Journal of Experimental Social Psychology 49 (2013) 419–425

Contents lists available at SciVerse ScienceDirect

Journal of Experimental Social Psychology

journal homepage: www.elsevier.com/locate/jesp

Reports

Fluency of visual processing explains prejudiced evaluations following categorization of concealable identities

David J. Lick [a,*], Kerri L. Johnson [b,1]

[a] Department of Psychology, University of California, Los Angeles, USA
[b] Departments of Communication Studies and Psychology, University of California, Los Angeles, USA

ARTICLE INFO

Article history:
Received 25 July 2012
Revised 30 December 2012
Available online 16 January 2013

Keywords:
Prejudice
Categorization
Fluency
Social cognition
Social perception

ABSTRACT

Prejudice arises from the categorizations people make upon perceiving others. To date, however, there has been little progress toward understanding how metacognitive processes underlying categorization contribute to prejudice. In two studies, we tested whether processing fluency – the speed with which targets are categorized – explains prejudiced evaluations related to concealable (sexual orientation) and overt (race) social identities. In Study 1, targets categorized as lesbian/gay were evaluated more negatively than targets categorized as straight, and evaluative differences were explained by the fluency with which targets were processed. In Study 2, we replicated our initial findings about the mediating role of processing fluency in evaluations related to sexual orientation categorizations, but found no evidence that fluency explains evaluations related to race categorizations. These findings provide a framework for understanding the perceptual underpinnings of interpersonal prejudice.

Introduction

Interpersonal prejudice is among the most enduring problems addressed by social psychology (Dovidio & Gaertner, 2010; Dovidio, Glick, & Rudman, 2005). In fact, one recent meta-analysis indicated that biased attitudes and behaviors toward some groups may be worsening over time, despite psychologists' best efforts to combat them (Katz-Wise & Hyde, 2012). Such biases are important because prejudice carries serious implications for its targets, including mental and physical health disparities (Clark, Anderson, Clark, & Williams, 1999; Meyer, 2003; Pascoe & Richman, 2009), monetary disadvantage (Bonilla-Silva, 1997; Krieger, 2012), and life-threatening violence (Katz-Wise & Hyde, 2012; Parrott, 2009). Therefore, continued research efforts are necessary to understand the deep roots of interpersonal prejudice and to pinpoint new modes of intervention aimed at reducing its deleterious consequences.

One reason that prejudice persists is its foundation in basic cognitive processes that guide human perception (Dovidio & Gaertner, 2010). Indeed, researchers have consistently demonstrated that perceivers unconsciously and automatically categorize others' social identities from mere glimpses of a face (Freeman, Johnson, Ambady, & Rule, 2010; Hugenberg & Bodenhausen, 2004; Maclin & Malpass, 2001; Rule & Ambady, 2008) or a body (Johnson, Gill, Reichman, & Tassinary, 2007; Lick, Johnson, & Gill, in press; Miller, Maner, & Becker, 2010). This categorization process is adaptive insofar as it aids human perception, but it also leads to biased judgments of people belonging to certain groups (Dovidio & Gaertner, 2010). For example, targets perceived to be Black are often judged to be poor and threatening due to stereotypes associated with their racial category (Hurwitz & Peffley, 1997). Similarly, targets perceived to be lesbian/gay are evaluated negatively across a wide range of social domains (Lehavot & Lambert, 2007; Talley & Battencourt, 2008). Whereas the inevitability of social categorization and its links to prejudiced evaluations are well-established, the metacognitive processes responsible for these links remain unclear.

Cognitive fluency – the ease with which stimuli are processed (Winkielman, Halberstadt, Fazendeiro, & Catty, 2006) – is one mechanism that may link social categorization and prejudice. Previous research has demonstrated that prototypical stimuli are processed more fluently than unique stimuli (Posner & Keele, 1968), and that fluent processing enhances perceivers' liking for stimuli (Laham, Alter, & Goodwin, 2009; Winkielman, Halberstadt, Fazendeiro, & Catty, 2006). In particular, stimuli that are processed fluently appear to arouse positive affect, leading to favorable evaluations downstream (Winkielman & Cacioppo, 2001; Winkielman, Schwarz, & Nowak, 2002). While compelling, evidence of fluency's role in evaluation comes primarily from studies of inanimate objects and geometric patterns. We propose that similar processes underlie social evaluations related to categorizations of people. Insofar as stigmatized targets appear unique due to their infrequent representation in social life and popular media (Williams,

* Corresponding author at: 1285 Franz Hall, Box 951563, Los Angeles, CA 90095-1563, USA. Fax: +1 310 206 2371.
E-mail addresses: david.lick@ucla.edu (D.J. Lick), Kerri.Johnson@ucla.edu (K.L. Johnson).
[1] Mailing address: 2330 Rolfe Hall, Los Angeles, CA 90095, USA.

0022-1031/$ – see front matter © 2013 Elsevier Inc. All rights reserved.
http://dx.doi.org/10.1016/j.jesp.2013.01.001

2000; Young, Hugenberg, Bernstein, & Sacco, 2012), they may be categorized disfluently and therefore evaluated negatively.

Two recent studies provide preliminary evidence for our claim that fluency functions in an interpersonal domain. In one series of studies (Rubin, Paolini, & Crisp, 2010), participants imagined the experiences of targets who either migrated or did not migrate from one group to another before evaluating how much they liked the target and how difficult it was to imagine their experiences. Participants disliked migrant targets more than non-migrant targets, and the difficulty they encountered while imagining targets' experiences helped to explain this difference. While this study suggests potential links between processing fluency and interpersonal prejudice, it relied on a minimal groups paradigm rather than on evaluations of people belonging to real social groups. Furthermore, it assessed the fluency with which perceivers *imagined* migrant experiences. While the findings are relevant for understanding perspective-taking, they do not address how perceptual fluency in the early stages of real social categorizations impacts evaluations.

