000) found that a random assignment procedure produced less discrimination than a classic procedure. Although random assignment procedures have the potential benefit of circumventing alternative explanations of MGP effects due to perceived similarity-attraction (Byrne, 1961), these latter studies suggest that random assignment procedures may be less effective in producing ingroup favoritism, possibly because they fail to create strong identity bonds. The present research provides a comparison of classic and random procedures in Experiment 2 in an effort to improve understanding of this issue.

Outside of the MGP literature there are group induction procedures that might be adapted for use in MGP studies. One such procedure is suggested by work on the effects of imagined intergroup contact (Crisp & Turner, 2009). For example, Turner, Crisp, and Lambert asked participants to imagine a brief interaction with an elderly stranger and then list "all of the different ways you could classify them into different groups of people" (2007, p. 431). Participants finally completed partner preference ratings for a social interaction involving both young and old participants that they thought would occur next. Results showed that the elderly imagination manipulation (compared to a control imagination) was associated with less outgroup bias. Similar imagination procedures have produced reductions in outgroup bias against homosexual men (Turner et al., 2007, Experiment 3) and reductions in stereotype threat with the elderly (Abrams et al., 2008a). Despite obvious procedural differences with the classic MGP induction, the powerful effect of imagination shown in the preceding studies suggests that an imagination procedure could be adapted to study MGP effects. Would instructing participants to simply imagine being a member of a novel group be enough to produce ingroup favoritism? This possibility is considered in Experiment 1.

Another candidate procedure outside of the MGP literature comes from research on implicit partisanship (IP; Greenwald, Pickrell, & Farnham, 2002b). Greenwald et al. gave participants 45 seconds to memorize the names of four members of a novel group. Participants subsequently completed assessments of implicit attitude and identification toward the studied group relative to an unstudied group using Implicit Association Tests (IAT; Greenwald, McGhee, & Schwartz, 1998). Greenwald et al. (2002b) found that participants implicitly preferred and identified more with the group whose names they had studied compared to the group whose names that they had not studied. Pinter and Greenwald (2004) subsequently reported evidence for strong implicit identification with, and preference for, the studied group regardless of the type of relationship shared by the groups (i.e., competitive or cooperative) or the type of group (i.e., human or non-human). Further, Pinter and Greenwald discovered a condition in which the name–study effect was limited – when the studied names were identified as students from a rival university. This result provides a basis for inferring that the memorization procedure ordinarily creates an identity bond, which was undermined in this case by a pre-existing, conflicting bond.

These findings suggest that the IP procedure could be used more broadly as a minimal group induction procedure. Although both procedures have been used to study minimal groups, the MGP and IP procedures differ in a number of potentially important aspects. First, MGP procedures involve explicit categorization, whereas the IP procedure provides no categorization. For IP,

participants merely memorize group names, which seems to promote implicit categorization. Second, MGP effects have been observed mostly with explicit measures, whereas IP effects have been observed exclusively with implicit measures. Because the extent to which implicit and explicit measures capture common variation in a domain is quite variable (Nosek, 2005), it is uncertain how much overlap exists for MGP and IP procedures. Third, MGP procedures typically provide only group category information, whereas the IP additionally provides individuating information in the form of group members' names. According to Social Identity Theory, individuating information about the ingroup should increase ingroup favoritism, but individuating information about the outgroup should decrease ingroup favoritism. So why does the IP name–study procedure produce favoritism at all? It may be that the focused study of individuating information about one group automatically creates and strengthens links between participants' self-concepts and the studied group while leaving the unstudied group relatively neutral or negative by contrast (Greenwald et al., 2002a). Interestingly, the subjective group dynamics model (Marques, Abrams, Paez, & Martinez-Taboada, 1998) suggests a complementary process involving individuating information in intact groups. According to the model, group members seek individuating information about group members for the purpose of monitoring ingroup norms and punishing deviants. Consistent with social identity theory precepts, the model suggests that this search process is motivated primarily by identity enhancement concerns. Evidence for the perspective has been found with undergraduates (Marques et al., 1998) and children (Abrams, Rutland, Ferrell, & Pelletier, 2008b; Nesdale & Brown, 2004) and dovetails with recent findings from developmental psychology showing children's early knowledge and application of stereotypes (Baron & Banaji, 2006; Bigler & Liben, 2007). In light of these considerations, the present research evaluates the potential of the IP name memorization procedure to be used more broadly in MGP research.

Experiment 1

The first experiment serves as an initial comparison of three minimal group induction procedures. These include procedures premised on:

1. having participants briefly study the names of members of one group (memorization);
2. asking participants to imagine being a member of a novel group (imagination); and
3. categorizing participants based on false feedback about painting preferences (classic).

Method

Participants

Forty-four undergraduate students at a small public college in the eastern United States participated for extra credit towards their introductory psychology course requirements. Experimental sessions consisted of five to seven participants. Data from two participants were excluded because of excessive error rates on the IAT dependent measures. The final sample sizes for the three conditions were 13 (memorization), 15 (imagination), and 14 (classic).

Procedure and independent variables

Participants were seated in separate cubicles and completed the experimental tasks (including informed consent and debriefing) on computers. Participants were randomly assigned to one of the three conditions (memorization, imagination or classic) and, within each condition, to one of two groups (Red or Green).

Memorization Participants in this condition were introduced to a task modeled in part after procedures used by Pinter and Greenwald (2004; Experiment 1). Participants first imagined that a small number of students on campus had been divided into two groups based on their preferences regarding two art styles. Next, participants read the following instruction:

> Now we'd like to help you learn the names of the people in the groups. The tasks that follow

> will be easier if you memorize the names of the members in one group. The names for the RED [GREEN] group will be presented on the following page for 45 seconds. Please try to memorize the names.

The next page presented five names (either Red: Lisa, Daniel, Christina, Ryan and Pat; or Green: Erin, Jeremy, Kimberly, Adam and Kris) in a horizontal block centered on the screen, below the instruction: "These are the members of the Red [Green] group." The group members' names were chosen to be common, familiar names. In contrast with the imagination and classic conditions, memorization participants were neither explicitly assigned to a group, nor told to imagine that they were part of a group.

