

Places and Faces: Geographic Environment Influences the Ingroup Memory Advantage

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The preferential allocation of attention and memory to the ingroup (the ingroup memory advantage) is one of the most replicated effects in the psychological literature. But little is known about what factors may influence such effects. Here the authors investigated a potential influence: category salience as determined by the perceiver's geographic environment. They did so by studying the ingroup memory advantage in perceptually ambiguous groups for whom perceptual cues do not make group membership immediately salient. Individuals in an environment in which a particular group membership was salient (Mormon and non-Mormon men and women living in Salt Lake City, Utah) showed better memory for faces belonging to their ingroup in an incidental encoding paradigm. Majority group participants in an environment where this group membership was not salient (non-Mormon men and women in the northeastern United States), however, showed no ingroup memory advantage whereas minority group participants (Mormons) in the same environment did. But in the same environment, when differences in group membership were made accessible via an unobtrusive priming task, non-Mormons did show an ingroup memory advantage and Mormons' memory for ingroup members increased. Environmental context cues therefore influence the ingroup memory advantage for categories that are not intrinsically salient.

Keywords: social categorization, person perception, own-race bias, accuracy

We tend to prefer those who are like us more than those who are not. Indeed, we are more generous in both our behaviors (e.g., the material resources we share; Tajfel, Billig, Bundy, & Flament, 1971) and cognitions (e.g., the cognitive resources we allocate; Rodin, 1987) when a target is an ingroup member rather than an outgroup member. Often described by terms such as the *own-race bias* (Meissner & Brigham, 2001) and *other-race effect* (Lindsay, Jack, & Christian, 1991), the observation that individuals preferentially attend to and remember those with whom they share identities is one of the most robust and highly replicated findings in the social psychological literature (see Sporer, 2001). But to date, relatively little is known about the perceptual and cognitive processes that underlie the ingroup memory advantage.

One open question concerns the role of external factors in influencing ingroup/outgroup memory effects. Both subjective experiences (Johnson & Fredrickson, 2005) and effortful training (Malpass, Lavigne, & Weldon, 1973) can moderate or mitigate the expression of ingroup benefits and outgroup deficits in perception and cognition. But given that group boundaries are typi-

cally defined along socially constructed lines (e.g., according to culture, nationality, or race), it stands to reason that environment and context might play an important role in the perception and cognition of groups. For example, whether one shows an own-age bias (e.g., Wright & Stroud, 2002) or an own-race bias would seem relative to the context one is in, depending on which identity is made salient (Macrae, Milne, & Bodenhausen, 1994).

Previous studies have examined the influence of context on the ingroup memory advantage but have focused primarily on the target's context. Shriver, Young, Hugenberg, Bernstein, and Lanter (2008) found that faces presented in stereotype-congruent scenes were better remembered than faces presented in stereotype-incongruent scenes. Specifically, White faces superimposed on pictures of wealthy, suburban homes were better remembered than White faces superimposed on pictures of less expensive homes, which were remembered about as well as outgroup, Black faces that were presented in both conditions. A similar asymmetry was noted by Evans, Marcon, and Meissner (2009) who found that contextual cues assisted perceivers in their memory for own-race targets but not for other-race targets. In addition, Bernstein, Young, and Hugenberg (2007) demonstrated that faces presented against a colored background signaling that the target was an ingroup member were better remembered than faces presented against a colored background signaling that the target was an outgroup member—although all of the targets and perceivers shared the same racial group membership.

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Perceptual cues, too, can create a context for targets that affects perceivers' memory for the targets. MacLin and Malpass (2001, 2003), for instance, showed that memory for the same racially ambiguous faces could be reversed simply by changing the targets' hairstyles from a race-typical hairstyle to a race-atypical hairstyle. Thus, targets' hairstyles formed a perceptual context for the face that affected perceivers' memory. Similarly, Corneille, Hugenberg, and Potter (2007) found that whereas faces presented with emotional expressions congruent with racial group stereotypes (e.g., angry Black faces) were better recognized, faces presented with incongruent expressions (e.g., happy Black faces) were better remembered because their atypicality rendered them more distinct (see also Stern, Mullennix, Corneille, & Huart, 2007).

Information about targets' group membership also has an influence upon how perceivers process them. Corneille, Goldstone, Queller, and Potter (2006) found that individuals' perceptual processing of faces was influenced by the targets' purported group membership, and Michel, Corneille, and Rossion (2007) observed differences in the holistic versus featural processing of faces when they were believed to be either racial ingroup or outgroup members. Huart, Corneille, and Becquart (2005) also found that gender-specific information associated with gender-ambiguous faces (morphed faces with equal male and female contributions) affected individuals' subsequent identifications of the faces (see also Corneille, Huart, Becquart, & Bredart, 2004; Pauker et al., 2009).

Although many studies have examined the influence of the target's context on perception and memory, only a few studies have explored the contributions made by the perceiver's context. Pauker et al. (2009) showed that perceivers' motivational states can be important determinants of whether they classify targets as ingroup members and subsequently remember them; and Yzerbyt and colleagues have shown that individual differences in ingroup identification were critical to determining individuals' criteria for including others into their group (Castano, Yzerbyt, Bourguignon, & Seron, 2002; Leyens & Yzerbyt, 1992; see also Blascovich, Wyer, Swart, & Kibler, 1997). Blanz (1999) also developed and tested a theoretical model examining the contextual factors contributing to perceivers' memory using the "Who said what?" paradigm, citing the importance of accessibility and relevance of a given distinction as well as the magnitude of intercategory differences.

Indeed, the salience of group boundaries may be a particularly critical antecedent to whether perceptual and cognitive effects, such as the ingroup memory advantage, will occur. Hugenberg and Sacco (2008) contest that social categorization of targets is a necessary prerequisite for ingroup memory effects. Similarly, Sporer's (2001) ingroup/outgroup model proposes that upon categorization of a target as an ingroup or outgroup member, distinct sets of perceptual processes are initiated that guide subsequent cognitions about the targets, such as memory. Levin (1996) too, after testing several competing theoretical accounts, concluded that the observed differential processing of targets from the ingroup versus the outgroup is dependent upon perceivers' initial perceptions and categorizations, equating markers of group membership (i.e., race) to a single visual feature (see also Levin, 2000). Each of these models, then, highlights the importance that the ability to recognize and distinguish group membership exerts upon the downstream cognitive processing of targets. However, for some groups, the markers of category differences are not obvious.

Effects of context may be particularly relevant for groups that are perceptually ambiguous and lack clear perceptual markers. Unlike perceptually obvious groups, for whom category-based thinking is presumed to be unavoidable (e.g., Brewer, 1988; Macrae & Bodenhausen, 2000), differences in group membership may not be salient when the perceptual markers distinguishing the groups are unclear. For instance, perceptually obvious differences in skin tone between White and Black individuals may activate thoughts about group membership upon first perception. But perceptually ambiguous differences in the features distinguishing, for instance, Jewish from non-Jewish individuals (Rice & Mullen, 2003) may require an external motivator or contextual cue to make differences in group membership salient (Huart et al., 2005; Pauker et al., 2009).

Thus, the accessibility of information about group membership may be contextually relative (see also Higgins, 1996; Srull & Wyer, 1989). For perceptually obvious groups, the obviousness of the perceptual features may serve as the contextual cues that make group membership salient (Levin, 1996, 2000), thereby promoting ingroup/outgroup effects on perception and cognition (Hugenberg & Sacco, 2008; Sporer, 2001). For perceptually ambiguous groups, the lack of obvious perceptual features may require that other cues in the environment make group membership salient. Therefore, contexts in which differences in group membership are not made salient by perceptual or environmental cues may fail to show evidence of ingroup/outgroup effects on perception and cognition.