Another recent study revealed that linguistic accents made the speech of non-native language speakers more difficult to process than the speech of native speakers, and that such processing deficits compromised the perceived credibility of non-native speakers (Lev-Ari & Keysar, 2010). While these findings clearly linked processing fluency to biased social judgments, they examined a single evaluative judgment (i.e., credibility) and pertained exclusively to aural cues. However, the burgeoning literature on social sensory perception highlights the critical importance of *visual* cues in the early stages of impression formation (Adams, Ambady, Nakayama, & Shimojo, 2011; Balcetis & Lassiter, 2010; Freeman & Ambady, 2011; Freeman, Johnson, Adams, & Ambady, 2012). In fact, recent evidence suggests that visual cues may be prioritized over other sensory modalities in social judgments, as perceivers can make decisions based upon visual information from a physical distance that precludes other forms of perception, including speech perception (e.g., Johnson, Iida, & Tassinary, 2012). It remains possible that perceptual fluency affects a broad range of social evaluations that originate in visual perception, but extant data do not speak to this point.

Thus, while recent studies have provided suggestive evidence that fluency relates to social evaluations in specific circumstances, its functional role for understanding social evaluations more broadly remains speculative. In particular, it is unclear whether and how fluency of visual processing affects a broad range of social evaluations that arise in the early stages of person perception. This is especially salient given the centrality of visual processes to biased social interactions (Nakayama, 2011). Furthermore, while recent studies have explored the fluency of imagined experiences and speech recognition, existing data do not speak to social categorization, which is a critical precursor of stereotyping and prejudice (Allport, 1954; Ashmore & Del Boca, 1981; Brewer, 1988; Dovidio et al., 2005; Fiske, 2010; Johnson & Tassinary, 2007; Taylor, Fiske, Etcoff, & Ruderman, 1978; Wilder, 1981; Zarate & Smith, 1990). New studies linking the fluency of categorization to prejudiced evaluations of real targets would supplement classic work in social cognition while enhancing our knowledge of perceptual fluency's role in social vision.

An important consideration when investigating the role of fluency in person perception is that social categories are not equally discernable from visual cues. Some identities (e.g., sex, race) are quite overt — they are efficiently appraised within milliseconds of visual exposure (Ito & Cacioppo, 2000; Ito, Thompson, & Cacioppo, 2004). In such cases, there is little ambiguity about a target's category membership, and the cognitive effort required for categorization is minimal. In fact, targets with overtly stigmatized identities (e.g., Black individuals) may be categorized even more fluently than those with majority identities (e.g., White individuals; Richeson & Trawalter, 2005; Stroessner, 1996). Thus, despite the fact that Black individuals face high rates of prejudice, they are categorized so efficiently that fluency may play little or no role in such biases.

In other cases, stigmatized group memberships are visually ambiguous, making categorization difficult. For example, while recent studies have found that perceivers are able to categorize sexual orientation with above chance accuracy from mere glimpses at another person (Freeman, Johnson, Ambady, & Rule, 2010; Johnson, Gill, Reichman, & Tassinary, 2007; Lick et al., in press; Rule & Ambady, 2008), these categorizations are far from perfect. In fact, accuracy levels rarely exceed 60%. One reason for the relatively low efficiency of sexual orientation categorizations is that, unlike judgments of race for which visual cues such as skin tone are perceptually obvious, judgments of sexual orientation rely on less direct inferences. For example, perceivers use gender typicality heuristics to determine sexual orientation: They first judge a person's sex (male/female) and gender (masculine/feminine), and then integrate these basic perceptions to inform sexual orientation categorizations, such that gender-atypical targets tend to be categorized as gay whereas gender-typical targets tend to be categorized as straight (Freeman et al., 2010; Johnson et al., 2007; Lick et al., in press; see also Kite & Deaux, 1987). Because categorizations of ambiguous social identities require not only the perception but also the integration of multiple pieces of information (e.g., sex, gender, typicality heuristics), interpersonal decisions may take longer and fluency may impact ultimate evaluations of the target.

In summary, recent research has suggested that fluency may help to explain biased evaluations of other people. However, studies have not yet linked fluency of visual processing to social categorization and prejudice, nor have they compared the impact of fluency on evaluations stemming from categorizations of overt and ambiguous social identities. The current research addresses both of these questions. We predicted that fluency would explain biased evaluations related to categorizations of more ambiguous identities (e.g., sexual orientation), but not of more overt identities (e.g., race). By testing these hypotheses, we aimed to highlight a metacognitive process linking categorization to prejudice in the early stages of person perception.

Study 1

Gay men and lesbians are among the most common targets of interpersonal prejudice today (U.S. Department of Justice, 2011). Furthermore, anti-gay bias arises early in person perception on the basis of social categorization, such that targets categorized as gay are evaluated more harshly than those categorized as straight (Lehavot & Lambert, 2007; Talley & Battencourt, 2008). In Study 1, we tested whether processing fluency helps to explain such harsh evaluations of individuals categorized as gay. We predicted that: (a) targets categorized as gay would be evaluated more negatively than targets categorized as straight; (b) targets categorized as gay would be processed less fluently than targets categorized as straight; and (c) fluency of visual processing would help to explain such prejudiced evaluations related to sexual orientation categorizations.

Material and methods

Participants

Thirty-seven heterosexual undergraduates (29 women, 8 men) participated in exchange for course credit.

Stimuli

Stimuli included 48 faces of real people that varied by sex, sexual orientation, and gender typicality (24 men — 6 gay gender-typical, 6 gay gender-atypical, 6 straight gender-typical, and 6 straight gender-atypical; 24 women — 6 lesbian gender-typical, 6 lesbian gender-atypical, 6 straight gender-typical, and 6 straight gender-atypical). These faces are a subsample of stimuli from Freeman et al. (2010), in which 10 coders rated the gender typicality of 158 faces (*1 = gender typical* to *7 = gender atypical*). Based on the mean gender typicality score for each face, we chose the 6 most gender-typical and the 6 most gender-atypical faces for each sex and sexual orientation category,

yielding the 48 stimuli described above. The images were standardized for size, and all faces were White and devoid of facial piercings.

Procedure

After providing informed consent, participants completed the study on Macintosh computers running customized stimulus presentation software. Participants viewed each face three times, providing a unique set of judgments in each block. Stimuli were presented randomly within each block.