Imagination This condition used a variation of the classic MGP painting preference task. First, participants imagined that a small number of students on campus had been divided into two groups based on their preferences regarding two art styles. They were instructed to imagine that "half the students were put into the Red group based on their liking of a particular kind of art. Similarly, half of the students were put into the Green group based on their liking of a different style of art". Participants were then instructed to imagine that they had been randomly assigned to one of the two groups and to memorize the name of their assigned group.

Classic This condition was modeled after the MGP procedure developed by Tajfel et al. (1971). Participants were informed that the purpose of the study was to examine artistic preferences ("Art plays such an important role in our lives, yet artistic preference is virtually ignored by psychologists", etc.). The participants' first task was to rate a series of 20 paintings in two artistic styles that were identified by the arbitrary group names, Red and Green. Paintings were displayed singly, and participants rated each painting on a six-point scale (where 1 = *dislike very much;* 6 = *like very much*). Afterwards, the computer paused briefly and then, ostensibly based upon the participants' ratings (but actually randomly), indicated each participant's group by displaying one of the style names (Red or Green) in large block letters for approximately 3 seconds. Subsequent instructions, borrowed from Ashburn-Nardo et al. (2001), reinforced the idea that participants' group assignments were based on their artistic preferences and enhanced the deception by presenting additional information about the supposed differences between the two groups (e.g., "Previous research has shown that people who prefer such paintings tend to process perceptual information in a bottom-up fashion. That is, you tend to examine the finer details of new stimuli, and then form an overall impression").

Name–group association task Next, in all conditions participants completed a categorization task to familiarize them with the group members' names and their corresponding group memberships. This task was necessary so that all participants – particularly those in the imagination and classic conditions who had not yet been exposed to any of the group members' names – could complete IAT measures in the next part of the experiment. The task consisted of two blocks of 30 trials for which participants classified singly presented names, using left-side ("d") and right-side ("k") computer keys that represented the two group categories. Both group labels remained on the display for the entire task and their left/right position switched on the second block of trials to disrupt consistent associations of response keys with the categories. Further, in each block the font color of the name stimuli was matched to the color of the group labels. These colors could be easily discriminated in the first block, but much less easily so in the second block. This feature was intended to facilitate learning of the name–group associations in the first block, and then to compel learning in the second block. Participants were instructed in the first block that "later tasks will not have the names colored, so it is important that you learn which names go with which groups", and in the second block to:

> Note that the colors associated with the groups are more similar now. This will make it more difficult for you to discriminate the

> groups on the basis of color. That's okay. Remember that in later tasks the color cues will disappear; thus, it is important that you learn which names go with which groups.

The name presentation was designed so that no more than three individuals' names of the same group could occur in sequence and that each name was displayed a total of six times in the two blocks. Participants were instructed to respond quickly, but to avoid errors. Response errors required correction (by the participant providing the correct response after seeing an error indicating red "X") for the program to continue.

Dependent measures

Implicit attitude and identification measures Immediately following the name–group association task, participants in all conditions completed two seven-block IATs designed to measure implicit attitude and implicit identification with the Red and Green groups. The IAT target categories were represented by the group names, *Red* and *Green*, and the 10 names of the group members served as stimuli for individual trials. The attribute categories and stimuli for the attitude IAT were *pleasant* (*good*, *win*, *palace*, *rich*, *miracle*) and *unpleasant* (*bad*, *lose*, *slum*, *poor*, *disaster*) and for the identification IAT, *self* (*I*, *me*, *mine*, *my*, *self*) and *other* (*other*, *their*, *theirs*, *them*, *they*). Response latencies were used to compute the IAT *D* measure (Greenwald, Nosek, & Banaji, 2003), for which positive values reflect greater association of *self* and *pleasant* (versus *other* and *unpleasant*) with the ingroup than with the outgroup.[1] Cronbach's alphas for IAT practice and test block responses were acceptable (attitude IAT: $\alpha = .81$; identification IAT: $\alpha = .69$).

Explicit attitude and identification measures Following the implicit measures, participants completed several items to measure explicit attitude and identification. Participants used a seven-point scale (where 1 = *strongly disagree* to 7 = *strongly agree*) to respond to eight total items measuring attitude ("I like the Red group", "I like the Green group", "The Red group is good", and "The Green group is good") and identification ("I feel attached to the Red group", "I feel attached to the Green group", "I identify with the Red group", and "I identify with the Green group"). The four items of each type were combined to create difference scores (paralleling the IAT) for which positive values indicate preference for, and identification with, the ingroup relative to the outgroup. Cronbach's alphas for these measures were also acceptable (attitude: $\alpha = .96$; identification: $\alpha = .95$).

Results

The results presented below were based on a series of 2 (group: red vs. green) × 3 (condition: memorization vs. imagination vs. classic) Analyses of Variance (ANOVAs). There were no significant effects involving group in any of Experiment 1 analyses.

IAT attitude and identification

The attitude IAT involved participants sorting names referring to the Red and Green groups and words referring to the categories *pleasant* and *unpleasant*. Figure 1, Panel A displays the relevant standardized means for each condition.