If the presence of ingroup/outgroup effects does rely on the contextual salience of group membership, this presents an interesting avenue for research into the cognitive processes that mediate ingroup/outgroup effects. The majority of research on ingroup/outgroup effects has thus far been restricted to groups with obvious perceptual markers. Focusing on these groups may have limited our ability to generalize about these processes only to occasions on which group membership is obvious. This leaves unexplored the possibility that other cues, such as the environmental context, may provide critical contributions to the emergence of ingroup/outgroup effects, such as the ingroup memory advantage. In an attempt to fill this gap, we conducted several studies aimed at examining the role of context in the instantiation of the ingroup memory advantage by investigating this effect in a perceptually ambiguous group: Mormon versus non-Mormon individuals.

Modar: The Detection of Mormons

Following the Holocaust, a series of researchers studied the perceptibility of Jewish versus non-Jewish individuals (e.g., Allport & Kramer, 1946). This work showed that the accuracy of discriminating between Jewish and non-Jewish targets was not particularly high but was significantly greater than chance guessing (see Rice & Mullen, 2003, for a review). More recently, research has shown evidence for distinction along another perceptually ambiguous categorization: sexual orientation. Ambady, Halahan, and Conner (1999) found that sexual orientation could be discerned from brief "thin slice" video clips and dynamic, full-body stills. In addition, Rule and Ambady (2008) showed that 50-ms presentations of gay and straight men's faces were sufficient to distinguish their sexual orientations at rates significantly greater than chance guessing.

It is interesting that many members of the Church of Jesus Christ of Latter-Day Saints (popularly known as “Mormons”) hold lay beliefs of discriminability between members of their faith and nonmembers. Mormons are a minority religious group in the United States founded in 1830 (Bushman, 2005). Throughout much of the Mormon Church’s early history, members were persecuted by non-Mormons, which resulted in their eventual settling on the American frontier. Because this persecution drove the Mormons from their beginnings in the Eastern United States, they remained relatively insulated from other subcultural American groups. Their greatest numbers are in Utah, and the headquarters of the Mormon Church is in Utah’s capital, Salt Lake City.

Folk beliefs among many Mormons hold that Mormon and non-Mormon individuals are discriminable. One basis for this difference is believed by Mormons to be due to a spiritual distinctiveness among members of the Mormon Church (Church of Jesus Christ of Latter-Day Saints, 2004). Given the observation among members of the Mormon Church that ingroup (Mormon) and outgroup (non-Mormon) individuals possess distinguishing characteristics, the first goal of this work was to test and document the viability of this effect.

Should Mormons and non-Mormons be found perceptually distinguishable, a second question concerns the contextually relative nature of this effect. Information about who is Mormon and who is not is likely of greater value to Mormons than to non-Mormons, given their status as a minority group in the United States. However, information about who is Mormon and who is non-Mormon may also be important for Mormons living as the majority group (as they do in Salt Lake City, Utah). Such information may be relevant to non-Mormons living in a part of the country where they are in the minority compared with Mormons and to Mormons living in a part of the country where they are in the minority compared with non-Mormons. Hence, given that Mormons represent the majority group in one geographic location but exist as the minority in other locations, they serve as a particularly suitable candidate group for the study of perceiver context as a moderator of ingroup/outgroup effects.

Perceiver Context and Ingroup/Outgroup Effects

Earlier work has shown that many contextual and cognitive factors may influence whether and how individuals perceive others as ingroup or outgroup members. For instance, Castano et al. (2002) found that ingroup identification was critical to determining individuals’ criterion for including others into their group. Similarly, van Rijswijk, Haslam, and Ellemers (2006) found that context had a specific effect on ingroup identification, which led to subsequent, group-based stereotyping. In addition, Greenberg et al. (1990) found that priming individuals affected their preference for the ingroup versus the outgroup: Participants primed with concepts related to death showed greater ingroup favoritism, whereas control participants not primed with death showed no such effect.

Given that various cognitive and contextual moderators may affect how individuals perceive others in terms of their group membership (e.g., Pauker et al., 2009), we speculated that geographic or environmental context may play an important role in the ingroup memory effect. Specifically, we expected that contexts with high intergroup salience would result in the ingroup memory

advantage, whereas contexts with low intergroup salience would not result in an ingroup memory advantage (see also Meissner & Brigham, 2001). Moreover, we thought that this would be particularly relevant for perceptually ambiguous groups, for whom category distinctions are not intrinsically salient. Thus, we examined the ingroup memory advantage among Mormon and non-Mormon individuals living in a Mormon-dominated environment (Salt Lake City, Utah) as well as the ingroup memory advantage among Mormons and non-Mormons living in a Mormon-scarce environment (the northeastern United States).

Study 1

In Study 1, we sought to answer two questions: (a) Can Mormons and non-Mormons be reliably distinguished according to their group membership? And (b) do Mormons and non-Mormons show evidence of an ingroup memory advantage, whereby they display better memory for those belonging to their own group?

Method

Participants. Seventy-two participants were recruited from the general community in Salt Lake City, Utah, via advertisements for a psychology study about person perception. Half of these participants were active members of the Church of Jesus Christ of Latter-Day Saints (Mormons; $n = 18$ women, $n = 18$ men), whereas the other half were non-Mormons ($n = 17$ women, $n = 19$ men). Participants were paid \$10. Participants indicated their religious affiliation at the end of the experiment, and none reported any awareness or suspicion that the experiment concerned religion or religious identity during debriefing. Thus, all participants were naïve to the experiment’s purpose.

Stimuli. Images of Mormon and non-Mormon men and women were obtained from online personal advertisements posted in various major cities across the United States. Search criteria were restricted to individuals 18–30 years of age who specifically indicated either active membership in the Church of Jesus Christ of Latter-Day Saints or membership in another non-Mormon religious organization. Thus, all targets were explicitly Mormon or non-Mormon.

Only photos of headshots were downloaded for use, and only those images presenting a directly oriented face free of adornments (such as facial piercings or glasses) were selected for the experiment. Special attention was paid to variation in the faces according to the Mormon Church’s appearance codes so that no obvious markers of Mormon or non-Mormon identity were present (e.g., women with more than one earring per ear would likely be perceived by Mormons as non-Mormon and were excluded). Of the remaining photos, we randomly selected photos of 40 Mormon men, 40 non-Mormon men, 40 Mormon women, and 40 non-Mormon women for use in the experiment. All of the targets were Caucasian.

All of the photos were cropped to the smallest frame that included the sides and tops of their hair and the bottom of their chin. Thus, neck jewelry, clothing, and image backgrounds were not visible. The photos were then converted to grayscale and standardized for size. In addition, independent samples of naïve research assistants coded the male and female targets for affect (male: $n = 2$, $R^{SB} = .87$; female: $n = 2$, $R^{SB} = .79$) and

attractiveness (male: $n = 4$, $R^{SB} = .77$; female: $n = 4$, $R^{SB} = .81$) along 7-point scales. These ratings showed no differences between the Mormon and non-Mormon targets for neither affect, $t_{\text{male}}(78) = 0.53$, $p = .60$; $t_{\text{female}}(78) = 0.14$, $p = .89$, nor attractiveness, $t_{\text{male}}(78) = 0.09$, $p = .93$; $t_{\text{female}}(78) = 0.90$, $p = .37$.

Procedure. Participants completed an incidental-encoding memory task, which consisted of several stages. In light of previous findings that have shown own-gender effects for memory (Wright & Sladden, 2003), male and female participants saw only male or female targets, respectively.

