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Gaydar: Snap judgments of women's vs. men's sexual orientation from facial cues

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Abstract

Recent research (Rule & Ambady, 2008) has demonstrated that people are able to discern a man's sexual orientation with above-chance accuracy after viewing a photograph of his face for 50 milliseconds. Despite the robustness of this phenomenon, substantive questions remain unanswered: Can people similarly judge women, whose sexual orientation is relatively fluid? And, what types of facial cues (local vs. configural) are used to make accurate judgments? We demonstrate that (a) perceivers read women's sexual orientation with above-chance accuracy from faces (without hair) presented for 50 milliseconds, (b) perceivers read sexual orientation with above-chance accuracy from faces of women and men presented *upside-down* for 50 milliseconds, and (c) accuracy of reading women's faces, but not men's, decreased when faces were presented upside-down. These findings indicate that sexual orientation can be read from faces of women and men but that the judgments rely on different facial cues.

Keywords: person perception; inverted faces; sexual orientation; trait inference; gaydar.

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Gaydar: Snap judgments of women's vs. men's sexual orientation from facial cues

Imagine arriving at a dinner party. Reflexively, you visually scan the faces of the guests, none of whom you have met previously. As you perform this rapid survey, you spontaneously tabulate statistics: you notice two nice people, four trustworthy people, two outgoing people, and one gay person. Without intention or conscious awareness, these social assessments confront you. *Are your judgments accurate, or are you merely judgmental?*

Numerous studies have shown that characteristics such as attractiveness (Olson & Marshuetz, 2005), trustworthiness (Todorov, 2008), competence (Willis & Todorov, 2006), and ethnicity (Quany, Keats, & Harkins, 1975) are read from faces quickly, effortlessly, and similarly across judges (see Hassin & Trope, 2000). Recently, researchers have found that naïve judges are able to read men's sexual orientation with above-chance accuracy from grossly impoverished photographs (i.e., grayscale, hair-removed) of men's faces presented for 50 ms (Rule & Ambady, 2008; Rule, Ambady, Adams, & Macrae, 2008). From a sexual strategies (Buss & Schmitt, 1993) or attachment (Hazan & Diamond, 2000) perspective, such an ability is beneficial to the extent that it enables individuals to find desired mates or romantic partners.

Despite the growing literature on spontaneous or "snap" judgments, no comprehensive theoretical framework exists to explain when they occur, who can make them, or how the ability to make snap judgments develops. In particular, little is known about spontaneous judgments of others' sexual orientation. For example, it is unknown whether sexual orientation can be read from women's faces, or what facial cues inform judgments of sexual orientation.

Research suggests that women's sexual orientation is more fluid, or environmentally malleable, than is men's sexual orientation; for instance, women are more likely than men to

report changes in their primary sexual orientation (from gay to straight, or vice versa) over the life course (Diamond, 2008; Kinnish, Strassberg, & Turner, 2004). Moreover, studies show that the genetic influence on sexual orientation is smaller for women than it is for men (e.g., Hu et al., 1995; see Bailey, 2003 and Rahman & Wilson, 2003 for reviews), allowing for greater environmental influence on sexual orientation. Indeed, Bailey (2009) even argues that women may not have an overarching sexual orientation in the way that men do.

Although women's sexual orientation can be inferred from thin slices of dynamic behaviors (e.g., 10- or 30-second audio or video clips) and from static images of the entire clothed person (Ambady, Hallahan, & Conner, 1999; Rieger, Linsenmeier, Gygax, Garcia, & Bailey, in press), these stimuli contain cues that could be deliberately manipulated, such as clothing and hairstyle, to signal sexual orientation. To date, it is still unknown whether women's sexual orientation can be read from faces alone, when behavioral signals are minimal.

Experiment 1 examines this issue.

