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Identifying a Facial Expression of Flirtation and Its Effect on Men

Parnia Haj-Mohamadi ^a, Omri Gillath^a, and Erika L. Rosenberg^b

^aDepartment of Psychology, University of Kansas; ^bCenter for Mind and Brain, University of California, Davis

ABSTRACT

Internal states may be conveyed to others nonverbally through facial expression. We investigated the existence of a particular facial cue that may be effectively used by women to indicate interest in a man. Across six studies, men generally recognized a female facial expression as representing flirting. Flirtatious expressions receiving low recognition by men differed in morphology from the highly recognized flirting expressions. The discrepancies are indicative of individual differences among women in effectively conveying a flirtatious facial cue and among men in recognizing this cue. The morphology of the highly recognized flirtatious facial expressions, coded using the Facial Action Coding System (FACS), included: a head turned to one side and tilted down slightly, a slight smile, and eyes turned forward (toward the implied target). Results from experimental studies showed that flirtatious facial expressions, as compared with happy or neutral expressions, led to faster identification of sex words by men. These findings support the role of flirtatious expression in communication and mating initiation.

As sexual creatures, people need to secure a mate to reproduce. Securing a sexual mate often necessitates the identification of an appropriate, and preferably available and willing, mate and the communication of interest in them. Effective communication should facilitate mating, whereas ineffective communication could result in negative outcomes for both sides (e.g., error management theory; Hall et al., 2015; Haselton & Buss, 2000). For example, effective communication conveys availability of a specific mate at a specific time (e.g., the swellings of female baboons; Dunbar, 2001), as well as the quality of a potential mate (e.g., peacock's tail or train; Petrie et al., 1991), all of which increase reproductive success. Conversely, ineffective communication can result in missed opportunities. For women, ineffectively conveying interest in a man may cause a woman to miss the opportunity to mate with a high-status man, which could lead to a missed opportunity for acquiring resources for her and her offspring. Ineffective communication also has negative impacts on men, such that a man may miss an opportunity to mate with an available woman, and in turn miss the opportunity to spread his genes and thus produce more offspring (Haselton & Buss, 2000).

One channel through which people can convey interest in a partner is nonverbal communication (Henningesen et al., 2008; Koeppl et al., 1993). Indeed, Moore (2010) recently reviewed ways that nonverbal communication is involved in human courtship. In particular, facial expressions are known to be an indicator of internal states and to play an important role in nonverbal communication (e.g., Ekman, 1992; Gottman et al., 2001), and have been suggested to be an efficient way to facilitate relationship initiation and mate-selection processes

(see Keltner, 2003). To date, little systematic research has examined the specific nonverbal facial cues involved in the initiation of the courtship process.

An effective tactic of conveying interest and getting the attention of a potential mate is often referred to as *flirting* (Moore, 2010). Nonverbal flirting behaviors, such as sustained eye contact, smiling, coy gazing and self-touching were already found to play an important role in the initiation or courtship process (Henningesen et al., 2008; Muehlenhard et al., 1986; Renninger et al., 2004; Tisdale & Sheldon, 2018). Flirting behaviors tend to be displayed by both people involved in the initiation process, providing them with a way to communicate their interest while possibly evoking interest from their potential mate (Keltner & Haidt, 1999; Renninger et al., 2004). Thus, one partner can communicate interest through flirting, potentially leading to a reciprocal response, in turn facilitating the initiation of mating or even a full-fledged relationship.

Flirting is communicative, yet subtle (Speer, 2017; White et al., 2018), leaving open the options for how (or if) to proceed. That is, using flirting, people can convey interest in a subtle way that allows them to easily retreat from the encounter if needed. This subtleness results in ambiguity, such that perceivers can interpret flirting behaviors in different ways such as sexual interest, friendliness, or mere academic interest (e.g., Henningesen et al., 2008). This, in turn, provides time for the initiator to determine if they want to further engage with the potential mate.

The ambiguity in the conveyed message is especially important for women. According to evolutionary theories, a different set of challenges (e.g., increased investment in childrearing such as pregnancy and nursing) motivates women to be more selective than men when choosing

a mate (Trivers, 1972). For example, committing to the “wrong” partner (e.g., one that would not support her and her offspring), or not getting the attention of the “right” partner (e.g., one that could have provided her and her offspring’s needs) can be detrimental to women and their offspring’s success. To enable selectivity, women should be able to control – at least to some extent – the initial interaction in opposite-sex encounters. This allows a woman to choose who would be encouraged to interact with her and to what extent the interaction would be allowed to proceed (Givens, 1978). Hence, a woman who uses cues to increase the likelihood of a man’s approach while “testing the waters” would have an advantage over women who do not use such cues. From an evolutionary perspective (e.g., Buss, 1989), women would have been expected to have developed such cues – cues that manifest as flirting behavior.