The generally positive values shown across conditions are indicative of stronger associations of the ingroup relative to the outgroup with *pleasant* words than with *unpleasant* words. In a test against zero association, there was a significant overall effect across conditions, $F(1, 36) = 11.47$, $p = .002$, $\eta_p^2 = .24$. However, a significant condition effect confirms that the degree of implicit ingroup preference varied by induction procedure, $F(2, 36) = 7.81$, $p = .002$, $\eta_p^2 = .30$. Post-hoc analyses (Tukey's HSD) revealed that implicit attitude effects were significantly larger for the memorization condition than for the imagination condition, $t(26) = 2.45$, $p = .05$, $d = .96$, or for the classic condition, $t(25) = 3.99$, $p = .001$, $d = 1.60$. The latter two conditions did not differ reliably, $t(27) = 1.65$, $p = .24$, $d = .64$.[2]

The identification IAT involved participants sorting names referring to the *Red* and *Green* groups and words referring to the categories, *self* and *other*. Figure 1, Panel B displays standardized

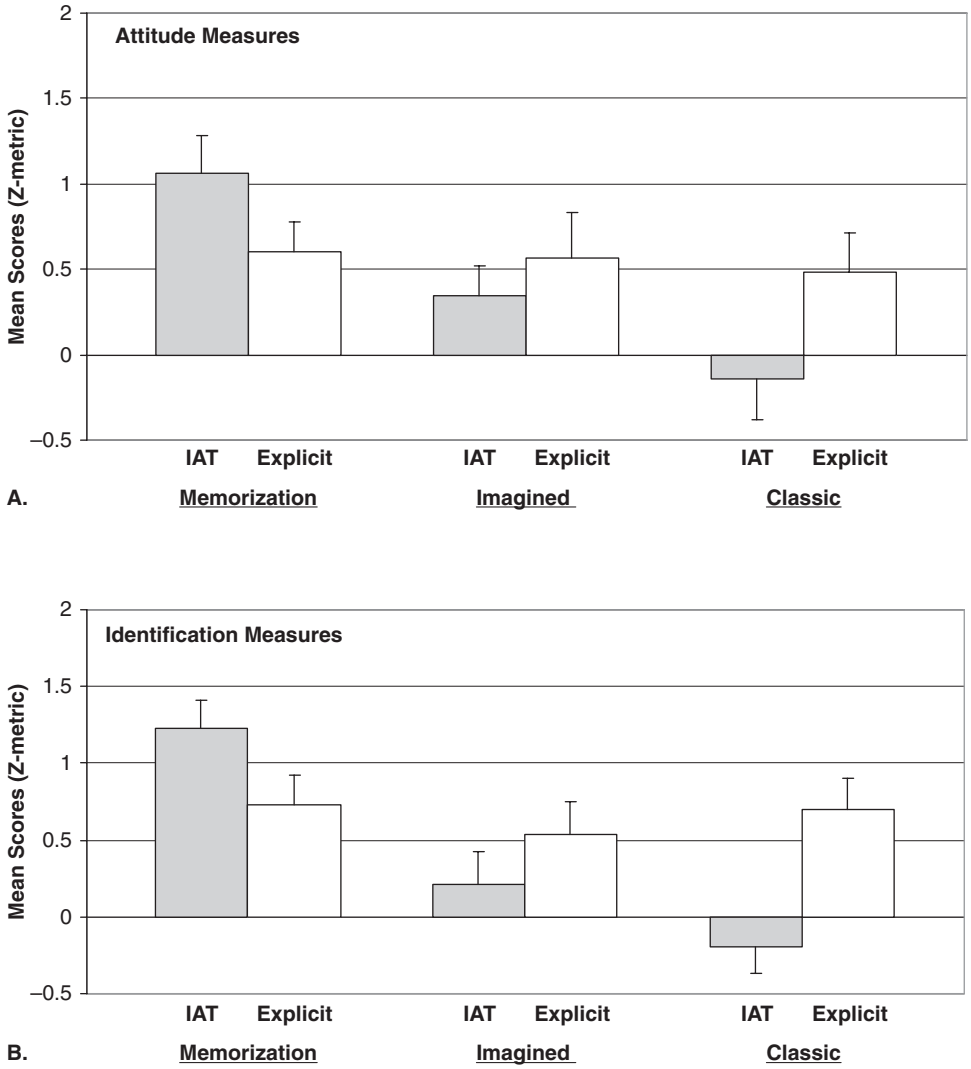

Figure 1. Attitude and identification effects (Experiment 1).
Note: For the IAT, subjects more easily associated *pleasant* and *self* with the ingroup than with the outgroup in the memorization condition only. On explicit measures, participants showed a consistent preference for, and identification with, the ingroup compared to the outgroup across conditions. Bar values represent standardized *D*-transformed response latencies (Greenwald et al., 2003) and standardized explicit relative preference ratings. Error bars represent standard errors.

means for the measure by condition. As shown, across conditions, participants evidenced stronger associations of the ingroup relative to the outgroup with *self* than with *other*, $F(1, 36) = 13.43$, $p = .001$, $\eta_p^2 = .27$. The degree of implicit ingroup identification also varied by condition, $F(2, 36) = 13.69$, $p = 10^{-5}$, $\eta_p^2 = .43$. Post-hoc analyses revealed that implicit identification effects were significantly larger for the memorization condition than for the imagination condition, $t(26) = 3.94$, $p = .001$, $d = 1.55$, or for the classic condition, $t(25) = 5.39$, $p = 10^{-5}$, $d = 2.16$. The latter two conditions did not differ reliably, $t(27) = 1.57$, $p = .27$, $d = .60$.[3]

Explicit attitude and identification

Participants completed four items designed to measure explicit preference for the ingroup and outgroup. Figure 1, Panel A displays the standardized means for each condition. Analyses revealed only a one-sample test for a difference from zero indicating that, across conditions, participants favored the ingroup to the outgroup, $M_{\tilde{z}} = .55$, $SD = .83$, $F(1, 36) = 15.31$, $p = .001$, $\eta_p^2 = .30$. Explicit preference for the ingroup did not vary by condition, $F(2, 36) = .08$, $p = .93$, $\eta_p^2 = .004$.

Participants also completed four items meant to assess explicit identification with the ingroup and outgroup. Figure 1, Panel B displays the standardized means by condition. Analyses again revealed only that across conditions participants identified more with the ingroup than with the outgroup, $M_{\tilde{z}} = .65$, $SD = .75$, $F(1, 36) = 27.13$, $p = 10^{-6}$, $\eta_p^2 = .43$. Explicit identification with the ingroup did not vary reliably by condition, $F(2, 36) = .19$, $p = .83$, $\eta_p^2 = .01$.