In addition, the facial cues that inform such judgments are not yet understood. Past work has shown that merely showing photographs of men's eyes or mouth area is sufficient to enable above-chance accuracy in the sexual orientation judgment task (Rule et al., 2008). Rule and colleagues (Rule et al., 2008, pp. 1026) have interpreted their findings to mean that snap judgments of men's sexual orientation rely on *local cues*, which are individual facial features (e.g., an eye or nose). However, each of the facial areas shown to participants also contains *configural cues*, another class of facial cues that are constructed relationships among local cues (e.g., distance between pupils; arrangement of lips in relation to each other; see Leder & Bruce, 2000, pp. 514-515). Thus, even though men's sexual orientation could be inferred from only the eye area (two eyes) or only the mouth area (two lips and one chin), it is not possible to

distinguish whether participants' judgments were based on local cues (e.g., an eye), configural cues (e.g., the distance between the eyes), or both. Identifying whether judgments rely on local versus configural cues may inform the brain regions involved in spontaneous judgments of sexual orientation. In particular, the fusiform face area (FFA) and occipital face-selective region (OFA) respond primarily to configural cues (Yovel & Kanwisher, 2005).

Presenting facial photographs upside-down is a technique for determining the relative importance of configural and local facial cues for character judgments. Displaying photographs of faces upright allows for unimpeded processing of both local and configural facial cues. In contrast, displaying facial photographs upside-down severely disrupts processing of configural facial cues (Leder & Bruce, 2000; Macrae & Martin, 2007; Macrae, Quinn, Mason & Quadflieg, 2005). A by-product of this facial inversion effect is that it is very difficult to make identity judgments (e.g., whether a face is a friend or an unknown other) from upside-down faces (Cloutier & Macrae, 2007). Accordingly, we used this facial inversion technique in Experiment 2 to assess the extent to which configural vs. local cues are used in sexual orientation judgments. To the extent that perception of sexual orientation relies on configural cues, accuracy of sexual orientation detection should deteriorate when faces are presented upside-down (vs. upright). To the extent that sexual orientation detection relies on the processing of local cues, accuracy should remain above chance for upside-down presentations.

Experiment 1

Past research (e.g., Rule & Ambady, 2008) has shown that sexual orientation can be read from faces of men, but can sexual orientation be read from faces of women?

Method

Participants. Forty-six Cornell students (32 women; age range = 18-21 years)

participated in exchange for extra course credit.^{1,2}

Apparatus. Inquisit 3.0.1.1 (Seattle WA: Millisecond Software, LLC.) was implemented on Windows XP-based computers with 19-inch CRT monitors (800×600 at 120 Hz).

Facial Photograph Selection and Preparation. The stimulus set used in Experiments 1 and 2 included facial photographs of 111 gay men, 122 straight men, 87 gay women, and 93 straight women. Facial photographs were gathered from Facebook.com profiles (cf. Rule & Ambady, 2008) of individuals living in 11 major US cities who self-identified as straight or gay (photographs of self-identified bisexual people were not used as targets). Each photograph had been posted by a target or a target's friend.

Whereas prior work used photographs that had been collected by researchers who had been aware of the experimental hypotheses (e.g., Rule & Ambady, 2008), we trained 11 undergraduate research assistants who were kept blind to the experimental topic and hypotheses to perform all photograph collection and preparation. To minimize the prospect that non-face cues would influence judgments, photographs of men or women with facial alterations or adornments (e.g., scars, eyewear, facial hair, makeup, non-earlobe piercings, etc.) were not included as experimental targets. To maximize consistency across faces, only photographs of White-appearing individuals who self-identified ages of 18-29 were included.

Using Adobe Photoshop CS3 Extended, research assistants removed hair and ears from each head and converted each image to grayscale (8-bit bitmap format), leaving the final "face" stimulus (Figure 1). When presenting faces to participants, Inquisit standardized each image's height to 200 pixels and adjusted each photograph's width proportionally, resulting in undistorted images of nearly constant size.

