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BRIEF REPORT

Context Is More Powerful Than We Think: Contextual Cues Override Facial Cues Even for Valence

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Context—the external situation—overrides facial information when judging the emotion from spontaneous facial expressions, even on valence. Observers ($N = 60$) judged the emotion in each of 15 facial expressions of athletes in the 2012 Olympics who had just won or lost their respective event. Observers were given either correct, incorrect, or no information about the results of the event. Context consistently overrode facial information, regardless of what the facial expression displayed.

Keywords: emotion, facial expressions, context

To navigate our social world, people must interpret the emotional reactions of others, and we have a variety of sources at hand. In this study, we explore two: the facial expression and situational information. Since the 1960s, Basic Emotion Theory has stimulated research on emotion, including research purported to show that at least six emotions—happiness, sadness, anger, fear, surprise, and disgust—are hardwired and produce recognizable facial expressions (Buck, 1994; Ekman, 1992; Ekman & Cordaro, 2011; Izard, 1994; Ekman, 1980; Ekman, Sorenson, & Friesen, 1969). The face is part of the emotion, a direct readout of emotion which thus automatically and reliably specifies the emotion. In cases where the face and situation suggest different emotions, the implication is that the face wins because different people react differently to the same situation.

Empirical tests that have compared face to situation have produced mixed results. The face often overrode the situation in specifying the emotion (e.g., Gnepp, 1983; Nakamura, Buck, & Kenny, 1990; Wallbott, 1988; Watson, 1972; Wiggers & van Lieshout, 1985). On the other hand, the situation occasionally overrode the face (Carroll & Russell, 1996).

Russell (1997) proposed a way to reconcile these conflicting findings. Based on a dimensional approach to emotion, Russell proposed that the facial expression automatically and reliably specifies *valence*—whether one feels pleasant or unpleasant—and arousal, but not a discrete emotion. Thus, when the face and the situation each suggest emotions of opposite valence, the face wins. On the other hand, the face does not specify a discrete emotion, and thus, when the face and the situation each suggest different emotions but of the same valence, then the situation wins.

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More recent evidence challenges Russell's (1997) proposal. Two studies have shown that body posture overrides the face in determining even valence. For example, the prototypical disgust face is judged as either negative (disgusted or angry) or positive (proud) when paired with body postures prototypical of these emotions (Aviezer et al., 2008). When asked to judge how pleasant or unpleasant professional tennis players felt after a match, observers more accurately identified winners and losers when shown only body posture than when shown only the face (Aviezer, Trope, & Todorov, 2012). So, contrary to Russell's (1997) proposal, the face does not always override the context even on valence—at least when context is body posture.

The evidence offered by Aviezer and colleagues opens the door to the question of whether contexts other than body—such as the external situation—can override facial information even on valence. If so, the external situation would be even more powerful than current literature suggests. To our knowledge, that question has not been addressed.

Study Overview

This study examined how facial information compares with contextual information in determining judgments of emotion when context is the external situation rather than the body. Most prior research on this topic used facial expressions that were posed. Posed expressions are created with the intent of conveying a single emotion, without distracting or irrelevant features. Posed expressions may therefore be a poor predictor of what happens in naturally occurring situations and, indeed, studies of recognition of emotion from posed faces produce dramatically different results than do spontaneous faces (Kayyal & Russell, 2013; Motley & Camden, 1988; Naab & Russell, 2007; Yik, Meng, & Russell, 1998). Here we examine spontaneously produced facial expressions of athletes in the 2012 Olympics. Observers viewed 15 facial expressions of athletes, 12 of whom had just won and 3 of whom had just lost their event. Observers were randomly assigned to one of three conditions. In the correct context condition, the face was presented with correct written information

about the result of the event. In the incorrect context condition, the face was presented with incorrect written information about the result of the event. In the no context condition, the face was presented with no written information. For each athlete, observers judged the athlete's emotion, specifically the degree to which the athlete felt each of seven emotions: happy, sad, angry, afraid, disgusted, proud, and excited.

Method

Participants

Sixty Boston College undergraduates (18 to 22 years, 29 male) completed the study in return for course credit.

