Consequences of being unable to categorize: The impact of racial ambiguity on spontaneous trait inferences

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Authors' note: Anonymized data and study materials necessary to reproduce the results presented in this article will be made available to researchers by request.

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Abstract

Impression formation is a ubiquitous socio-cognitive process underlying perceptions, judgments, and interactions with other people. Dominant theories regarding impression formation processes underscore the importance of social categorization (e.g., by race or gender). However, limited research has examined impression formation in the context of dual or ambiguous group membership. This research examined the consequences of being unable to categorize by investigating the influence of racial ambiguity on spontaneous trait inferences (STIs). Participants ($N = 112$) completed a savings-in-relearning paradigm, designed to measure the formation of STIs (Carlston & Skowronski, 1994). STI formation for racially ambiguous and racially unambiguous (i.e., easily categorizable) faces was compared. Results suggest that racial ambiguity impaired perceiver's ability to form STIs, a basic impression formation process. Implications of these findings for social perception and social interaction are discussed.

Consequences of being unable to categorize: The impact of racial ambiguity on spontaneous trait inferences

Impression formation is an essential process for social interaction that helps individuals predict others' future behaviors and anticipate subsequent interactions. Furthermore, impression formation comprises a series of processes, with initial social categorizations guiding observations and judgments (e.g., Fiske and Neuberg, 1990). With respect to the first step in impression formation—social categorization—it is thought that some social categories are quickly and automatically encoded (i.e., race and gender; Blair, Judd, & Fallman, 2004; Ito & Urland, 2003; Macrae & Bodenhausen, 2000). However, past research has largely overlooked what happens to impression formation processes when these typically visually apparent social category memberships of an individual are actually ambiguous.

Testing the impact of category ambiguity on impression formation is important for understanding whether categorization is a necessary initial step in impression formation. To address this fundamental question, this study examined the impact of ambiguity on subsequent impression formation processes. Given the importance of social categorization, we argue that being unable to categorize will have consequences for impression formation processes.

Specifically, this study tested whether racial ambiguity impacts perceivers' ability to make trait inferences. People regularly infer traits from others' behaviors, often without intention or awareness, making these trait inferences spontaneous and ubiquitous (Winter & Uleman, 1984; Todorov & Uleman, 2003). Furthermore, people tend to overuse trait inferences they make, assuming that individuals will behave in a trait-congruent manner in future interactions (Winter & Uleman, 1984; McCarthy & Skowronski, 2011). Thus, spontaneous trait inferences (STIs) are commonly formed and have implications for future behavior, making them an

importance aspect of impressions. Practically speaking, examining STIs elucidates how others perceive members of the growing population of Americans who are racially ambiguous.

We predicted that racial categorization difficulty would impact impression formation processes, specifically perceivers' likelihood of forming STIs. The two bodies of literature on impression formation and processing fluency suggested competing possibilities for the nature of this impact. In the following sections we outline research from both bodies of literature that provide support for these competing possibilities.

Impression Formation Models

The question of how individuals form impressions of novel individuals has been studied by social psychologists for over five decades. Asch (1946) showed that, despite hearing a series of seemingly separate terms and traits, individuals synthesize this information into a unified impression—processing each trait in relation to the others. Two predominant models of impression formation emerged within this literature: 1) the dual process model and 2) the continuum model.

Brewer's (1988) dual processing model of impression formation posits that there are two processing types or modes. The first processing type operates at the category level and is more automatic, beginning at the highest order global identification and stopping when the individual has sufficiently been identified. The second is person-based and represents more controlled processes.

Building on Brewer's (1988) model, Fiske and Neuberg's (1990) continuum model of impression formation places social group memberships as an important, guiding factor in impression formation. This model states that different processes used to form impressions are on a continuum from category-based to attribute-based (or individuating). Category-based processes

are those that draw from categorical knowledge (e.g., racial group membership) to organize information, coming at a cost to the use of more specific, attribute-level information.