Sexual Orientation Judgment Task. Each trial consisted of: (a) a fixation cross for 1000

ms, (b) a target face stimulus for 50 ms, and (c) a backward mask for 100 ms, after which participants categorized the target face as either “gay” or “straight” “*as quickly and accurately as possible*” by depressing “A” or “L.” The intertrial interval was 1000 ms.

Faces of women were, on average, lighter than faces of men. Therefore, we created four masks to match the luminance of female targets, and four masks to match the luminance of male targets. Masks were generated using Matlab R2007b by adding random noise to the white background of facial photographs and then randomizing each image’s pixels (code modified from Prins, 2007; Figure 1).

Judgments for male and female targets were made in separate 112-trial blocks. Each block consisted of 96 randomly-ordered faces (48 gay and 48 straight; randomly selected without replacement from all faces of each type) and 16 control trials. To monitor participants’ attention, we included control trials that unambiguously represented either the category gay or straight (i.e., an image of two same-gender or opposite-gender stick figures holding hands). Block order (female faces first vs. second) and response keys (“gay” on left vs. right) were counterbalanced across participants; these procedural factors did not produce any significant main effects or interactions.

Figure 1

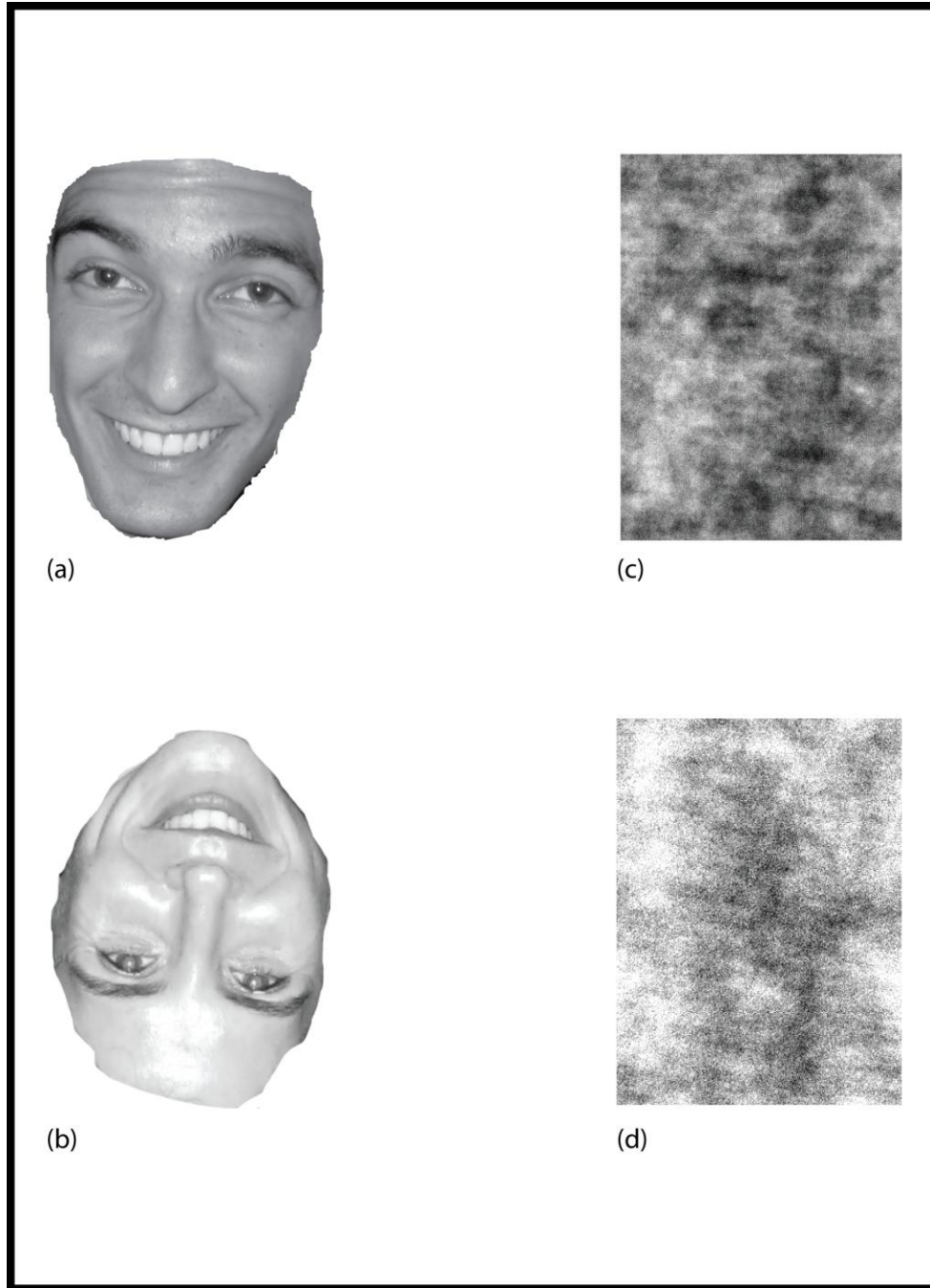


Figure 1. Sexual orientation judgment task sample stimuli: (a) upright male and (b) upside-down female faces, presented for 50 ms; (c) upright male and (d) upside-down female backward masks, presented for 100 ms. Note: In Experiment 1, faces were presented upright; in Experiment 2, faces were presented both upright and upside-down.

Data Analytic Strategy. We measured sexual orientation judgment accuracy using A' (Rae, 1976), a nonparametric bias-adjusted accuracy score.³ A' measures sensitivity to the signal “gay” after correcting for participants’ biases to categorize faces as straight or gay. Chance responding is indexed by an A' of .5. Two A' scores were computed for each participant: A'_f (women’s faces) and A'_m (men’s faces).

Results and Discussion