Materials

Photographs. Facial expressions were 15 black-and-white, 4-in × 5-in photographs of athletes in the 2012 London Olympics. Of the 28 images available online (http://deportes.elpais.com/deportes/2012/07/30/album/1343643665_059178.html#1343643665_059178_1344532907), we excluded 13 because the face was not clearly visible, the athlete was easily recognizable, there was more than one athlete, or, in one case, a gold medal was visible. The final set of photographs consisted of 15 athletes, 12 who had just won and three who had just lost their event; the Appendix gives the action units for each athlete's facial expression.

Procedure

Observers completed the study online. Observers were randomly assigned to one of the three conditions, in which observers received either correct, incorrect, or no written information about the result of the event. Each observer viewed the 15 facial expressions, one at a time, for an unlimited time, in an order randomly generated for each observer. For each facial expression, the observer then made an emotion judgment.

Judgment task. For each photograph, observers judged the degree to which the athlete felt each of seven emotions (happy, sad, angry, proud, afraid, disgusted, and excited) by using a 7-point Likert scale that ranged from 0 (*not at all*) to 6 (*extremely*).

Scoring. A positive score was the sum of intensity scores for happy, excited, and proud divided by 3; a negative score was the sum of intensity scores for sad, angry, scared, and disgusted divided by 4. The valence score was the positive score minus the negative score.

The facial expressions of winners and losers were analyzed separately because they were uneven in number (n = 12 vs. 3, respectively). Thus, in two separate Repeated Measures ANOVAs, facial expression (12 levels for winners, 3 levels for losers) was a within-subjects factor and condition (3 levels: Correct Context, Incorrect Context, and No Context) was a between-subjects factor; the dependent variable was the valence score for each of the faces.

Results

Preliminary Analysis

There were no significant sex differences for valence scores for either winners (M_{score} = 2.1 vs. 1.1, respectively, t_{58} = 1.67, p = .10) or for losers (M_{score} = −1.09 vs. 0.09, respectively, $t(58) = -1.34$, p = .16). Sex of observers was therefore excluded from remaining analyses.

No Context

When given no information about the results of the event, observers typically judged winners as feeling slightly positive (M_{score} = 1.5) and losers as feeling slightly negative (M_{score} = −1.7), as is shown in Figure 1. Valence scores were positive for seven of the 12 winners, negative for all three losers. Thus, face conveys valence, although weakly, in the absence of any other cue.

Correct Versus Incorrect Context

As expected, observers' emotion judgment for each athlete varied with context.

Winners. Figure 1 gives the mean valence scores for winning athletes in each condition. Observers judged the athletes as feeling more intensely positive when told, correctly, that the winning athlete had won (M_{score} = 3.7) than when told, incorrectly, that the winning athlete had lost (M_{score} = −0.85) (or when given no contextual information,[1] M_{score} = 1.5), as is indicated by the main effect for condition, $F(2, 57) = 75.90$, $p < .001$; $\eta^2 = 0.73$. For nine (of the 12) winners, the emotion attributed most intensely was either *happy*, *excited*, or *proud* when correctly told the athlete won. Conversely, the emotion attributed most intensely was *sad* or *angry* when incorrectly told the athlete lost. Independent-samples t tests supported the context effect. Thus, the same facial expression was judged as either more emotionally positive or more emotionally negative, depending on the contextual information given.

The presence and type of contextual information influenced valence judgments more for some faces than for others, as indicated by the significant Face × Condition interaction, $F(22, 627) = 6.03$, $p < .001$, $\eta^2 = 0.18$. In the most extreme example of context-dependency, context reversed the valence judgment: face 7 (see the Appendix) was seen as intensely positive (mean valence score = 4.0) when told, correctly, the athlete won, but moderately negative (mean valence score = −2.8) when told, incorrectly, that the athlete lost. At the other extreme, context had a weaker effect—influenced the intensity but did not reverse—on the valence judgment: face 2 (see the Appendix) was seen as

[1] Although there was no written context that hinted at who won or lost, there was subtle incidental (pictorial) context (such as an Olympic emblem, sweat, national flag, gold medals) in five (of the 15) photos. A follow-up condition in which these five photos were photo-shopped to exclude incidental context) showed that, indeed, this bit of incidental context had no effect on observers' valence scores (which indicate how positive or negative observers thought the face expressed). For only one (of the five) photo-shopped faces did valence scores significantly differ between the No Context and this follow-up conditions (M_{score} = −.05 and −.35, $p < .05$, respectively): Observers attributed significantly fewer negative emotions (saw this crying face as less negative) when the Olympic symbol on the athlete's jacket was present than when it was absent. Thus, observers were more likely to attribute positive emotions to this crying face when they could infer that the person was an Olympic athlete. There were no significant differences between the No Context and this follow-up condition for four remaining four faces (ts: −1.63, −1.15, 0.263, and −1.49, respectively, all ps > .11).