Individuating processes involve analyzing targets on an attribute-by-attribute level, piecing together different sources of information available to the perceiver. The continuum model suggests a sequential processing in which people first encounter a target, attempt to categorize that target and, if the categorization process is successful, processing is unlikely to go any further (i.e., individuation does not occur). Importantly, forming an impression based on individuating information requires greater attentional resources and is more cognitively taxing than category-oriented approaches (Fiske, Neuberg, Beattie, & Milberg, 1987). Thus, category-based information is relied upon when possible.

A common feature in both theories of impression formation is the role of categorization. Both prominent theories of impression formation implicate the importance of categorization into group membership, outlining two qualitatively different processes: *categorization* and *individuation*. The weight that both of these influential models place on social categorization highlights the importance of investigating instances in which social category membership is ambiguous.

However, empirical research has yet to look at how racial ambiguity affects these processes. As mentioned previously, Fiske and Neuberg (1990) theorize that category-based processes are used when available. If an individual or target does not easily prompt a category, a perceiver will need to use more individuating factors, focusing their impression on specific behaviors. This theoretical model suggests that, because a category is not easily prompted, perceivers will form impressions of racially ambiguous targets based on more individuating processes. In particular, the continuum model of impression formation argues that, if a target

does not easily prompt a meaningful social category, an impression will be based on individuation, or attribute-level integration of available information. One potential implication of this is that perceivers will have heightened processing of behavioral information and make more trait inferences for ambiguous individuals. An alternative prediction is that perceivers may be unmotivated to devote the cognitive resources and effort required for individuation, resulting in lower frequency of trait inferences. We expand on this possibility below.

Processing Fluency

Research examining processing fluency provides further support for predicting lower likelihood of trait inferences for racially ambiguous, relative to unambiguous, individuals. Individuals who are ambiguous along one or more social category dimensions elicit more difficult, or disfluent, processing, and subsequently more negative evaluations relative to unambiguous individuals (e.g., Halberstadt & Winkielman, 2014; Lick, Johnson, and Rule, 2015). Researchers have attributed this effect to processing *fluency*—the ease with which an individual or object is processed—impacts evaluative judgments about individuals (see Lick & Johnson, 2015 for a review). Yet, it is not clear whether ambiguity or disfluency impact social cognitive processes in other domains, notably impression formation.

A commonly proposed mechanism of processing fluency effects is that disfluent processing requires greater metacognitive effort (Lick & Johnson, 2015). We reasoned that people would exert greater effort in processing people who appear racially ambiguous. In turn, this may result in decreased processing efficiency of behavioral information. Being unable to process behavioral information would correspond to a lower likelihood of forming STIs.

Consistent with the hypothesis that racial ambiguity will impair STI formation, work on face recognition has found that Black and White monoracial participants demonstrate a memory

deficit for racially ambiguous faces, relative to Black and White faces (Pauker, Weisbuch, Ambady, Sommers, Adams, & Ivcevic, 2009). These findings suggest that ambiguity impairs visual memory for faces. Extending this research, we anticipated that perceivers' ability to form STIs about racially ambiguous individuals may also be impaired.

Current Study

In summary, past research suggests competing hypotheses regarding perceivers' trait inference tendencies towards racially ambiguous targets. One possibility, driven by impression formation models, is that difficulty of categorization will result in *increased* formation of trait inferences. Being unable to categorize racially ambiguous targets may lead to individuation and an increased focus on attribute level information. This focus may promote heightened processing of behavioral information, and greater frequency of trait inferences. However, disfluency may result in greater perceived effort and diminished motivation to process racially ambiguous faces, resulting in *decreased* processing of behavioral information and fewer trait inferences, relative to unambiguous individuals. To examine these predictions, we investigated STI formation for Black/White racially ambiguous, compared to White and Black unambiguous, targets.

Method

Participants and Design

There was a 3 (Target group: Black, White, and racially ambiguous) $\times$ 2 (Trial type: implied traits and filler traits) within-subjects design. Participants were recruited via the University of Utah Department of Psychology participant pool and received credit toward an approved psychology course. We aimed to collect data from 100 participants.