Participants were significantly better than chance at reading women’s sexual orientation ($Mean A'_f = .59$), $t(45) = 6.04$, $p < .001$, Cohen’s effect size $d = .89$. Replicating previous findings (Rule & Ambady, 2008), participants also read men’s sexual orientation significantly better than chance ($Mean A'_m = .54$), $t(45) = 2.45$, $p = .019$, $d = .36$.

Participants showed greater accuracy at reading sexual orientation from faces of women than from faces of men; a mixed-model analysis of variance (ANOVA) on accuracy with participant sex as a between-participants factor and target gender as a within-participant factor indicated a main effect of target, $F(1,44) = 13.08$, $p < .001$, $\eta^2_p = .23$. This effect was qualified by a target gender \times sex of participant interaction, $F(1,44) = 7.26$, $p < .01$, $\eta^2_p = .14$. Male and female participants did not significantly differ in their accuracy for women’s faces, $t(45) = -1.37$, $p = .18$, $d = .21$. However, females were significantly more accurate than males when judging men’s faces, $t(43.54) = 2.74$, $p = .009$, $d = .41$.^{4,5}

Experiment 2

Are sexual orientation judgments informed by processing of local facial cues (e.g., an eye; a lip) or processing of configural facial cues (i.e., spatial relationships between two or more local facial cues)? At least for faces of men, certain areas of the face may inform sexual orientation judgments (Rule et al., 2008). However, no work has assessed whether it is local or

configural facial cues that drive sexual orientation judgments.

Method

Participants. One hundred twenty-five Cornell students (79 women; age range = 18-28 years) participated in exchange for extra course credit and candy.⁶

Sexual Orientation Judgment Task. Participants completed the sexual orientation judgment task from Experiment 1 with two additional blocks in which the stimuli were presented upside-down (i.e., photographs and masks used in Experiment 1 were rotated 180°; see Figure 1). On control trials, instead of stick figures, the word “gay” or “straight” was the target stimulus. Block order (female faces first vs. second; upright faces first vs. second) and response key assignment (“gay” on left vs. right) were counterbalanced across participants; these procedural factors did not produce significant effects or interactions.