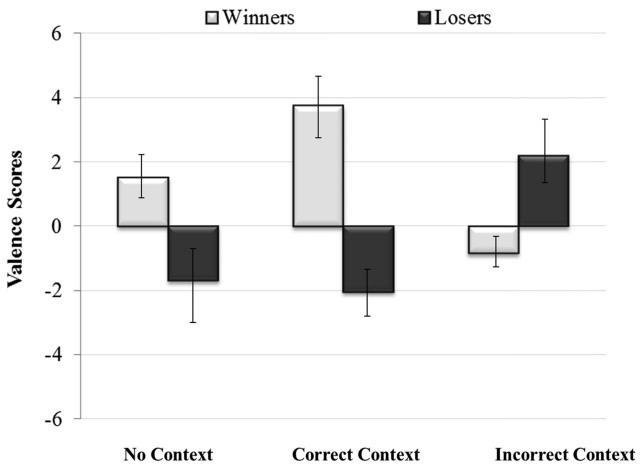

Figure 1. Mean valence scores (and standard error) are shown for winning and losing athletes for the no context, correct context, and incorrect context conditions. Higher (positive) valence scores indicate that observers were more likely to attribute positive emotions to a given face; lower (negative) valence scores indicate the opposite.

intensely positive (mean valence score = 4.3) when told, correctly, that the athlete won, and moderately positive (mean valence score = 2.7) when told, incorrectly, that the athlete lost.

Our response format allowed the observer to indicate more than one emotion, and they took the opportunity. Told, correctly, that an athlete won, observers selected more than one emotion. For face 9 (see the Appendix), for example, 85% of observers judged the athlete as happy, 80% as proud, 50% as excited. Unexpectedly, observers also selected a range of negative emotions: 55% judged the athlete as *sad*, 50% as afraid, 20% as angry, and 15% as disgusted—although they were told, correctly, that she won. (Percentages add up to more than 100% because observers were allowed to choose more than one emotion per face.) Thus, observers saw a range of positive and negative emotions, albeit to different degrees. For no winning face did an observer select one and only one emotion.

Losers. Again, observers' emotion judgments varied with context. Figure 1 shows that observers judged the athletes as feeling more emotionally negative than emotionally positive when told, correctly, that the athlete had lost ($M_{score} = -1.02$) than when told, incorrectly, that the athlete had won ($M_{score} = .04$) (or when given no contextual information, $M_{score} = -.50$), as is indicated by the main effect for condition, $F(2, 57) = 42.15$, $p < .001$; $\eta^2 = 0.60$. For all three losers, the emotion attributed most intensely varied with condition: *sad* when told, correctly, that the athlete lost, but *happy* or *proud* when told, incorrectly, the athlete won. Again, independent-samples *t* tests supported the context effect. Thus, the same facial expression was judged as either more emotionally positive or negative, depending on the contextual information given. This effect held across all three losing faces, as indicated by the nonsignificant Face x Condition interaction: $F(4, 114) = 2.34$, $p = .06$; $\eta^2 = 0.08$.

Again, observers attributed more than one emotion per face. Told, correctly, that an athlete lost, observers selected a wide range of negative emotions. For one particular face (face 14), for example, 100% of observers judged the athlete as *sad*, 75% as angry, 50% as disgusted, and 35% as afraid. Few observers judged her as feeling a positive emotion: 15% proud, 5% as excited, and 0% as happy. (Percentages add up to more than 100% because observers were allowed to choose more than one emotion per face.) Thus, observers saw a range of primarily negative emotions, albeit to different degrees. No observer selected one and only one negative emotion.

Conclusion

Observers' emotion judgment of a facial expression varied with the presence and type of context (i.e., external situation) given. Given no context, observers typically judged a winner as feeling slightly positive, a loser as feeling slightly negative. When told that the athlete won or lost, observers attributed more intense emotions. Observers judged athletes as feeling emotionally positive (such as excited, happy, or proud) when told the athlete just won, but judged the same athlete with the same facial expression as feeling emotionally negative (such as sad or angry) when told the athlete just lost; this difference reliably occurred in 11 of the 15 cases. Thus, the face alone communicates valence, albeit weakly, but that communicative value falls apart when other cues to emotion—in this case, the external situation—are added. This study is the first to show that information about the external situation can override facial information even on valence.