One hundred and fifteen participants were recruited for the study. Data for 3 participants was excluded due to technical issues occurring during the sessions (e.g., software program

freezing). Thus, 112 participants made up the final sample (75 women, 36 men, and 1 non-binary identified individual; $M_{\text{age}} = 21.49$, $SD_{\text{age}} = 4.65$). Approximately 87% of the sample was U.S. born. Participants identified as White ($n = 69$), Latinx ($n = 15$), Asian ($n = 14$), Multiracial ($n = 11$), Black ($n = 2$), and Other ($n = 1$). Socioeconomic status was measured using the MacArthur Scale of subjective social status (SSS; Adler & Stewart, 2007). On a 10-rung ladder, participants on average ranked themselves between a five and six on the social hierarchy, indicating mid-level SSS (range 1 to 9, $SD = 1.47$).

Materials and Measures

Face Stimuli. Participants were shown 24 computer-generated faces, eight within each target group (8 White, 8 Black, and 8 racially ambiguous). These 24 faces were previously created using FaceGen (see Pauker et al., 2009). Prior to their use, Pauker et al. (2009) pretested the faces on distinctiveness, racial prototypicality, and attractiveness. As expected, racially ambiguous faces were rated as less prototypical than Black or White faces. Ratings of attractiveness and distinctiveness did not significantly differ across the target faces (see Pauker et al., 2009 for more details). Stimuli was evenly split across gender.

Behavior and Trait Stimuli. We used 24 behaviors, selected from a body of 40 pretested behaviors. Twelve of the 24 behaviors were trait-implying behaviors and 12 were filler behaviors that did not reliably imply traits. An initial pretest examined valence of the behaviors and which traits were implied by the behaviors. Participants ($N = 43$) were asked to rate each behavior on valence from 1 (*very negative*) to 9 (*very positive*) and to provide three attributes or traits that the behavior implies. To select behaviors that were neither extremely positive or negative, we only included behaviors ranging from 3.5 to eight. Additionally, we selected behaviors with at least 65% agreement on their implied traits for trait implying behaviors and less than 30% agreement

on implied traits for filler behaviors. Although it is possible that the filler behaviors implied specific traits for certain participants, we could conclude from the participants' freely generated responses that the behaviors did not reliably imply the traits that they were paired with in the experimental session.

A second pretest ($N = 20$) investigated how stereotypical the behaviors were of Black and White racial groups. Participants were asked to rate the extent to which people in general would consider each behavior to be stereotypical of White people and of Black people on a 9-point scale from 1 (*Highly counterstereotypic*) to 9 (*Highly stereotypic*). Ratings were counterbalanced, and participants rated all behaviors for stereotypicality of one racial group before moving onto the next racial group. We included two validity checks that previous research found to be high in stereotypicality of White individuals (*"The individual scored higher than average on the SAT"*) and Black individuals (*"The individual played basketball on their high school team"*). Participants rated these as high in stereotypicality of the respective groups. To reduce any potential effects on STI formation due to stereotype consistency (Wigboldus, Dijksterhuis, & van Knippenberg, 2003), behaviors that were low on both stereotypicality and counterstereotypicality for both target groups were selected.

Pretest results of the 24 selected behaviors are described in the Appendix. Filler and implied behaviors did not significantly differ on valence, $t(11) = 1.44, p = .18$, Cohen's $d = -.58$, mean difference = -0.68 , 95% CI $[-1.73, -0.36]$, White stereotypicality, $t(11) = .87, p = .40$, Cohen's $d = .40$, mean difference = 0.30 , 95% CI $[-0.46, 1.06]$, or Black stereotypicality, $t(11) = .55, p = .59$, Cohen's $d = .24$, mean difference = 0.21 , 95% CI $[-0.62, 1.03]$. Behaviors overall were more stereotypic of White people ($M = 6.11, SD = 0.74$) than Black people ($M = 5.03, SD = 0.86$), $t(46) = 4.67, p < .001$, Cohen's $d = 1.35$.

Procedure

Participants were told that the purpose of this study was to investigate how people perceive, remember, and learn about other individuals. Following the informed consent process, participants were seated at an individual computer station. All study instructions and procedures were presented using Empirisoft's DirectRT (Jarvis, 2012).