Results and Discussion

For each participant, four A' scores were computed: A'_{upw} (upright women’s faces), A'_{upm} (upright men’s faces), A'_{udw} (upside-down women’s faces), and A'_{udm} (upside-down men’s faces).⁷

As displayed in Figure 2, participants read sexual orientation significantly better than chance from upright faces of women ($Mean A'_{upw} = .59$), $t(124) = 9.10$, $p < .001$, $d = .81$, and upright faces of men ($Mean A'_{upm} = .57$), $t(124) = 7.03$, $p < .001$, $d = .63$.

Figure 2

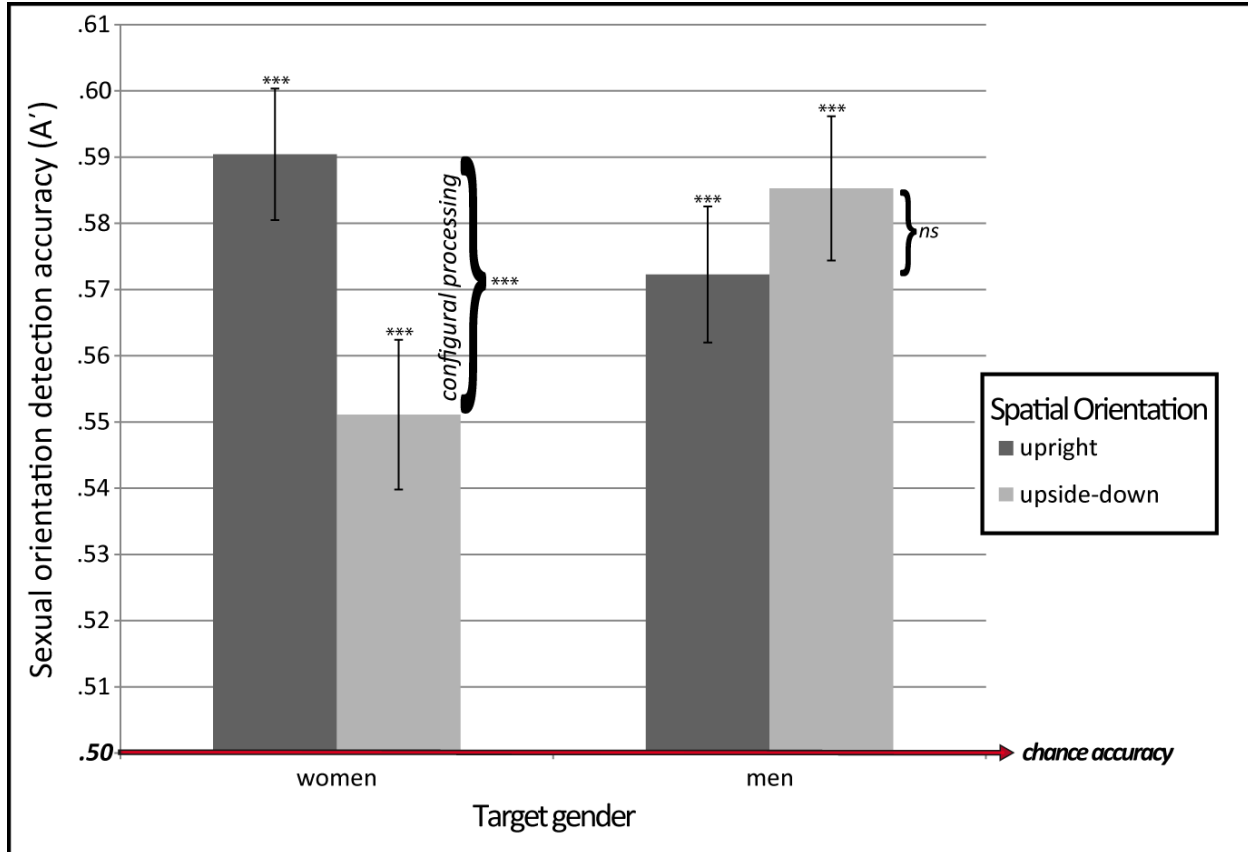


Figure 2. Mean accuracy (A') in judging sexual orientation from faces presented for 50 milliseconds as a function of the target's gender and spatial orientation (upright or upside-down). When faces are presented upside-down (light grey bars), judgments may be based only on processing of local facial cues. When faces are presented upright (dark grey bars), judgments may be based on processing of both local and configural facial cues.

Error bars represent ± 1 SEM.

*** $p \leq .001$.

Additionally, participants read sexual orientation with above-chance accuracy from upside-down faces of women ($Mean A'_{udw} = .55$), $t(124) = 4.52$, $p < .001$, $d = .40$, and upside-down faces of men ($Mean A'_{udm} = .59$), $t(124) = 7.82$, $p < .001$, $d = .70$ (Figure 2). Because processing of configural facial cues is dramatically impaired when faces are presented upside-down, these results show that processing of local facial cues (e.g., an eye, a lip) contributes to judgments of sexual orientation for both female and male targets.

To assess whether the processing of configural facial cues boosts accuracy of sexual orientation judgments above the accuracy observed when only processing of local cues is permitted (i.e., during the upside-down trials), we performed a mixed-model ANOVA on accuracy with target gender and spatial orientation (upright vs. upside-down) as within-participant factors and participant sex as a between-participants factor. The ANOVA yielded a target gender \times spatial orientation interaction, $F(1,123) = 11.76$, $p < .001$, $\eta^2_p = .09$. Planned comparisons indicated that for faces of men, accuracy in reading sexual orientation did not vary between upright and upside-down trials, $t(124) = -1.01$, $p = .31$, $d = .09$. The power to detect