Men, conversely, had a different set of challenges to cope with throughout evolution and hence developed different mating goals and strategies. From an evolutionary perspective, selectivity is less important for men: their main goal is to avoid missed mating opportunities. For men, every mating opportunity can potentially result in the attainment of their ultimate evolutionary goal – passing on their genes. Missing such opportunities carries a genetic cost; therefore, men are expected to be highly motivated to detect signs of interest that are conveyed by women (Abbey, 1982; Haselton & Buss, 2000). At the same time, courting a woman who is not interested can result in negative outcomes such as rejection, wasted resources, and even retaliation (Berscheid et al., 1971). Men, therefore, try to avoid these potential negative outcomes by being as accurate as possible in identifying women’s cues of interest. Being successful at correctly identifying interest while minimizing the chance for false-positives would be advantageous for men; thus, men are expected to develop the capability to identify flirtatious cues posed by women. Koeppl et al. (1993) found that men tend to adopt the belief that flirting is an indicant of *invitation*, or a cue to act and avoid missing an opportunity.

Cross-cultural observational research suggests that female flirting cues do exist, and specifically in the form of facial expression: a “coy glance,” involving a downward gaze and a half-smile (Eibl-Eibesfeldt, 1971). In the laboratory, using Eibl-Eibesfeldt’s description of a flirting expression, coders were able to rate interest among women using the number of coy glances (Simpson et al., 1993). Based on this previous work, in the current set of studies, using a variety of methods, we examined whether: (1) a specific facial expression can be generated by women to represent flirting (defined as a subtle cue communicating interest in the courtship process; Studies 1–2); (2) this expression is recognized by men and is distinguishable from other expressions (Study 3); (3) assuming such an expression exists, we wanted to define its morphology using the Facial Action Coding System (FACS; Ekman & Friesen, 1978; Study, p. 4); and (4) assuming it exists, this expression should convey meaning relevant to mating, such that exposing people to flirtatious expressions, compared to happy or neutral expressions, will result in higher accessibility of sex-related words, especially in men (Studies 5–6).

Method

The studies presented here were designed following the procedures of Tracy and Robins’ (2004) identification of a pride expression. A total of 482 pictures were taken of nine female posers. The women were either professional actresses (ones who had specifically participated in Tracy and Robins’ work) or women who, in a preliminary interview, reported having flirted in the past. The pictures consisted of happy and neutral expressions (controls), and flirtatious expressions (experimental) that were made spontaneously by the poser or as instructed by the experimenter. The instructions for posing happiness expressions utilized anatomically-based instructions from the directed facial action task (Ekman et al., 1983). For flirtation, the exact form of which had not yet been specified, we provided anatomically-based suggestions, based on Eibl-Eibesfeldt’s (1971) journals in some pictures, or instructed the poser to generate what she thought was a flirtatious facial expression in other pictures. All posers wore a white t-shirt and were photographed against a blue background. All pictures were cropped so that nothing was visible below the shoulders (see Figure 1). Each picture was then rated by 117 men (M age = 20.57; range 18–41 years) at a large Midwestern university in one of six studies for course credit.

Study 1

The goal of Study 1 was to determine whether men perceived certain facial expressions as indicative of flirting and, if so, to narrow down the large stimulus pool into a smaller number of pictures that were rated as highly representative of a flirtatious facial expression. Specifically, we exposed men to each picture (500 ms) and recorded their immediate reactions to the facial expressions conveyed by the female actresses. This allowed us to capture participants’ ranking of the fit of each picture to each of the three categories (flirt, happy, neutral).

Participants, Materials, and Procedure

Ten men participated in Study 1. Men were presented with 482 pictures in random order on a computer screen. Because we wanted to receive participants’ immediate or gut reaction to the facial expressions, each picture was presented for 500 ms. Following the presentation of the picture, participants rated how well each picture fit with the label: “flirtatious,” “happy,” and “neutral” on a 7-point Likert scale ranging from 1 (*not at all*) to 7 (*extremely*). We included neutral pictures by the same posers to control for the possibility that some women were being perceived as flirtatious regardless of the expression they posed. We also included photos of happy facial expressions (i.e., enjoyment smiles, as per Ekman et al., 1990) to ensure that general positive facial expressions were not perceived as flirtatious by men. The initial set of pictures contained approximately 50% flirtatious expressions ($n = 242$), 25% happy expressions ($n = 120$), and 25% neutral expressions ($n = 120$).