Participants first completed the savings-in-relearning paradigm (Carlston & Skowronski, 1994). This paradigm consists of a three-stage memory task in which participants are presented with images of hypothetical individuals and information about the individuals. Each participant completed 24 trials per stage, 72 trials in total.

In the first stage of the savings-in-relearning paradigm, participants were told to familiarize themselves with the study materials (Exposure Stage). To the extent that the participant followed these instructions and did not try to actively memorize the face-behavior pairings, any trait inference that is made was spontaneous. Participants were shown a series of face-behavior pairings on the screen, 12 trait-implicating trials and 12 filler trials (behaviors that did not reliably imply traits). For each trial, a behavior was paired below a photograph of a single individual. Face-behavior pairings were randomized across participants (24 trials total). Trials automatically advanced, and each slide was presented for seven seconds.

Next, participants were presented with face-trait pairings (Learning Stage). In this stage, participants were told to learn the face-trait pairings and that their memory would be tested later. The same faces from the Exposure Stage were again presented one at a time but each face was now shown with a single trait rather than a behavior. Immediately following the Learning Stage, all participants completed an unrelated task (a series of puzzle completion questions). This task took approximately four minutes, and was designed to eliminate any potential recency effects

between the Learning and Memory Stages.

In the final stage, participants completed a free-recall memory task (Memory Stage). Participants were shown each of the faces one at a time and instructed to type out the trait paired with it in the Learning Stage.

We used participants' memory for implied versus filler traits as our key outcome measure. If trait inferences are spontaneously formed from the behaviors presented in the Exposure Stage, we would observe better recall in the Memory Stage for traits paired with those faces in the Learning Stage (implied trials). Thus, STI formation was indicated by greater memory recall for implied traits than control traits.

Following the savings-in-relearning paradigm, participants completed a questionnaire with the 15-item need for closure scale (Roets & Van Hiel, 2011; Webster & Kruglanski, 1994), internal and external motivation to respond without prejudice scale (Plant & Devine, 1998), and demographics.

Results

Participants' responses to the Memory Stage were coded for accuracy by two research assistants who were blind to the hypotheses and trial type. Synonyms of the presented traits were considered correct responses, as they reflect inferences consistent with a trait's general meaning. For example, responses such as "fearless" instead of "brave" were coded as correct. Research assistants' coding had over 96% agreement. Discrepancies were reviewed to correct for obvious errors (e.g., counting "brave" as incorrect for "brave"). In cases of subjective disagreement, the code that best represented that response was selected. For each participant, the proportion of correctly recalled implied traits and filler traits was calculated separately for each target race.

Additionally, an unambiguous target category was created by averaging the proportion of traits recalled for both White and Black faces.

As mentioned previously, evidence of spontaneous trait inferences (STIs) would be demonstrated by more accurate memory for implied traits compared to filler traits. we first tested the primary hypothesis that racial ambiguity would influence STI formation by examining STIs formed for ambiguous targets and unambiguous targets. Then, we conducted analyses comparing STI formation patterns for Black and White targets separately. Lastly, exploratory analyses were conducted to investigate the extent to which any effects were dependent upon participant characteristics.

Spontaneous trait inference formation by target ambiguity

To test whether STIs varied according to targets' racial ambiguity, we conducted a repeated measures ANOVA comparing the proportion of recalled implied and filler traits for ambiguous and unambiguous targets. There was a marginally significant interaction between target race and trial type, $F(1,111) = 3.53$, $p = .06$, $\eta^2 = .03$. Pairwise comparisons were examined. As illustrated in Figure 1, memory for implied traits ($M = .20$, $SD = .16$) was significantly higher than memory for filler traits ($M = .15$, $SD = .13$) when presented with unambiguous faces (mean difference = .06, 95% CI [.02, .09], $p = .003$, Cohen's $d = .34$). However, for ambiguous faces, there was no significant difference in memory for implied, compared to filler traits (mean difference = .006, 95% CI [-.06, .05], $p = .83$, Cohen's $d = .03$). Therefore, there was evidence of STI formation for unambiguous faces but no evidence of STI formation for ambiguous faces. These results suggest people did not form STIs for ambiguous targets.