In the first stage, participants were given instructions that they would be seeing a series of faces appear on a computer screen and that they were to passively view each face. Participants saw 40 faces in random order for 3 s each. Each face was preceded by a 500-ms fixation cross and succeeded by 1,500 ms of rest. Unbeknownst to the participants, half (20) of the faces were Mormon, and the other half (20) were non-Mormon.

After participants viewed all of the faces, they were presented with a second set of instructions asking them to work on a word-search puzzle that was located face down on the table next to the computer. The topic of the puzzle was unrelated to the experiment and was identical for each participant. Participants worked on the puzzle for 2 min, after which the computer emitted several beeps and flashes to recall their attention.

Participants were then presented with new instructions informing them that they would be presented with a series of faces, some of which they had seen in the first section of the experiment and some of which they had not. These faces consisted of all 40 Mormon and non-Mormon targets from the first part of the experiment and 40 new faces, half of which were also Mormon and non-Mormon. Participants were asked to indicate via key press whether or not they had seen the face in the previous portion of the experiment. Although the task was self-paced, participants were instructed to work as quickly and accurately as possible. Critically, the assignment of faces as encoded or novel was counterbalanced for both male and female participants.

Upon completion of the recognition task, participants then received a final set of instructions. Participants were told that they would be seeing each of the faces they had seen previously and that they were to categorize each face as either Mormon or non-Mormon. This was the first point at which religion or group identity was mentioned in the experiment. Although the task was not timed, participants were instructed to work as quickly and accurately as possible, relying on their intuition or gut feeling.

Once the categorization task was complete, participants provided demographic information about their religious identity, were debriefed, and were probed for suspicion about the encoding stage of the experiment. No participants reported any suspicion or knowledge that the experiment concerned religion, group identity, or differences between Mormons and non-Mormons.

Results

Perceptual accuracy. Data were analyzed using the signal detection statistic A' (Rae, 1976). Categorizations of Mormon faces as Mormon were counted as hits, and categorizations of non-Mormon faces as Mormon were counted as false alarms. These values were then used to calculate a single A' score for each

participant and compared against chance guessing ($A' = .50$).¹ A one-sample t test showed that participants' ability to categorize targets as Mormon and non-Mormon ($M_{A'} = 0.59$, $SD = 0.11$) was significantly better than chance, $t(70) = 6.83$, $p < .001$, $r = .63$. This was true for both Mormon, $M = 0.61$, $SD = 0.11$, $t(34) = 5.98$, $p < .001$, $r = .72$, and non-Mormon, $M = .58$, $SD = 0.12$, $t(35) = 3.85$, $p < .001$, $r = .55$, participants. In addition, we conducted a 2 (participant identity: Mormon or non-Mormon) \times 2 (participant gender: male or female) between-participants analysis of variance (ANOVA) for participants' categorization accuracy (A') scores, which showed no main effects for either participants' gender, $F(1, 67) = 3.52$, $p = .07$, or religious group membership, $F(1, 67) = 1.45$, $p = .23$, and no Gender \times Group Membership interaction, $F(1, 67) = 1.60$, $p = .21$. Similarly, a 2 (participant identity) \times 2 (participant gender) ANOVA for participants' response-bias scores (B' ; Quilty, Keats, & Harkins, 1975) showed neither main effects nor an interaction (all F s < 0.84 , all p s $> .36$). Both Mormon ($M = -0.06$, $SD = 0.21$) and non-Mormon ($M = -0.02$, $SD = 0.15$) participants showed a tendency to categorize targets as Mormon.

Memory. The memory data were also analyzed using signal detection. Faces that were correctly recognized from the encoding stage were treated as hits, whereas faces incorrectly recognized were treated as false alarms. This generated two A' scores for each participant: recognition for Mormon targets and recognition for non-Mormon targets. These scores were then compared via a 2 (target identity: Mormon or non-Mormon) \times 2 (participant identity: Mormon or non-Mormon) \times 2 (participant gender: male or female) mixed-model ANOVA with repeated measures on the first factor (see Table 1 for descriptive statistics).

Consistent with the ingroup memory advantage that has previously been shown for perceptually obvious groups, participants showed significantly better memory for targets from their own group, as revealed by a significant Target Identity \times Participant Identity interaction, $F(1, 68) = 9.57$, $p = .003$, $r = .35$ (see Figure 1). Results of the ANOVA showed no main effects of target identity, $F(1, 68) = 0.11$, $p = .74$; participant identity, $F(1, 68) = 0.04$, $p = .84$; or participant gender, $F(1, 68) = 0.17$, $p = .68$. Similarly, there was no interaction between target identity and participant gender, $F(1, 68) = 2.47$, $p = .12$, and no three-way interaction between target identity, participant identity, and participant gender, $F(1, 48) = 0.19$, $p = .67$. Decomposition of the significant Target Identity \times Participant Identity interaction into simple effects showed that both Mormon, $t(35) = 2.23$, $p = .03$, $r = .35$, and non-Mormon, $t(35) = 1.45$, $p = .04$, $r = .28$, participants had better memory for targets belonging to their own group than for targets belonging to the other's group.

In addition to testing participants' accuracy, we conducted a second ANOVA for measures of participants' response bias (B'). Participants showed no significant main effects or interactions for the 2 (target identity: Mormon or non-Mormon) \times 2 (participant identity: Mormon or non-Mormon) \times 2 (participant gender: male or female) mixed model ANOVA with repeated measures on the

¹ One Mormon man categorized all of the targets as non-Mormon. His categorization data were therefore excluded as a statistical outlier, lying more than three standard deviations below the mean.

Table 1
Means (and Standard Deviations) for Hits, False Alarms, A' , and B' for the Memory Data in Study 1

Participants	Targets							
	Mormon				Non-Mormon			
	Hits	False alarms	A'	B'	Hits	False alarms	A'	B'
Mormons								
Male	.76 (.16)	.15 (.23)	.86 (.17)	.41 (.52)	.76 (.12)	.19 (.23)	.84 (.17)	.28 (.23)
Female	.75 (.15)	.14 (.09)	.88 (.06)	.18 (.43)	.68 (.18)	.17 (.12)	.83 (.12)	.27 (.41)
Both	.76 (.15)	.15 (.17)	.87 (.12)	.29 (.48)	.72 (.15)	.18 (.18)	.83 (.14)	.28 (.32)
Non-Mormons								
Male	.73 (.18)	.25 (.19)	.83 (.09)	.08 (.46)	.77 (.19)	.18 (.16)	.87 (.07)	.13 (.49)
Female	.72 (.10)	.17 (.17)	.86 (.07)	.32 (.46)	.74 (.15)	.17 (.15)	.87 (.07)	.17 (.55)
Both	.73 (.15)	.21 (.18)	.84 (.08)	.21 (.47)	.75 (.17)	.18 (.15)	.87 (.07)	.15 (.52)

first factor (all $F_s < 2.52$, all $p_s > .12$; see Table 1 for descriptive statistics).

Finally, we examined the relationship between participants' accuracy in categorizing targets as Mormon and non-Mormon with the magnitude of their ingroup memory effect. We subtracted individuals' recognition memory score for outgroup targets from their recognition memory score for ingroup targets and then correlated these difference scores with the participants' respective categorization accuracy score. These relationships showed no significant effects for either Mormon, $r(33) = -.12$, $p = .48$, or non-Mormon, $r(34) = .02$, $p = .92$, participants, suggesting that participants' ability to remember ingroup targets was not related to their ability to accurately categorize those targets.²

Discussion

Study 1 shows two important effects. First, targets' status as Mormon and non-Mormon can be reliably distinguished from photographs of their faces with above-chance accuracy. Second, Mormons possess better recognition memory for same-sex Mormon faces, and non-Mormons possess better recognition memory for same-sex non-Mormon faces.