Implicit–explicit measure correlations The implicit–explicit correlations for the full sample ($N = 42$) were weak to moderate in magnitude according to conventional standards (Cohen, 1977), $r = .16$, $p = .32$, attitude; and $r = .34$, $p = .03$, identification. Examining each condition separately revealed consistently weaker correlations for attitude measures than for identification measures across the procedures (memorization: $r = -.03$, $p = .93$, attitude, $r = .50$, $p = .08$, identification; imagination: $r = .26$, $p = .35$, attitude, $r = .60$, $p = .02$, identification; classic: $r = .16$, $p = .59$, attitude, $r = .83$, $p = 10^{-4}$, identification). Overall attitude–identification correlations were large for both the IAT, $r = .66$, $p = 10^{-7}$, and explicit measures, $r = .71$, $p = 10^{-8}$.

Discussion

Experiment 1 provided an initial comparison of three minimal group induction procedures. In the memorization condition, participants were not assigned group membership, but rather simply studied the names of the five members of one of two groups. In the imagination condition, participants were instructed to imagine that they had been randomly assigned to one of the groups. Finally, in the classic condition, participants were informed that they had been assigned to one of the two groups based on their preferences on a painting judgment task.

The results for the IAT attitude and identification measures revealed that, across the three procedures, participants showed greater implicit preference for, and identification with, the ingroup (i.e., the group whose names they memorized, the group they imagined, or the group that they were assigned) relative to the outgroup. Further, these effects were significantly larger for participants in the memorization condition than for participants in the other two conditions. By contrast, results for the explicit measures of attitude and identification did not show differences among the conditions, but did reveal a consistent, moderate preference for the ingroup. Finally, analyses of implicit–explicit correlations showed weaker relationships between measure types than within measure types, indicating that implicit and explicit ingroup favoritism are not well related.

These initial findings suggest some tentative answers to questions about the merits of the three induction procedures. The consistent finding of ingroup favoritism across procedures on explicit measures supports the idea that both the memorization procedure adapted from IP research, and the imagination procedure adapted from imagined intergroup contact research, are reasonable alternatives to the classic procedure. Further, results for implicit measures are intriguing in suggesting a difference among the procedures. Specifically, with the memorization induction, implicit attitude and identification effects were large, whereas with the imagination and classic procedures effects were small and, surprisingly, descriptively outgroup-favoring for the classic procedure.

Despite these promising findings, there are aspects of Experiment 1 that could limit its ability to be generalized. First, one potentially limiting aspect relates to the application of the art scenario to all three procedures. This design feature was intended to improve comparability across procedures, but one could wonder

justifiably whether the use of the scenario was necessary or even potentially confounded. For example, participants in the memorization and imagination conditions were asked to imagine other students who shared their group memberships. Although hypothetical, this instruction may have inadvertently invoked perceptions of interpersonal similarity, which would have inflated the attitude and identification results. For this reason, the procedures in Experiment 2 were modified to include only necessary components. This change should affect a more rigorous comparison. Second, another potentially limiting aspect of the design relates to the exclusive use of attitudinal measures in Experiment 1. Given the long history of the use of behavioral measures in MGP, one might rightly inquire about the results of a comparison of procedures using a behavioral measure, such as a money allocation task. Experiment 2 included a set of MAMs to address this question. Third, the initial comparison did not include the commonly used random assignment procedure. For Experiment 2, then, imagination procedure was replaced with a random procedure to permit its evaluation.

Experiment 2

The second experiment compares three minimal group induction procedures. These include two refined procedures from Experiment 1 premised on:

1. having participants briefly study the names of members of one group (memorization);
2. categorizing participants based on false feedback about painting preferences (classic); and
3. the addition of a procedure that randomly assigns participants to groups (random).

Method

Participants

Seventy-four undergraduate students at small public college in the eastern United States participated for extra credit towards their introductory psychology course requirements. Experimental sessions consisted of five to seven participants. Data from one participant were excluded because of computer malfunction. The final sample sizes for the three conditions were 24 (memorization), 24 (random), and 25 (classic).

Procedure

All procedures were unchanged from Experiment 1, except for a few described below that were intended to improve conceptual clarity or practicality, or included to measure additional variables related to the procedural comparison.

Memorization In contrast with Experiment 1, no mention was made of the art scenario involving participants imagining campus groups being divided based on art preferences. In this modified version of the procedure, participants were simply instructed that the computer would "randomly assign you to study a short list of names of a group".

Random Participants in this condition received no mention of the art scenario. They were simply instructed that the computer would "randomly assign you to a group".

Classic There were two changes to the classic procedure from Experiment 1. First, to shorten the experiment, participants rated 10 paintings rather than 20. Second, following the display of their group assignment, participants did not receive subsequent instructions about the purported differences in information processing styles between the two groups.

Next, in all conditions, the computer paused briefly and then indicated participants' group by displaying one of the group names in large block letters for approximately 3 seconds. Finally, all participants completed the name–group association task and the dependent measures.

Dependent measures

Manipulation check After completing the same IATs (attitude IAT: $\alpha = .83$; identification IAT: $\alpha = .58$) and explicit measures (explicit attitude: $\alpha = .90$; explicit identification: $\alpha = .93$) from Experiment 1, participants responded to a manipulation check

question: "Initial instructions emphasized which of the following?" Participants selected one of four answer choices: "I would be in a group based on my painting preferences", "I should imagine being assigned to a group", "I was to study for 45 seconds the names of one of two groups", and "I can't remember". For analysis, responses were scored so that 0 and 1 indicated, respectively, incorrect and correct answers based on condition.

MAMs The final assessment was the MAM task (Bornstein et al., 1983a). Participants were instructed to indicate their preferences for how a small amount of bonus money, described as left over from a previous study, would be distributed to two other participants present in their experimental session (one from each of the approximately equally represented groups). Following typical allocation task instructions (e.g., Gaertner and Insko, 2000; Experiment 1), it was emphasized that participants could not allocate money to themselves, but that they could receive money from both ingroup and outgroup members. It was also emphasized that once participants had completed the task, the experimenter would access their ratings and allocate money based on the participants' preferences.