Results

Ratings for flirtatious expressions were averaged across participants. For the 482 pictures, the average ratings of flirtatious



Figure 1. The flirting expression. Figure 1a and 1b depict high recognition flirt faces, rated as flirtatious by 77% and 71% of men, respectively. FACS codes for 1a: 6B + 12 C + 52 C + 54B + 61D + 63 and 1b: 12B + 24A + 51B + 54 C + 62 C + 63. Figure 1c and 1d depict two low recognition faces (8% and 13% recognition, respectively). FACS codes for 1 c: 12D + 25D + 51B + 54B + 55 C + 62 C & 1d: 12A + 51B + 54B + 62B.

expressions ranged from 1.7 to 6.3, with a mean rating of 3.8. The 18 pictures that were rated above the mean on flirting were retained for Study 2.

Study 2

Although Study 1 revealed that certain pictures were more likely than others to be rated as flirtatious, we were unsure of the standard that men used to inform their ratings for flirtatious expressions. Thus, in Study 2, we provided participants with a definition for flirting and then asked them to rate the set of pictures selected on the basis of Study 1. The goal of this study was to further parse our large pool of photographs to uniquely identify flirtatious expressions from happy and neutral expressions with as little overlap as possible.

Participants, Materials, and Procedure

Twenty-six men participated in Study 2. Before showing the photos, we provided participants with a common definition of flirting: “A form of human interaction, usually expressing a sexual or romantic interest in the other person. It can consist of conversation, body language, or brief physical contact. It may be one-sided or reciprocated” (Henningsen et al., 2008). Participants were then presented with 233 pictures of flirtatious, happy, and neutral facial expressions. For each picture, men were asked to imagine seeing the woman with the shown expression at a party or bar and rate how much she fits with the provided definition of flirting. Responses were made on a 5-point Likert scale ranging from 1 (*not at all*) to 5 (*very much*). All pictures were presented on a computer and remained on the screen

until the participant indicated his response. The order of presentation was randomized across participants. Similar to Study 1, approximately half of the pictures included a flirtatious expression ($n = 113$) and the remainder was a mixture of happy ($n = 60$) and neutral expressions ($n = 60$).

Results

Pictures that were rated in the top 10% of the stimulus pool as flirtatious were retained for consideration.¹ Based on ratings from Studies 1 and 2, a total of 18 pictures of six posers were retained as representing a flirtatious facial expression.

Study 3

In Studies 1 and 2, our goal was to narrow down a large stimulus set into a smaller number of pictures rated as representing a flirtatious expression. In our previous studies, men were explicitly asked to rate each picture’s fit with conveying a flirtatious expression. We designed Study 3 to determine whether men would label the expressions in the pictures selected in Studies 1 and 2 as flirtatious *without* initially being prompted. An additional goal was to verify that men were not simply rating the women’s more attractive pictures as indicative of flirtation.

¹In addition to determining the components of a recognizable flirtatious expression, we also wanted to ensure that each poser had a highly rated picture for the “happy” and “neutral” expressions as well. Due to this requirement, some posers were dropped from consideration after Study 2.

Participants, Materials, and Procedure

Twenty-six men were presented with 31 pictures from six female posers (18 of which were rated as flirtatious in the previous studies; 13 of which were rated as non-flirtatious: either happy or neutral expressions). Pictures were randomly presented in two counter balanced blocks and remained on the screen until a response was made by the participant. In one block, participants were presented with the 31 pictures and were asked to think of one word that described what the woman in each picture was trying to convey or express. They responded in an open-ended manner. In the other block, participants were presented with the same pictures and asked to rate how attractive the woman in the picture was on a 7-point Likert scale from 1 (*not at all*) to 7 (*very much*).

Results

Three research assistants coded the open-ended responses to the facial expressions. For each one-word response, its fit with flirtation was rated using a 5-point scale ranging from 1 (*not at all*) to 5 (*very much*) (ICC between raters = .85). Responses that were coded as flirtatious included the following: “flirting,” “attraction,” “interested,” and “aroused.” To determine whether the flirtatious responses occurred above chance level, we followed the method of Tracy and Robins (2004), in which each response was coded as a 1 if it was at or above the scale midpoint of 3 on flirting or as a 0 if it was below the midpoint. A binomial test revealed that 11 of the 18 previously rated flirtatious pictures were rated as flirtatious more than would be expected by chance ($ps < .05$; chance set at 33%).