Previous research has shown that other perceptually ambiguous groups can be discerned from photos of faces with similar rates of accuracy to those observed here (i.e., Jewish/non-Jewish, Rice & Mullen, 2003; and gay/straight, Rule & Ambady, 2008). This is

particularly interesting given that Mormons are not known to evidence any distinct biological correlates, such as those expressed among gay men (e.g., Hamer, Hu, Magnuson, Hu, & Pattatucci, 1993), and their identity as a group has emerged relatively recently compared, for instance, with the Jewish religion, which has existed for thousands of years.

But perhaps more surprising is that both Mormons and non-Mormons showed better recognition memory for members of their own group. Although previous work has shown that gay and straight men exhibit increased recognition memory for other gay and straight men, respectively, the findings of that work relied on the perception of who the participants thought shared their sexual orientation, rather than those who actually did share their sexual orientation (Rule, Ambady, Adams, & Macrae, 2007). These data show a much stronger effect: Mormons had better memory for other Mormons, and non-Mormons had better memory for other non-Mormons, according to the targets' actual group membership.

Moreover, the finding that participants' categorization accuracy for the faces was unrelated to their memory for the faces suggests that perceivers may have been unconsciously coding Mormons' and non-Mormons' group identity more accurately than they were able to explicitly report in their categorizations (see also Dijksterhuis, Bos, Nordgren, & van Baaren, 2006). This is consistent with previous work examining the categorization of other perceptually ambiguous groups, which has shown that perceivers typically do not possess conscious knowledge of their ability to accurately categorize perceptually ambiguous group members (Rule, Ambady, Adams, & Macrae, 2008), that these categorizations occur automatically (Rule, Macrae, & Ambady, 2009), and that deliberation about targets' category membership significantly impairs perceivers' ability to accurately categorize the targets (Rule, Ambady, & Hallett, 2009). Extant models of the ingroup memory

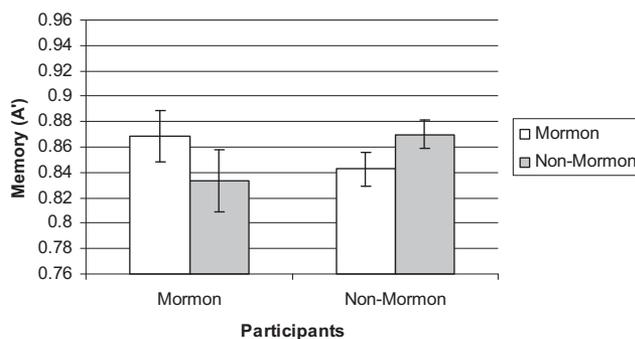


Figure 1. Means and standard errors for Mormon and non-Mormon participants' recognition memory of Mormon and non-Mormon faces as measured by A' in a Mormon-dominated environment in Study 1.

² We also conducted an items-based analysis for the recognition memory (an approximation of how well each face was remembered, collapsing across participants) and categorization accuracy (an approximation of how accurately each face was categorized, collapsing across participants) for each face to test whether a subset of highly memorable or obviously categorizable faces might be responsible for the observed memory effects. However, there were no significant relationships between recognition memory for the targets and the accuracy with which they were categorized in any of the studies reported in this article (all $r_s < 1.13$).

advantage would propose that such implicit categorization at encoding is a necessary precursor for such memory effects to occur (e.g., Hugenberg & Sacco, 2008; Sporer, 2001), suggesting that an absence of correspondence between the implicit and explicit categorizations may simply be due to a dissociation between implicit and explicit categorizations. At present, however, this dissociation between implicit categorization of the Mormon and non-Mormon faces during encoding and explicit categorization of the faces in the final categorization stage remains speculative.

Previous work has shown that majority group members often show an ingroup effect for recognition memory, whereas minority group members often show equivalent memory for their own group and the majority group (Anthony, Copper, & Mullen, 1992). In the current data, however, it is unclear which group is the minority. Nationally, Mormons are clearly a minority religious and subcultural group. But in Utah, Mormons make up the majority (Pew Research Center, 2008). Thus, the geographic context would render the non-Mormons the minority group.

This raises the important question of the role of perceivers' geographic or environmental context in fostering the ingroup memory advantage. Particularly, would non-Mormons not living in a Mormon-dominated environment show any ability to distinguish Mormons from non-Mormons? Study 2 investigated this question further.

Study 2

Mormons and non-Mormons living in Salt Lake City, Utah, showed a significant advantage in recognition memory for ingroup members. Geographic context may have played a role in this, such that the effects observed for the non-Mormon participants (a local minority but national majority) were akin to previous reports of ingroup effects for national minority groups, such as Black people living in the United States (see Meissner & Brigham, 2001, for a review). Study 2 therefore attempted to further explore the role of geographic and environmental context on mediating these ingroup effects. Specifically, we hypothesized that non-Mormons living in an environment that has very few Mormons would not show advantaged memory for their ingroup over that of the outgroup, because they would not be motivated to distinguish the two groups unless prompted to do so. We expected that one's identity as a Mormon or non-Mormon would be a highly salient, chronically accessible characteristic in the Mormon-dominated environment of Salt Lake City, Utah (see Bohner et al., 1998; Bruner, 1957; Higgins, 1989, 1996) but expected that one's identity as non-Mormon would not be a highly salient characteristic in the Mormon-scarce environment of a Northeastern U.S. university. To test this, we therefore asked non-Mormon participants from a Mormon-scarce environment to complete the same task as in Study 1 and compared their performance against participants who completed the same task following an ostensibly unrelated priming task that would cue them to implicitly categorize the faces as ingroup (non-Mormon) and outgroup (Mormon) members during the incidental encoding stage.

Method

Fifty-eight undergraduates from a private university in the Northeastern United States participated for partial course credit in

an introductory psychology class or for \$10.³ All participants were non-Mormon, and none reported any knowledge or suspicion that the task concerned religion, group identity, or memory for faces. Thirty-two participants ($n = 16$ women, $n = 16$ men) completed the same task as in Study 1.

The remaining 26 participants ($n = 12$ women, $n = 14$ men) were brought into the laboratory and instructed that they would be completing several short tasks. They were told that their first task was to read some newspaper articles that we were planning to use in a future, unrelated study. Participants were asked to read each article carefully and were given two scoring sheets. The participants were shown the scoring sheets as the experimenter explained that, after reading each article, the participant was to indicate how easy/difficult the article was to read (from 1 = *easy* to 7 = *difficult*), the extent to which the reporting in the article seemed biased (from 1 = *not at all biased* to 7 = *very biased*), and how positive/negative the article was toward Mormons (from -3 = *very negative* to 3 = *very positive*). Participants also responded as to whether they had read the article previously and whether they had heard the news story before. None reported any previous experience with the articles or the stories that they covered.

In reality, the articles served as a means of increasing the cognitive accessibility of the Mormon category and participants' non-Mormon identity. To accomplish this, two newspaper articles about Mormons were selected from a major American national newspaper and copied into a word processing file so as to preserve only the articles' titles and contents. Immediately following completion of the reading task, participants were thanked and told that they would now begin the next, unrelated study. From this point, the stimuli and procedure were the same as in Study 1. During debriefing, few participants reported any suspicion of a link between the first and second tasks, and no participants reported being suspicious of a link between the two tasks prior to the final stage of the recognition memory experiment, when they were asked to categorize the faces as Mormon or non-Mormon. All participants were non-Mormon.

Results

Priming manipulation. Analysis of participants' responses to the articles indicated that the contents of the articles were perceived as relatively easy to understand ($M = 1.95$, $SD = 1.13$), low in bias ($M = 3.25$, $SD = 1.37$), and relatively neutral toward Mormons ($M = 0.15$, $SD = 1.27$).

