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You smile–I smile: Emotion expression in social interaction

Ursula Hess [a,*], Patrick Bourgeois [b]

[a] University of Quebec at Montreal, Canada
[b] University of Montreal, Canada

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ABSTRACT

Two studies were conducted to assess the influence of emotional context and social context, in terms of gender and status, on speaker expressivity and observer mimicry in a dyadic interactive setting. For Study 1, 96 same sex dyads and for Study 2, 72 mixed sex dyads participated in a social sharing paradigm. The results showed that in both same sex and mixed sex dyads women smile more than men and members of both sexes use Duchenne smiles rather than non-Duchenne smiles to signal social intent. In same sex dyads facial expressivity and facial mimicry were determined by both the emotional and the social context of the situation. However, whereas emotional context effects maintained, social context effects were absent in mixed sex dyads. The study is the first to show evidence for facial mimicry in an interactional setting and supports the notion that mimicry is dependent on social context.

It is difficult to conceive of social interactions in which no emotions are expressed by any of the interaction partners. How and when emotions are expressed is regulated by social and cultural norms (Buck, 1984; Ekman and Friesen, 1971). In fact, interpersonal situations are highly rule-governed (Gallois, 1994) and these rules are perceived as normative for the interactions and even correct in a moral sense (Hall, 1959). Consequently, people expect costs and rewards as a function of adhering to such rules (Davis et al., 1992; Stoppard and Gruchy, 1993) as even minor violations of rules guiding emotional behavior can create substantial problems for the interaction process.

The present research investigated the expression of emotions in social interaction using the lens of facial mimicry. Mimicry is usually defined as the tendency to imitate facially, vocally or posturally people with whom we are interacting (e.g., Hess et al., 1999). Mimicry is a pervasive behavior, which is found in children (Chisholm and Strayer, 1995; Haviland and Lelwica, 1987; Kagan et al., 1994; Reissland and Harris, 1991) as well as adults (Dimberg, 1982, 1986, 1990; Lundqvist and Dimberg, 1995; Öhman and Dimberg, 1978). Mimicry is generally considered to be an unconscious and automatic process that is difficult, if not impossible, to suppress (Dimberg et al., 2000, 2002).

Lakin et al. (2003) posit that the function of behavioral mimicry has evolved from a communication role to a mechanism creating social coordination through affiliation between interaction partners and several studies confirm that mimicry improves the quality of interactions (e.g., Bernieri and Rosenthal, 1991; Chartrand and Bargh, 1999; LaFrance and Broadbent, 1976; Yabar and Hess, 2006). Since humans are a social species, social coordination is essential for their survival. Therefore, the display of affiliative tendencies represents a healthy strategy. In line with this view, mimicry tends to be shown preferentially to ingroup members or others with whom we cooperate, as arguably we are generally more likely to affiliate with those towards whom we are positively inclined (Bourgeois and Hess, 2008; Likowski et al., 2008) or with whom we expect to cooperate rather than to compete (Lanzetta and Englis, 1989; Weyers et al., 2009). This notion also corresponds to the naïve emotion theories that people hold, in that, when asked, participants consider it appropriate to show a matching facial expression when listening to someone recounting an emotional event, and they consider it more likely to show a matching facial expression in the presence of someone with whom they have a cooperative rather than a competitive relationship (Hess et al., submitted for publication). However, even though a number of studies have considered the impact of the relationship between interaction partners on mimicry, less is known about the impact of other important social context factors in particular the gender composition and the relative status of the interacting individuals. The aim of the present study is to investigate this question.

1. Gender and status

There are a number of reasons to expect gender and status to have an impact on facial mimicry. First, stereotypical gender roles

* Corresponding author.
E-mail address: ursula.hess@alum.dartmouth.org (U. Hess).

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demand both more positive, and less negative affect displays from women than from men (Brody and Hall, 2000; Fischer, 1993). More generally, women's perception as more communal (Eagly and Mladinic, 1989; Eagly et al., 1991) entrains a prescriptive component that requires the display of communal, affiliative behaviors, and also proscribes the display by women of the self-assertive, agentic behaviors that are part of the male stereotype (Shields, 2002). Hochschild (1983) commented that "women are more likely to be presented with the task of mastering anger and aggression in the service of 'being nice'" (p. 163). Hence, women expect more costs when not expressing positive emotions in an "other" oriented context (Stoppard and Gruchy, 1993) and are rated more negatively when they do not smile (Deutsch et al., 1987). To the degree that women are in fact more communally oriented than men and take on the task of 'being nice' more readily, they may also be more likely to mimic others, especially the positive emotions of others, as this behavior reinforces affiliative links (Hess et al., 1999; Lakin and Chartrand, 2003; Lakin et al., 2003).