First, the participants evaluated each face on the following 7-point semantic differentials: appropriate/inappropriate (reverse-scored), improper/proper, respectable/indecent (reverse-scored), unacceptable/acceptable, in poor taste/in good taste, sincere/insincere (reverse-scored), honest/dishonest (reverse-scored), intelligent/unintelligent (reverse-scored), not dependable/dependable (reverse-scored), warm/cold (reverse-scored), and competent/incompetent (reverse-scored). Next, they judged each target's gender (*1 = masculine* to *7 = feminine*). Finally, the participants categorized each target's sexual orientation using keys labeled *lesbian/gay* and *straight*. Afterward, the participants indicated their own sex and sexual orientation before being debriefed.

Analytic plan

We computed within-subject reliability across the evaluative items using the methods described by Cranford et al. (2006). The items showed high within-subject reliability (0.91), so we collapsed them into a composite score on which higher values indicated more positive evaluations (hereafter, *Evaluations*). We operationalized fluency as the composite speed (ms) with which the participants processed each target's gender and sexual orientation, with higher scores indicating disfluent processing (hereafter, *Fluency*; $M = 4642.74$, $SD = 1636.64$). We included gender judgments in this composite because previous studies have demonstrated that gendered appearance is a critical determinant of sexual orientation categorizations (Freeman et al., 2010; Johnson et al., 2007; Lick et al., in press).

We explored whether perceived sexual orientation and processing fluency were associated with evaluative judgments using generalized estimating equations, which are multilevel regression models that allow for accurate prediction of both dichotomous and continuous variables while accounting for within-subject dependencies in data (Zeger & Liang, 1986). Then, to directly test our hypothesis that variance in processing fluency helps to explain differences in evaluations of targets categorized as gay and straight, we explored fluency as a mediator. Our tests for mediation employed the multilevel approach recommended by Bauer, Preacher, and Gil (2006), which provided unbiased estimates of indirect and total effects using Monte Carlo simulations with 10,000 draws. When used as predictors, Fluency and Evaluations were centered at their means, and Perceived Sexual Orientation was effect-coded (*straight = −0.5, lesbian/gay = 0.5*). Response latencies more than 3 standard deviations from the mean were excluded as outliers.[2]

Results and discussion

We began with a preliminary examination of the effects of processing fluency and sexual orientation categorization on evaluations. First, we regressed Evaluations onto Perceived Sexual Orientation, which revealed less favorable evaluations for targets categorized as gay relative to targets categorized as straight, $B = -5.4975$, $SE = 0.6613$, $z = -8.31$, $p < 0.0001$. Next, we regressed Evaluations onto Fluency, which indicated more favorable evaluations for targets that were processed fluently relative to disfluently, $B = -0.0009$, $SE = 0.0003$, $z = -3.30$, $p = 0.0010$. To further probe these effects, we regressed Evaluations onto Perceived Sexual Orientation, Fluency, and their interaction. A significant two-way interaction emerged, $B = 0.0011$, $SE = 0.0003$, $z = 3.14$, $p = 0.0017$ (Fig. 1). Among targets categorized as gay, fluency was not significantly associated with evaluations, $B = 0.0002$, $SE = 0.0002$, $z = 0.67$, $p = 0.5021$. Among targets categorized as straight, however, targets who took longer to process were evaluated more harshly, $B = -0.0009$, $SE = 0.0003$, $z = -2.98$, $p = 0.0029$.

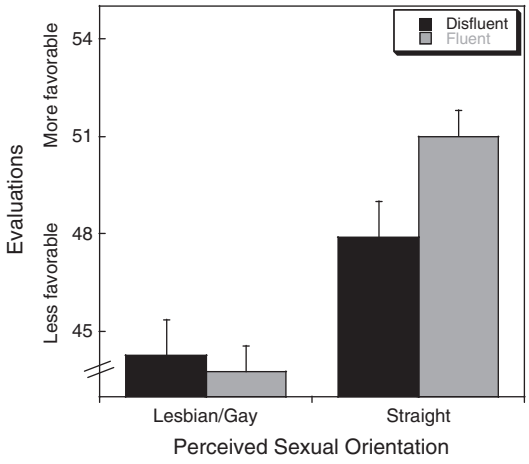

Fig. 1. Interaction between Fluency and Perceived Sexual Orientation in Study 1. Error bars depict standard errors for the effect of fluency.

Our initial findings revealed that fluency had a particularly strong effect on evaluations of targets who were disfluently categorized as straight, yet they did not answer our central question — namely, whether fluency accounted for the baseline differences in evaluations received by targets categorized as gay vs. straight. An analysis of Fluency as a function of Perceived Sexual Orientation suggested that this may be the case, as targets categorized as gay were processed less fluently than were targets categorized as straight ($Ms = 4601.1502$ and 5226.0681, respectively), $B = 588.2485$, $SE = 104.3043$, $z = 5.64$, $p < 0.0001$. Consequently, we conducted a more direct test of our prediction that differences in evaluations for gay and straight targets emerge as a function of fluency using a mediation model.

To test our central prediction of mediation, we began with the causal steps approach outlined by Baron and Kenny (1986). We first regressed Evaluations onto Perceived Sexual Orientation. As noted above, targets categorized as lesbian/gay were evaluated more negatively than were targets categorized as straight, $B = -5.4975$, $SE = 0.6613$, $z = -8.31$, $p < 0.0001$ (c path; Fig. 2). Next, we regressed Fluency onto Perceived Sexual Orientation. Targets categorized as gay were processed less fluently than were targets categorized as straight, $B = 588.2485$, $SE = 104.3043$, $z = 5.64$, $p < 0.0001$ (a path). Finally, we regressed Evaluations onto Fluency, finding that targets who were processed less fluently received more negative evaluations than did targets who were processed more fluently, $B = -0.0009$, $SE = 0.0003$, $z = -3.30$, $p = 0.0010$ (b path). When controlling for the effect of Fluency, the path from Perceived Sexual Orientation to Evaluative Judgments was reduced in magnitude, $B = -5.1592$, $SE = 0.5951$, $z = -8.67$, $p < 0.0001$ (c′ path). In fact, Monte Carlo simulations indicated a statistically significant indirect effect of Fluency ($p = 0.0324$, 95% CI: −1.2872, −0.0992), indicating that prejudiced evaluations of targets categorized as gay occurred in part because of differences in processing fluency.