Figure 1. Proportion of implied and filler traits recalled for ambiguous and unambiguous targets. Error bars represent standard errors.

Spontaneous trait inference formation by target race

In order to determine whether there was justification for collapsing memory performance across Black and White targets in the above analysis, we examined STI formation within the unambiguous category—comparing Black targets and White targets. we conducted a 2 (Target: Black or White) $\times$ 2 (Trial type: implied trait or filler trait) repeated measures ANOVA.

Although overall memory was more accurate for White targets, there was evidence of STIs formed for both Black and White targets (see Figure 2). Specifically, there was a main effect of target race, $F(1, 111) = 6.78, p = .01, \eta^2 = .06$, such that the proportion of traits recalled for White faces ($M = .20, SD = .15$) was significantly higher than the proportion of traits recalled for Black faces ($M = .15, SD = .13$). There was also a main effect of trial type, $F(1, 111) = 9.02, p = .003, \eta^2 = .07$; memory for implied traits ($M = .18, SD = .13$) was significantly higher than memory for filler traits ($M = .15, SD = .11$). This indicated STIs were formed for both Black and White faces. Importantly, there was no significant interaction between target race and trial type,

$p = .91$, $\eta^2 = 0$, indicating that the pattern of STI formation was the same across Black and White faces.

Figure 2. Proportion of implied and filler traits recalled for each target group. Error bars represent standard errors.

Individual Differences

Exploratory analyses were conducted to examine the influence of individual difference variables on STI formation. First, we examined participant race. Participants' racial group backgrounds were coded as either White ($n = 69$) or non-White ($n = 32$). Multiracial participants ($n = 11$) were excluded in these analyses due to small sample size. we investigated the influence of participant race in the context of both target ambiguity (unambiguous vs. ambiguous) and target race (Black, White, ambiguous). Due to a disproportionate sample, we did not anticipate having sufficient power to detect three-way interactions. All pairwise comparisons (Bonferroni adjusted) were examined to understand patterns across the data.

The relationship between participant race, target ambiguity, and STIs were tested using a 2 (Target: ambiguous or unambiguous) $\times$ 2 (Trial type: implied trait or filler trait) $\times$ 2

(Participant race: White or non-White) mixed model ANOVA with participant race as a between-subjects factor. The three-way interaction between trial type, target ambiguity, and participant race was not significant, $p = .59$, $\eta^2 = .003$. However, pairwise comparisons suggested that non-White participants were not forming STIs for unambiguous faces to the same extent as White participants (see Figure 3). Specifically, White participants showed better accuracy for implied traits than for filler traits paired with unambiguous faces (mean difference = .08, 95% CI [.12, .03], $p = .002$, Cohen's $d = .50$). However, non-White participants did not show this improved accuracy for implied versus filler traits for unambiguous faces, though the means were in the anticipated direction (mean difference = .03, 95% CI [-.04, .09], $p = .42$, Cohen's $d = .21$).

Figure 3. Proportion of traits recalled by participant race and condition. Error bars represent standard errors.

Then, we examined the influence of participant race on the relationship between target race as a three-level factor and STI formation. This allowed for a test of whether ingroup or outgroup effects of STI formation were occurring. we conducted a 3 (Target: Black, White, or ambiguous) $\times$ 2 (Trial type: implied trait or filler trait) $\times$ 2 (Participant race: White or non-White) mixed model ANOVA with participant race as a between-subjects factor. A similar pattern emerged when comparing within target race as a three-level factor (See Figure 4). The three-way interaction between trial type, target race, and participant race was not significant, $p =$

.88, $\eta^2 = .001$. Pairwise comparisons demonstrated that White people had better accuracy for implied, compared to filler traits, for White targets (mean difference = .07, 95% CI [.004, .13], $p = .04$, Cohen's $d = 0.39$) and Black targets (mean difference = .08, 95% CI [.009, .16], $p = .03$, Cohen's $d = .35$). However, non-White people did not form STIs for White or Black targets ($p = .63$ and $p = .55$ respectively). This suggested that non-White participants formed fewer STIs overall. Furthermore, it did not provide evidence for ingroup effects, given that White participants made comparable STIs for both White and Black targets.

