Emotion

Faces In-Between: Evaluations Reflect the Interplay of Facial Features and Task-Dependent Fluency

Piotr Winkielman, Michal Olszanowski, and Mateusz Gola

Online First Publication, February 2, 2015. http://dx.doi.org/10.1037/emo0000036

Emotion

1528-3542/15/$12.00 http://dx.doi.org/10.1037/emo0000036

Faces In-Between: Evaluations Reflect the Interplay of Facial Features and Task-Dependent Fluency

Piotr Winkielman
University of California, San Diego, and University of Social Sciences and Humanities and Warwick Business School

Michal Olszanowski
University of Social Sciences and Humanities, Warsaw, Poland

Mateusz Gola
Polish Academy of Science

Facial features influence social evaluations. For example, faces are rated as more attractive and trustworthy when they have more smiling features and also more female features. However, the influence of facial features on evaluations should be qualified by the affective consequences of fluency (cognitive ease) with which such features are processed. Further, fluency (along with its affective consequences) should depend on whether the current task highlights conflict between specific features. Four experiments are presented. In 3 experiments, participants saw faces varying in expressions ranging from pure anger, through mixed expression, to pure happiness. Perceivers first categorized faces either on a control dimension, or an emotional dimension (angry/happy). Thus, the emotional categorization task made "pure" expressions fluent and "mixed" expressions disfluent. Next, participants made social evaluations. Results show that after emotional categorization, but not control categorization, targets with mixed expressions are relatively devalued. Further, this effect is mediated by categorization disfluency. Additional data from facial electromyography reveal that on a basic physiological level, affective devaluation of mixed expressions is driven by their objective ambiguity. The fourth experiment shows that the relative devaluation of mixed faces that vary in gender ambiguity requires a gender categorization task. Overall, these studies highlight that the impact of facial features on evaluation is qualified by their fluency, and that the fluency of features is a function of the current task. The discussion highlights the implications of these findings for research on emotional reactions to ambiguity.

Keywords: facial expressions, fluency, trust, attractiveness, facial electromyography

You've got to accentuate the positive

Eliminate the negative

Latch on to the affirmative

Don't mess with Mister In-Between.
—*Accentuate the Positive*, song by Bing Crosby (words and music by Harold Arlen and Johnny Mercer)

How do people construct social evaluations? Objective features of a target clearly matter, and adding positively valued features usually increases targets' ratings (Anderson, 1981). On the other hand, processing experiences also matter (Schwarz, 2007, 2015; Winkielman & Schwarz, 2001). Much research shows that easy, highly fluent processing enhances evaluations, presumably reflecting a (mis)attribution of fluency-based affect to target characteristics (Winkielman, Schwarz, Fazendeiro, & Reber, 2003). Here, we explore three aspects of how fluency interacts with value of the features.

First, we show that disfluency can arise from the presence of features with mixed valence within the same target. Consequently, "mixed" targets become relatively devalued, compared to "pure" targets. This allows us also to highlight a novel, nonintuitive phenomenon where negative targets fail to benefit from adding more positive features, when those added positive features conflict with preexisting negative features, triggering disfluency. Second, we show that the process by which a mixed-value target triggers disfluency (and resultant devaluation) is task-dependent. This underscores that fluency effects are not driven by the global processing of a target but by the current task. Third, we explore these processes in a central domain for research on social evaluations—judgments of attractiveness and trust from valence-related facial features, such as emotional expressions and gender cues.

Piotr Winkielman, Department of Psychology, University of California, San Diego, Department of Psychology, University of Social Sciences and Humanities and Behavioural Science Group, Warwick Business School, University of Warwick; Michal Olszanowski, Department of Psychology, University of Social Sciences and Humanities, Warsaw, Poland; Mateusz Gola, Institute of Psychology, Polish Academy of Science.

This research was supported by National Science Center, Poland (Grant 2011/01/B/HS6/0335 to Piotr Winkielman, Michal Olszanowski, and Mateusz Gola). We appreciate help of Evan Carr, Jamin Halberstadt, Galit Hofree, Olga Kamińska, Liam Kavanagh, and our research assistants.

Correspondence concerning this article should be addressed to Piotr Winkielman, Psychology Department, University of California, San Diego, 9500 Gilman Drive, La Jolla, CA 92093-0109. E-mail: pwinkiel@ucsd.edu

Faces, Features, and Fluency

It has long been known that certain facial features (e.g., expressive cues, age cues, or gender cues) influence basic affective and motivational responses (Darwin, 1872/1962; Ekman & Oster, 1979; Keltner & Haidt, 1999). Such facial features also influence a wide variety of social judgments. As examples, increased smiling or a greater presence of female features tends to enhance attractiveness ratings—a key dimension not only in personal relationships but also in many professional situations (O'Doherty et al., 2003; Reis et al., 1990). Expression-related and gender-related features also influence judgments of internal dispositions, such as trustworthiness (Ambady & Weisbuch, 2011; Boone & Buck, 2003; Knutson, 1996; LaFrance & Hecht, 1995; Todorov, Said, Engell, & Oosterhof, 2008). This is important as trust is another key dimension in social interactions, including relationships, trade, politics, and governance (Rezlescu, Duchaine, Olivola, & Chater, 2012; Wojciszke, Bazinska, & Jaworski, 1998).

Importantly, faces usually contain many mixed features. Thus, expressions in life and in art (e.g., Mona Lisa) are frequently emotion blends (Aviezer et al., 2008; Russell, 1997; Sebe et al., 2007). As a result, emotion expression are often ambiguous and susceptible to the influence of contextual and conceptual information (e.g., Barrett & Kensinger, 2010; Halberstadt & Niedenthal, 2001; Halberstadt, Winkielman, Niedenthal, & Dalle, 2009; for a recent review, see Hassin, Aviezer, & Bentin, 2013). Similarly, faces can be ambiguous on the dimension of gender, blending both male and female features (Ambady & Weisbuch, 2011). This property makes faces an ideal and important stimulus to investigate the interplay of stimulus features and processing fluency and their effects on social evaluations.

Recent studies suggest that social evaluations are influenced by the fluency with which valence-neutral features of faces are processed. For instance, when presented with a morph of two neutral faces, participants generally rate the blend as more attractive (i.e., the "beauty-in-averageness" effect). However, when the original faces are famous (e.g., morphs of two celebrities), the effect reverses and turns into the "ugliness-in-averageness" effect (Halberstadt, Pecher, Zeelenberg, Ip Wai, & Winkielman, 2013). Presumably, this occurs because a morph of two well-known individuals contains competing visual features, which spontaneously (i.e., in a pop-out fashion) elicit both perceptual and categorization difficulty. As a result, this difficulty triggers negative affect, which generalizes to the target's attractiveness. It is also experimentally possible to decrease evaluation of a blend between two nonfamous neutral individuals. However, this effect does not occur spontaneously and requires that participants are first led to experience some difficulty in resolving categorical membership of the blend (Halberstadt & Winkielman, 2014). In the case of a mix between two individuals, this can be done by asking participants to determine the families contributing to the blend (e.g., asking the participant to classify "Acks vs. Blubs"), or in the case of mixed-race individuals, the race of the blend (e.g., asking the participant to classify "White vs. Asian").

The logic just described should apply to blends of faces with features related to valence (such as smiling) and gender (such as femaleness). When such features become disfluent, this fluency-induced negative affect should generalize to participants' evaluations of the target. If so, the current research identifies a new empirical phenomenon: Devaluation of mixed-valence faces. This is also theoretically interesting, as it qualifies the familiar logic of information integration where adding positive features typically increases target evaluation (Anderson, 1981).

Task-Dependent Fluency

Our research also explores the phenomenon of task-dependent fluency. Note that stimuli, such as faces containing mixed features, can be *objectively* ambiguous. However, whether a particular stimulus is *subjectively* fluent or disfluent is task-dependent. After all, the same stimulus may be fluent on one dimension and disfluent on another. This raises the intriguing theoretical possibility that fluency is not a function of objective features and general stimulus processing, but instead depends on the current task which highlights relevant dimensions.