One should note that previous research on facial mimicry has not found many sex differences. However, this failure may be explained by two reasons. First, most research on facial mimicry studied only women (e.g., Dimberg et al., 2000, 2002; Likowski et al., 2008; Weyers et al., 2009). Second, whereas research on postural mimicry has often been conducted in interactive settings (e.g., Chartrand and Bargh, 1999; LaFrance and Broadbent, 1976), research on facial mimicry has generally employed settings of limited sociality by using photos (e.g., Dimberg, 1982; Dimberg et al., 2000, 2002; Lundqvist and Dimberg, 1995), videos (Hess and Blairy, 2001; Yoshikawa and Sato, 2006), or computer-generated avatars (Likowski et al., 2008; Weyers et al., 2009). However, it has been argued that social context effects, and especially gender effects, are weaker when people are tested individually rather than in the richer context of a real interaction (Maccoby, 1990). Hence the present study assessed the influence of social context on facial mimicry in a dyadic setting.

As regards power/status, Keltner et al.'s (2003) *Approach/inhibition Theory of Power* suggests that power tips the balance between approach and inhibition towards approach. Thus, people high in power feel more positive (approach) emotions (Anderson and Berdahl, 2002) but they are conversely also freer to express anger, also an approach emotion (Carver and Harmon-Jones, 2009). In fact, power status influences the perceived appropriateness of negative affect displays. In this sense, Averill (1997) states that power is an "entry requirement" for anger, i.e., anger only appears justified to others when expressed by a person in a position to change the anger eliciting situation. This notion is supported by Maybury (1997 cited in Shields, 2000) who found that anger displays were judged as more appropriate, favorable, and situationally motivated when shown by high power protagonists in an observer judgment paradigm.

In the same vein, *Expressivity Demand Theory* (LaFrance and Hecht, 2000), which links gender and power norms, contends that individuals high in power are freer to express their emotions, either positive or negative. Thus, men, by virtue of their higher social status and power are less bound by the social norms that prescribe emotional behavior generally. A somewhat related position has been presented by Brody and Hall (2000) who propose a model whereby gender differences in smiling can be explained by a number of affective, motivational, and cognitive factors, including social knowledge and situational cues. Their affective, motivational, cognitive model of emotional expressivity makes predictions similar to those of Expressivity Demand Theory but weighs social role pressures and social role knowledge more heavily.

What these positions share is the notion that individuals high in power may express their anger when they feel it, but are also more likely to experience positive emotion and then express these (Berdahl and Martorana, 2006). By contrast, individuals low in power are more bound by situational rules. As showing a congruent emotional expression when told about an emotional event experienced by the other has been found to be a pertinent display rule (Hess et al., submitted for publication), this would suggest that lower status individuals may be more likely to mimic others. Hence for dyads with a high status speaker a higher mimicry score can be expected.

In sum, both gender and status are expected to influence facial expressivity and facial mimicry. For the study of gender differences, it has been suggested that gender differences should be most prominent in same sex dyads, by contrast, social role effects such as the impact of expressive norms and rules, play a more dominant role in mixed sex dyads (Aries, 1976, 1996; Maccoby, 1990, 1998). Hence, it is important in this context to study both same sex and mixed sex dyads.

The notion that emotional mimicry is an affiliative signal also implies that emotional mimicry should depend on the specific emotion shown. Specifically, emotional facial expressions have affiliative value. Thus, individuals expressing happiness are perceived as more affiliative than those expressing anger (Hess et al., 2000; Knutson, 1996). Hence, the mimicry of anger expressions would represent a contradictory situation in which an expression that signals lack of affiliative intent would serve to signal affiliative intent.

2. The present research

The present studies aimed to assess the influence of two social context factors, relative status and the gender composition within a dyad, on facial mimicry in a life interactive setting. For this, each member of a dyad related either an angry or happy event from their life to the other member. Power/status was manipulated and the gender composition of the dyad was varied. Specifically, in Study 1 same sex dyads interacted whereas for Study 2 mixed sex dyads were created.

Facial mimicry was assessed concurrently using facial EMG. Frowning was assessed by measuring activity of the *Corrugator Supercilii*, which draws the eyebrows together (see e.g., Hess, 2009a). *Levator Labii Aleaque Nasii* lifts the upper lip in a sneer. Activity of these two muscles was measured to assess anger and contempt/disgust. Happiness is indexed by smiling. Two types of smiles were assessed, first, the so-called Duchenne smiles for which *Zygomaticus Major* and *Orbicularis Oculi* are concurrently activated and second, *Zygomaticus Major* only smiles. The first are considered to be more reflective of 'felt' affect, the latter are considered to be more likely when a smile is forced (e.g., Frank and Ekman, 1993; Frank et al., 1993).