The seven preferences for the distribution of money to the ingroup/outgroup were: \$2.10/\$1.10 (max rel own), \$2.35/\$1.50 (max own), \$2.20/\$1.80 (max joint own), \$1.70/\$1.70 (min dif), \$1.80/\$2.20 (max joint other), \$1.50/\$2.35 (max other), and \$1.10/\$2.10 (max rel other). Each of the alternatives appeared one at a time (in the fixed order given above) on subsequent screens along with a direction to indicate a preference for each distribution option using a seven-point scale (where 1 = *strongly disagree* to 7 = *strongly agree*).

Prior to analyses, MAM values were recoded so that positive values represented stronger preference for the ingroup for each MAM for all participants. A principal components factor analysis was also conducted with the seven MAM preference ratings. This analysis revealed two factors with eigenvalues above 1.0 that accounted for 80% of the variation in the MAM scores. The first factor, labeled *ingroup preference*, showed factor loadings greater than .80 on max rel own, max own and max joint own, whereas the second factor, labeled *outgroup preference*, showed factor loadings above .80 on max rel other, max other and max joint other.

Results

The results presented below were based on a series of 2 (group: red vs. green) × 3 (condition: memorization vs. random vs. classic) ANOVAs. Except where noted there were no significant effects involving group in Experiment 2.

Manipulation check

In a test against random responding, participants correctly indicated the basis for their group membership in 86% of the cases, $F(1, 67) = 483.92$, $p = 10^{-32}$, $\eta_p^2 = .88$. No other effects were statistically significant.[4]

IAT attitude and identification

Figure 2, Panel A displays the standardized means for the attitude IAT measure. The generally positive values shown across conditions are indicative of stronger associations of the ingroup relative to the outgroup, with *pleasant* words than with *unpleasant* words. In a test against zero association, there was a significant overall effect across conditions, $F(1, 67) = 57.78$, $p = 10^{-10}$, $\eta_p^2 = .46$. However, a significant condition effect revealed that the degree of ingroup implicit preference varied as a function of the induction procedure, $F(2, 67) = 13.13$, $p = 10^{-5}$, $\eta_p^2 = .28$. Post-hoc analyses showed that attitude IAT effects were significantly larger for the memorization condition than for the random condition, $t(46) = 3.02$, $p = .01$, $d = .89$, or for the classic condition, $t(47) = 5.10$, $p = 10^{-6}$, $d = 1.49$. The latter two conditions did not differ reliably, $t(47) = 2.04$, $p = .11$, $d = .60$.[5]

Figure 2, Panel B displays the standardized means for the identification IAT measure. Consistent with the attitude IAT results, across conditions participants evidenced stronger associations of the ingroup relative to the outgroup with *self* than with *other*, $F(1, 67) = 6.64$, $p = .02$,

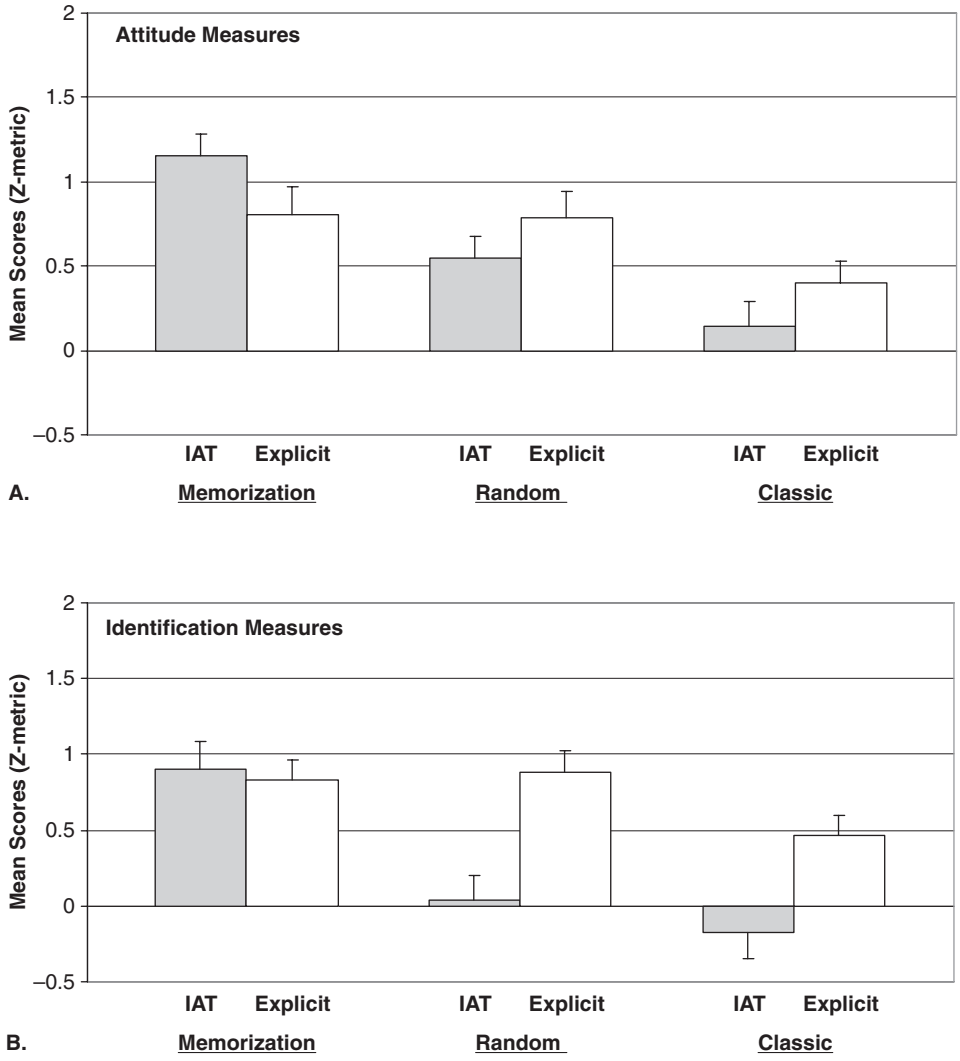

Figure 2. Attitude and identification effects (Experiment 2).
Note: For the IAT, participants more easily associated *pleasant* and *self* with the ingroup than the outgroup in the memorization and random conditions compared to the classic condition. On explicit measures, participants showed a consistent preference for and identification with the ingroup compared to the outgroup across conditions. Bar values represent standardized *D*-transformed response latencies (Greenwald et al., 2003) and standardized explicit relative preference ratings. Error bars represent standard errors.