even a small-moderate effect ($d = .3$) of spatial orientation for male targets in this experiment was .91. Thus, this null finding suggests that under the current viewing conditions, the ability to read sexual orientation from men's faces does not appreciably rely on processing of configural facial cues. However, for faces of women, participants were significantly more accurate at reading sexual orientation from upright faces than from upside-down faces, $t(124) = 3.37$, $p = .001$, $d = .30$. The increase in accuracy for faces presented upright (vs. upside-down, when processing of configural information is dramatically inhibited), suggests that the ability to read sexual orientation from faces of women *does* significantly rely on processing of configural cues, as well as processing of local cues.

General Discussion

Even though sexual orientation appears to be more flexible in women than it is in men (Diamond, 2008), the present research demonstrated that women's sexual orientation can be read from relatively uncontrollable cues – faces, without hair, presented for only 50 ms. The finding that people can read sexual orientation with above-chance accuracy even when given only grossly impoverished sources of information (i.e., grayscale, hair-removed facial photographs) illustrates that people are highly efficient at judging men's *and* women's sexual orientation. Indeed, the efficiency of this judgment is further demonstrated by findings from Experiment 2 showing, remarkably, that even when photographs are presented *upside-down* for 50 ms, accuracy of judging women's and men's sexual orientation is better than chance.

Moreover, the present research was the first attempt to differentiate the roles that local and configural facial cues play in accuracy of judgments of sexual orientation. Because sexual orientation was read with above-chance accuracy from upside-down faces of both women and men – a situation in which the processing of configural facial information is considerably diminished (Leder & Bruce, 2000) – it appears that sexual orientation can be inferred from local, feature-based cues. These findings indicate that local facial cues (e.g., an eye, a lip, a nose) – alone – do provide sufficient data to inform sexual orientation judgments, consistent with past work (Rule et al., 2008).