Let us illustrate this with an example (see Figure 1 for a hypothetical pattern of results): Consider a clearly female target expressing a blend of anger and happiness (intermediate morph). If a perceiver focuses on gender, the expression ambiguity will *not* cause disfluency and its negative affective or judgmental consequences. However, if a perceiver instead focuses on emotion, the mixed expression will cause disfluency, resulting in devaluation. Therefore, all things held equal, emotionally mixed expressions should be relatively judged as more negative while pure expressions should be relatively judged as more positive. Critically, this effect should occur when the judgment follows a specific task that generates subjective disfluency on the specific dimension of-interest (i.e., in the current example, emotional categorization). In turn, when the target's gender is the ambiguous dimension, focusing on male–female discrimination should cause disfluency and devaluation of intermediate morphs. We will return to this issue in the discussion.

Note that the final judgment should reflect a combination of fluency-based evaluations and feature-based evaluations. As mentioned, adding positively valenced features, such as smiling or femaleness, should generally increase evaluations. However, this effect should be modified when mixed-features are made disfluent

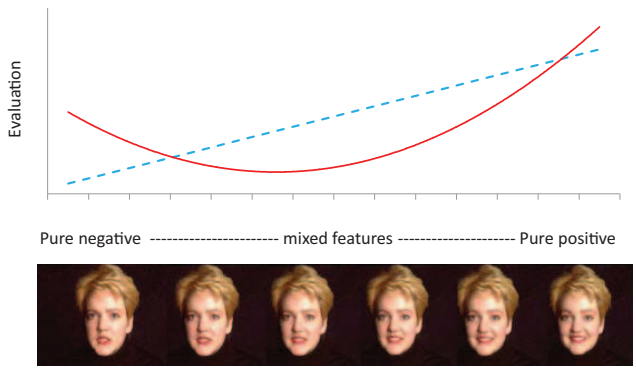

Figure 1. Hypothetical pattern for evaluation as a function of facial features and categorization on an experimental dimension (e.g., expression: solid red line) or control dimension (e.g., gender: blue dashed line). Images courtesy of Halberstadt and Niedenthal, 2001. See the online article for the color version of this figure.

by the task. As shown in Figure 1, this should result in a quadratic (U-shaped) relation between positivity of features and evaluation (see Figure 1).

Current Research

We explored the interplay of features and fluency in four experiments. In all studies, participants made social evaluations from faces, but we varied the stimulus dimensions. In Experiments 1, 2, and 3, faces varied on emotional expressions that ranged from pure anger through mixed expression to pure happiness. In Experiment 4, faces varied on gender from pure male through mixed gender to pure female. As a fluency manipulation, participants first categorized each face on either the varied dimension or some control dimension (or performed no categorization at all). Next, participants made different judgments, including attractiveness and trustworthiness. We predicted that mixed faces would elicit disfluency, but only when the categorization task focused on mixed dimension. In this condition, disfluency should lead to a relative devaluation of mixed expressions. We assessed these effects with social judgments, but also with a physiological method: facial electromyography (EMG), which can capture participants' underlying affective reactions implicitly and with high temporal resolution (Experiment 3).

Experiment 1

This experiment tested how valence-related features and task-dependent fluency influence attractiveness and trust judgments. Following previous research, we expected faces with more smiling features to be rated as both more attractive and more trustworthy. Critically though, we predicted that fluency would qualify the influence of expression features. Specifically, mixed expressions should be relatively devalued, but *only* when made disfluent by the relevant categorization task.

Method

Twenty-nine students from the University of Social Sciences and Humanities in Warsaw, Poland, participated for course credit. Stimuli came from five separate individuals, and they represented their pure expressions of anger and happiness along with three intermediate blends (66% anger, 50/50, and 66% happiness). On each trial, a face appeared for 2,000 ms, followed by a categorization question. The categorization type was manipulated between-subjects, and the question asked about either (a) the target's gender (i.e., male vs. female), or (b) the target's expression (i.e., angry vs. happy). Next, two questions appeared on the screen: (a) "Is this person attractive?" and (b) "Is this person trustworthy?" Participants responded with a mouse by moving a 100-point slider, anchored from "no" to "yes." In total, each participant progressed through 85 trials.

Results

All data were analyzed using a 2 (Categorization: expression vs. gender, between-subjects) × 5 (Valence: from pure anger through mixed to happiness, within-subjects) mixed-model ANOVA. As mentioned, we predicted that in the expression categorization condition, judgmental responses to valence would take a *U*-shaped form (inverse-*U* for fluency). Thus, we tested for quadratic contrasts on valence and their interaction with categorization condition (via the within-subjects contrast option in SPSS).

Fluency. We first computed each subject's log-reaction-times (RTs) on the categorization task (to reduce the impact of outliers and individual differences) and then averaged log-RTs for each stimulus type. As expected, fluency of mixed expressions depended on the categorization condition (see Figure 2a). In the emotion condition, categorization of mixed expressions took longer than pure expressions. This quadratic (inverse *U*-shape) contrast was significant, $F(1, 13) = 18.9$, $p < .001$, $\eta^2 = .59$. In the gender categorization condition, valence had no impact on RTs. This pattern yielded an interaction of quadratic contrast on valence with categorization, $F(1, 27) = 8.31$, $p < .01$, $\eta^2 = .24$.

Judgments. Judgments of attractiveness and trust were highly correlated, $r = .47$, $p < .001$, and there were no interactions involving judgment type. Thus, in the first analysis, we combined attractiveness and trust. Figure 2b shows that in the gender categorization condition, more smiling led to increasingly higher evaluations, yielding a linear contrast, $F(1, 14) = 14.14$, $p < .01$, $\eta^2 = .5$. Critically, in emotion categorization condition, the evaluation was *U*-shaped, yielding a quadratic contrast, $F(1, 13) = 18.62$, $p < .01$, $\eta^2 = .59$; linear contrast, $F(1, 13) = 15.62$, $p < .01$, $\eta^2 = .53$. This difference produced an interaction of quadratic contrast on valence with categorization, $F(1, 27) = 6.09$, $p < .05$, $\eta^2 = .2$.

Similar effects held when judgments were analyzed separately. On attractiveness, the gender categorization condition showed a

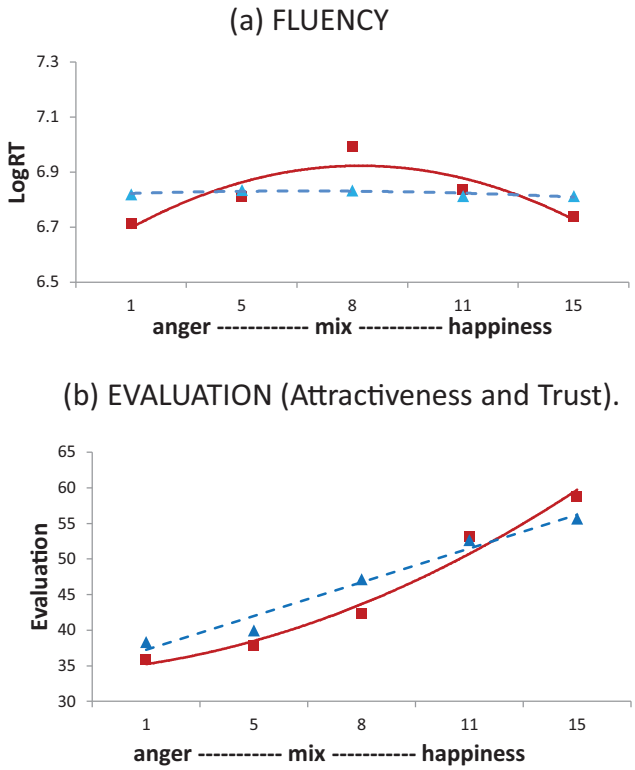

Figure 2. Experiment 1 results on (a) fluency and (b) evaluation. Responses shown as a function of target features (smiling) and categorization condition (expression: solid red; gender: dashed blue. Lines reflect estimated trend. See the online article for the color version of this figure.

linear effect, $F(1, 14) = 8.73$, $p < .05$, $\eta^2 = .38$. The expression categorization condition showed a *U*-shaped quadratic effect, $F(1, 13) = 7.81$, $p < .05$, $\eta^2 = .37$; linear, $F(1, 13) = 12.49$, $p < .01$, $\eta^2 = .49$). This pattern yielded a quadratic Valence × Categorization interaction, $F(1, 27) = 7.33$, $p < .05$, $\eta^2 = .21$. On trust, the gender categorization condition showed a linear effect, $F(1, 14) = 17.35$, $p < .01$, $\eta^2 = .55$. The expression categorization condition showed a *U*-shaped, quadratic effect, $F(1, 13) = 26.59$, $p < .001$, $\eta^2 = .67$; linear, $F(1, 13) = 17.51$, $p < .01$, $\eta^2 = .57$, and a quadratic Valence × Categorization interaction, $F(1, 27) = 7.44$, $p < .05$, $\eta^2 = .22$.