$\eta_p^2 = .09$. The degree of ingroup implicit identification also varied with condition, $F(2, 67) = 11.50$, $p = 10^{-5}$, $\eta_p^2 = .26$.[6] Post-hoc analyses revealed that identification effects were significantly larger for the memorization condition than for the random condition, $t(46) = 3.60$, $p = .002$, $d = 1.06$, or for the classic condition, $t(47) = 4.47$, $p = 10^{-5}$, $d = 1.30$. The latter two conditions did not differ, $t(47) = .85$, $p = .67$, $d = .25$.[7]

Explicit attitude and identification

Figure 2, Panel A displays the standardized means for explicit group attitude measures. Across

Table 1. Preference ratings for bonus money allocation strategies (Experiment 2)

MAM	Classic	Condition Random	Memorization
Max Rel Own	4.24 (2.05)	5.13 (1.62)	5.29 (1.55)
Max Own	4.64 (2.00)	5.29 (1.40)	5.13 (2.07)
Max Joint Own	4.68 (1.93)	5.17 (1.52)	5.08 (1.77)
Min Dif	3.76 (2.22)	3.21 (2.11)	4.17 (2.22)
Max Joint Other	3.64 (1.78)	2.96 (1.40)	3.00 (1.91)
Max Other	3.36 (1.82)	2.96 (1.40)	3.04 (1.94)
Max Rel Other	3.72 (1.86)	3.13 (1.75)	2.88 (1.96)

Note: Subjects used a seven-point scale (1 = *strongly disagree* to 7 = *strongly agree*) to indicate their agreement with each of the bonus money allocation alternatives. Standard deviations are in parentheses.

conditions, participants favored the ingroup relative to the outgroup, $M_{\tilde{x}} = .66$, $SD = .74$, $F(1, 67) = 60.62$, $p = 10^{-11}$, $\eta_p^2 = .48$. Explicit preference for the ingroup did not vary by condition, $F(2, 67) = 2.41$, $p = .10$, $\eta_p^2 = .07$.

Figure 2, Panel B displays the standardized means for explicit group identification measures. Across conditions participants identified more with the ingroup than the outgroup, $M_{\tilde{x}} = .72$, $SD = .69$, $F(1, 67) = 87.89$, $p = 10^{-14}$, $\eta_p^2 = .57$. Explicit identification with the ingroup did not vary by condition, $F(2, 67) = 2.87$, $p = .07$, $\eta_p^2 = .08$.

MAMs Analyses of the preference ratings for each bonus money allocation option revealed significant differences from the scale midpoint for max rel own, $F(1, 67) = 22.67$, $p = 10^{-5}$, $\eta_{p_2}^2 = .25$, max own, $F(1, 67) = 28.27$, $p = 10^{-6}$, $\eta_p^2 = .30$, max joint own, $F(1, 67) = 27.03$, $p = 10^{-6}$, $\eta_p^2 = .29$, max joint other, $F(1, 67) = 15.43$, $p = .0002$, $\eta_p^2 = .19$, max other, $F(1, 67) = 19.93$, $p = 10^{-5}$, $\eta_p^2 = .23$, and max rel other, $F(1, 67) = 14.07$, $p = .0003$, $\eta_p^2 = .17$, but not for min dif, $F(1, 67) = 2.68$, $p = .11$, $\eta_p^2 = .04$. As shown in Table 1, across MGP procedures, participants generally rated significantly stronger agreement with allocation strategies that maximized relative ingroup earnings, maximized absolute ingroup earnings, and maximized joint group earnings favoring the ingroup. At the same time, participants generally rated significantly lesser agreement with strategies that maximized joint earnings favoring the outgroup, maximized absolute outgroup earnings, and maximized relative outgroup earnings.

In addition to these general effects, there was a marginally significant effect for condition on max rel own, $F(2, 67) = 2.77$, $p = .08$, $\eta_p^2 = .08$. Follow-up comparisons showed a marginal difference between the memorization and classic conditions, $t(47) = 2.28$, $p = .07$, $d = .67$, indicating a stronger preference for maximizing relative ingroup outcomes for the memorization condition relative to the classic condition. Neither condition differed reliably from the random condition (ps > .14).[8]

Implicit–explicit measure correlations Table 2 presents correlations of the implicit and explicit measures with the ingroup and outgroup preference MAM factor scores. Similar to Experiment 1, across procedures implicit–explicit measure correlations were again relatively weak in magnitude, whereas same-measure attitude–identification correlations were moderate to large in size. Of particular note are the correlations involving ingroup and outgroup preference factor scores. Across procedures, stronger ingroup attraction and identification was positively correlated with ingroup preference. However, stronger ingroup attraction and identification was not well related to outgroup preference. Despite minor variations, this pattern was replicated across the three induction procedures.

Discussion

Experiment 2 presented a comparison of two refined procedures from Experiment 1 (memorization and classic) and, new to the comparison, a random assignment procedure. Participants

Table 2. Implicit–explicit correlations (Experiment 2)

Measure and conditions	Implicit attitude	Implicit identification	Explicit attitude	Explicit identification
Implicit Identification	**.48*****			
Memorization	.33			
Random	.33			
Classic	.31			
Explicit attitude	**.10**	**.16**		
Memorization	.09	.13		
Random	.03	.16		
Classic	–.17	–.03		
Explicit identification	**.22**	**.11**	**.71*****	
Memorization	–.06	.04	.77***	
Random	.29	.23	.61***	
Classic	.19	–.16	.68***	
Ingroup preference	**.24***	**.23***	**.27***	**.37****
Memorization	.25	.23	–.01	.10
Random	.12	.17	.59**	.50*
Classic	.21	–.02	.17	.39
Outgroup preference	**–.17**	**–.14**	**–.02**	**.09**
Memorization	–.24	–.12	.10	.12
Random	–.02	.01	.04	.02
Classic	–.09	–.45*	–.13	.20

Note: $N = 73$. Bolded values represent correlations collapsed over condition.
$^{*}p < .05$; $^{**}p < .01$; $^{***}p < .001$.

experienced one of the three induction procedures and then completed implicit and explicit attitude and identification measures and the MAM bonus money allocation task.