An additional goal of Study 3 was to verify that flirtatious ratings were independent of the women’s perceived attractiveness. To test whether men labeled expressions as flirtatious as a function of physical attractiveness, we conducted six repeated-measures ANOVAs (i.e., one for each poser) with facial expression as the within-subjects factor (i.e., flirtatious, happy, neutral). Ratings of attractiveness did not differ across photos (all $ps > .15$), suggesting that flirtation ratings were based on the facial expressions posed by the women rather than their perceived attractiveness.

Study 4

In Study 4, we had two goals: (1) to use a different methodology to verify that the pictures chosen as representing flirtation (rated by men in the previous studies) are indeed perceived as flirtation; (2) to determine the specific morphology of an expression recognized as flirtation by men. To obtain these goals, we used only flirtatious expressions and examined which expressions were more likely to be rated as flirtatious from a multiple-choice list of 10 response options. We then used a Facial Action Coding System (FACS; Ekman & Friesen, 1978) to capture the unique components of the perceived flirtatious facial expressions from the previous studies. This allowed us to obtain the highest flirtatious expressions and provide an explicit analysis of what constitutes a flirtatious expression.

Participants, Materials, and Procedure

Based on the previous three studies, 48 men were presented with 16 pictures and were asked to select from a list what the woman in the picture was expressing. The pictures were randomly presented on a computer screen. Each picture remained on the screen until the participant made a response. The response options were derived from emotions validated in previous studies (e.g., Ekman et al., 1969; Keltner, 1995) as well as the open-ended responses from Study 3 (e.g., embarrassed, confusion, excitement).

Nine pictures with an expression previously rated as flirtatious were included.² To ensure variation in the flirtatious expressions presented, four of the pictures had been rated as representing flirting in all three previous studies, while five of the pictures had been rated as flirting in only one previous study (thus had lower recognizability as a flirtatious expression). Having variability in the flirtatious expressions was expected to allow us to compare the morphology of highly recognizable flirtatious expressions versus less recognizable ones. For each picture, participants were asked to rate the expression by choosing one of the following 10 options: happiness, anger, flirtatious, embarrassed, surprise, sadness, pride, excitement, confusion, or none.

Results

To determine if any expressions were recognized as flirtation, we converted the responses into binomials, dummy coding “flirtatious” responses as 1 and all other responses as 0. A binomial test, with a conservatively set 50% threshold, revealed that only two expressions were recognized as flirtation significantly more often than would be expected by chance, both binomial $ps < .01$. These two pictures had also been rated as flirtatious in the previous three studies.

The two pictures recognized as flirtation received the “flirtatious” selection by 77% (Figure 1a) and 71% (Figure 1b) of men, which is within a typical range for agreement in recognition of facial expressions (see Ekman et al., 1987). An expert (third author Rosenberg) coded all faces using FACS. Another coder, blind to the study and hypotheses, coded a subset of the pictures as well. Inter-coder agreement using a ratio of the total number of agreements between coders/total number of agreements plus disagreement was .93 (Wexler, 1972). The FACS coding revealed a common morphology among the two highly recognized flirtatious expressions, which consisted of: a head turned to one side, head tilted down slightly, a slight smile, and eyes turned forward (toward the implied target). When the morphology of faces with lower recognition as flirtation (8% and 13%; Figure 1c and 1d, respectively) was contrasted with high recognition faces, the lower recognition faces showed smiles that were either much more intense, very subtle, less head tilt, or showed the head tilted up rather than down.

²A pretest on recognition was conducted in which two of the 11 pictures from Study 3 were rated as being neutral and were not included in the final study.

Study 5

Studies 1–4 demonstrated that a flirtatious facial expression has unique characteristics, rendering it different from happy or neutral expressions. According to theory (Keltner & Haidt, 1999), flirtatious expressions are supposed to communicate interest and sexual availability to potential mates. In other words, viewing a flirtatious facial expression should activate sex-related association networks. Using the identified expression and pictures, in Study 5 we tested this proposition by exposing participants to a flirtatious facial expression, as compared to a happy expression, and subsequently measured the cognitive accessibility for sex-related words. We used a 2×2 factorial design with prime type (flirtatious, happy expression) and target word (sex, neutral) as the within-subjects factors. We expected that exposure to flirtatious expressions, compared to happy expressions, would result in higher cognitive accessibility of sex-related words, as demonstrated by faster reaction times for sex-related words versus neutral words.