In light of the neuroscience literature, the finding that sexual orientation can be read from faces presented *upside-down* for merely 50 ms helps to illuminate the process used to judge sexual orientation from faces. When faces are presented upside-down, the functioning of neural circuitry devoted to the processing of faces is inhibited, even though local facial cues are processed relatively fluently (Yovel & Kanwisher, 2005). Because the fusiform face area (FFA)

and occipital face-selective region (OFA) respond primarily to upright (but not upside-down) faces, the present findings indicate that it is possible to infer sexual orientation from faces when local facial cues are processed, but specialized neural face processing, which is usually necessary for identity judgments (e.g., whether a person is known or unfamiliar), is diminished (Yovel & Kanwisher, 2005; Cloutier & Macrae, 2007).

Additionally, the results indicate that, at least under the given viewing conditions, the process of reading sexual orientation from faces of women is quite different from the process of reading sexual orientation from faces of men. Experiment 2 showed that both local and configural facial cues are valuable when making judgments of women's sexual orientation, but only local facial cues appear valuable when making judgments of men's sexual orientation.

The prospect of distinct processes for extracting sexual orientation from female and male faces is intriguing, yet not entirely surprising. The face is assumed to reflect experiences, at least in part. There are gender differences in experiences of romantic love and sexual desire, neurophysiological and hormonal responses to sex and attachment, and phenomenology of sexual orientation (Diamond, 2004; Hazan & Diamond, 2000). The current findings suggest that facial indicators of sexual orientation differ by gender, as well.

It is also possible that judgments of women's, but not men's, sexual orientation were affected by the upside-down presentation because the concept "gay man" may be perceived more as a category (vs. identity), than is the concept "lesbian" (or "gay woman"). This interpretation of the findings from Experiment 2 is supported by research showing that when faces are presented upside-down, it is very difficult to infer identity information, but there is little trouble inferring social category information (Cloutier & Macrae, 2007). Further research should clarify whether sexual orientation is perceived as category information or as identity information.

The present research is the first to demonstrate that sexual orientation is read from briefly presented faces of women, that the cues used to infer sexual orientation differ for women's and men's faces, and that sexual orientation can be read from faces even when they are presented upside-down. In light of these findings, it is interesting to note the popular desire to learn to read faces like books (e.g., Tickle, 2003). Considering how challenging it is to read a book upside-down, it seems that we read faces *better* than we read books.

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Footnotes

¹Three participants (2 female) were excluded from analyses due to failure to follow instructions, failure to classify any stimuli as gay, or average reaction times more than 3 SD above the mean.

²Self-reports and a gay-straight IAT were also completed, but not discussed. Only demographics and nine questions about willingness to interact with gay people were completed prior to the judging sexual orientation task. Because participants were explicitly instructed to classify photographs as gay and straight, the fact that the preceding questionnaire also activated these concepts should not have impacted performance.

³Analyses using d' (a parametric index of signal sensitivity) confirmed results from A' .

⁴ Df corrected for violation of assumption of homogeneity of variances.

⁵Although person \times target interactions are not the focus of the current paper, this interaction is consistent with expectations from attachment theory and sexual strategies theory; according to both theories, people should be best at identifying sexual orientation in targets that are romantically or sexually desired. Although similar gender differences have been reported in other studies using different paradigms, the target gender \times sex of participant effect appears to be small and therefore not always reliable (as in Ambady et al., 1999). Indeed, the target gender \times sex of participant interaction from Experiment 1 did not replicate in Experiment 2.

⁶Nineteen participants (9 women, 8 men, 2 unknown) were excluded from analyses due to computer malfunctions ($n=11$) or the criteria used in Experiment 1 ($n=8$; see footnote 1).

⁷Participants viewed some photographs twice (once upright and once upside-down). We repeated the analyses using only data for the first presentation (resulting in the exclusion of 23% of trials); the pattern of results was unchanged.