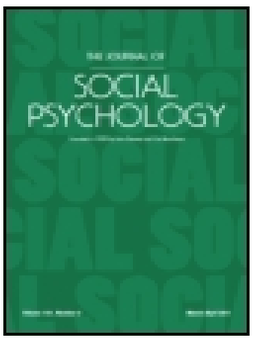

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# Women outperform men in distinguishing between authentic and nonauthentic smiles

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# Women outperform men in distinguishing between authentic and nonauthentic smiles

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**ABSTRACT**

Women tend to be more accurate in decoding facial expressions than men. We hypothesized that women's better performance in decoding facial expressions extends to distinguishing between authentic and nonauthentic smiles. We showed participants portrait photos of persons who smiled because either they saw a pleasant picture (authentic smile) or were instructed to smile by the experimenter (nonauthentic smile) and asked them to identify the smiles. Participants judged single photos of persons depicting either an authentic or a nonauthentic smile, and they judged adjacent photos of the same person depicting an authentic smile and a nonauthentic smile. Women outperformed men in identifying the smiles when judging the adjacent photos. We discuss implications for judging smile authenticity in real life and limitations for the observed sex difference.

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The ability to interpret facial expressions is essential for human interaction. Facial expressions provide the most immediate cues to a person's feelings (Freitas-Magalhães, 2007). One expression that is particularly important for judging the feelings and intentions of others is the smile. Smiling indicates the experience of positive emotion (e.g., enjoyment), and smiling (vs. nonsmiling) people are judged as more sincere, sociable, and trustworthy (Ozono et al., 2010). Smiles not only occur as expressions of genuine positive emotion, however, but also as communication tools (Kraut & Johnston, 1979).

The simulation of smiles model (Niedenthal, Mermillod, Maringer, & Hess, 2010) differentiates *enjoyment smiles* that signal positive emotion from *affiliative smiles* that signal positive social intentions (e.g., appeasement) and *dominance smiles* that signal high social status (e.g., superiority). Other researchers distinguish smiles that spontaneously result from positive emotion ("authentic" or "genuine" smiles) from smiles that people produce deliberately ("nonauthentic" or "social" smiles), even though they feel no positive emotion (e.g., smiling for a photo; Ekman & Friesen, 1982).

## *Authentic versus nonauthentic smiles*

Several cues point to whether a smile spontaneously results from positive emotion. Spontaneous expressions had an earlier onset in the left (vs. right) hemisphere of the face (Carr, Korb, Niedenthal, & Winkielman, 2014). Moreover, smiles perceived as authentic had a longer duration (Krumhuber & Manstead, 2009), greater intensity, and wider mouth opening (Korb, With, Niedenthal, Kaiser, & Grandjean, 2014). The most widely used indicator of smile authenticity, however, is the Duchenne marker (Duchenne, 1962). The Duchenne marker refers to activation in the eye region, resulting from the *orbicularis oculi* muscle, which pulls the upper cheek toward the eyes. Whereas both authentic and nonauthentic smiles involve activation in the mouth region produced by the

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*zygomaticus major* muscle, which raises the lip corners, authentic smiles involve stronger activation in the eye region. Indeed, people producing smiles involving the Duchenne marker are perceived as more authentic, genuine, and trustworthy (Gunnery & Ruben, 2016). Because the eye region tends to defy voluntary control (Ekman, 2003), feigning a Duchenne smile is difficult, although not impossible (Krumhuber & Manstead, 2009).

Distinguishing between authentic and nonauthentic smiles is beneficial for estimating others' feelings and intentions in everyday life. Recognizing whether someone is truly enjoying a social interaction and experiences honest affiliation may affect one's readiness to initiate benevolent, cooperative, or romantic relationships. We investigated whether women better differentiate between authentic and nonauthentic smiles than men.

### Sex differences in decoding facial expressions

Women tend to be more accurate in decoding facial cues than men (Hall, 1978; McClure, 2000; Thompson & Voyer, 2014). They make fewer errors when classifying expressions (Thayer & Johnsen, 2000), recognize expressions faster (Hampson, Van Anders, & Mullin, 2006), and have higher explicit knowledge of nonverbal cues (Rosip & Hall, 2004). Thus, women are faster and more accurate in distinguishing facial expressions of emotions (e.g., anger, fear). It is yet unclear, however, whether women's better performance in decoding facial expressions extends to judging smile authenticity.