3. Hypotheses

As mentioned above, women are generally expected to express more positive affect and more affiliation. Also individuals lower in power are more bound by display rules (LaFrance and Hecht, 2000). Further, anger is perceived as more appropriate for men and for individuals higher in power. We predicted therefore that (1) women would smile more and show more mimicry than men; (2) individuals lower in power would be more likely to show mimicry than individuals higher in power because they follow a display rule to show congruent affect when listening to someone narrating an emotional event; (3a) anger, because it is not an affiliative emotion, should be shown and mimicked to a lesser degree than happiness; (3b) if anger is mimicked at all, it should be mimicked more by men and individuals high in power than by women or individuals low in power.

4. Study 1

4.1. Method

4.1.1. Participants

Forty-eight male and 48 female dyads aged between 18 and 30 years participated; the members of the dyads did not previously know each other. Participants were recruited in classrooms and public areas at the University of Quebec at Montreal. All participants were fluent in French. Prior to the research appropriate IRB approval had been obtained.

4.1.2. Procedure

Participants were welcomed by two experimenters and presented to each other. They were informed about the goal of the experiment and then signed a consent form. They also completed a questionnaire, which was presented as measuring emotional intelligence.

Participants were seated in comfortable chairs around a small table facing each other. Facial EMG electrodes were then placed. In order for the participants to habituate to the experimental setting and to the presence of the video cameras and the electrodes, they played a card based story-telling game. Following this, participants completed a questionnaire about the emotional episode they wanted to narrate to help them refresh their memory.

Next, participants' status was manipulated using a procedure validated by Cantin and Hess (1998) for the manipulation of relative status. For this, participants received bogus feedback on an emotional intelligence test. Systematically, a score of 89% was given to the high status participant whereas the lower status participant received a score of 80%. Participants were told either that in order to facilitate the unfolding of the experiment, the person with the higher score would start to talk or start to listen because of a higher proficiency in that domain. For same status dyads, this part of the procedure was excluded. Role (speaker and listener), status (same, higher, lower) and emotional event to be recounted (happiness and anger) were counterbalanced across participants. The experimenter instructed the participants in the use of the intercom allowing them to signal when the narrative was finished and left the room while participants were interacting.

Before the first, and following each narrative, participants completed a "wellbeing" questionnaire. After the second narrative had been presented, the electrodes were removed and participants were conducted to the main laboratory to complete additional questionnaires. This was followed by a debriefing session where the status manipulation was explained.

4.1.3. Dependant variables

4.1.3.1. Facial EMG. Facial muscle activity at the *Orbicularis Oculi*, *Zygomaticus Major*, *Corrugator Supercilii*, and *Levator Labii Aleaque Nasii* sites was measured on the left side of the face, using bipolar placements of Med. Associates Inc. Ag/AgCl miniature surface electrodes with Med. Associates Inc. electrolyte gel (TD41). Electrode placements were chosen according to Fridlund and Cacioppo (1986). All pairs were referenced to a forehead electrode placed near the midline. The skin was cleansed with PDI disposable electrode prep pads (70% alcohol and pumice). A Contact Precision Instruments system with 60 Hz notch filter was used to amplify the raw EMG signals, which were integrated with a 200 ms time constant. The smoothed EMG signal was sampled at 20 Hz and stored to disk.

4.1.3.2. Self-report measures. Self-reported emotional state was assessed before and after each narrative using a series of 7-point scales anchored with 0—not at all and 6—very intensely. The questionnaire was presented as a measure of wellbeing and the majority of the scales related to physical symptoms likely to occur in an experimental context (i.e., tense muscles, dry eyes). Two items designed to unobtrusively measure emotional state were included: feeling cheerful and feeling irritated. The labels were chosen to correspond to the emotional content of the narratives without using the same terms as those employed in the instructions. Participants typically report that the scale serves to assess stress and are not aware that emotional state is assessed as well. For the analyses difference scores from baseline were calculated.

4.2. Results

4.2.1. Manipulation check

To verify whether the task elicited the corresponding emotional states in speakers, we assessed whether difference scores from baseline for self-reported emotional state differed from 0. For the happy condition, the one sample *t*-test was significant for speaker cheerfulness ($M = .63$, SD = 1.27, $t(94) = 4.84$, $p < .001$). For the anger condition, the one sample *t*-test was significant for both speaker cheerfulness ($M = -1.16$, SD = 1.72, $t(94) = 6.58$, $p < .001$) and speaker irritation ($M = .92$, SD = 2.15, $t(94) = 4.16$, $p < .001$). Thus, as suggested by Rimé (1995) speaking about an emotional event elicited a congruent emotional state.