These findings supported our hypothesis that processing fluency helps to explain biases related to social categorization. In particular, targets categorized as gay were evaluated more harshly than were targets categorized as straight across several social domains. The speed with which perceivers processed targets helped to explain this association between perceived sexual orientation and evaluation. While targets categorized as gay were generally processed less fluently and evaluated more harshly than targets categorized as straight, fluency also impacted evaluations of targets categorized as straight. In fact, the negative effects

[2] The pattern and significance of results remained the same when including outliers.

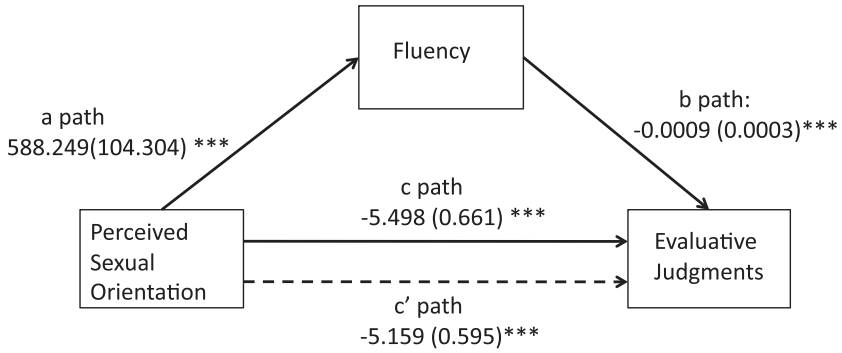

Fig. 2. Mediation model for Study 1, demonstrating a significant indirect effect of Fluency on the association between Perceived Sexual Orientation and Evaluations.

of disfluent processing were pronounced for targets who were ultimately categorized as straight. This pattern may reflect the tacit assumption that a person is straight until proven otherwise (Hyde & Jaffee, 2000; Rich, 1980). In our study, if a target who was ultimately categorized as straight was processed disfluently, then perceivers likely had some hesitations about their sexual orientation. Such hesitations may have broken perceivers' expectations about heterosexuality, leading to feelings of uncertainty that ultimately spawned harsh evaluations. Collectively, these results provide the first empirical demonstration that processing fluency explains evaluative biases related to social categorization.

Study 2

In Study 1, we found that fluency of visual processing helps to explain prejudiced evaluations related to perceptions of a target's sexual orientation. However, our findings were limited in several respects. For instance, we did not counterbalance the order of judgments, so it is possible that initial evaluations affected subsequent categorizations. Furthermore, we only examined links between fluency and evaluations in the context of a relatively ambiguous social identity (e.g., sexual orientation). It remains possible that fluency functions differently for evaluations related to more overt identities (e.g., race). Study 2 was designed to address these issues.

Material and methods

Participants

Fifty-three heterosexual undergraduates (41 women, 12 men) participated in exchange for course credit. The majority of the participants were identified as Asian (53%), though sizable proportions were identified as White (23%), biracial (17%), or Latino (6%). Only one participant was identified as Black.

Stimuli

Stimuli included a random subsample of 80 faces from Johnson and Ghavami (2011), which depicted real people that varied by sex, sexual orientation, and race (24 men — 6 Black gay, 6 Black straight, 6 White gay, and 6 White straight; 24 women — 6 Black lesbian, 6 Black straight, 6 White lesbian, and 6 White straight). The images were standardized for size and all faces were devoid of facial piercings.

Procedure

After providing informed consent, the participants completed the study on Macintosh computers running customized stimulus presentation software. They viewed each face five times, providing a unique set of judgments in each block. Stimuli were presented randomly within each block, and block order was fully counterbalanced across participants.

Three of the blocks were similar to Study 1, in which the participants evaluated each target across 11 9-point semantic differentials (appropriateness, propriety, respectability, acceptability, taste, sincerity, honesty, intelligence, dependability, warmth, and competence) and with regard to their gender (*1 = masculine* to *9 = feminine*) and sexual orientation (*lesbian/gay* or *straight*). Two new blocks involved perceptions of race. In one of these blocks, the participants categorized each target's race using keys labeled *Black* and *White*. In the other new block, participants rated how typical the target appeared for their racial group (*1 = race-typical* to *9 = race-atypical*). After completing all trials, the participants indicated their own sex, race, and sexual orientation before being debriefed.

Analytic plan

As in Study 1, the evaluative items showed high within-subject reliability (0.92), so we collapsed them into a composite score on which higher values indicated more positive evaluations (hereafter, *Evaluations*). We created two fluency variables — one assessing the composite speed (ms) with which participants judged each target's gender and sexual orientation (hereafter, *Sexual Orientation Fluency; M* = 4095.45, *SD* = 1487.82), and one assessing the composite speed (ms) with which participants judged each target's race and race-typicality (hereafter, *Race Fluency*; *M* = 3679.74, *SD* = 1393.45).

We tested our hypotheses about the effect of fluency on evaluations separately for race and sexual orientation, following the same analytic plan as in Study 1. When used as predictors, Sexual Orientation Fluency, Race Fluency, and Evaluations were centered at their means, and Perceived Sexual Orientation and Perceived Race were effect-coded (*straight = −0.5*, *lesbian/gay = 0.5*; *White = −0.5*, *Black = 0.5*). Response latencies more than 3 standard deviations from the mean were excluded as outliers.[3]

Results and discussion

Sexual orientation

Our first aim was to replicate findings from Study 1. We began by regressing Evaluations onto Perceived Sexual Orientation, which corroborated the finding that targets categorized as gay were evaluated less favorably than were targets categorized as straight, $B = -6.0257$, $SE = 1.3504$, $z = -4.46$, $p < 0.0001$. We also regressed Evaluations onto Sexual Orientation Fluency, which revealed that targets processed fluently were evaluated more favorably than were targets processed disfluently, $B = -0.0009$, $SE = 0.0002$, $z = -4.38$, $p < 0.0001$. Upon regressing Evaluations onto Perceived Sexual Orientation, Sexual Orientation Fluency, and their interaction, a significant two-way interaction emerged, $B = 0.0015$, $SE = 0.0007$, $z = 2.25$, $p = 0.0245$ (Fig. 3a). Consistent with findings from Study 1, fluency was not significantly associated with evaluations among targets categorized as gay, $B = 0.0006$, $SE = 0.0006$, $z = 1.05$, $p = 0.2938$, but among categorized

[3] The pattern and significance of results remained the same when including outliers.