We tested whether fluency mediated the relationship between emotion mixedness and evaluation within emotion categorization condition. Bootstrap analyses of the sampling distribution were employed to test the indirect mediating effect by estimating the 95% confidence interval (CI) around the effect using the SPSS macros provided by Preacher and Hayes (2008). Our predictor was *mixedness*, ranging from 1 (*pure angry and pure happy*) to 3 (*maximally blended*). Our dependent measure was *evaluation* (attractiveness and trust). Our mediator was *fluency* (categorization log-RTs). This yields three paths: (a) mixedness–fluency, (b) fluency–evaluation, and (c) mixedness–evaluation. We will use the same path terminology throughout the article.

The direct effect of the mixedness on evaluation (*c*-path) was significant in case of trust ($\beta = -.80$, $p < .001$, $SE = .156$) and attractiveness ($\beta = -.31$, $p < .05$, $SE = .151$). The direct effect of mixedness on fluency (*a*-path) was statistically significant ($\beta = .03$, $p < .001$, $SE = .004$), and the direct effect of fluency on evaluation (*b*-path) was statistically significant for trust ($\beta = -2.61$, $p < .01$, $SE = .794$) and attractiveness ($\beta = -2.29$, $p < .05$, $SE = .761$). Lastly, the effect of mixedness on evaluation when controlling for the effect of fluency (c'-path) was reduced to nonsignificance for attractiveness ($\beta = -.24$, $p = .114$, $SE = .153$) and reduced but still significant in the case of trust ($\beta = -.72$, $p < .001$, $SE = .160$), compared with the significant direct effect of mixedness on evaluation. The bootstrap analysis indicated that categorization fluency (log-RTs) partially mediated the relationship between purity of expression and evaluation, as confidence intervals did not include zero for attractiveness ($M = -.0697$, $SE = .0231$, 95% CI [–.118, −.028]) and for trust ($M = -.0775$, $SE = .0230$, 95% CI [–.133, −.039]). Separate analyses for gender categorization condition did not reveal any mediation effects.

Discussion

Experiment 1 showed the interplay of valenced features and processing fluency on two important social judgments made from facial expressions—attractiveness and trust. Replicating previous research, these judgments were enhanced by expression-related features, with smiling faces rated as more attractive and more trustworthy than angry faces (Reis et al., 1990; Todorov et al., 2008). Critically, the effect of features was qualified by fluency. When processing of mixed expression was made difficult by current task, their evaluations relatively declined, with the devaluation mediated by fluency.

Experiment 1b (Follow-up Study)

Experiment 1 left unclear whether our task manipulation (emotion focus) leads to relative devaluation of mixed expressions (generating the quadratic trend) or, alternatively, whether focusing on the control dimension (gender) eliminates the default devaluation effect for mixed features. Thus, we ran a "default" condition, involving no initial categorization, using just the attractiveness and trustworthiness judgments. Thirty-three participants performed the above procedure (only with this paradigm, there were 40 total trials, as opposed to 85 in the main Experiment 1). Results showed no difference between attractiveness and trust ratings, which were combined. As shown in Figure 3, happy faces were again evaluated higher than angry. However, contrast analysis revealed only a robust linear trend, $F(1, 32) = 42.97$, $p < .001$, $\eta 2 = .57$, with no evidence for quadratic trend ($F < .5$). Thus, as suggested by the main Experiment 1, judgmental devaluation of faces with mixed features requires (or is enhanced by) focusing participants on the ambiguous dimension. This is theoretically interesting because it highlights that (dis)fluency effects are not simply driven by intrinsic, task-independent features of the valenced stimuli, but instead require a particular task set. It is also practically interesting in that it suggests contexts which highlight or require expression categorization (e.g., scanning for social acceptance cues) are particularly likely to produce such effects. We will return to this issue in the discussion.

Experiment 2

Experiment 2 addressed several questions. First, in Experiment 1, the attractiveness judgment always preceded the trust judgment. Thus, any effects on trust could reflect spillovers from attractiveness. To eliminate this concern, Experiment 2 used only trust judgments. Focusing on trust is important, given its central role in social evaluations (Wojciszke et al., 1998). Further, trust judgments refer to internal, dispositional qualities that are pertinent to character- or morality-related aspects of an individual. Yet, interestingly, previous research shows that trust judgments are influenced by facial appearance (e.g., Willis & Todorov, 2006) and incidental subjective experiences (e.g., Lount, 2010). This high-

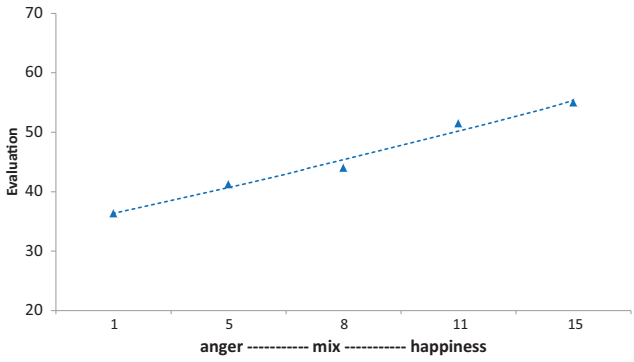

Figure 3. Results from Experiment 1b for evaluation (attractiveness and trustworthiness) as a function of expressive features (smiling). Experiment had no categorization task. See the online article for the color version of this figure.

lights the possibility that trust will be influenced by facial features and processing fluency.

We also wanted to better understand how our categorization manipulation influences trust judgments. Our proposal is that asking participants to categorize faces on emotion causes disfluency for blended expressions, with the resulting negative affect (mis)attributed to target evaluation. Another possibility is that this categorization manipulation highlights the unintelligibility of mixed-expressions, and this perception then drives the negative evaluation. This is especially possible in the domain of trust, where openness is prized, and inscrutability is disliked. To assess this alternative, Experiment 2 also collected judgments of intelligibility of targets' intention. Specifically, we asked, "How clear (readable) are the person's intentions?" Note here that, independent of any fluency effects, readability judgments should be higher for happiness, as (compared to anger) happiness is less confused with other emotions (Elfenbein & Ambady, 2003), is better recognized under many visual conditions (Smith & Schyns, 2009), and is more socially expected (Ekman & Oster, 1979).

Method

Stimuli. Stimuli were faces of 18 White individuals from a study by Halberstadt and Niedenthal (2001). We used each individual's two pure expressions anger and happiness and blended them in different proportions to create a total of 14 pictures of each target (see Figure 1). From this pool of 252 pictures, three pictures of each target were randomly selected for a participant. This avoided too many ratings of the same target and kept the experiment length at a reasonable 54 trials.