We suspected that women would outperform men in accurately recognizing smile authenticity because women's superiority in decoding facial cues may allow them to detect the Duchenne marker more reliably. They also pay more attention to the eyes (J. K. Hall, Hutton, & Morgan, 2009) and better distinguish between authentic and nonauthentic expressions of pain than men (Hill & Craig, 2004). Moreover, women are more interpersonally oriented (Cross & Madson, 1997). They emphasize close interpersonal relationships and make more effort to actively infer other's feelings and intentions. Accurately decoding smile authenticity may help women to initiate and maintain close interpersonal relationships. Finally, researchers proposed that because women have the larger parental investment (e.g., pregnancy), it is more important for them to accurately judge the romantic intent of a potential partner (Tooke & Camire, 1991).

## Method

### Participants

One hundred seventy-seven participants from Germany (103 female, $M_{age}$ = 26.0 years, $SD$ = 6.02) completed the questionnaire online. We advertised the study on several Web sites (e.g., Facebook) as about how people process facial expressions. Participants could win coupons. Following similar studies on emotion recognition (Hall, 1978; McClure, 2000) we aimed to recruit at least 70 participants per sex. See the Supplementary[1] for demographic information.

### Procedure

Following Frank, Ekman, and Friesen (1993), we presented participants with two tasks. They first saw single photos of persons displaying either an authentic or a nonauthentic smile. Then they saw adjacent photos of the same person displaying an authentic and a nonauthentic smile. Judging single smiles resembles a naturalistic situation more closely than judging adjacent smiles, but it is more difficult (Frank et al.). Thus, to assure that both female and male participants would be able to differentiate the smiles, we included the adjacent photos task.

We created the photos in a pretest using a procedure that has been successfully used to elicit authentic versus nonauthentic smiles (Johnston, Miles, & McCrea, 2010; Miles & Johnston, 2007;

Slessor, Miles, Bull, & Phillips, 2010). To create the nonauthentic smiles, we instructed persons to smile as for a passport photo; to create the authentic smiles, we presented persons with pleasant pictures and instructed them to smile only if they felt like it. To verify that the selected photos displayed the smiles we aimed for, we coded them with the Facial Action Coding System (Ekman, Friesen, & Hager, 2002). As intended, the authentic (vs. nonauthentic) smiles on average evinced a stronger eye-muscle (but not mouth-muscle) contraction. See the Supplementary for example photos and the procedure of creating, coding, and analyzing the photos.

### *Single photos*

Participants judged 21 single photos of the persons from the pretest. Because there were 21 persons, 10 photos depicted an authentic and 11 a nonauthentic smile. On each page of the questionnaire, participants saw one photo and indicated whether the smile was "authentic" or "nonauthentic" by selecting a button (see Supplementary for verbatim instructions). The program then proceeded to the next page.

### *Adjacent photos*

Participants judged adjacent photos of the same person depicting an authentic smile and a nonauthentic smile. The photos were of the 21 persons from the pretest. On each page, participants saw two adjacent photos and indicated which photo depicted the "authentic" and which the "nonauthentic" smile by selecting a button. The order of the photos within each task and relative position of the adjacent photos (authentic smile above or below the nonauthentic smile) were randomized; the trials were self-paced. Participants also completed questionnaires measuring demographic and control variables (age, mood, rejection sensitivity, confidence, and competence in judging facial expressions). Finally, participants were fully debriefed.

## Results

We computed hit rates by calculating the percentage of trials with correctly judged smiles from the total number of trials (21) in each task.

### *Descriptives*

Participants on average judged 54.1% ($SD$ = 11.8) of the single smiles and 75.3% ($SD$ = 12.4) of the adjacent smiles correctly. These hit rates are consistent with the hit rates of Frank et al. (1993; 56% and 74%, respectively). Hit rates in the two tasks correlated positively ($r$ = .17, $p$ = .028).

### *Sex differences in hit rates*

We examined sex differences in hit rates using a mixed-model ANOVA with sex as the between-subjects factor and task type (single vs. adjacent photos) as the within-subjects factor. We observed main effects of task type, $F(1, 175) = 314.00$, $p < .001$, and sex, $F(1, 175) = 5.16$, $p = .024$. There was also a task type by sex interaction effect, $F(1, 175) = 9.38$, $p = .003$. The pattern indicates that participants judged more adjacent than single photos correctly. Moreover, as predicted, women judged more photos correctly than men. This difference, however, was due to women's (vs. men's) better performance in the adjacent photos task. See Table 1 for contrasts between women's and men's hit rates in both tasks. The effect size for women's better performance in judging the adjacent photos was medium ($d$ = .55; Cohen, 1988). To explore the robustness of the results, we performed supplementary analyses. Specifically, we corrected for possible response tendencies in the single photos tasks, examined reaction times for participants' judgments, explored whether the sex of the smiling person influenced judgement accuracy for women vs. men, and investigated whether the results remained the same when controlling for participants' age, mood, rejection sensitivity,

**Table 1.** Contrasts between women and men for both tasks.

| Hit Rates | | | | |
|---|---|---|---|---|
| Task | Women | Men | *t* | *p* |
| Single Photos | 53.9 (12.0) | 54.3 (11.4) | .23 | .822 |
| Adjacent Photos | 78.1 (10.8) | 71.4 (13.5) | 3.54 | .001 |
| Overall | 66.0 (8.46) | 62.8 (9.97) | 2.27 | .024 |

*Note*. Standard deviations in parenthesis.

confidence and competence in judging facial expressions. Overall, the pattern that women outperformed men in the adjacent photos task remained robust. We report the analyses in the Supplementary.