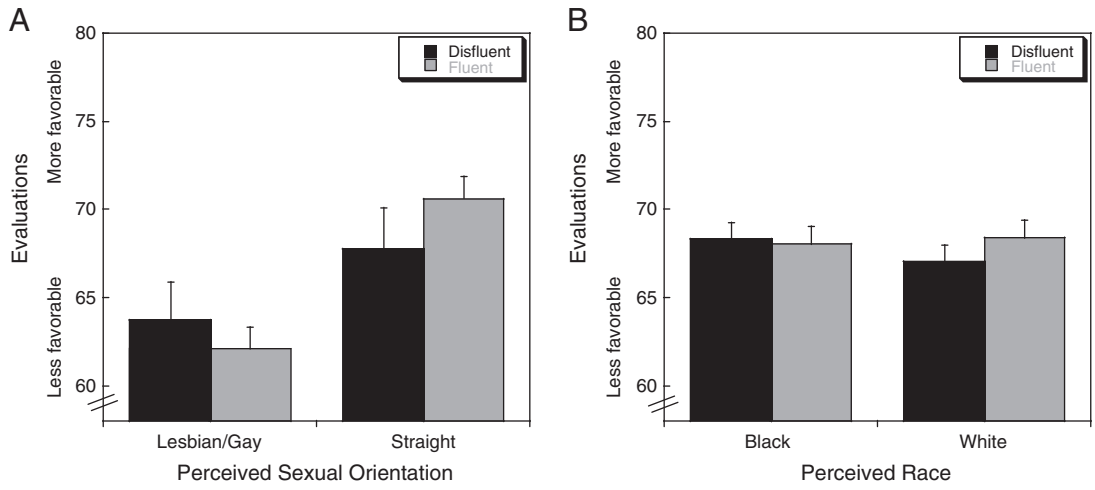

Fig. 3. Interaction between Fluency and Perceived Sexual Orientation (A) and Fluency and Perceived Race (B) in Study 2. Error bars depict standard errors for the effect of fluency.

as straight, those who took longer to process were evaluated more harshly, $B = -0.0009$, $SE = 0.0002$, $z = -4.28$, $p < 0.0001$.

While these analyses suggest links between sexual orientation categorizations, fluency, and evaluations, they do not address our central question about whether fluency accounts for differences in evaluations of targets categorized as gay and straight. Once again, an analysis of Fluency as a function of Perceived Sexual Orientation suggested that this may be the case, as targets categorized as gay were processed less fluently than targets categorized as straight ($Ms = 4071.7341$ and 4780.3751, respectively), $B = 577.4826$, $SE = 67.8656$, $z = 8.51$, $p < 0.0001$. To test for mediation, we first regressed Evaluations onto Perceived Sexual Orientation. As expected, targets categorized as gay were evaluated more negatively than targets categorized as straight, $B = -6.0257$, $SE = 1.3504$, $z = -4.46$, $p < 0.0001$ (c path; Fig. 4a). Next, we regressed Sexual Orientation Fluency onto Perceived Sexual Orientation, revealing that targets categorized as lesbian/gay were processed less fluently than targets categorized as straight, $B = 577.4826$, $SE = 67.8656$, $z = 8.51$, $p < 0.0001$ (a path). Finally, we regressed Evaluations onto Sexual Orientation Fluency, finding that targets processed less fluently received harsher evaluations than targets processed more fluently, $B = -0.0009$, $SE = 0.0002$, $z = -4.38$, $p < 0.0001$ (b path). When controlling for the effect of Fluency, the path from Perceived Sexual Orientation to Evaluative Judgments was reduced in magnitude, $B = -5.7199$, $SE = 1.3445$, $z = -4.25$, $p < 0.0001$ (c′ path). Results of Monte Carlo simulations indicated a statistically significant indirect effect of Sexual Orientation Fluency ($p = 0.0184$, 95% CI: -0.6977, -0.0768), suggesting that prejudiced evaluations related to sexual orientation categorizations occurred in part because of differences in processing fluency.

These findings replicated those from Study 1, but with several improvements. Here, we collected a larger sample, utilized a different stimulus set, and employed a fully counterbalanced design. As such,

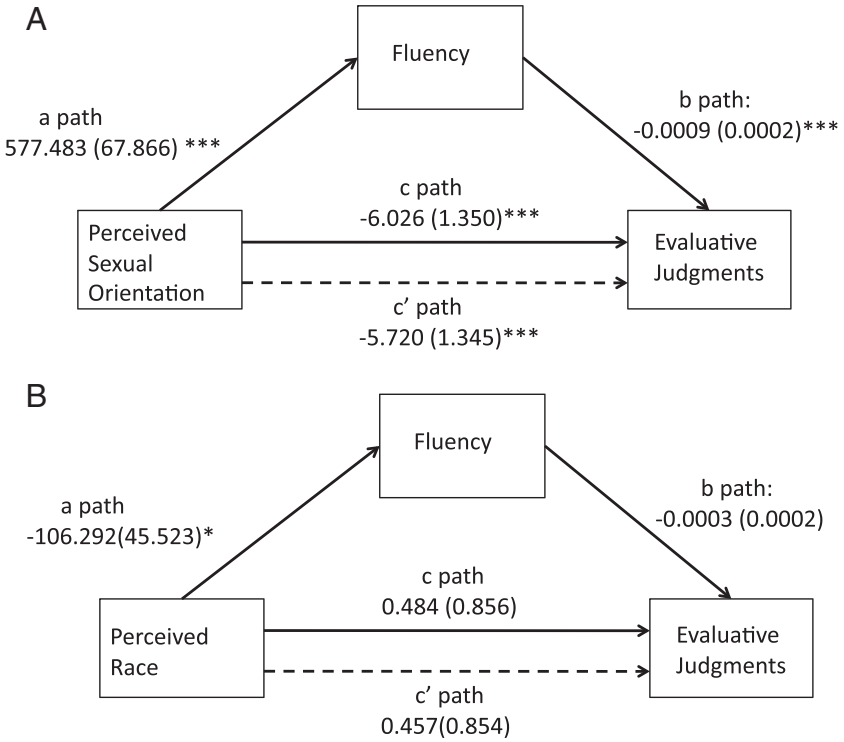

Fig. 4. Mediation models for Study 2, demonstrating a significant indirect effect of Fluency on the association between Perceived Sexual Orientation and Evaluations (2a), but a non-significant indirect effect of Fluency on the association between Perceived Race and Evaluations (2b).

these findings corroborate our hypothesis that fluency affects evaluations related to targets' perceived sexual orientations. They also provide confidence in our finding that disfluent processing is damaging even for targets that are ultimately categorized as straight. We next sought to test whether similar processes underlie evaluations related to a more overt social category — race.