Participants, Materials, and Procedure

Fifty-five male participants (age range 18–28; M age = 19.67 years) completed the study in return for class credit. Participants were invited individually to the laboratory to take part in a study about “communication strategies.” After consenting, participants received instructions for a computerized lexical decision task (see Schvaneveldt & Meyer, 1973) that stated:

For the following study, your task is to determine as quickly and accurately as possible, whether a string of letters appearing on the screen is a word or not. You will see a flashing image, then a string of letters. Sometimes the letters will spell out a word, but other times it will not be a word. We are interested in how quickly you can respond to whether it is a word or not.

The lexical decision-making task consisted of 131 trials – five practice trials followed by 126 experimental trials. Each trial started with a fixation “X” presented for 500 ms, followed by the prime images, which were either a flirtatious facial expression (50% of the trials) or a happy facial expression (50% of the trials) for 25 ms. The prime presentation was followed by a mask presented for 500 ms (a visual “noise” pattern that was used to reduce the possibility that an afterimage remains on the retina). Participants were then presented with a target letter string and were asked to indicate whether the letter string was a proper English word (by pressing 1) or a non-word (by pressing 3) as fast as they could. Target letter words appeared in size 20 Tahoma regular font in black lettering in the center of the screen on a white background. There was a total of 63 target words across two categories: sex-related words (e.g., orgasm) and neutral words (e.g., journal). All words were selected from the Affective Norms for English Words (ANEW; Bradley & Lang, 1999). The task was run on an IBM PC Pentium III computer with a SVGA color screen using SuperLab Pro 2.0 program (Cedrus Corporation, San Pedro, CA). Participants worked at their own pace.

Results

To test our prediction that exposure to a flirtatious facial expression, compared to a happy expression, leads to higher accessibility of sex-related words, we conducted a repeated measures ANOVA with target word (sex, neutral) and prime type (flirtatious, happy expression) as the within-subjects factors.³ A significant main effect of target word emerged, $F(1, 54) = 14.87, p = .0001, \eta_p^2 = .22$, in which sex words were identified faster than neutral words. This effect was qualified by a two-way interaction between prime type and target word, $F(1, 54) = 4.64, p = .036, \eta_p^2 = .08$. No main effect of prime emerged, $F(1, 54) = .006, p = .94, \eta_p^2 = .00$.

A series of pairwise comparisons between the target words and prime type were conducted to probe the interaction. Findings from post-hoc comparisons revealed that flirtatious expressions led to significantly faster reaction times for sex target words ($M = 601.50$ ms, $SD = 110.54$) compared to neutral words ($M = 653.14$ ms, $SD = 151.97$), $F(1, 54) = 18.64, p = .0001, \eta_p^2 = .26$. Happy expression primes also led to faster reaction times for sex words ($M = 616.11$ ms, $SD = 120.98$) compared to neutral words ($M = 639.76$ ms, $SD = 139.50$), $F(1, 54) = 4.24, p = .044, \eta_p^2 = .07$. Mean reaction times for sex target words in the flirtatious prime condition compared to the happy condition reflected a nonsignificant marginal trend in the predicted direction, $t(54) = -1.55, p = .128$. A difference score of reaction times between sex and neutral target words was created for the flirt condition and happy condition to determine whether the difference in reaction times was stronger in the flirt versus happy condition. Differences in reaction times between sex and neutral target words were significantly larger in the flirt condition ($M = -51.64, SD = 88.72$) compared to the happy condition ($M = -23.65, SD = 85.20$), $t(54) = -2.15, p = .036, 95\% \text{ CI} [-54.05, -1.93]$. See Figure 2 for a depiction of the mean reaction times across condition.

Study 5 was designed to test whether priming men with flirtatious vs. happy facial expressions lead to faster reaction times for identifying sex-related words. Results supported our hypothesis that men showed significantly faster reaction times for sex-related target words (e.g., orgasm) compared to neutral target words (e.g., journal) after being primed with flirtatious expressions. Although men also identified sex words faster than neutral words in the happy prime condition, the difference in reaction times for identifying sex-related target words between the flirtatious and the happy expression conditions approached significance in the predicted direction. The identification of sex target words, compared to neutral words, was significantly faster after exposure to flirtatious expressions compared to happy expressions. These results support our general prediction that being primed with a flirtatious facial

³The goal of using the lexical decision task was to determine whether priming flirting would result in faster responses to sex-related words compared to a neutral, unrelated word. After data collection was complete, we realized that the lexical-decision task did not include non-words, as noted in the instructions. We do not expect this omission to affect the findings reported, given that the objective of this study focused on semantic accessibility rather than semantic processing. Nonetheless, Study 6 was conducted as a follow-up study that included non-words in addition to sex and neutral words to address this limitation.