## Discussion

We showed participants single photos of persons depicting either an authentic or nonauthentic smile, and we showed them adjacent photos of the same person, depicting an authentic and a nonauthentic smile. Women outperformed men in differentiating between the smiles in the adjacent photos but not in the single photos. Hit rate in judging the single photos (54%) was barely above chance (50%). Thus, judging the single photos may have been too difficult for both women and men for the sex difference to emerge.

Women's better performance in decoding smile authenticity may be an advantage in many situations. Because smiles with the Duchenne marker can be feigned, however (Krumhuber & Manstead, 2009), women's better decoding skills may make them more susceptible to being misled by skillfully feigned Duchenne smiles. Also, although better decoding skills are associated with greater social effectiveness (e.g., relationship management), being too accurate in decoding nonverbal information that the sender intends to hide (e.g., rejection cues), may be less socially beneficial (Rosenthal & DePaulo, 1979).

### *Judging smile authenticity in real life*

The forced-choice rating of static photos employed here limits the ecological validity of our findings. Women outperformed men only when they could simultaneously compare authentic with nonauthentic smiles in the same person. Such a situation does not occur in real life, though. Perhaps in real-life settings, people judge smile authenticity by comparing successive smiles within the same person. Future research may test whether women outperform men when authentic and nonauthentic smiles are presented successively rather than simultaneously in the same person.

Also, we presented the smiles within a neutral context (the photos had a white background). In real life, people may use the context in which the smiling occurs as a cue for their judgments. It may be easier to identify authentic smiles within a congruent context (seeing a beloved person after a long time) than incongruent context (greeting a remote acquaintance). Future work should test whether women outperform men in identifying authentic smiles in congruent versus incongruent contexts.

### *Limitations and future directions*

The role of static versus dynamic stimuli (videos) for judging smile authenticity has been discussed. Research has shown that perceivers relied more on the Duchenne marker when judging static than dynamic smiles (Korb et al., 2014), and they perceived smiles with the Duchenne marker as less authentic in static than dynamic smiles (Gunnery & Ruben, 2016). Future research may examine whether the sex difference emerges using dynamic smiles. Relatedly, the relevance of the Duchenne marker vs. other indicators of smile authenticity has been debated (Krumhuber & Manstead, 2009). For example, Korb et al. manipulated the mouth openings of smiles using animated avatar faces.

They observed that participants judged smiles with a wider mouth opening as more authentic. The elicited authentic and nonauthentic smiles in our research, however, did not significantly differ in average mouth-region activation. Thus, apparently the participants in our study did not exclusively rely on the mouth region for making their judgments. To further investigate the role of the eye versus the mouth region, future research may explore whether the sex difference emerges when participants view only the upper vs. lower half of the face.

Moreover, people may judge smile authenticity via other pathways than decoding facial cues. People's emotions, for instance, trigger similar emotions in others (emotional contagion) in part because people automatically mimic the expressions of others (Hatfield, Cacioppo, & Rapson, 1993). Mimicking smiles also helps in judging smile authenticity (Korb et al., 2014). As women are more susceptible to emotional contagion (Doherty, Orimoto, Singelis, Hatfield, & Hebb, 1995), future studies may investigate whether women more accurately judge smile authenticity because of their better mimicry.

As participants judged the single photos first, practice effects might have contributed to their better performance in judging the adjacent photos. Because participants did not receive performance feedback, however, it seems unlikely that their better performance in the second task is due to practice effects entirely. Future work may test whether one can train accuracy in judging smile authenticity by providing performance feedback.

Finally, one may examine the mechanisms for women's better performance. For instance, one could use eye-tracking to test whether women's greater attention to the eyes (J. K. Hall et al., 2009) is a mechanism for the observed difference. In closing, apparently, women not only recognize facial expressions faster and more accurately than men but also more reliably distinguish between genuine and nonauthentic smiles.

## Note

1. The supplementary material and the data for the main study with sufficient information to reproduce the results is available at: https://osf.io/7ugsk.

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