Procedure. Fifty-three University of California, San Diego, undergraduates participated for course credit. On each trial, participants saw a 3-s picture of a face along with an appropriate categorization question (manipulated between subjects). In the expression condition, participants categorized each face, using the "z" and "/" keys, as either angry or happy. In the gender condition, participants categorized each face as either male or female. Participants needed to categorize quickly because the trial automatically advanced to the judgment phase after 3 s. Next, for each face, participants responded to two questions in sequence (counterbalanced) on a 9-point scale: (a) "How trustworthy is that person?" (1 = *not at all* to 9 = *extremely*) and (b) "How clear (readable) are the person's intentions?" (1 = *not clear* to 9 = *clear*).

Results

Fluency. Figure 4A shows that categorization of mixed expressions took longer than pure expressions, but only in the expression categorization condition. Specifically, in this condition, there was a quadratic (reversed *U*-shape) effect of valence, $F(1, 51) = 32.26$, $p < .001$, $\eta^2 = .56$. In the gender categorization condition, valence had no impact on RTs. Overall, this pattern yielded a quadratic interaction between valence and categorization, $F(1, 51) = 19.76$, $p < .001$, $\eta^2 = .28$.

Judgments. Figure 4b shows that, in the gender categorization condition, adding more smiling generally enhances evaluations, with the strongest contrast being linear, $F(1, 26) = 26.64$, $p < .001$, $\eta^2 = .52$. Critically, in emotion categorization condition, the evaluation was *U*-shaped, with the strongest contrast being

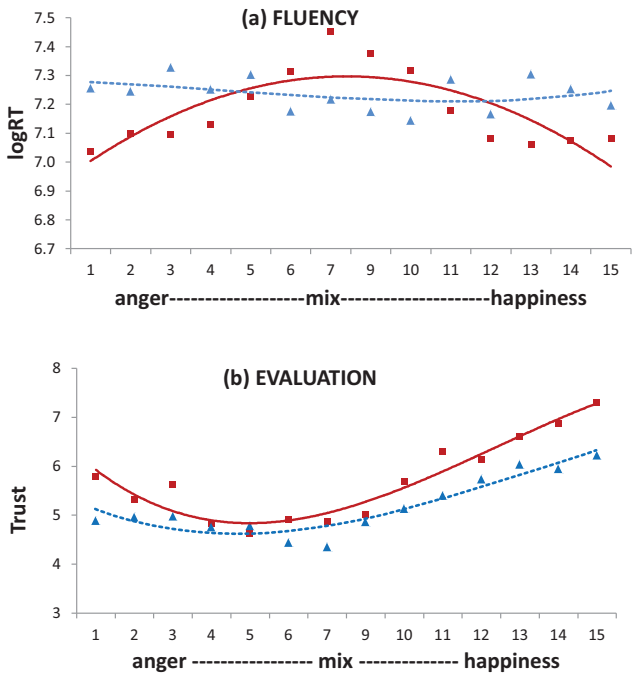

Figure 4. Experiment 2 results for (a) fluency and (b) evaluation. Responses are shown as a function of target features (smiling) and categorization condition (expression as red squares, gender as blue triangles). Lines represent estimated trend. See the online article for the color version of this figure.

quadratic, $F(1, 25) = 65.68$, $p < .001$, $\eta^2 = .72$; linear contrast, $F(1, 25) = 40.66$, $p < .001$, $\eta^2 = .61$. This produced a quadratic Valence × Categorization effect, $F(1, 51) = 4.9$, $p < .05$, $\eta^2 = .09$. Figure 4b highlights that this effect represents the relative cost to mixed expressions, along with the relative benefits to pure expressions. For example, the two happiest faces (*f14* and *f15*) were trusted more in the expression than gender categorization condition ($p < .05$).

On readability judgments, only valence was significant and showed a linear trend such that happier expressions received higher ratings, $F(1, 51) = 42.57$, $p < .001$, $\eta^2 = .45$. This follows previous findings that happiness is less confusable than anger, probably due to relatively basic perceptual features (Elfenbein & Ambady, 2003; Smith & Schyns, 2009). The categorization condition had no effects. Overall, the readability data suggest that our manipulation did not selectively alter perceived intelligibility of the expression.

Mediation. Once again, we used bootstrap analyses to test the indirect mediating effect of fluency on the relationship between feature blending and trust (Preacher & Hayes, 2008). Our predictor was expression mixedness, ranging from 1 (*pure angry and pure happy*) to 7 (*maximally blended*). Our outcome was the trust rating, with fluency (classification log-RTs) as the mediator. Analyses for the emotion categorization condition showed the direct effect of mixedness on trust (*c*-path) was significant ($\beta = -.23$, $p < .001$, $SE = .035$), the direct effect of mixedness on fluency (*a*-path) was statistically significant ($\beta = .10$, $p < .001$, $SE = .019$), and the direct effect of fluency on trust (*b*-path) was statistically significant ($\beta = -.18$, $p < .01$, $SE = .057$). Lastly, the effect of

mixedness on trust when controlling for fluency (c'-path) was reduced, but still significant ($\beta = -.21$, $p < .001$, $SE = .035$), compared with the significant direct effect of mixedness on evaluation. The bootstrap analysis indicated that categorization fluency (log-RTs) partially mediated the relationship between purity of expression and trust, as confidence intervals did not include zero ($M = -.0183$, $SE = .0066$, 95% CI [–.034, –.007]). Separate analysis for gender categorization condition did not reveal any mediation effects.

Experiment 3

Experiment 3 addressed several open issues. First, how do features and fluency influence underlying evaluative processes, as assessed by nonverbal, continuous physiological measures with high temporal resolution? One such measure is facial EMG—a sensitive indicator of affective states (Cacioppo, Petty, Losch, & Kim, 1986). Many studies show rapid activation of the *zygomaticus major* (cheek) muscle to smiles and *corrugator supercilii* (brow) muscle to frowns. These responses, especially in early periods, may represent mimicry responses (e.g., Dimberg, Thunberg, & Grunedal, 2002), but they also tap into evaluative reactions to the facial expression (Moody, McIntosh, Mann, & Weisser, 2007). Crucially, EMG can also capture evaluative reactions due to fluency, with easy processing increasing zygomaticus activity, without changing corrugator activity (Harmon-Jones & Allen, 2001; Winkielman & Cacioppo, 2001; Winkielman et al., 2006).

Besides capturing underlying evaluative reactions, physiological measures can illuminate two important issues. First, EMG can help understand the temporal dynamics of the interplay between features and fluency. Many studies have demonstrated that judgments and physiological reactions change as stimulus processing moves from perceptual to conceptual stages (Ashley, Vuilleumier, & Swick, 2004; Bradley & Lang, 2007). In the case of facial expressions, this suggests that early EMG reactions should primarily reflect expression features, with stronger smiles triggering greater zygomaticus EMG (Dimberg et al., 2002). However, later EMG reactions should reflect more categorical processes. Indeed, this was observed in previous research. For example, greater zygomaticus EMG to semantic coherence appear late—about 2 s into the trial (Topolinski, Likowski, Weyers, & Strack, 2009). Similarly, in the research on reactions to racially ambiguous individuals, lower zygomaticus responses to categorical conflict appear about 2 s into the trial (Halberstadt & Winkielman, 2014). In short, late zygomaticus "smiling" EMG should be greater to pure expressions, as compared to mixed expressions.

The second issue that can be addressed by EMG is the relation between physiological and judgmental responses to mixed features and their dependence on the overt task. One possibility is that EMG and judgments tap the same underlying evaluative response and are similarly dependent on the overt categorization task. However, research suggests that physiological responses often dissociate from judgments and track "objective" rather than subjective task demands (von Helversen, Gendolla, Winkielman, & Schmidt, 2008). Specifically, physiological responses to facial expressions track their objective valenced features, including emotional ambiguity, even when the overt task is nonemotional (Neta, Kelley, & Whalen, 2013; Whalen, 1998). If so, EMG responses could be independent of our task manipulation.