Our findings challenge current theories of emotion recognition from the face. Contrary to Basic Emotion Theory, discrete emotion judgments varied with context for a given face. Contrary to Russell's (1997) dimensional approach, valence judgments varied with context for a given face. We thus need an account of the perception of emotion in others that includes facial cues but that does not assume the face is preeminent. If so, why might face have determined valence in prior work, but not in this study? One possibility is that prior work, unlike this study, is based on posed facial expressions, which are unusually extreme and created to convey one and only one discrete emotion.

Why did the face not communicate a specific discrete emotion that overrode contextual information, as suggested by Basic Emotion Theory? The current study suggests a production rather than recognition problem: In general, the facial expressions lacked the action units (AUs) prototypical of a predicted emotion (as coded by Ekman & Friesen's, 1978 Facial Action Coding System). Consider first the winners. On the assumption that the winners felt happy, their faces should have expressed the AU prototypical for happiness: AU12 (pulled lip corners). Of the 12 winners, only three showed AU12. (None of the 3 losers showed AU12.) Of the three losers, one showed AUs prototypical of sadness, one of anger, and one was ambiguous (sharing AUs prototypical of sadness and fear but fitting in neither). Nonetheless, incorrect context reversed valence for all three losers.

Ecological questions remain to be explored. We examined only 15 facial expressions, context of winning and losing an athletic contest, and observers calmly made judgments. The question of how powerful face and context are in other situations remains to be explored.

Nonetheless, our findings raise again the question of what the face expresses. On one account, the face expresses not specific emotions but what in Spanish is called 'emotionada' (Fernandez-Dols & Ruiz-Belda, 1995). On this account, the face expresses

unspecified emotionality (e.g., one is moved vs. specifically happy, sad, angry, and so on). An alternative hypothesis stems from Russell's dimensional account. Russell suggested that the facial expression conveys valence and arousal. The valence hypothesis did not fare well in the present study, but perhaps faces convey arousal, but neither valence nor a discrete emotion. Yet another account is that a person's facial expression alone most reliably tells you that the person is reacting to something in the situation; thus, the message is that the situation is worth investigating. The facial expression may be emotionally relevant (a frown might indicate a negative situation) or it may not be (a frown might be the result of it being too sunny outside). In situations where the facial expression is emotionally relevant, the interpretation of that face (whether discrete or dimensional in nature) is post hoc; it becomes part of the emotion already determined by the situation.

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Appendix

Facial Action Units for Each of the 15 Facial Expressions Used in This Study

Face number	Athlete	Action units
		Winners
1	Hitomi Obara of Japan	4E + 6C + 12A + 17E + 20D + 25B + 43E + 54D + 58B
2	Nicola Adams of Britain	12C + 51C
3	Aries Merritt of United States	1B + 2B + 6B + 19D + 26D + 27D + 56C
4	Natalya Antyukhgo of Russia	4B + 12B + 25C + 26C
5	Tayyiba Maneef-Park of United States	1D + 2D + 25C + 26C + 53B
6	Usain Bolt of Jamaica	4B + 17E + 29B + 34C + 43E + 53B
7	Kim Hyeonwoo of S. Korea	4E + 9E + 25D + 27D + 43E + 53B
8	Marc Gasol of Spain	4E + 9A + 25E + 27E + 43E
9	Katherine Copeland of Britain	1C + 4B + 7C + 72
10	Maider Unda of Spain	4E + 7D + 26E + 27E
11	Giovanni Cernogoraz of Croatia	1B + 2B + 11A + 17A + 54D
12	David Lekuta of Kenya	4B + 7D + 9D + 10D + 25E + 27E
		Losers
13	Grete Ann Norgaard of Denmark	1C + 2C + 4D + 72
14	Silvia Navarro of Spain	1A + 4B + 11A + 17D + 43E
15	Ruixue Jing of China	4B + 7B + 55C + 61C + 72

Note. Each facial expression's facial action units is coded by Ekman and Friesen's (1978) Facial Action Coding System (FACS). Each facial expression was coded by one FACS certified coder.

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