Figure 4. Proportion of traits recalled by participant race and condition with target race as a three-level factor. Error bars represent standard errors.

Lastly, we examined whether two additional individual difference variables moderated the effect of ambiguity on STI formation. There were no significant interactions with need for closure. There was also no significant interactions with internal or external motivation to control prejudice.

Discussion

American perceivers are particularly skilled at categorizing others into single, distinct racial categories (Willadsen-Jensen & Ito, 2006). Race is a salient category with readily available visual cues (Brewer & Lui, 1989). Thus, investigating how racially ambiguous targets are perceived is important for furthering our understanding of how racial ambiguity may impact

person perception and social interaction. Because people tend to hold mutually exclusive, biological representations of racial categories (e.g., Hirschfeld, 1996; Keller, 2005; Williams & Eberhardt, 2008), being unable to categorize a target has implications for social cognitive processing. Ambiguity along race and gender impacts social processes such as face recognition (Pauker et al., 2009) and evaluative judgments about others (Halberstadt, & Winkielman, 2014). we extended this line of work, demonstrating that racial ambiguity interfered with people's ability to form impressions. Specifically, people made spontaneous trait inferences (STIs) for unambiguous, but not ambiguous targets. Therefore, racial ambiguity impaired perceivers' ability to individuate other people. These findings serve to advance theoretical understanding of how people perceive and form impressions about individuals with dual or ambiguous category membership.

Importantly, this study supports the claim that social categorization is a necessary, initial step in impression formation. Models of impression formation have emphasized social categorization (Fiske & Neuberg, 1990). Yet, no empirical research has examined what happens in impression formation when a target is ambiguous along one or more commonly used categories. These results confirm that social categorization is indeed integral to impression formation. Furthermore, there was limited evidence for individual differences in this effect, speaking to the robustness of social categories as a guiding factor in impression formation.

These findings also provide support for the role of processing fluency in social perception. In particular, disfluent processing may induce cognitive load, and an inability to process behavioral information to make initial impressions. Although this study does not speak to these specific mechanisms, it sheds light on the impact of ambiguity on impressions, providing some support for the importance of (dis)fluency.

Some limitations of this study should be noted. First, although we found no evidence for individual differences along need for closure and motivations to control prejudice, there were different patterns for White and non-White participants in STI formation. This study did not have a sufficient sample to investigate whether this difference represented true population-level distinctions. However, a large proportion of non-White participants in the study were born outside the United States. Given noted cultural differences in STIs (e.g., STIs are more frequent and automatic for European Americans than Asian Americans; Na & Kitayama, 2011; Shimizu, Lee, & Uleman, 2017; Zarate, Uleman, & Voils, 2001), the observed differences may reflect cultural variation in STI formation. Future research could actively recruit participants of different racial and cultural backgrounds and directly compare effects of ambiguity between these groups.

A second key limitation was the use of computer-generated faces. While stimuli were selected due to available pretesting and provided control in manipulating ambiguity, it is not clear whether these findings would extend to real life individuals. In particular, this stimuli set was designed to have racially ambiguous targets; it is possible that this level of ambiguity does not generalize to perceptions of real faces. Notably, these faces also may not generalize to all multiracial people, who are heterogenous in appearance. Thus, while these results provide evidence for the role of racial categorization (or lack of it) in impression formation processes, additional studies need to examine the generalizability of these claims.

Similarly, caution exists regarding the generalizability of this effect to other people in the United States. While no restrictions were made on the sample, we used a predominately White, U.S. born, student population. As mentioned previously, STIs vary along cultural contexts. Furthermore, participant exposure to multiracial populations and racially ambiguous individuals is comparatively low in the recruitment location (12%) relative to other regions (Pew, 2017).