Method

Procedure. Twenty-two University of California, San Diego, undergraduates participated for course credit (one additional participant provided bad EMG data). This sample size is typical for costly and lengthy physiological studies with multiple stimulus repetitions (but we acknowledge its limitations here and later). The task was similar to Experiment 2, but with a few timing changes necessitated by physiological measurement, which requires longer time windows and minimal movement. Specifically, because we wanted to collect clean EMG signals after the face presentation and before the social judgments, we shortened the face presentation and delayed the ratings. The trial started with a 4-s fixation point, followed by a 1-s presentation of a face stimulus along with the categorization question (about gender or expression). However, unlike Experiment 1, the participants were not forced to answer quickly and the question stayed on the screen for an additional 3 s (as a result, categorization RTs were slow and will not be discussed further). Finally, participants were asked counterbalanced questions about trust and expression readability.

EMG measurement and analysis. EMG was recorded with BIOPAC MP150 over the *zygomaticus major* (smile) and *corrugator supercilii* (frown), using standard procedures (Fridlund & Cacioppo, 1986). Signals were sampled at 2,000 Hz and bandpassed at 50–500 Hz. Prestimulus baseline was the last 1,000 ms during fixation. To avoid orientation and movement artifacts in the poststimulus period, we discarded the initial 500 ms poststimulus and the 500 ms immediately before keyboard responses (cf. Winkielman & Cacioppo, 2001). This resulted in 3 s of clean EMG activity that preceded overt responses. For the purpose of time-course analyses, the 3-s period was split in half, as in mentioned research. Thus, the early period was 500–2,000 ms, and the later period was 2,000–3,500 ms poststimulus onset. For each trial, the differences in the mean absolute amplitudes between the pre- and poststimulus periods were then calculated.

Judgments. Figure 5A shows trust judgments. In the gender condition, the valence effect was only linear, with happier faces receiving with higher ratings, $F(1, 9) = 27.29$, $p < .01$, $\eta^2 = .75$. In the expression condition, the was quadratic (*U*-shape) contrast, with mixed faces relatively devaluated, $F(1, 11) = 5.06$, $p < .05$, $\eta 2 = .32$; linear, $F(1, 11) = 18.82$, $p < .01$, $\eta^2 = .63$). This yielded a quadratic interaction between valence and categorization, $F(1, 20) = 5.89$, $p < .05$, $\eta^2 = .23$.

On readability judgments, happier faces were once again rated as clearer, as evidenced by a strong linear effect, $F(1, 21) = 53.18$, $p < .001$, $\eta^2 = .73$. There was also a weaker quadratic effect, $F(1, 21) = 18.91$, $p < .001$, $\eta^2 = .49$. As in Experiment 2, there was no interaction with categorization condition.

EMG measures. Figure 5b shows early EMG reactions. An increase in happiness features in the stimulus linearly enhanced the subjects' zygomaticus smiling activity, $F(1, 21) = 7.52$, $p < .05$; $\eta^2 = .26$. More happiness (i.e., less anger) also tended to decrease corrugator frowning activity ($p = .10$, two-tailed). There was no interaction with the categorization condition. In short, early EMG responses were driven purely by expression features (cf., Dimberg et al., 2002).

Figure 5c shows late EMG reactions. Across both conditions participants showed more zygomaticus (smiling) activity to pure expressions than to mixed expressions. This resulted in a quadratic

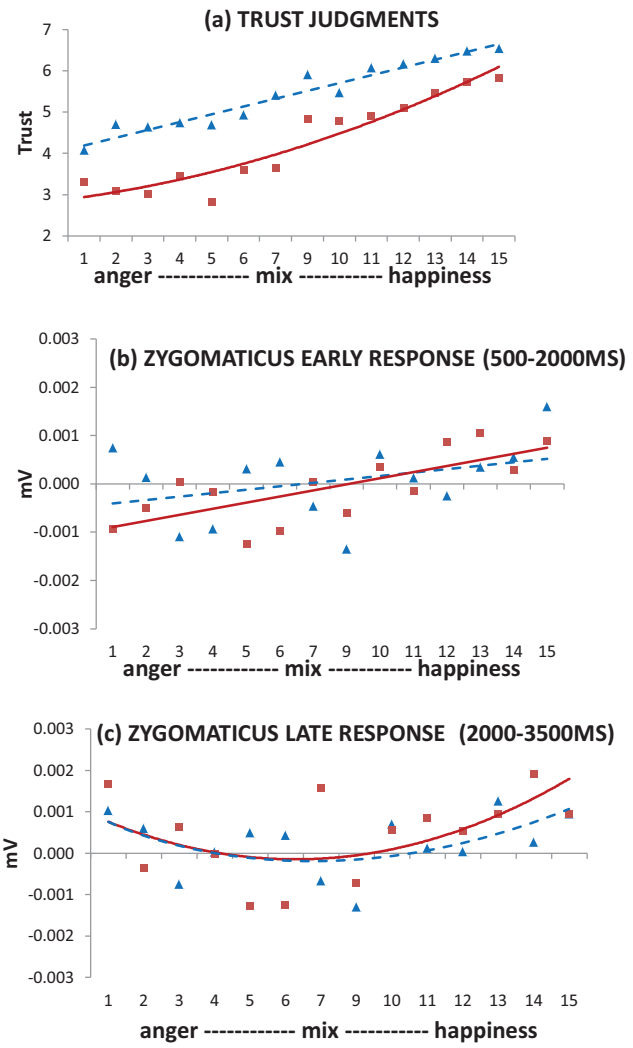

Figure 5. Experiment 3 results for (a) judgmental evaluation, as well as physiological zygomaticus-muscle responses in (b) early and (c) late period. Responses are shown as a function of target features (smiling) and categorization condition (expression: solid red line; gender: dashed blue line). Lines represent estimated trend. See the online article for the color version of this figure.

contrast, $F(1, 21) = 4.69$, $p < .05$, $\eta^2 = .18$. There was no interaction with categorization condition. This suggests that late physiological responses are tracking the objective ambiguity of mixed expression, regardless of the overt task (Whalen, 1998). Interestingly, late zygomaticus responses and trust judgments were correlated in the expression condition ($r = .09$; $p < .05$) but not in the gender condition ($r = .025$; $p = .57$). However, the correlation was weak, and the difference in correlation between conditions was not significant, so these data need to be interpreted with caution. Finally, consistent with other EMG work on fluency, there were no differences in corrugator activity during the later period. Still, the negative conclusions and interpretations of effect sizes from the current study are limited by its modest sample size. Though our sample size was not atypical for laborious, lengthy, and costly physiological investigations with multiple stimulus sampling, we again acknowledge its limitations, especially in the light of recent discussions (Button et al., 2013).

Experiment 4

All the above experiments focused on emotionally expressive features of the face. However, our model assumes that target devaluations can result from task-dependent focusing on any mixed feature. If so, similar devaluation effects should occur when faces are ambiguous on the gender dimension (which served as a control in preceding experiments), and the judgment task focuses on that dimension. Thus, in Experiment 4, we varied faces in terms of male–female features and focused participants on the gender dimension (compared to a control dimension). We used neutral faces in this experiment, but recall that female faces receive more positive ratings, due to facial morphology and social stereotypes (Ambady & Weisbuch, 2011). As such, using faces that vary on male–femaleness dimension provides a good parallel to previous experiments that varied the faces on anger–smile dimension.

Method

Participants were 78 students at the University of California, San Diego. Procedure was based on Experiment 1, but this time, we used pure male and female stimuli and selected six intermediate gender blends. Specifically, the stimuli came from 14 blended White males and females and 14 blended Asian males and females. Participants were asked to first categorize the face either by gender (experimental dimension) or ethnicity (control dimension) and then made judgments of attractiveness and trust (in counterbalanced order).

Results

Both the fluency and judgment data were analyzed with a 2 (Categorization Type: gender vs. ethnicity, between-subjects) × 8 (Gender Level: from pure male through mixed to pure female, within-subjects) mixed-model ANOVA.