Perceptual accuracy. Data were analyzed using signal detection, as in Study 1. Categorizations of Mormon faces as Mormon were counted as hits, and categorizations of non-Mormon faces as Mormon were counted as false alarms. Measures of signal detection showed that participants' categorization accuracy was significantly better than chance guessing, $M_{A'} = 0.56$, $SD = 0.12$, $t(56) = 3.94$, $p < .001$, $r = .47$, with a bias toward categorizing targets as non-Mormon versus Mormon ($M_{B'} = 0.03$, $SD =$

³ In reality, the two conditions of Study 2 were run as independent experiments. They are combined here merely for ease of presentation.

0.17).⁴ Furthermore, the results of a 2 (condition: prime or no prime) \times 2 (participant gender: male or female) ANOVA showed no significant effects for condition, participant sex, or the interaction of the two for either accuracy or response bias (all $F_s < 1.10$, all $p_s > .30$).

Memory. Similar to Study 1, measures of A' were calculated based on the hit and false-alarm rates, yielding two recognition memory scores (one for Mormon targets and one for non-Mormon targets) per each participant (see Table 2 for descriptive statistics). These scores were then subjected to a 2 (target identity: Mormon or non-Mormon) \times 2 (condition: prime or no prime) \times 2 (participant gender: male or female) mixed model ANOVA with repeated measures on the first factor.

The results of this analysis showed no main effects for target identity, $F(1, 54) = 1.43, p = .24$; condition, $F(1, 54) = 1.29, p = .26$; or gender, $F(1, 54) = 1.21, p = .28$. We also observed no significant interactions of these factors (all $F_s < 0.33$, all $p_s > .57$), with the exception of the predicted significant Condition \times Target interaction, $F(1, 54) = 4.80, p = .03, r = .29$ (see Figure 2). Simple effects showed that this was due to participants' significantly better memory for ingroup non-Mormon targets than outgroup Mormon targets in the prime condition, $t(25) = 2.36, p = .03, r = .52$. In addition, participants in the prime condition showed significantly better memory for ingroup non-Mormon targets than did participants in the no-prime condition, $t(56) = 2.00, p = .05, r = .26$. Participants in the no-prime condition showed no differences in their memory for outgroup Mormon targets, nor did memory for Mormon targets differ across conditions (both $t_s < 0.75$, both $p_s > .46$). No significant effects were observed for the analogous 2 (target) \times 2 (condition) \times 2 (gender) ANOVA of participants' response bias (B') scores (all $F_s < 1.01$, all $p_s > .32$). Finally, the difference between participants' memory for ingroup targets minus outgroup targets was unrelated to their accuracy in categorizing the targets as such, $r(55) = .20, p = .14$.

Discussion

Similar to the Mormon and non-Mormon participants in Study 1, non-Mormons living in a Mormon-scarce environment were able to discern Mormon from non-Mormon targets significantly better than chance guessing. But, distinct from the participants in Study 1, the non-Mormons from the Mormon-scarce environment did not show an ingroup effect for recognition memory, except when they were primed.

Participants who read news articles about Mormons did exhibit an ingroup memory advantage. Even though participants rated the articles about Mormons as relatively neutral in content, the mere activation of the concept Mormon appears to have influenced them to differentiate between Mormon and non-Mormon targets during incidental encoding. These encoding effects were seen in the ingroup memory effect on the surprise memory test. None of the participants reported any awareness of this influence upon their encoding of the faces. Rather, participants indicated during debriefing that they had no knowledge of a link between the articles and the incidental encoding memory task and that they were not aware that the second task involved Mormons until the final phase in which they were asked to categorize the targets as Mormon and non-Mormon. These data therefore suggest that a subtle cue can produce ingroup memory advantages: Living in an environmental

context with high intergroup contact may provide such cues chronically, whereas if one lives outside of such a context, the cues may be induced conditionally (see Blanz, 1999; Bohner et al., 1998; Higgins, 1996).

Frequent exposure to Mormons therefore does not appear to be a necessary prerequisite to distinguishing Mormons from non-Mormons when prompted. However, prolonged exposure to Mormons may provide the contextual salience necessary to distinguish between Mormons and non-Mormons at encoding, thereby leading to preferential allocation of cognitive and attentional resources to the ingroup. These effects were duplicated, however, when participants were subtly and unobtrusively primed. Environmental context therefore seems to play an important role in determining whether the ingroup memory advantage takes effect. To our knowledge, environmental context has not previously been shown to exert an influence on the ingroup memory advantage.

Study 3

Study 1 showed that both Mormons and non-Mormons living in a geographic environment that makes their Mormon/non-Mormon group memberships chronically accessible displayed an ingroup memory advantage. Study 2 showed that non-Mormons living in a geographic environment where non-Mormon group membership is not chronically accessible did not display an ingroup memory advantage but that if this identity is made accessible via an unobtrusive prime, an ingroup memory advantage will emerge. Study 3 replicated Study 2 and examined the recognition memory for Mormon and non-Mormon targets among Mormons living in a Mormon-scarce environment.

Minority group members living in a majority-dominated environment tend to show better memory for ingroup members than for outgroup members (Meissner & Brigham, 2001). Thus, given that Mormons constitute a cohesive minority group (numbering fewer than 2% in the northeastern United States; Pew Research Center, 2008), we predicted that Mormons' group membership would remain accessible to them even outside of a Mormon-majority environment, such as Salt Lake City, Utah (the site of Study 1). Thus, although non-Mormons living in a Mormon-scarce environment did not show an ingroup memory advantage without being primed, we predicted that Mormons living in a Mormon-scarce environment would show an ingroup memory advantage, regardless of whether they are primed (see also Bohner et al., 1998).

To test this, we administered the same recognition memory test employed in Studies 1 and 2 to both Mormon and non-Mormon residents of a major Northeastern U.S. city. In addition, we randomly assigned members of both groups to first undergo the priming task used in Study 2 or to receive no prime. We therefore sought to replicate the effects of Study 2 while extending these effects to Mormon participants drawn from the same geographic location.

Method

Participants consisted of 46 ($n = 19$ women, $n = 27$ men) active members of the Church of Jesus Christ of Latter-Day Saints (i.e.,

⁴ One male participant did not complete the categorization stage of the experiment because of a computer error.

Table 2
Means (and Standard Deviations) for Hits, False Alarms, A' , and B' for the Memory Data in Study 2

Participants	Targets							
	Mormon				Non-Mormon			
	Hits	False alarms	A'	B'	Hits	False alarms	A'	B'
Prime condition								
Male	.71 (.14)	.19 (.15)	.83 (.12)	.25 (.46)	.72 (.16)	.15 (.08)	.86 (.07)	.22 (.28)
Female	.67 (.18)	.17 (.13)	.83 (.09)	.21 (.25)	.70 (.21)	.13 (.11)	.86 (.09)	.22 (.50)
Both	.69 (.16)	.18 (.14)	.83 (.10)	.23 (.37)	.71 (.18)	.14 (.09)	.86 (.08)	.22 (.39)
No-prime condition								
Male	.63 (.14)	.18 (.10)	.82 (.07)	.23 (.28)	.68 (.14)	.22 (.11)	.81 (.11)	.12 (.26)
Female	.71 (.15)	.17 (.10)	.85 (.06)	.21 (.42)	.69 (.15)	.18 (.08)	.84 (.05)	.14 (.27)
Both	.67 (.15)	.18 (.10)	.83 (.07)	.22 (.35)	.69 (.14)	.20 (.10)	.82 (.08)	.13 (.26)

Mormons) and 56 ($n = 28$ women, $n = 28$ men) self-identified non-Mormons. Approximately half of the Mormon ($n = 24$) and non-Mormon ($n = 28$) participants were assigned to the prime condition. Stimuli, materials, and procedures were identical to those of Studies 1 and 2.