This may limit participants' familiarity with, and use of, biracial categories (e.g., see Pauker, Carpinella, Lick, Sanchez, & Johnson, 2018). It is possible that individuals with more exposure to racial ambiguity would not demonstrate these effects. Future studies could manipulate exposure to ambiguity, and examine longitudinal changes in impression formation processes for racially ambiguous others.

Despite these limitations, these results have a number of potential practical implications for the experiences that multiracial individuals may have as a result of monoracial perceivers' decreased individuation of them. Impressions form the basis for prediction of future behavior and determine how we judge others in subsequent interactions (e.g., Carlston, 1980; Crawford, McCarthy, Kjærstad, & Skowronski, 2013). Impressions also acquire stability relatively early; how we interpret a given trait depends upon how it fits within our present summary judgment and earlier information (Asch, 1946). Thus, initial impressions of an individual can have profound impacts on future judgments we make about that person (Heider, 1958; McCarthy & Skowronski, 2011). Notably, if people are unable to form impressions due to multiracials' ambiguity, they will be unlikely to synthesize information about that individual. Lower frequency of STIs may elicit uncertainty in predicting future behavior, thus directly impact people's tendency to engage in future interactions with multiracial people.

Another practical implication of this work lies in what cues people will rely on to form impressions. Difficulty in impression formation due to racial ambiguity may lead individuals to look towards other information or other social categories. In other words, people may try to seek out more information and categorize others along different dimensions. This can have interpersonal consequences, including questioning others' identities or an overreliance on other visually apparent identities. For example, if a person is unable to racially categorize another

individual, they may look to gender cues, and rely on gender categorization to inform their impression. Although we did not find evidence of reliance on other categories within this study, future work could manipulate the saliency of various social categories. If gender is made salient (e.g., gendered social behaviors are presented), researchers may not find evidence for racial ambiguity effects, and vice versa. However, given the importance of race and gender in American society, it is not clear how ambiguity along other categories (e.g., sexual orientation) may influence impression formation processes.

This work provides additional avenues for interesting future research. Importantly, this study did not examine the downstream consequences of a lack of STI formation. Past research has demonstrated that STIs about people and groups extend to judgments of those people and subsequent behavior (Carlston, 1980). However, it is not clear what happens if no trait inferences are formed. Future work could determine potential downstream consequences of these findings for everyday social interaction and judgment. For example, a study could examine subsequent trait ratings after a STI paradigm (e.g., “How *brave* is this person?”). Perceivers may not have extreme judgments on trait ratings regarding ambiguous targets. Thus, people may be less likely to hold a strongly positive, or negative, view of someone who is racially ambiguous. This may in turn have differing implications for social liking and interpersonal relationships.

Another key future line of research lies in clarifying mechanisms for the observed effects in this study. Lick and Johnson (2015) hypothesize that disfluency effects operate through metacognitive difficulty arising from an inability to categorize. It is possible that ambiguity and cognitive load influence STIs in similar ways. Individuation is cognitively taxing (Fiske et al., 1987). If an individual has already exerted resources when processing a face and is unable to categorize that face, they may be unlikely to form impressions using a further cognitively taxing

method. This could be examined by placing participants in a cognitive load condition or a control condition during an STI paradigm (see Chen, Banerji, Moons, & Sherman, 2014 for a similar procedure). If cognitive load is driving these effects, it can be expected that those in the cognitive load condition would show weaker ambiguity effects than those in the no load condition (e.g., more similar patterns across ambiguous and unambiguous faces). Alternatively, future studies could examine whether distraction plays a role in formation of STIs for racially ambiguous faces. Additionally, future studies can examine if disambiguating an ambiguous target is sufficient to elicit STI formation. Ostensibly, disambiguating characteristics can reduce cognitive load, allowing for individuation, or providing a category on which to base an impression. Future studies could examine the influence of disambiguating characteristics, and to what extent they influence whether people use category-based or individuating processes.

In conclusion, social categorization is an important element for impression formation, particularly for STIs. This study demonstrated that peoples' ability to form STIs is impacted by racial ambiguity. These findings contribute to theoretical models of impressions and person perception by identifying how these models work in the context of ambiguous group membership. Overall, results contribute to an understanding of how others perceive and make judgments about the growing population of Americans who are racially ambiguous, many of whom do not identify with existing monoracial groups.