Fluency. We first computed each subject's log-RTs on the categorization task to reduce the impact of outliers and individual differences. We then averaged log-RTs for each stimulus type. As shown in Figure 6A, fluency of mixed faces depended on the categorization condition. In the gender condition, categorization of mixed-gender faces took longer than pure gender expressions. This quadratic (inverse *U*-shape) contrast was significant, $F(1, 42) = 24.77$, $p < .001$, $\eta^2 = .37$. In the ethnicity categorization condition, gender level had no impact on log-RTs. This pattern yielded an interaction of quadratic contrast on the gender level with categorization type, $F(1, 76) = 8.13$, $p < .01$, $\eta^2 = .10$.

Judgments. Judgments of attractiveness and trust (counterbalanced) were highly correlated, $r = .55$, $p < .001$, and there were no interactions involving judgment type. Thus, we combined attractiveness and trust. Figure 6b shows that in the control condition (ethnic categorization), more female faces were generally rated higher, yielding a linear contrast, $F(1, 34) = 13.05$, $p < .01$, $\eta^2 = .3$. Interestingly, mixed gender faces received the highest ratings (reversed *U*-shape contrast, resembling the beauty-in-averageness effect), $F(1, 34) = 14.37$, $p < .01$, $\eta^2 = .3$. Critically, in gender categorization condition, the quadratic contrast, while

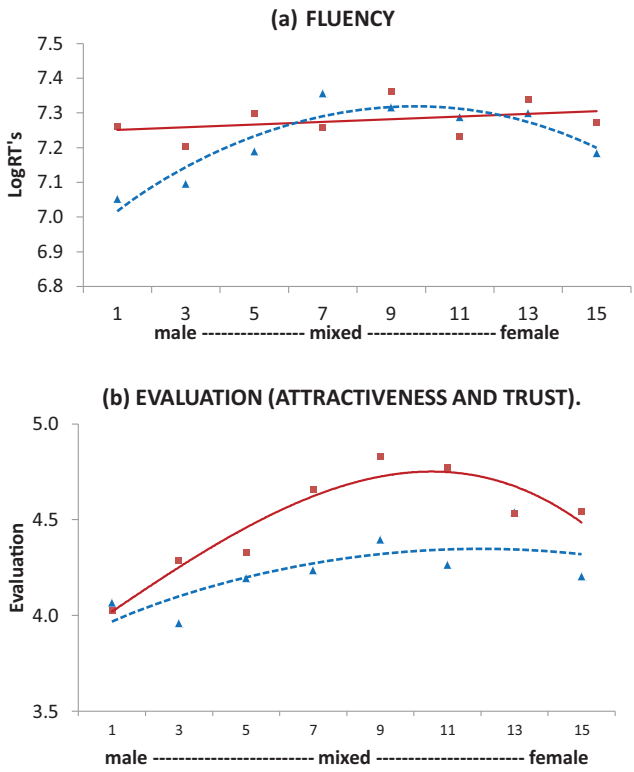

Figure 6. Experiment 4 results for (a) fluency and (b) evaluation as a function of target features (femaleness) and categorization condition (gender: dashed blue line; control: solid red line). Lines represent estimated trend. See the online article for the color version of this figure.

still significant, $F(1, 42) = 4.27$, $p < .05$, $\eta^2 = .09$, was also weaker, producing an interaction of quadratic contrast of gender level with categorization type, $F(1, 76) = 4.29$, $p < .05$, $\eta 2 = .05$. In sum, when faces were blended on the gender dimension (making the mixed faces disfluent by the pertinent categorization task), this led to their relative devaluation (as compared to the relative benefits enjoyed by the gender-mixed faces in the control condition).

General Discussion

Overall, the current studies show that evaluations reflect the interplay of stimulus features and processing fluency in the context of the current task. Adding positively valenced facial features related to smiling or female gender robustly increases target evaluations. This is consistent with previous research highlighting the importance of such valenced features in social judgments. However, the data presented here suggest that the judgmental impact of those features is qualified by fluency. When mixed faces become disfluent, they are relatively devalued in judgments. The basic effect occurs on central, important, yet qualitatively different social judgments—attractiveness (i.e., physical evaluation) and trust (i.e., dispositional evaluation), suggesting that the operating process is rather broad. Still, because attractiveness and trustworthiness dimensions are correlated in judgment (Oosterhof & Todorov, 2008; Todorov et al., 2008), future research may explore such effects with other evaluative dimensions.

Importantly, the judgmental effects of objective stimulus properties are dependent on the current task focus. When participants simply viewed mixed faces, without any categorization task (Experiment 1b), or when they focused on a dimension on which faces were not mixed, the judgments were a simple linear function of feature positivity, as observed in earlier research.

Interestingly, on the physiological level, ambiguity of expressive features influenced EMG responses independently of the perceiver's task (Experiment 3). Our finding parallels earlier reports that judgmental effects may track subjective fluency, whereas physiological measures track objective indices of processing (Forster, Leder, & Ansorge, 2013; Schwarz, 2007; von Helversen et al., 2008). More specifically, in the context of facial expressions, ambiguity appears to elicit physiological responses independent of task focus. Interestingly though, such effects still emerge relatively late, suggesting their origin in categorical processing (cf. Neta et al., 2013). Future research may explore further the relation between judgmental and physiological responses to facial ambiguity (and their dependence on processing stage, task set, and individual differences). One relevant line of research in this context is the work on the facial expression of surprise, which is ambiguous in terms of valence and can be interpreted as either positive (happy) or negative (fear). This research shows that surprise expressions are difficult to categorize in terms of valence and that individual differences in interpretational biases toward negativity tends to be associated with increased corrugator EMG responses (Neta, Norris, & Whalen, 2009). Interestingly, the initial interpretation of surprise tends to be generally biased toward negativity, suggesting again that ambiguity effects may arise at later processing stages (Neta & Whalen, 2010).

Still, it is interesting to recall in this context that in one of our previous studies, blends of extremely familiar individuals (e.g., celebrities) elicited ambiguity-related negative reaction even on spontaneous viewing, without any categorization task (Halberstadt et al., 2013). Thus, it may be theoretically possible to construct blends of highly familiar or highly stereotyped emotional expressions where their ambiguity will spontaneously pop out. In other contexts though, for our effects to occur, it may take a situational cue encouraging people to classify the emotion. As mentioned earlier, such contexts are plentiful and include a variety of social situations (e.g., first impressions, dating, job interview, scanning for social acceptance cues, etc.). In terms of gender ambiguity, future research may explore, for example, if devaluation occurs when meeting a gender-ambiguous person in a context that requires performing a gender-stereotyped action (e.g., hand-kissing in Poland), addressing the person with gender-specific terms (e.g., "sir" or "madam"), noting the person's gender in some document, or considering the person for a gender-stereotyped activity.

Another possible line of future research involves people with chronic difficulties in perception and interpretation of emotional facial expressions, such as autism (e.g., Clark, Winkielman, & McIntosh, 2008), or even faces in general (prosopagnosia). Such persons might experience a heightened level of frustration in reading faces and, thus, either show lower ratings of others or even greater social avoidance (for evidence from prosopagnosia, see Yardley, McDermott, Pisarski, Duchaine, & Nakayama, 2008). On the production side, atypical individuals (e.g., autism, Loveland et al., 1994) tend to make ambiguous, unclear facial expressions. As

a result, such individuals may experience negative reactions from perceivers experiencing categorization difficulty.

Lastly, though the current work and some of our recent research has focused on faces, it is clear that similar effects should hold for all kinds of ambiguous stimuli. In fact, our earlier work has highlighted the affective benefits of easy categorization with artificial stimuli, such as shapes (e.g., squares vs. diamonds) and random dots (Winkielman, Halberstadt, Fazendeiro, & Catty, 2006).