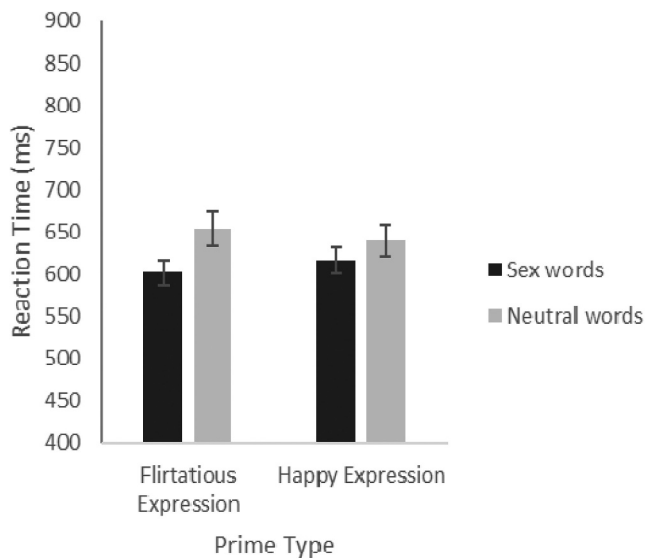


Figure 2. Study 5 findings for mean reaction times across prime condition. Error bars represent standard errors.

expression activates sex-related semantic networks in the brain, which heightens the accessibility of sex-related words, and hence leads to faster reaction times for identifying sex target words.

Study 6

In Study 5, we learned that men had significantly faster reaction times for detecting sex target words compared to neutral words when primed with a flirting facial expression. In Study 6, we wanted to further test this hypothesis using a mixed-subjects design. Specifically, in Study 6, we compared the effect of flirtatious expressions to happy and neutral expressions on the accessibility of sex target words. Flirtatious expressions, compared to happy and neutral expressions, were expected to result in faster identification of sex-related words compared to neutral or non-words.

Participants, Materials, and Procedure

A total of 72 male undergraduate students from the University of Kansas were recruited from the university subject pool. Similar to Study 5, participants were asked to participate in a study about “communication strategies.” Participants received course credit for their participation.

Participants came to the lab and were randomly assigned to one of three priming conditions: flirting facial expression ($n = 24$), happy facial expression ($n = 25$), or a neutral facial expression ($n = 23$). Next, participants completed the same computerized lexical decision task in SuperLab (Cedrus Corporation, San Pedro, CA) as in Study 5. Similar to Study 5, each trial started with a fixation x presented for 500 ms, followed by the prime images, which were either a flirtatious facial expression, happy facial expression, or neutral facial expression, depending on condition, presented for 25 ms. The prime presentation was followed by a mask presented for 500 ms. Participants then indicated whether the letter string was a proper English word

(by pressing 1) or a non-word (by pressing 3) as fast as they could. Across 80 trials participants saw either sex (e.g., naked), neutral (e.g., key), or non-words (e.g., vderi). Target words were selected from the ANEW database (Bradley & Lang, 1999).

Results

We hypothesized that people who were primed with a flirtatious facial expression, compared to a happy or neutral facial expression, would exhibit faster reaction times for recognizing sex words compared to neutral or non-words. To test our prediction, we conducted a 3×3 mixed factorial analysis of variance with prime type (flirting expression, happy expression, and neutral expression) as the between-subjects factor and target word (sex, neutral, non-word) as the within-subjects factor. Results revealed a main effect of word type, $F(1.84, 126.69) = 9.286$, $p = .0001$, $\eta_p^2 = .12$, in which sex words were identified faster than neutral or non-words; but no main effect of prime type, $F(2, 69) = .340$, $p = .713$, $\eta_p^2 = .01$. The main effect of word type was qualified by a nonsignificant trend between word type and prime, $F(3.67, 126.69) = 2.18$, $p = .08$, $\eta_p^2 = .06$.

As expected, sex words ($M = 698.29$ ms, $SD = 37.87$) were identified faster as words than neutral words ($M = 732.10$ ms, $SD = 33.91$) when primed with a flirtatious expression, $p = .02$, 95% CI $[-63.11, -4.51]$. Reaction times for sex and neutral words did not differ in the happy expression ($p = .11$) or neutral expression prime conditions ($p = .74$). Men responded faster to sex words ($M = 730.42$ ms, $SD = 37.10$) than non-words ($M = 768.15$ ms, $SD = 38.63$) in the neutral expression condition, $p = .05$, 95% CI $[-74.91, -.54]$. Men also responded faster to sex words ($M = 740.28$ ms, $SD = 38.68$) than non-words ($M = 802.51$ ms, $SD = 40.28$) in the happy expression condition, $p = .002$, 95% CI $[-101.00, -23.47]$. Identification of sex target words did not differ from neutral words in the happy or neutral prime conditions, $ps > .05$. See Figure 3 for a depiction of the mean reaction times across condition.