The results agreed well with those obtained in Experiment 1. For the attitude and identification IATs, participants again showed greater implicit preference for, and identification, with the ingroup relative to the outgroup, and these effects were significantly larger for the memorization condition than for the other two conditions. On the MAM assessment, results revealed the typical MGP discrimination pattern: across conditions, participants preferred strategies that favored the ingroup. Finally, the implicit–explicit correlations showed weak between-measure relationships relative to within-measure relationships and stronger correlations with the ingroup preference factor.

The strong consistency between the present results and Experiment 1 suggests that concerns regarding the ability to generalize the findings were unfounded. In particular, the memorization procedure did not feature the art scenario used in the classic condition, and yet it produced very similar results across experiments. The inclusion of the MAM task was meant to address the question of differences among procedures on a behavioral task. The results revealed a consistent degree of ingroup favoritism across the three procedures. That result, coupled with the pattern of correlations involving the ingroup preference factor scores, substantiates the utility of all three procedures on explicit measures. Finally, the random assignment procedure was included in Experiment 2 given its frequent use in the literature. Although it produced comparable effects on explicit measures and MAMs, the random assignment procedure did not produce strong results on implicit measures. Altogether, these findings suggest some recommendations for future MGP research, which are considered in the section that follows.

Conclusion

This article began by noting that for 40 years researchers have studied minimal groups using various procedures that have never been formally evaluated. The present experiments were designed

to provide some answers regarding the merits of four MGP induction procedures. We now briefly draw some conclusions and offer advice regarding the choice of MGP induction procedures.

Classic procedures

The classic MGP induction technique involves assigning participants to groups based on false feedback of various sorts. Given the long history of its use, it is not surprising that it proved quite successful across two experiments on explicit measures of attitude and identification, as well as the MAMs, producing ingroup favoritism effects that were comparable to the other procedures. However, the classic procedure was less successful on the implicit measures. Neither the within-condition IAT tests (see notes), nor the implicit–explicit correlations in either experiment, indicated effectiveness of the classic procedure on implicit measures. These findings are moderately surprising in light of the handful of studies which have used implicit measures in this domain. For example, Ashburn-Nardo et al. (2001) found implicit ingroup favoritism using a classic procedure very similar to what was used in the present research. Unfortunately, a complete evaluation must await an accumulation of future studies using the classic procedure with implicit measures. At present, a prudent recommendation would seem to be to use an alternative procedure if one's interests focus primarily on implicit ingroup favoritism.

Imagination procedures

The possible use of an imagination procedure in a MGP context was suggested by work on imagined intergroup contact (Crisp & Turner, 2009). Notably, this simple induction procedure represents a degree of minimalism not found even with the classic procedure. Results from Experiment 1 showed that this induction produces typical ingroup favoritism effects on explicit measures of attitude and identification, but relatively weak effects on implicit measures (including small, within-condition IAT effects). Although these latter findings are not encouraging, it should be noted that this was the first administration of a pure, imagination procedure in the domain of minimal groups. It would be beneficial to see what future applications will reveal, and so these initial results are best regarded as a promising first step.

Random procedures

The lone established alternative to the classic MGP procedure involves categorization on an explicitly random basis. Previous studies have produced mixed results regarding its efficacy. In Experiment 2 the random induction produced MGP effects on explicit measures, including the MAMs, but like the classic and imagination procedures, produced inconsistent results on implicit measures (including a moderate effect on attitude IAT and a trivial effect on the identification IAT). The possibility that the random procedure does not strongly instill strong identity bonds is supported by these results, suggesting that researchers should choose from among the other procedures.

Memorization procedures

The name memorization procedure was borrowed from IP research (Greenwald et al., 2002b). The induction requires simply that participants study a few names of a novel group. Although it has been used with success in two previous investigations (Greenwald et al., 2002b; Pinter & Greenwald, 2004), it was unclear whether it could be applied for use as an MGP induction. In the present research, the memorization procedure was the most broadly successful of the four procedures compared. In both experiments, the memorization procedure produced large effects on the IATs, comparable effects on explicit measures and the MAMs, and stronger implicit–explicit correlations. These findings mitigate concerns about the observed differences between the MGP and IP procedures. The first concern relates to the observation that MGP procedures involve explicit categorization of participants into groups, whereas the IP procedure provides no such categorization. Results confirm that

despite the absence of explicit categorization, the memorization procedure produced sizable effects on explicit measures, supporting the conclusion that IP findings are genuine (Pinter & Greenwald, 2004). At the same time, the demonstration of strong effects on implicit measures with the memorization procedure supports the idea that oft-observed MGP ingroup favoritism effects, shown across procedures, are not artifacts of experimental demands or social desirability. The second concern relates to degree of construct overlap with implicit and explicit ingroup favoritism. The consistently small correlations across induction procedures suggests that there is little correspondence between implicit and explicit ingroup favoritism. Additional research will be necessary to identify the basis for this difference. The third concern relates to the difference in information content provided by the procedures. MGP procedures typically provide only group category information, whereas the IP additionally provides individuating information in the form of group members' names. Although there is not presently a comprehensive explanation of the effect of the name memorization procedure, it seems probable that the focused study of individuating information about one group automatically creates and strengthens links between participants' self-concepts and the studied group, while leaving the unstudied group relatively neutral or negative by contrast. The large ingroup favoritism effects on the identification IATs in both experiments support this conclusion, as does related theory from the subjective group dynamics model (Marques et al., 1998).