The current work has several implications for basic theorizing about social–cognitive mechanisms of evaluation. As mentioned, it qualifies the commonly used assumption, grounded in the information integration models, that adding positive features typically increases target evaluation (Anderson, 1981). Instead, it shows that the resulting disfluency, stemming from conflict with preexisting negative features, can undermine the benefits of added positive features. However, perhaps the most important conclusion from the current work is that the emergence of fluency effects depends not only on objective features associated with the stimulus but also as a function of the perceiver's task. There might be some intrinsically disfluent stimuli in the world, but in most cases, fluency (and its evaluative consequences) derives from the interaction between perceptual features of the stimulus and the task-focus of the perceiver. As such, our work points to the power of context in constructing what is *psychologically* ambiguous, disfluent, and negative (Halberstadt & Winkielman, 2013).

Finally, it is worth discussing the relation of this work to some classic questions of emotion literature. The link between ambiguity and emotion has been scientifically studied for nearly 100 years. Pavlov (1927) pointed out that in dogs, categorization difficulty (e.g., between a reward-announcing circle and a similar but reward-neutral ellipse) can lead to what he termed "experimental neurosis." Further research with animals and humans has shown adverse negative consequence of difficult discrimination (for review, see Mineka & Kihlstrom, 1978). While this work is related, note that in our studies no explicit reward (or punishment) was associated with a particular categorization. Further, our participants are unlikely to experience the experimental situation as uncontrollable or unpredictable. Another difference is that in our context any experienced ambiguity or disfluency is rather subtle, which ironically may facilitate the transfer of negative affect to the target (Schwarz, 2015). Still, it is worth acknowledging the general relation of the current phenomenon to the above work as well as to the very rich tradition of exploring the frequently negative emotional reactions to ambiguity, risk and uncertainty in psychology (Halberstadt & Winkielman, 2013), neuroscience (Whalen, 1998), and even economics (e.g., Loewenstein, Weber, Hsee & Welch, 2001). In closing, human reactions to ambiguity vary, but Bing Crosby may have sensed something with his advice to "don't mess with Mister In-Between."

References

Ambady, N., & Weisbuch, M. (2011). Facial expressions: Culture and context. In A. J. Calder, G. Rhodes, J. V. Haxby, & M. H. Johnson (Eds.), *The handbook of face perception* (pp. 479–488). New York, NY: Oxford University Press.

Anderson, N. H. (1981). *Foundation of information integration theory*. New York, NY: Academic Press.

Ashley, V., Vuilleumier, P., & Swick, D. (2004). Time course and specificity of event-related potentials to emotional expressions. *Neuroreport, 15,* 211–216. http://dx.doi.org/10.1097/00001756-200401190-00041

Aviezer, H., Hassin, R. R., Ryan, J., Grady, C., Susskind, J., Anderson, A., . . . Bentin, S. (2008). Angry, disgusted, or afraid? Studies on the malleability of emotion perception. *Psychological Science, 19,* 724–732. http://dx.doi.org/10.1111/j.1467-9280.2008.02148.x

Barrett, L. F., & Kensinger, E. A. (2010). Context is routinely encoded during emotion perception. *Psychological Science, 21,* 595–599. http://dx.doi.org/10.1177/0956797610363547

Boone, R. T., & Buck, R. (2003). Emotional expressivity and trustworthiness: The role of nonverbal behavior in the evolution of cooperation. *Journal of Nonverbal Behavior, 27,* 163–182. http://dx.doi.org/10.1023/A:1025341931128

Bradley, M. M., & Lang, P. J. (2007). Emotion and motivation. In J. T. Cacioppo, L. G. Tassinary, & G. G. Berntson (Eds.), *Handbook of psychophysiology* (pp. 581–607). Cambridge, UK: Cambridge University Press. http://dx.doi.org/10.1017/CBO9780511546396.025

Button, K. S., Ioannidis, J. P. A., Mokrysz, C., Nosek, B. A., Flint, J., Robinson, E. S. J., & Munafò, M. R. (2013). Power failure: Why small sample size undermines the reliability of neuroscience. *Nature Reviews Neuroscience, 14,* 365–376. http://dx.doi.org/10.1038/nrn3475

Cacioppo, J. T., Petty, R. E., Losch, M. E., & Kim, H. S. (1986). Electromyographic activity over facial muscle regions can differentiate the valence and intensity of affective reactions. *Journal of Personality and Social Psychology, 50,* 260–268. http://dx.doi.org/10.1037/0022-3514.50.2.260

Clark, T. F., Winkielman, P., & McIntosh, D. N. (2008). Autism and the extraction of emotion from briefly presented facial expressions: Stumbling at the first step of empathy. *Emotion, 8,* 803–809. http://dx.doi.org/10.1037/a0014124

Darwin, C. (1962). *The expression of the emotions in man and animals*. London, UK: John Murray. (Original work published 1872).

Dimberg, U., Thunberg, M., & Grunedal, S. (2002). Facial reactions to emotional stimuli: Automatically controlled emotional responses. *Cognition and Emotion, 16,* 449–471. http://dx.doi.org/10.1080/02699930143000356

Ekman, P., & Oster, H. (1979). Facial expressions of emotion. *Annual Review of Psychology, 30,* 527–554. http://dx.doi.org/10.1146/annurev.ps.30.020179.002523

Elfenbein, H. A., & Ambady, N. (2003). When familiarity breeds accuracy: Cultural exposure and facial emotion recognition. *Journal of Personality and Social Psychology, 85,* 276–290. http://dx.doi.org/10.1037/0022-3514.85.2.276

Forster, M., Leder, H., & Ansorge, U. (2013). It felt fluent, and I liked it: Subjective feeling of fluency rather than objective fluency determines liking. *Emotion, 13,* 280–289. http://dx.doi.org/10.1037/a0030115

Fridlund, A. J., & Cacioppo, J. T. (1986). Guidelines for human electromyographic research. *Psychophysiology, 23,* 567–589. http://dx.doi.org/10.1111/j.1469-8986.1986.tb00676.x

Halberstadt, J. B., & Niedenthal, P. M. (2001). Effects of emotion concepts on perceptual memory for emotional expressions. *Journal of Personality and Social Psychology, 81,* 587–598. http://dx.doi.org/10.1037/0022-3514.81.4.587

Halberstadt, J., Pecher, D., Zeelenberg, R., Ip Wai, L., & Winkielman, P. (2013). Two faces of attractiveness: Making beauty in averageness appear and reverse. *Psychological Science, 24,* 2343–2346. http://dx.doi.org/10.1177/0956797613491969

Halberstadt, J., & Winkielman, P. (2013). When good blends go bad: How fluency can explain when we like and dislike ambiguity. In C. Unkelbach & R. Greisfelder (Eds.), *The experience of thinking: How feelings from mental processes influence cognition and behavior* (pp. 133–151). New York, NY: Psychology Press.

Halberstadt, J., & Winkielman, P. (2014). Easy on the eyes, or hard to categorize: Classification difficulty decreases the appeal of facial blends. *Journal of Experimental Social Psychology, 50,* 175–183. http://dx.doi.org/10.1016/j.jesp.2013.08.004

Halberstadt, J., Winkielman, P., Niedenthal, P. M., & Dalle, N. (2009). Emotional conception: How embodied emotion concepts guide perception and facial action. *Psychological Science, 20,* 1254–1261. http://dx.doi.org/10.1111/j.1467-9280.2009.02432.x

Harmon-Jones, E., & Allen, J. J. B. (2001). The role of affect in the mere exposure effect: Evidence from psychophysiological and individual differences approaches. *Personality and Social Psychology Bulletin, 27,* 889–898. http://dx.doi.org/10.1177/0146167201277011

Hassin, R. R., Aviezer, H., & Bentin, S. (2013). Inherently ambiguous: Facial expressions of emotions, in context. *Emotion Review, 5,* 60–65. http://dx.doi.org/10.1177/1754073912451331

Keltner, D., & Haidt, J. (1999). Social functions of emotions at four levels of analysis. *Cognition and Emotion, 13,* 505–521. http://dx.doi.org/10.1080/026999399379168