General Discussion

Six studies, using a variety of methods, allowed us to identify two facial expressions consistently recognizable by men as flirtation. The highly recognized flirtatious expressions exhibited distinct similarities with previously observed flirtatious expressions, including key elements described by Eibl-Eibesfeldt (1971). The specific morphology of the highly recognized expression included a head turned to one side, head tilted down slightly, a slight smile, and eyes turned forward (toward the implied target). Both chosen pictures involved minor body turns as well. Notably, only one of the expressions contained features of a Duchenne’s smile, indicative of felt enjoyment (Figure 1a; Ekman et al., 1990); however, it is unclear if this difference is suggestive of two forms or motivations for flirting, or if it is an artifact of posing. The fact that men consistently indicated a particular form of expression as flirting suggests that this nonverbal behavior may be a part of an evolved set of behaviors designed to facilitate the initiation of relationships.

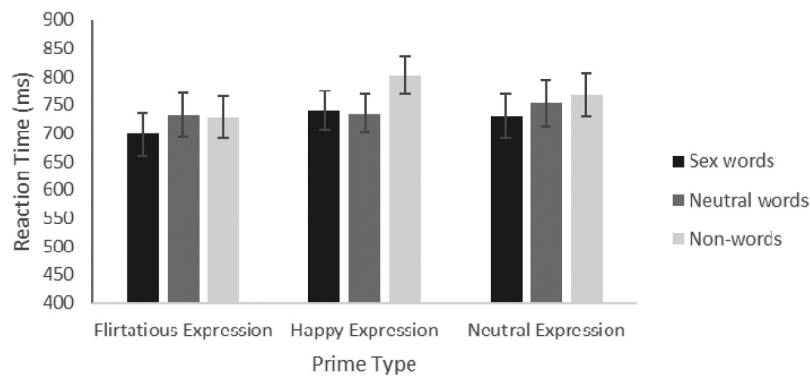


Figure 3. Study 6 findings for mean reaction times across prime condition. Error bars represent standard errors.

Observable differences in morphology were found between high and low recognition flirting expressions. Low recognition expressions appeared either too ambiguous (Figure 1d) resulting in participants being unable to label the expression as conveying anything consistently, or too happy (Figure 1c), potentially resulting in the expression being interpreted as purely friendly. Thus, expressions that contain some components of the flirting expression, but are too subtle, may be interpreted as flirting only by men with a very low threshold for perceiving signs of interest. In contrast, flirting in a way that demonstrates too much of one of these components (e.g., Figure 1c), such as smiling, may end up being interpreted as happiness, missing the courtship-related cue. Further research is needed to discriminate among these various explanations.

Flirtatious facial expressions activated sex-related schemas as shown by faster identification of sex-related words compared to neutral words (Studies 5 and 6). These findings suggest that flirtatious expressions in women convey interest and are successfully acknowledged by men. Although women's motives for flirting may not always be sex-related (e.g., see Hall et al., 2010; Henningsen, 2004), men are more inclined to perceive flirtatious expressions as an indication of sexual interest (e.g., Henningsen et al., 2008) and believe that flirting is an invitation to initiate sexual relationships with women (Koeppel et al., 1993). Sex words were also identified faster than non-words, which may be due to men's greater inclination to interpret women's behaviors as more sexual in cross-sex interactions (Abbey, 1982; Henningsen, 2004; Koeppel et al., 1993; Shotland & Craig, 1988).

Flirtatious facial expressions are subtle and ambiguous; this allows women to communicate their potential interest while keeping a buffer of safety. Men were able to recognize this subtlety in flirtatious expressions as compared to happy or neutral expressions. Men's ability to recognize ambiguous and subtle flirtatious cues is consistent with evolutionary perspectives that men strive to avoid missing opportunities for mating.

Notably, flirtatious expressions, compared to happy or neutral expressions, resulted in trends toward faster identification of sex-related words. In other words, men detected the subtle differences between the flirtatious and happy expressions and responded faster to the flirting females. These findings are in line with work showing that men are most likely to interpret

flirtation as an invitation, or an opportunity to take action and initiate a relationship with women (Henningsen et al., 2008; Koeppel et al., 1993).