Race

Mirroring our analyses of sexual orientation, we began by exploring general associations between race, fluency, and evaluations. First, we regressed Evaluations onto Perceived Race. As might be expected based upon theories of aversive racism (Dovidio & Gaertner, 2004), these explicit evaluations did not vary as a function of race categorizations, $B = 0.4835$, $SE = 0.8563$, $z = 0.56$, $p = 0.5723$. We also regressed Race Fluency onto Perceived Race, which revealed that participants took less time to categorize Black targets relative to White targets, $B = -106.2920$, $SE = 45.5228$, $z = -2.33$, $p = 0.0195$. Finally, we regressed Evaluations onto Perceived Race, Race Fluency, and their interaction, which revealed a marginally significant two-way interaction, $B = 0.0006$, $SE = 0.0003$, $z = 1.95$, $p = 0.0509$ (Fig. 3b). Consistent with our earlier findings, fluency was not significantly associated with evaluations among targets categorized as Black, $B = 0.0001$, $SE = 0.0003$, $z = 0.19$, $p = 0.8457$, but among targets categorized as White, those processed disfluently were evaluated harshly, $B = -0.0005$, $SE = 0.0002$, $z = -2.45$, $p = 0.0142$.

Next, we tested whether Fluency mediated the association between Perceived Race and Evaluations. We began by regressing Evaluations onto Perceived Race. As noted above, evaluations did not vary as a function of perceived race, $B = 0.4835$, $SE = 0.8563$, $z = 0.56$, $p = 0.5723$ (c path; Fig. 4b). We also regressed Race Fluency onto Perceived Race, which revealed that participants took less time to categorize Black targets than White targets, $B = -106.2920$, $SE = 45.5228$, $z = -2.33$, $p = 0.0195$ (a path). Finally, we regressed Evaluations onto Race Fluency. These variables were not significantly related, $B = -0.0003$, $SE = 0.0002$, $z = -1.31$, $p = 0.1914$ (b path), and controlling for the effect of race fluency had a negligible effect on the association between Perceived Race and Evaluations, $B = 0.4574$, $SE = 0.8544$, $z = 0.54$, $p = 0.5924$ (c′ path). As expected based upon these results, Monte Carlo simulations indicated a non-significant indirect effect of Race Fluency ($p = 0.4153$, 95% CI: −0.0702, 0.1810).

Thus, as predicted, fluency did not mediate the association between race categorizations and social evaluations. In light of these results, Study 2 pinpoints an important boundary condition of fluency's effects on social evaluation: Fluency may be associated with evaluations related to ambiguous social categories (e.g., sexual orientation), but not overt social categories (e.g., race). These findings make sense in the context of research on social categorization more broadly, which has demonstrated that racial categorization occurs with remarkable efficiency (Ito, Thompson, & Cacioppo, 2004) whereas sexual orientation categorization occurs more slowly and with a higher degree of error (Lick et al., in press; Rule & Ambady, 2008). Indeed, in the current study, participants made race categorizations more than half a second faster than sexual orientation categorizations ($Ms = 4095.45$ and 3679.74, respectively), yet race categorizations were much more accurate (96% vs. 54% correct). We suspect that targets' racial group memberships were so obvious that fluency was not a consideration in downstream evaluations, whereas fluency did factor into evaluations related to more uncertain categorizations of sexual orientation.

Discussion

The current findings warrant three conclusions about metacognitive processes linking social categorization to prejudice. First, the fluency with targets are categorized helps to explain the evaluations they receive. In two studies with diverse samples and stimuli, we found that perceivers evaluated individuals they categorized as gay more negatively than individuals they categorized as straight within mere seconds of face perception. Perceivers also processed individuals they categorized as gay more slowly than individuals they categorized as straight, and this disfluency helped to explain variance in evaluations related to perceived sexual orientation. Second, the fluency with which targets are categorized helps to explain prejudiced evaluations of those with relatively ambiguous stigmas, but not those with overt stigmas. Specifically, we found that fluency mediated the link between categorization and evaluation with regard to sexual orientation but not race. Third, the negative effects of disfluency on evaluations occur even for targets categorized as majority group members. That is, while targets categorized as gay were processed less fluently than targets categorized as straight and subsequently received harsh evaluations, targets processed disfluently but categorized as straight also faced harsh evaluations.

These findings offer several contributions to theory about the evaluative implications of perceptual fluency. Early work in this area used either vignettes (Laham, Alter, & Goodwin, 2009) or geometric patterns (Winkielman et al., 2006) to demonstrate that disfluent processing compromises evaluations of stimuli. More recent findings extended cognitive fluency to an interpersonal domain, revealing that fluency helps to explain biased evaluations of imagined migrants (Rubin, Paolini, & Crisp, 2010) and non-native language speakers (Lev-Ari & Keysar, 2010). While they provided important insights for fluency theory, these studies were limited to imaginary and aural cues rather than visual cues, which are central to social evaluation (Nakayama, 2011). The studies described here are the first to implicate fluency of visual processing in prejudiced evaluations of real people.

Our findings also extend classic theories about the social cognitive underpinnings of prejudice (Allport, 1954; Brewer, 1988; Wilder, 1981). Much of the early work in this area focused on the inevitability of social categorization, demonstrating robust links between acts of categorization and downstream prejudice (Fiske, 2010). While these processes have been carefully explicated, the metacognitive mechanisms that link categorization to prejudice are less well understood. Our studies pinpoint fluency as one such process, providing a proximal explanation for the negative effects of social categorization.