Choice of induction procedure can be guided by many considerations. Empirically, the memorization procedure has been shown to be preferable, but it may not be practical to use computer-mediated administration for mass testing sessions or when computer resources are limited. In those instances, a simple paper-and-pencil administration could be easily implemented, perhaps along with a paper-and-pencil IAT (Lowery, Hardin, & Sinclair, 2001). Ethical considerations may be relevant as well. While the use of deception in experimental research was once common in social psychology (Adair, Dushenko, & Lindsay, 1985), it seems to be waning, particularly in the last few decades (Kimmel, 2001). In contrast with this positive trend, groups researchers continue to use the classic induction procedure for which participants are deceived about the true basis for their group assignment. The present findings should discourage this practice.

Notes

1. To ease presentation, "ingroup" will refer to the memorized, imagined, or assigned group and "outgroup" will refer to the contrast group.
2. Separate effects tests within conditions revealed a significant effect from zero for the memorization condition, $F(1, 11) = 22.67$, $p = .001$, $\eta_p^2 = .67$, but not for the imagination, $F(1, 13) = 3.64$, $p = .08$, $\eta_p^2 = .22$, or classic, $F(1, 12) = .39$, $p = .55$, $\eta_p^2 = .03$, conditions.
3. Separate effects tests within conditions revealed a significant effect from zero for the memorization condition, $F(1, 11) = 42.30$, $p = 10^{-5}$, $\eta_p^2 = .79$, but not for the imagination, $F(1, 13) = 1.00$, $p = .34$, $\eta_p^2 = .07$, or classic, $F(1, 12) = 1.48$, $p = .25$, $\eta_p^2 = .11$, conditions.
4. Analyses without data from participants who failed the manipulation check did not differ meaningfully from analyses including all data. For this reason, we report analyses based on all data in the text.
5. Separate effects tests within conditions revealed significant effects against zero for the memorization, $F(1, 22) = 72.45$, $p = 10^{-8}$, $\eta_p^2 = .77$, random, $F(1, 22) = 17.47$, $p = .001$, $\eta_p^2 = .44$, and classic, $F(1, 23) = .91$, $p = .35$, $\eta_p^2 = .04$, conditions.
6. Also significant was a main effect for group, $F(2, 67) = 4.98$, $p = .03$, $\eta_p^2 = .07$, and the condition × group interaction, $F(2, 67) = 3.14$, $p = .05$, $\eta_p^2 = .09$. Inspection of relevant means shows that the tendency for participants to implicitly associate the ingroup with *self* was stronger for the Red group than for the Green group in the memorization condition, but the effect was stronger for the Green group than for the Red group in the classic condition.
7. Separate effects tests within conditions revealed a significant effect against zero for the memorization condition, $F(1, 22) = 24.63$, $p = 10^{-5}$, $\eta_p^2 = .53$, but

not for either of the random, $F(1, 22) = .06$, $p = .81$, $\eta_p^2 = .003$, or classic, $F(1, 23) = 1.18$, $p = .29$, $\eta_p^2 = .05$, conditions.

8. There were also significant effects for group on max rel own, $F(1, 67) = 13.09$, $p = .001$, $\eta_p^2 = .17$, max own, $F(1, 67) = 14.69$, $p = .0002$, $\eta_p^2 = .18$, max joint own, $F(1, 67) = 7.96$, $p = .006$, $\eta_p^2 = .11$, min dif, $F(1, 67) = 54.27$, $p = 10^{-10}$, $\eta_p^2 = .45$, max other, $F(1, 67) = 6.19$, $p = .02$, $\eta_p^2 = .09$, and max rel other, $F(1, 67) = 15.13$, $p = .0002$, $\eta_p^2 = .18$. Examination of the means suggests that participants assigned to the Red group (compared to the Green group) gave weaker ingroup-favoring preferences on max rel own, max own, max joint own, and min dif, but gave stronger ingroup-favoring preferences on max other and max rel other.

   Separate analyses were conducted for each group in which preference ratings were compared to the scale midpoints. Analyses with Green-assigned participants were generally more consistent with the overall pattern reported in the main text compared to similar analyses with the Red-assigned participants. Specifically, for Green-assigned participants, there were: (a) statistically significant effects in the predicted direction for max rel own, $F(1, 33) = 71.62$, $p = 10^{-10}$, $\eta_p^2 = .69$, max own, $F(1, 33) = 101.94$, $p = 10^{-11}$, $\eta_p^2 = .76$, max joint own, $F(1, 33) = 48.30$, $p = 10^{-8}$, $\eta_p^2 = .59$, min dif, $F(1, 33) = 37.09$, $p = 10^{-7}$, $\eta_p^2 = .53$, and max joint other, $F(1, 33) = 4.72$, $p = .04$, $\eta_p^2 = .13$; and (b) non-statistically significant effects in the predicted direction for max other, $F(1, 33) = 1.50$, $p = .23$, $\eta_p^2 = .04$, and max rel other, $F(1, 33) = .01$, $p = .94$, $\eta_p^2 = .00$. For Red-assigned participants, there were: (a) statistically significant effects in the predicted direction for min dif, $F(1, 34) = 18.01$, $p = 10^{-4}$, $\eta_p^2 = .35$, max joint other, $F(1, 34) = 12.04$, $p = .001$, $\eta_p^2 = .26$, max other, $F(1, 34) = 33.82$, $p = 10^{-6}$, $\eta_p^2 = .50$, and max rel other, $F(1, 34) = 47.35$, $p = 10^{-8}$, $\eta_p^2 = .58$; and (b) non-statistically significant effects in the predicted direction for max rel own, $F(1, 34) = .44$, $p = .51$, $\eta_p^2 = .01$, max own, $F(1, 34) = .71$, $p = .41$, $\eta_p^2 = .02$, and max joint own, $F(1, 34) = 2.15$, $p = .15$, $\eta_p^2 = .06$.

   It is not immediately clear why effects differed by group only in Experiment 2, however two observations boost confidence in the stability of the main findings. First, all 14 of the previously described MAM effects were in the predicted direction, and nine of those were statistically reliable. Second, there were no condition x group interaction effects even approaching statistical significance for any of the MAM effects.

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