Knutson, B. (1996). Facial expressions of emotion influence interpersonal trait inferences. *Journal of Nonverbal Behavior, 20,* 165–182. http://dx.doi.org/10.1007/BF02281954

LaFrance, M., & Hecht, M. A. (1995). Why smiles generate leniency. *Personality and Social Psychology Bulletin, 21,* 207–214. http://dx.doi.org/10.1177/0146167295213002

Loewenstein, G. F., Weber, E. U., Hsee, C. K., & Welch, N. (2001). Risk as feelings. *Psychological Bulletin, 127,* 267–286. http://dx.doi.org/10.1037/0033-2909.127.2.267

Lount, R. B., Jr. (2010). The impact of positive mood on trust in interpersonal and intergroup interactions. *Journal of Personality and Social Psychology, 98,* 420–433. http://dx.doi.org/10.1037/a0017344

Loveland, K. A., Tunali-Kotoski, B., Pearson, R., Brelsford, K., Ortegon, J., & Chen, R. (1994). Imitation and expression of facial affect in autism. *Development and Psychopathology, 6,* 433–444. http://dx.doi.org/10.1017/S0954579400006039

Mineka, S., & Kihlstrom, J. F. (1978). Unpredictable and uncontrollable events: A new perspective on experimental neurosis. *Journal of Abnormal Psychology, 87,* 256–271. http://dx.doi.org/10.1037/0021-843X.87.2.256

Moody, E. J., McIntosh, D. N., Mann, L. J., & Weisser, K. R. (2007). More than mere mimicry? The influence of emotion on rapid facial reactions to faces. *Emotion, 7,* 447–457. http://dx.doi.org/10.1037/1528-3542.7.2.447

Neta, M., Kelley, W. M., & Whalen, P. J. (2013). Neural responses to ambiguity involve domain-general and domain-specific emotion processing systems. *Journal of Cognitive Neuroscience, 25,* 547–557. http://dx.doi.org/10.1162/jocn_a_00363

Neta, M., Norris, C. J., & Whalen, P. J. (2009). Corrugator muscle responses to surprised facial expressions are associated with individual differences in positivity-negativity bias. *Emotion, 9,* 640–648. http://dx.doi.org/10.1037/a0016819

Neta, M., & Whalen, P. J. (2010). The primacy of negative interpretations when resolving the valence of ambiguous facial expressions. *Psychological Science, 21,* 901–907. http://dx.doi.org/10.1177/0956797610373934

O'Doherty, J., Winston, J., Critchley, H., Perrett, D., Burt, D. M., & Dolan, R. J. (2003). Beauty in a smile: The role of medial orbitofrontal cortex in facial attractiveness. *Neuropsychologia, 41,* 147–155. http://dx.doi.org/10.1016/S0028-3932(02)00145-8

Oosterhof, N. N., & Todorov, A. (2008). The functional basis of face evaluation. *PNAS Proceedings of the National Academy of Sciences of the United States of America, 105,* 11087–11092. http://dx.doi.org/10.1073/pnas.0805664105

Pavlov, I. P. (1927). *Conditioned reflexes: An investigation of the physiological activity of the cerebral cortex*. London, UK: Oxford University Press.

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods, 40,* 879–891. http://dx.doi.org/10.3758/BRM.40.3.879

Reis, H. T., Wilson, I. M., Monestere, C., Bernstein, S., Clark, K., Seidl, E., . . . Radoane, K. (1990). What is smiling is beautiful and good. *European Journal of Social Psychology, 20,* 259–267. http://dx.doi.org/10.1002/ejsp.2420200307

Rezlescu, C., Duchaine, B., Olivola, C. Y., & Chater, N. (2012). Unfakeable facial configurations affect strategic choices in trust games with or without information about past behavior. *PLoS ONE, 7,* e34293. http://dx.doi.org/10.1371/journal.pone.0034293

Russell, J. A. (1997). Reading emotion from and into faces: Resurrecting a dimensional-contextual perspective. In J. A. Russell & J. M. Fernandez-Dols (Eds.), *The psychology of facial expression* (pp. 295–320). New York, NY: Cambridge University Press. http://dx.doi.org/10.1017/CBO9780511659911.015

Schwarz, N. (2007). Attitude construction: Evaluation in context. *Social Cognition, 25,* 638–656. http://dx.doi.org/10.1521/soco.2007.25.5.638

Schwarz, N. (2015). Metacognition. In E. Borgida & J. A. Bargh (Eds.), *APA handbook of personality and social psychology: Attitudes and social cognition* (pp. 203–229). Washington, DC: APA.

Sebe, N., Lew, M., Sun, Y., Cohen, I., Gevers, T., & Huang, T. S. (2007). Authentic facial expression analysis. *Image and Vision Computing, 25,* 1856–1863. http://dx.doi.org/10.1016/j.imavis.2005.12.021

Smith, F. W., & Schyns, P. G. (2009). Smile through your fear and sadness: Transmitting and identifying facial expression signals over a range of viewing distances. *Psychological Science, 20,* 1202–1208. http://dx.doi.org/10.1111/j.1467-9280.2009.02427.x

Todorov, A., Said, C. P., Engell, A. D., & Oosterhof, N. N. (2008). Understanding evaluation of faces on social dimensions. *Trends in Cognitive Sciences, 12,* 455–460. http://dx.doi.org/10.1016/j.tics.2008.10.001

Topolinski, S., Likowski, K. U., Weyers, P., & Strack, F. (2009). The face of fluency: Semantic coherence automatically elicits a specific pattern of facial muscle reactions. *Cognition and Emotion, 23,* 260–271. http://dx.doi.org/10.1080/02699930801994112

von Helversen, B., Gendolla, G. H. E., Winkielman, P., & Schmidt, R. E. (2008). Exploring the hardship of ease: Subjective and objective effort in the ease-of-processing paradigm. *Motivation and Emotion, 32,* 1–10. http://dx.doi.org/10.1007/s11031-008-9080-6

Whalen, P. J. (1998). Fear, vigilance, and ambiguity: Initial neuroimaging studies of the human amygdala. *Current Directions in Psychological Science, 7,* 177–188. http://dx.doi.org/10.1111/1467-8721.ep10836912

Willis, J., & Todorov, A. (2006). First impressions: Making up your mind after a 100-ms exposure to a face. *Psychological Science, 17,* 592–598. http://dx.doi.org/10.1111/j.1467-9280.2006.01750.x

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. http://dx.doi.org/10.1037/0022-3514.81.6.989

Winkielman, P., Halberstadt, J., Fazendeiro, T., & Catty, S. (2006). Prototypes are attractive because they are easy on the mind. *Psychological Science, 17,* 799–806. http://dx.doi.org/10.1111/j.1467-9280.2006.01785.x

Winkielman, P., & Schwarz, N. (2001). How pleasant was your childhood? Beliefs about memory shape inferences from experienced difficulty of recall. *Psychological Science, 12,* 176–179. http://dx.doi.org/10.1111/1467-9280.00330

Winkielman, P., Schwarz, N., Fazendeiro, T., & Reber, R. (2003). The hedonic marking of processing fluency: Implications for evaluative

judgment. In J. Musch & K. C. Klauer (Eds.), *The psychology of evaluation: Affective processes in cognition and emotion* (pp. 189–217). Mahwah, NJ: Erlbaum.

Wojciszke, B., Bazinska, R., & Jaworski, M. (1998). On the dominance of moral categories in impression formation. *Personality and Social Psychology Bulletin, 24,* 1251–1257. http://dx.doi.org/10.1177/01461672982412001

Yardley, L., McDermott, L., Pisarski, S., Duchaine, B., & Nakayama, K. (2008). Psychosocial consequences of developmental prosopagnosia: A problem of recognition. *Journal of Psychosomatic Research, 65,* 445–451. http://dx.doi.org/10.1016/j.jpsychores.2008.03.013

Received April 9, 2014
Revision received August 11, 2014
Accepted October 14, 2014 ■