Both groups consisted of young adults ranging in age from 18–30 years old, the majority of whom were undergraduate or graduate students receiving either monetary compensation (\$10) or partial credit in an introductory psychology course. Participants were recruited via online and paper advertisements, as well as snowball sampling. Given that Mormons are a fairly cohesive minority group with relatively low numbers in the Northeastern United States, great care was taken to assure that the Mormon participants did not know that they were being explicitly recruited because of their Mormon group membership. The most effective strategy for achieving this was through snowball sampling within networks of individuals acquainted through their membership in the Mormon Church. To match this strategy, snowball sampling was also used to recruit non-Mormons, again using acquaintanceship networks. Similar to Study 3, none of the Mormon or non-Mormon participants reported suspicion or knowledge that the priming task was related to the subsequent memory task.

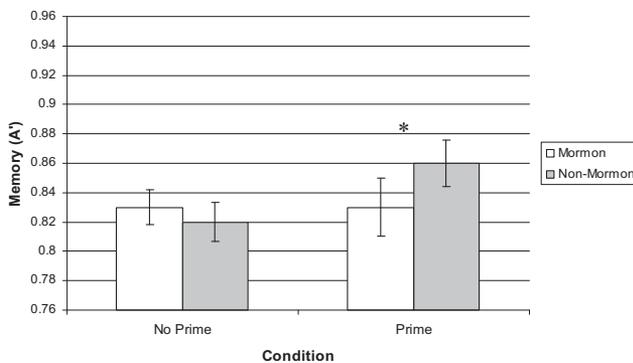


Figure 2. Means and standard errors for non-Mormon participants' recognition memory of Mormon and non-Mormon faces as measured by A' in a Mormon-scarce environment both with and without an identity prime in Study 2.

Results

Priming manipulation. As in Study 2, non-Mormon participants found the articles relatively easy to understand ($M = 1.78$, $SD = 0.95$), low in bias ($M = 3.64$, $SD = 1.74$), and relatively neutral toward Mormons ($M = -0.16$, $SD = 1.39$). Similarly, Mormon participants also found the articles relatively easy to understand ($M = 1.95$, $SD = 1.13$), low in bias ($M = 3.25$, $SD = 1.37$), and relatively neutral toward Mormons ($M = 0.13$, $SD = 1.54$), and the results of a doubly multivariate ANOVA showed that the two groups did not significantly differ on any of these three measures (all F s < 3.14 , all p s $> .08$).

Perceptual accuracy. Both Mormon,⁵ $M_{A'} = 0.62$, $SD = 0.08$, $t(44) = 10.08$, $p < .001$, $r = .84$, and non-Mormon, $M_{A'} = 0.53$, $SD = 0.09$, $t(55) = 2.10$, $p = .04$, $r = .27$, participants' accuracy was significantly greater than chance guessing. We also conducted a 2 (participant identity: Mormon or non-Mormon) \times 2 (condition: prime or no prime) \times 2 (participant gender: male or female) ANOVA on participants' accuracy (A') scores. Results of the ANOVA showed a significant main effect for participant identity, whereby Mormon participants were significantly more accurate in categorizing targets than were non-Mormon participants, $F(1, 93) = 25.46$, $p < .001$, $r = .46$; all other effects were nonsignificant (all F s < 1.60 , all p s $> .21$). Similarly, the results of a 2 (participant identity: Mormon or non-Mormon) \times 2 (condition: prime or no prime) \times 2 (participant gender: male or female) ANOVA on participants' response bias (B') scores also showed a main effect for participant identity, whereby Mormon participants ($M = -0.03$, $SD = 0.11$) were significantly more likely to categorize targets as Mormon than were non-Mormon participants ($M = 0.02$, $SD = 0.08$).

To assess the overall categorization accuracy and response bias for Mormon and non-Mormon participants across Studies 1–3, we conducted separate 2 (participant identity: Mormon or non-Mormon) \times 2 (condition: prime or no prime) \times 2 (participant gender: male or female) \times 2 (location: Salt Lake City, Utah, or the Northeastern United States) between-participants ANOVAs for

⁵ One Mormon man categorized all of the targets as Mormon. His categorization data were therefore excluded as a statistical outlier, lying more than three standard deviations below the mean.

participants' accuracy (A') and response bias (B') scores. Both ANOVAs revealed significant main effects for participant identity whereby Mormon participants ($M_{A'} = 0.62, SD = 0.09$) were significantly more accurate than non-Mormon participants, $M_{A'} = 0.55, SD = 0.11, F(1, 217) = 13.52, p < .001, r = .24$, and Mormon participants ($M_{B'} = -0.04, SD = 0.16$) were significantly more likely to categorize targets as Mormon than as non-Mormon, compared with non-Mormon participants, $M_{B'} = 0.02, SD = 0.16, F(1, 217) = 6.37, p = .012, r = .17$.

Memory. Participants' recognition memory scores were subjected to a 2 (target identity: Mormon or non-Mormon) \times 2 (participant identity: Mormon or non-Mormon) \times 2 (condition: prime or no prime) \times 2 (participant gender: male or female) mixed model ANOVA with repeated measures on the first factor (see Table 3 for descriptive statistics). Participants showed a significant Target Identity \times Participant Identity interaction, $F(1, 94) = 16.54, p < .001, r = .39$, which was qualified by a significant Target Identity \times Participant Identity \times Condition interaction, $F(1, 94) = 4.60, p = .03, r = .22$ (see Figure 3). It is notable that none of these effects was qualified by gender (all F s < 1.56 , all p s $> .22$).

We first examined this Target \times Condition interaction separately for Mormon and non-Mormon participants. Simple effects tests showed that Mormon participants had significantly better memory for ingroup (Mormon) targets than outgroup (non-Mormon) targets, $F_{\text{target}}(1, 44) = 9.71, p = .003, r = .43$, regardless of whether they were primed, $F_{\text{Target} \times \text{Condition}}(1, 44) = 0.11, p = .74$; prime condition: $t_{\text{target}}(22) = 2.30, p = .03, r = .43$; no prime condition: $t_{\text{target}}(21) = 2.15, p = .04, r = .42$. Non-Mormon participants, however, showed significantly better memory for ingroup (non-Mormon) targets than outgroup (Mormon) targets when primed, $t_{\text{target}}(27) = 4.53, p < .001, r = .66$, but not when they were not primed, $t_{\text{target}}(27) = 0.24, p = .81, F_{\text{Target} \times \text{Condition}}(1, 54) = 6.18, p = .02, r = .32$.

We then explored the priming effects further by examining the effects of the prime on each of the separate groups of participants

and targets. We observed a significant main effect of condition such that participants in the prime condition showed significantly better memory than those in the no-prime condition, $F(1, 94) = 5.00, p = .03, r = .22$. Simple effects showed that Mormon participants had significantly better memory for ingroup (Mormon) targets when they were primed, as opposed to when they were not primed, $t(44) = 2.12, p = .04, r = .30$, but showed no difference in memory for outgroup (non-Mormon) targets across the two conditions, $t(44) = 1.74, p = .09$. Similarly, non-Mormon participants had significantly better memory for ingroup (non-Mormon) targets when they were primed, as opposed to when they were not primed, $t(54) = 2.20, p = .03, r = .29$, but showed no difference in memory for outgroup (Mormon) targets across the two conditions, $t(54) = 0.07, p = .94$. In addition, these effects contributed to a significant main effect of participant identity such that Mormons showed overall better memory than did non-Mormons, $F(1, 94) = 4.74, p = .03, r = .22$, an effect that was due in part to Mormons' better memory for Mormon faces across both the prime and no-prime conditions compared to non-Mormons, $F(1, 100) = 3.27, p = .001, r = .31$, who showed only an ingroup advantage in the prime condition.