Aside from their contributions to existing theory, our studies also provide important directions for future research. In particular, the differential fluency effects we observed for targets with overt and ambiguous stigmas welcome additional study. It will be especially important for future researchers to explore the generality of these effects, testing whether they extend to other ambiguous (e.g., religious minorities, individuals with psychopathological diagnoses) and overt stigmas (e.g., overweight individuals). It will also be important to explore fluency effects with identities that lie somewhere between ambiguous and overt, such as biracial identities. Finally, the current studies demonstrated that the negative effects of disfluency are even pronounced for targets ultimately categorized as belonging to the majority group (i.e., straight). Future researchers might systematically test how social expectations (e.g., straight until proven otherwise; Hyde & Jaffee, 2000; Rich, 1980) contribute to biases against targets who are disfluently categorized, even if they belong to the majority group.

In conclusion, these are the first studies implicating fluency as a mechanism driving the well-documented links between social categorization and prejudice. As such, they provide crucial insights into the metacognitive underpinnings of prejudice generally, and sexual orientation-related prejudice specifically. Aside from their theoretical contributions, our findings offer new suggestions for reducing prejudice related to concealable stigmas. In particular, they raise the possibility that perceptual manipulations that enhance fluency could mitigate prejudiced evaluations related to one's perceived social identity.

Acknowledgments

This research was supported by a National Science Foundation Graduate Research Fellowship, Chancellor's Prize, and Eugene V. Cota-Robles Fellowship (Lick), as well as National Science Foundation Grant BCS-1052896 (Johnson). We thank Jon Freeman for stimuli, Masumi Iida and Josh Wiley for statistical advice, and members of the Social Communication Lab for assistance with data collection.

References

Adams, R. B., Jr., Ambady, N., Nakayama, K., & Shimojo, S. (2011). *The science of social vision.* Oxford: New York.

Allport, G. W. (1954). *The nature of prejudice.* Cambridge, MA: Perseus Books.

Ashmore, R. D., & Del Boca, F. K. (1981). Conceptual approaches to stereotypes and stereotyping. In D. L. Hamilton (Ed.), *Cognitive processes in stereotyping and intergroup behavior*. Hillsdale: Erlbaum.

Balcetis, E., & Lassiter, G. D. (2010). *Social psychology of visual perception.* New York: Psychology Press.

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*, 1173–1182.

Bauer, D. J., Preacher, K. J., & Gil, K. M. (2006). Conceptualizing and testing random indirect effects and moderated mediation in multilevel models: New procedures and recommendations. *Psychological Methods*, *11*, 142–163.

Bonilla-Silva, E. (1997). Rethinking racism: Toward a structural interpretation. *American Sociological Review*, *62*, 465–480.

Brewer, M. B. (1988). A dual process model of impression formation. In R. S. WyerJr., & T. K. Srull (Eds.), *A dual-process model of impression formation: Advances in social cognition* (pp. 1–36). Hillsdale, NJ: Lawrence Erlbaum.

Clark, R., Anderson, N. B., Clark, V. R., & Williams, D. R. (1999). Racism as a stressor for African Americans: A biopsychosocial model. *American Psychologist*, *54*, 805–816.

Cranford, J. A., Shrout, P. E., Iida, M., Rafaeli, E., Yip, P., & Bolger, N. (2006). A procedure for evaluating sensitivity to within-person change: Can mood measures in diary studies detect change reliably? *Personality and Social Psychology Bulletin*, *32*, 917–929.

Dovidio, J. F., & Gaertner, S. L. (2004). The aversive form of racism. In J. L. Chin (Ed.), *The psychology of prejudice and discrimination: Racism in America*. Prager: Westport.

Dovidio, J. F., & Gaertner, S. L. (2010). Intergroup bias. In S. T. Fiske, D. T. Gilbert, & G. Lindzey (Eds.), *Handbook of social psychology* (pp. 1084–1122). New York: Wiley.

Dovidio, J. F., Glick, P., & Rudman, L. A. (2005). *On the nature of prejudice: Fifty years after Allport.* Malden, MA: Blackwell.

Fiske, S. T. (2010). Stereotyping, prejudice, and discrimination. In D. T. Gilbert, S. T. Fiske, & G. Lindzey (Eds.), *Handbook of social psychology*. Boston: Mcgraw-Hill.

Freeman, J. B., & Ambady, N. (2011). A dynamic interactive theory of person construal. *Psychological Review*, *118*, 247–279.

Freeman, J. B., Johnson, K. L., Adams, R. B., Jr., & Ambady, N. (2012). The social-sensory interface: Category interactions in person perception. *Frontiers in Integrative Neuroscience*, *6*, 81.

Freeman, J. B., Johnson, K. L., Ambady, N., & Rule, N. O. (2010). Sexual orientation perception involves gendered facial cues. *Personality and Social Psychology Bulletin*, *36*, 1318–1331.

Hugenberg, K., & Bodenhausen, G. V. (2004). Ambiguity in social categorization the role of prejudice and facial affect in race categorization. *Psychological Science*, *15*, 342–345.

Hurwitz, J., & Peffley, M. (1997). Public perceptions of race and crime: The role of racial stereotypes. *American Journal of Political Science*, *41*, 375–401.

Hyde, J. S., & Jaffee, S. R. (2000). Becoming a heterosexual adult: The experiences of young women. *Journal of Social Issues*, *56*, 283–296.

Ito, T. A., & Cacioppo, J. T. (2000). Electrophysiological evidence of implicit and explicit categorization processes. *Journal of Experimental Social Psychology*, *36*, 660–676.

Ito, T. A., Thompson, E., & Cacioppo, J. T. (2004). Tracking the timecourse of social perception: The effects of racial cues on event-related brain potentials. *Personality and Social Psychology Bulletin*, *30*, 1267–1280.

Johnson, K. L., & Ghavami, N. (2011). At the crossroads of conspicuous and concealable: What race categories communicate about sexual orientation. *PLoS One*, *6*, e18025.

Johnson, K. L., Gill, S., Reichman, V., & Tassinary, L. G. (2007). Swagger, sway, and sexuality: Judging sexual orientation from body motion and morphology. *Journal of Personality and Social Psychology*, *93*, 321–334.