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Appendix

Table A1

Pretesting Results for Filler Stimuli

Behavior	Paired Trait (% agreement)	Valence of behavior (SD)	Average White Stereotypicality of behavior (SD)	Average Black Stereotypicality of behavior (SD)
This person decided not to camp because of the threat of bears.	loyal (0%)	5.20 (1.86)	5.35 (2.16)	5.05 (2.21)
This person went to the movies.	kind (2.32%)	6.42 (1.2)	6.30 (1.66)	5.60 (1.14)
This person started a petition to get their boss fired.	generous (0%)	4.59 (1.56)	6.50 (1.93)	4.70 (2.05)
This person argued with the professor's answer to an exam question.	cautious (2.32%)	5.10 (1.58)	6.90 (1.55)	4.85 (1.90)
This person went out for dinner at a local restaurant.	motivated (0%)	6.31 (1.07)	6.20 (1.64)	5.75 (1.33)
This person never started meetings earlier than 11am.	curious (0%)	5.05 (1.54)	4.95 (1.67)	5.60 (1.31)
This person walked down the sidewalk in a city square.	stubborn (0%)	5.74 (1.06)	5.80 (1.79)	6.00 (1.34)
This person went to a high school reunion.	innovative (0%)	5.58 (1.48)	7.35 (1.42)	4.45 (1.39)
This person went to Las Vegas.	respectful (0%)	5.95 (1.77)	7.00 (1.52)	5.60 (1.85)
This person kept pressuring a friend to talk about his new girlfriend.	lazy (0%)	3.952 (1.51)	6.10 (1.41)	5.75 (1.41)
This person attended a classical concert.	honest (0%)	6.578 (1.39)	7.25 (1.68)	2.60 (1.35)
This person stuck in the old routine rather than try new innovations proposed.	anxious (20.93%)	4.143 (1.41)	5.45 (2.16)	5.65 (1.69)

Table A2

Pretesting Results for Implied Stimuli

Behavior	Paired Trait (% agreement)	Valence of behavior (<i>SD</i>)	Average White Stereotypicality of behavior (<i>SD</i>)	Average Black Stereotypicality of behavior (<i>SD</i>)
This person worked on research funded by the National Science Foundation.	intelligent (81.39%)	7.50 (0.98)	6.40 (1.27)	4.15 (1.23)
This person went to the gym to exercise.	healthy (86.05%)	7.41 (1.01)	6.20 (1.67)	6.50 (1.47)
This person cleaned up the picnic area before leaving.	considerate (67.44%)	7.50 (1.06)	5.40 (1.57)	4.35 (1.39)
This person presented artwork at a local gallery.	creative (67.44%)	7.03 (1.42)	6.15 (1.63)	4.05 (1.36)
This person made an order at a restaurant and changed it at the last second.	indecisive (81.39%)	4.36 (0.96)	6.40 (1.54)	4.25 (1.41)
This person kept a to-do list for each day.	organized (86.05%)	7.00 (1.33)	6.45 (1.79)	4.30 (1.42)
This person held potlucks instead of restaurant dinners.	sociable (79.07%)	6.39 (1.20)	5.60 (2.11)	5.60 (1.76)
This person made a prank phone call.	immature (65.12%)	3.90 (1.55)	6.85 (1.63)	5.90 (1.41)
This person stayed late at work to finish the project early.	dedicated (83.72%)	7.35 (0.88)	5.75 (1.25)	4.35 (1.57)
This person didn't remember to add a title page to the big class project.	forgetful (67.44%)	4.19 (1.42)	4.75 (1.62)	5.35 (1.50)
This person opted out of a skydiving expedition.	fearful (81.39%)	4.93 (1.42)	4.80 (1.54)	5.45 (1.47)
This person explored a boarded up old house that everyone said was haunted.	brave (69.77%)	5.26 (1.52)	6.80 (1.82)	4.85 (2.21)