We also conducted a 2 (target identity: Mormon or non-Mormon) \times 2 (participant identity: Mormon or non-Mormon) \times 2 (condition: prime or no prime) \times 2 (participant gender: male or female) mixed model ANOVA with repeated measures on the first factor for participants' response bias (B') scores (see Table 3 for descriptive statistics). Results of the analysis showed a significant main effect of participant identity, whereby non-Mormon participants showed a significantly more restricted response criterion (i.e., they were significantly less likely to indicate recognition of a face) than did Mormon participants, $F(1, 94) = 8.19, p = .005, r = .28$. This effect was qualified by a significant Participant Identity \times Condition interaction, wherein Mormon participants showed a restricted response bias in the no-prime condition ($M = 0.16, SE = 0.08$) but a lax response criterion in the prime condition

Table 3
Means (and Standard Deviations) for Hits, False Alarms, A' , and B' for the Memory Data in Study 3

Participants	Targets							
	Mormon				Non-Mormon			
	Hits	False alarms	A'	B'	Hits	False alarms	A'	B'
Prime condition								
Mormons								
Male	.88 (.08)	.18 (.09)	.91 (.04)	-.19 (.39)	.84 (.06)	.20 (.10)	.89 (.05)	-.05 (.28)
Female	.89 (.10)	.15 (.11)	.92 (.06)	-.20 (.51)	.79 (.13)	.14 (.12)	.89 (.05)	.13 (.62)
Both	.89 (.09)	.16 (.10)	.92 (.05)	-.20 (.46)	.81 (.11)	.17 (.11)	.89 (.05)	.05 (.51)
Non-Mormons								
Male	.62 (.15)	.18 (.15)	.80 (.11)	.29 (.23)	.70 (.16)	.19 (.14)	.84 (.09)	.21 (.50)
Female	.74 (.12)	.12 (.11)	.88 (.06)	.36 (.36)	.86 (.10)	.06 (.07)	.94 (.04)	.34 (.57)
Both	.68 (.15)	.15 (.13)	.84 (.10)	.33 (.30)	.78 (.15)	.12 (.13)	.89 (.08)	.27 (.53)
No-prime condition								
Mormons								
Male	.82 (.14)	.14 (.10)	.90 (.08)	-.04 (.39)	.78 (.20)	.12 (.09)	.89 (.10)	.11 (.56)
Female	.76 (.12)	.19 (.16)	.86 (.09)	.27 (.51)	.68 (.14)	.19 (.12)	.83 (.09)	.23 (.45)
Both	.79 (.13)	.17 (.14)	.87 (.09)	.14 (.48)	.72 (.17)	.16 (.11)	.85 (.10)	.18 (.49)
Non-Mormons								
Male	.67 (.18)	.25 (.14)	.80 (.10)	.06 (.40)	.69 (.20)	.22 (.14)	.83 (.07)	.12 (.41)
Female	.76 (.10)	.14 (.13)	.89 (.05)	.31 (.32)	.73 (.16)	.15 (.10)	.86 (.09)	.19 (.37)
Both	.71 (.15)	.19 (.15)	.84 (.09)	.19 (.38)	.71 (.18)	.18 (.12)	.84 (.08)	.15 (.39)

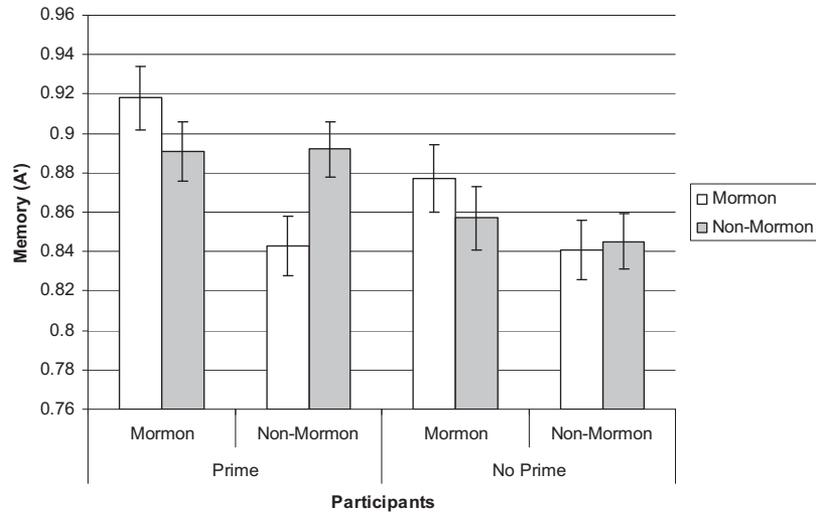


Figure 3. Means and standard errors for Mormon and non-Mormon participants' recognition memory (as measured by A') for Mormon and non-Mormon participants in a Mormon-scarce environment in both prime and no-prime conditions in Study 3.

($M = -0.07$, $SE = 0.07$) and non-Mormon participants showed restricted response criteria in both the prime ($M = 0.30$, $SE = 0.07$) and no-prime ($M = 0.17$, $SE = 0.07$) conditions. Simple effects tests therefore showed that the interaction was driven primarily by the difference between Mormons in the prime condition versus non-Mormons in the prime condition, $F(1, 50) = 15.06$, $p < .001$, $r = .48$, as well as by the difference between Mormons across both conditions, $F(1, 44) = 4.49$, $p = .04$, $r = .30$. The difference between Mormons and non-Mormons in the no-prime condition was nonsignificant, $F(1, 48) < 0.01$, $p = .95$, as was the difference between non-Mormons in the prime condition and non-Mormons in the no-prime condition, $F(1, 54) = 2.17$, $p = .15$.

Finally, we examined the relationship between participants' accuracy in categorizing targets as Mormon and non-Mormon with the magnitude of their ingroup memory effect. There were no significant relationships for either Mormons or non-Mormons in both the prime and no-prime conditions (all r s $< .131$, all p s $> .48$).

Discussion

As seen in Study 2, non-Mormon participants in the current study also showed an ingroup memory advantage when unobtrusively primed but showed no difference in memory for ingroup (non-Mormon) and outgroup (Mormon) targets when they were not primed. Thus, non-Mormon participants showed an ingroup memory effect but appeared to require the (albeit subtle) prime for the effect to occur.

Mormon participants, in contrast, showed significantly better memory for ingroup (Mormon) targets than for outgroup (non-Mormon) targets both when they were unobtrusively primed and when they were not primed. This effect suggests that for Mormons, group membership may be chronically accessible, even when living in a Mormon-scarce environment like the Northeastern United States. This effect is not surprising, as minorities often

experience group membership salience, perhaps because of frequent and persistent encounters with outgroup members (Meissner & Brigham, 2001). In addition, however, Mormon participants were also affected by the priming manipulation. Although Mormon participants showed a significant ingroup memory effect when they were not primed, this effect increased when they were primed. Even though Mormon group membership may be chronically accessible to Mormons living in a Mormon-scarce environment, then, subtly promoting thoughts about Mormons served to increase access over and above any baseline, chronic access.

Related to Mormons' overall better memory were the differences between the groups in response bias. Indeed, Mormons were significantly more liberal in their response criterion for recognition memory, a response strategy that may have contributed to their overall better memory. This pattern occurred across experimental conditions: Mormons showed significantly better overall memory in the prime condition, for which they were significantly more lax in their response criterion, than in the no-prime condition, where their response criterion was more restricted.