Johnson, K. L., Iida, M., & Tassinary, L. G. (2012). Person (mis)perception: Functionally biased sex categorization of bodies. *Proceedings of the Royal Society B: Biological Sciences*, *279*, 4982–4989.

Johnson, K. L., & Tassinary, L. G. (2007). Interpersonal metaperception: The importance of compatibility in the aesthetic appreciation of bodily cues. In V. Swami, & A. Furnham (Eds.), *The body beautiful: Evolutionary and sociocultural perspectives*. New York: Palgrave Macmillan.

Katz-Wise, S. L., & Hyde, J. S. (2012). Victimization experiences of lesbian, gay, and bisexual individuals: A meta-analysis. *Journal of Sex Research*, *49*, 142–167.

Kite, M. E., & Deaux, K. (1987). Gender belief systems: Homosexuality and the implicit inversion theory. *Psychology of Women Quarterly*, *11*, 83–96.

Krieger, N. (2012). Methods for the scientific study of discrimination and health: An ecosocial approach. *American Journal of Public Health*, *102*, 936–944.

Laham, S. M., Alter, A. L., & Goodwin, G. P. (2009). Easy on the mind, easy on the wrongdoer: Discrepantly fluent violations are deemed less morally wrong. *Cognition*, *112*, 462–466.

Lehavot, K., & Lambert, A. J. (2007). Toward a greater understanding of antigay prejudice: On the role of sexual orientation and gender role violation. *Basic and Applied Social Psychology*, *29*, 279–292.

Lev-Ari, S., & Keysar, B. (2010). Why don't we believe non-native speakers? The influence of accent on credibility. *Journal of Experimental Social Psychology*, *46*, 1093–1096.

Lick, D. J., Johnson, K. L., & Gill, S. V. (in press). Deliberate changes to gendered body motion influence basic social perceptions. *Social Cognition*.

Maclin, O. H., & Malpass, R. S. (2001). Racial categorization of faces: The ambiguous race face effect. *Psychology, Public Policy, and Law*, *7*, 98–118.

Meyer, I. H. (2003). Prejudice, social stress, and mental health in lesbian, gay, and bisexual populations: Conceptual issues and research evidence. *Psychological Bulletin*, *129*, 674–697.

Miller, S. L., Maner, J. K., & Becker, D. V. (2010). Self-protective biases in group categorization: Threat cues shape the psychological boundary between "us" and "them. *Journal of Personality and Social Psychology*, *99*, 62–77.

Nakayama, K. (2011). Introduction: Vision going social. In R. B. AdamsJr., N. Ambady, K. Nakayama, & S. Shimojo (Eds.), *The science of social vision* (pp. xv–xxix). New York: Oxford.

Parrott, D. J. (2009). Aggression toward gay men as gender role enforcement: Effects of male role norms, sexual prejudice, and masculine gender role stress. *Journal of Personality*, *77*, 1137–1166.

Pascoe, E. A., & Richman, L. S. (2009). Perceived discrimination and health: A meta-analytic review. *Psychological Bulletin*, *135*, 531–554.

Posner, M. I., & Keele, S. W. (1968). On the genesis of abstract ideas. *Journal of Experimental Psychology: General*, *77*, 353–363.

Rich, A. (1980). Compulsory heterosexuality and lesbian experience. *Signs: Journal of Women in Culture and Society*, *5*, 631–660.

Richeson, J. A., & Trawalter, S. (2005). Categorization of admired and disliked exemplars of admired and disliked racial groups. *Journal of Personality and Social Psychology*, *89*, 517–530.

Rubin, M., Paolini, S., & Crisp, R. J. (2010). Processing fluency explanation of bias against migrants. *Journal of Experimental Social Psychology*, *46*, 21–28.

Rule, N. O., & Ambady, N. (2008). Brief exposures: Male sexual orientation is accurately perceived at 50 ms. *Journal of Experimental Social Psychology*, *44*, 1100–1105.

Stroessner, S. J. (1996). Social categorization by race or sex: Effects of perceived non-normalcy on response times. *Social Cognition*, *14*, 247–276.

Talley, A. E., & Battencourt, B. A. (2008). Evaluations and aggression directed at a gay male target: The role of threat and antigay prejudice. *Journal of Applied Social Psychology*, *38*, 647–683.

Taylor, S. E., Fiske, S. T., Etcoff, N. L., & Ruderman, A. J. (1978). Categorical and contextual bases of person memory and stereotyping. *Journal of Personality and Social Psychology*, *36*, 778–793.

Wilder, D. A. (1981). Perceiving persons as a group: Categorization and intergroup relations. In D. L. Hamilton (Ed.), *Cognitive processes in stereotyping and intergroup behavior*. Hillsdale: Erlbaum.

Williams, G. (2000). Don't try to adjust your television - I'm Black: Ruminations on the recurrent controversy over Whiteness on TV. *Journal of Gender, Race, and Justice*, *4*, 99–136.

Winkielman, P., & Cacioppo, J. T. (2001). Mind at ease puts a smile on the face: Psychophysiological evidence that processing facilitation elicits positive affect. *Journal of Personality and Social Psychology*, *81*, 989–1000.

Winkielman, P., Halberstadt, J., Fazendeiro, T., & Catty, S. (2006). Prototypes are attractive because they are easy on the mind. *Psychological Science*, *17*, 799–806.

Winkielman, P., Schwarz, N., & Nowak, A. (2002). Affect and processing dynamics: Perceptual fluency enhances evaluations. In S. Moore, & M. Oaksford (Eds.), *Emotional cognition: From brain to behaviour* (pp. 111–136). Amsterdam, NL: John Benjamins.

Young, S. G., Hugenberg, K., Bernstein, M. J., & Sacco, D. F. (2012). Perception and motivation in face recognition: A critical review of theories of the cross-race effect. *Personality and Social Psychology Review*, *16*, 116–142.

Zarate, M. A., & Smith, E. R. (1990). Person categorization and stereotyping. *Social Cognition*, *8*, 161–185.

Zeger, S. L., & Liang, K. Y. (1986). Longitudinal data analysis for discrete and continuous outcomes. *Biometrics*, *42*, 121–130.