Limitations and Future Directions

We do not claim the universal existence of a specific flirting expression or intend to suggest that other behaviors are not equally or more important in courtship; rather, we contend that this facial expression may be a particular, recognizable component of the flirting process and facilitate mate selection. To further validate the flirting expression, cross-cultural evidence is needed. Findings should also be replicated using members of different age groups and non-university samples to provide further generalizability. In addition, the stimuli in the current studies were posed expressions generated by volunteers. Images of spontaneously generated flirting expressions in a natural setting are needed and would likely provide not only external validity, but also further information on individual differences in the ability to generate this expression.

Although we focused here on off-line face-to-face flirting, flirtation can also be conveyed nonverbally in online settings (e.g., chat rooms) through the use of flirtatious emoticons and flattery (Ben-Ze'ev, 2004; Whitty, 2003, 2004) or by controlling self-presentation on online platforms (e.g., Facebook; Abbasi & Alghamdi, 2017). Indeed, work suggests that virtual flirtation elicits greater sexual reactions compared to in-person flirtation (Alapack et al., 2005). Future research should compare our identified expression with other formats of flirting. Future work should also consider the facial morphology of online dating profiles and whether those who display flirtatious facial expressions have greater success with securing dates, as measured by the number of likes or messages received from interested males.

Another limitation of the current work has to do with the lack of diversity of our posers. Future research should use posers of different backgrounds, as the posers here were all European Americans from a similar SES and background. Ekman and Keltner's (1997) seminal paper on the universality of emotions suggested that facial expressions should not vary cross-culturally. Nevertheless, future work should examine whether nuanced expressions (i.e., flirtatious expressions)

vary across posers of different backgrounds in terms of the distinctiveness and recognizability of the expression among men.

Another limitation is that we did not measure the sexual orientation of the judges. The argument outlined here is in line with heterosexual mating behavior; however, we did not measure sexual orientation or gender identity. We do not know for certain that all male judges identified only as male or only as heterosexual, and we do not know how well these findings generalize to other types of attraction. Future work should also look at the use of flirting among people of varied gender identities and the role of sexual orientation (e.g., in same-sex men relationships).

Some expressions in our research were rated as flirtatious in some studies, but not in others. This suggests that there is more than one way to signal interest in a mate and there are individual differences in both men's recognition of a flirting expression and women's expression of a flirting facial cue. Women who are more comfortable in the dating context, for example, might be more skilled at displaying an effective flirtatious facial expression. Alternatively, being better able to communicate interest via a flirtatious expression could be the result of experience (e.g., determining the facial expression that receives the most positive feedback). A third option can be that the flirting expression could be spontaneously generated by some women more effectively than others, resulting in some women having a more difficult time signaling interest to men.

In addition to learning more about individual differences in effective signaling among women, additional research could also provide a greater understanding of the differences in interpreting flirtatious expressions in men. Perhaps men with a higher preference for a short-term mating strategy or those with higher levels of sociosexuality (i.e., permissive sexual attitudes) have a lower threshold for recognizing a flirting expression, allowing them to feel greater confidence in pursuing more mates. Recognition of flirtatious expressions may also vary based on relationship status (i.e., single, dating, married). Motivations for flirting have been studied in married couples (Frisby, 2009; Frisby & Booth-Butterfield, 2012), though the success of recognizing a flirtatious expression is unknown. Relationship status was not assessed in the present work, therefore there may have been group differences between single and non-single partners that we are unaware of. Future research, taking into account the FACS differences between high and low recognition flirting expressions, could provide insight into the reasons for discrepant success rates among people interested in initiating relationships.

The current set of studies focused on flirtatious expressions signaled by women (presumably) toward men. Based on sexual selection theory, we would expect that women and men would have different strategies and goals in courtship. Thus, we would not expect the same expression to be mimicked in men. Future research should explore a facial expression among men that is displayed during courtship and recognized by women as a flirting cue. While the expression among women has components of submissiveness (e.g., head tilted down), a man's flirtatious expression might have more dominant components and a goal of generating maximum interest and attraction rather than of maximizing selection.

In conclusion, our results show that men consistently rated a small subset of pictures as flirtatious. There were other pictures we used that were rated as flirtatious by some but not by others, suggesting that the universality of the expression is highly specific. The FACS based similarity among the highly rated flirting expressions and their differences from the other expressions suggest there is indeed a specific morphology involved in the effective signaling and recognition of female interest. Exposure to flirtatious expressions, compared to happy or neutral expressions, resulted in higher accessibility of sex-related words compared to neutral words in men. Although further research is needed, our studies serve as an important first step in identifying the existence and morphology of flirtatious cues and their effect on men.

ORCID

Parnia Haj-Mohamadi  <http://orcid.org/0000-0002-3133-7648>

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