Finally, Mormon participants also showed significantly better categorization accuracy than did the non-Mormon participants, an effect that was again mirrored by a liberal response threshold for categorization. This was true both for the participants in the current study, as well as for the aggregate sample of participants across Studies 1–3. Mormon participants could therefore distinguish who was Mormon and who was not Mormon significantly better than could non-Mormon participants, although the non-Mormon participants still categorized Mormons and non-Mormons significantly better than chance guessing. Individuals' categorization accuracy, however, was unrelated to their recognition memory for ingroup and outgroup targets.

In sum, Study 3 showed that both Mormon and non-Mormon participants expressed an ingroup memory advantage. Mormon participants demonstrated better memory for Mormon faces than for non-Mormon faces, an effect that was enhanced when the test was

preceded by an unobtrusive priming task. Non-Mormon participants demonstrated better memory for non-Mormon faces than for Mormon faces but only when primed. Non-Mormon participants showed equivalent memory for both Mormon and non-Mormon faces when not primed. These effects suggest that group membership is chronically accessible for Mormons but not for non-Mormons living in the Mormon-scarce environment of the Northeastern United States. Priming Mormon and non-Mormon individuals seems to increase the accessibility of their group membership, resulting in an ingroup memory advantage for both groups.

General Discussion

For categories that are not intrinsically salient, perceivers' environmental context contributes to the ingroup memory advantage. Individuals in a geographic context that promoted chronic accessibility to differences in group membership showed better incidentally encoded recognition memory for ingroup members (Study 1). But in geographic contexts without chronic cues to group differences, an ingroup memory advantage was observed only among minority group members (Studies 2 and 3). When differences in group membership were made accessible via subtle priming, however, majority group members showed an ingroup memory advantage and minority group members showed a boost in their already present ingroup memory advantage (Studies 2 and 3).

This is not the first study to show that external factors can affect ingroup/outgroup memory effects. A number of previous studies examining perceptually obvious groups have shown that ingroup memory biases can be effortfully removed. For instance, Malpass et al. (1973) found that intensive training could abate outgroup homogeneity effects, and Hugenberg, Miller, and Claypool (2007) found that informing participants about the cross-race effect reduced their expression of ingroup bias. Other work has shown that participants' emotional experience influences their memory for ingroup and outgroup faces (Johnson & Fredrickson, 2005), and that targets' emotional expression can reduce outgroup memory deficits (Ackerman et al., 2006; Corneille et al., 2007). Perhaps more relevant to the current work, Sangrigoli, Pallier, Argenti, Ventureyra, and de Schonen (2005) reported that Korean children's own-race bias reversed after years of exposure to Caucasian individuals, following their childhood adoptions to Europe. Each of these studies thus shows that context can diminish or eliminate outgroup deficits in memory and perception. In contrast, we show that cues from the perceiver's context can promote or create such outgroup effects.

Similarly, previous work has documented that the accessibility of trait information can be a critical precursor to how individuals are perceived and construed (Bohner et al., 1998; see Higgins, 1996; Srull & Wyer, 1989, for reviews). Although this work has shown that priming perceivers with information can affect their subsequent impression formation of target individuals (e.g., Srull & Wyer, 1979, 1980) and that individuals with both chronic and contextual access to such information may diverge in their judgments, links between these effects to downstream processes, such as memory, have not been well established. The current work therefore merges the previous research on ingroup/outgroup effects with the previous research on accessibility and impression formation.

The present research also shows that the detection of a subtle and perceptually ambiguous cultural identity is discriminable from the face. Even for those participants who did not show memory advantages for their ingroup (e.g., the non-Mormon participants of Studies 2 and 3), group membership was discriminable on the basis of static facial cues. Thus, it is not that the unprimed participants in Studies 2 and 3 were unable to distinguish ingroup from outgroup members but, rather, that they did so only when group membership was made salient to them by instructions to categorize the faces as Mormon and non-Mormon. For non-Mormon participants primed in Studies 2 and 3, salience in group membership was effectively induced outside of participants' awareness, which caused them to process the faces of ingroup and outgroup members differently. It therefore appears that context-induced accessibility via the explicit question or implicit suggestion of group differences provided enough salience to make the groups distinguishable and to affect downstream cognitions, such as recognition memory.

Theoretical models of the ingroup memory advantage have suggested that implicit categorization of targets as ingroup and outgroup members is a necessary prerequisite to the subsequent memory differences (e.g., Hugenberg & Sacco, 2008; Sporer, 2001). But it is interesting that participants' explicit categorizations of ingroup and outgroup members in the current studies appeared unrelated to their memory for the targets. We believe that this difference may be explained by a distinction between implicit and explicit processing. Studies of other perceptually ambiguous groups have shown evidence that group membership may be processed unconsciously (Rule et al., 2008; Rule, Ambady, & Hallett, 2009; Rule, Macrae, & Ambady, 2009). Implicit categorization during the incidental encoding of targets during the first stage of the memory task may therefore have yielded a better estimate of accuracy than participants' subsequent, explicit categorizations of the targets. For instance, Rule, Ambady, and Hallett (2009) found that deliberation about judgments of whether women were lesbian or straight significantly impaired perceivers' ability to accurately judge their sexual orientations. Indeed, numerous studies have evidenced the benefits of unconscious over conscious thinking for certain intuitive types of decision-making (e.g., Dijksterhuis et al., 2006; Nordgren & Dijksterhuis, 2009). The demands of consciously categorizing targets as Mormon or non-Mormon may therefore have resulted in poorer accuracy than might have been achieved during the implicit processing of group membership during the incidental encoding stage. Similar findings were reported by Rule et al. (2008), who showed that participants' accuracy in judging full faces (such as those employed here) as gay and straight was uncorrelated with their explicitly reported estimations of their actual accuracy, suggesting a disconnect between the participants' categorizations and their explicit knowledge about those categorizations. We suspect that a similar separation between implicit and explicit categorizations has influenced the present results. This explanation is only speculative, however. Further empirical work should seek to address this question in greater detail.

These findings therefore highlight the importance of the perceiver's environmental context for the expression of ingroup/outgroup effects, such as the ingroup memory advantage. An important component of this may be accessibility of information about differences in group membership (see also Bohner et al., 1998; Higgins, 1996; Srull & Wyer, 1989; Wyer, Hung, & Jiang,

2008). For perceptually obvious groups, the obviousness of distinctive perceptual markers may provide consistent access to thoughts and information that make group differences salient (Hugenberg & Sacco, 2008; Levin, 1996; MacLin & Malpass, 2001; Sporer, 2001). Similarly, environmental contexts where intergroup contact is frequent and prominent might also serve to provide chronic access to thoughts and information that make group differences salient, as we observed in Study 1. But in the absence of both perceptual and environmental cues, group membership may not be salient or accessed. In such contexts, individuals may not show an ingroup memory advantage, as we observed in the no-prime conditions of Studies 2 and 3. Notably, promoting (even unobtrusive) access to information about group membership reintroduced the ingroup memory advantage in Studies 2 and 3.

This suggests that categorical thinking may not be obligatory in the absence of clear perceptual cues (cf. Macrae & Bodenhausen, 2000). Rather, whether one accesses information about group membership may rely on a number of factors, including both perceptual cues and the environmental context. The influence of these factors may have otherwise been obscured by the focus on perceptually obvious groups in previous research on outgroup memory effects. Therefore, by studying a perceptually ambiguous group, we have gained insight into some of the component processes that affect the cognitive processes underlying social categorization and the ingroup memory advantage. Subtle contextual cues can instantiate the ingroup memory effect among perceivers, even for groups that are not delineated by obvious perceptual features.

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