4.2.2. Length of the interaction

Interactions lasted on average 183 s, ranging from 30 to 625 s. No sex differences were observed. Overall, a marginally significant effect, $F(1, 180) = 3.21$, $p = .075$, suggested that participants spent more time narrating anger events ($M = 197$, SD = 128) than happiness events ($M = 168$, SD = 97). However, this pattern was qualified by a significant narrative × status interaction, $F(2, 180) = 4.05$, $p = .019$. Post hoc tests ($p < .05$) showed that this difference was significant for high status speakers ($M = 213$, SD = 125 versus $M = 144$, SD = 94 and speakers in same status dyads ($M = 221$, SD = 131 versus $M = 167$, SD = 79, $p = .053$). By contrast, the pattern of means for low status speakers was reversed such that they spent less time talking about anger events ($M = 158$, SD = 121) than talking about happy events ($M = 194$, SD = 113). This latter difference was not significant, but the pattern suggests that low status speakers felt less comfortable speaking about anger events. Speaking more about happy events and less about anger events may represent an ingratiating effort by the low status speakers.

4.2.3. Speaker facial expression

Initial analyses revealed no effects of the emotional or social variables on *Corrugator Supercilii*, and only a few contradictory, barely significant effects for *Levator LAN* activity. We therefore focused the analyses on smiling behavior.

4.2.4. Scoring

To assess smiling behavior, we calculated the percentage of time during the conversation that speakers showed a visible Duchenne smile and a visible non-Duchenne smile. For this we set a cutoff of 15 μV, which corresponds to the level at which facial muscle activity becomes visible in the face (Girard et al., 1996). We then assessed the percentage of time during which both *Zygomaticus Major* and *Orbicularis Oculi* activity were above that limit as Duchenne smiles. The amount of time that *Zygomaticus Major* activity but not *Orbicularis Oculi* activity was above threshold corresponds to social smiles.

4.2.5. The influence of gender and status on speaker smiling

4.2.5.1. Duchenne smiles. A 2 (sex) × 2 (narrative: happy, angry) × 3 (speaker status: same, superior, inferior) revealed significant main effects of sex, $F(1, 176) = 11.75$, $p = .001$, and narrative type, $F(1, 176) = 6.70$, $p = .001$, as well as a marginally significant emotion × status interaction, $F(2, 176) = 2.44$, $p = .090$. Women spent significantly more time Duchenne smiling ($M = .71$, SD = .30) than did men ($M = .56$, SD = .33). Congruent with the emotional content of the narratives, speakers spend significantly more time Duchenne smiling when they talked about a happy event in their lives ($M = .69$, SD = .27) than when they talked about an anger eliciting event ($M = .58$, SD = .33). However, the percentage of time spent Duchenne smiling in this condition was still rather high, suggesting that in this social situation the speakers' Duchenne smiles did not so much reflect their emotional state than it did their involvement in the social situation.

Further, simple effects analysis showed that speakers who reported a happy event from their lives in the same status condition smiled significantly less ($M = .58$, SD = .31) than did speakers in a condition involving a status differential ($M = .70$, SD = .29 and $M = .79$, SD = .22 for high and low status speakers respectively). For anger narratives no significant difference as a function of status emerged.

4.2.5.2. Non-Duchenne smiles. Overall, participants spent only 6% of the time showing a non-Duchenne smile, compared to 69% of the time spent Duchenne smiling. This finding suggests that in a social context like the one in the present study, smiles that could be considered 'fake' or 'unfelt' occurred only rarely.

A marginally significant main effect of emotion condition, $F(1, 176) = 2.05$, $p = .083$, emerged such that participants spent more time showing a non-Duchenne smile ($M = .08$, SD = .15) when reporting an anger event, then when reporting a happy event ($M = .04$, SD = .12), suggesting that non-Duchenne smiles are indeed less likely to reflect positive affect than are Duchenne smiles, for which a strong opposite pattern was found.

Further, an emotion by status interaction, $F(2, 176) = 2.94$, $p = .055$, emerged. For happiness narratives, the pattern for social smiles matched the pattern for Duchenne smiles, but did not reach significance in post hoc tests. For anger narratives, however, a different pattern emerged, here, speakers with lower status tended to show significantly more non-Duchenne smiles ($M = .11$, SD = .17) than speakers high in status ($M = .05$, SD = .10), with same status speakers between the two ($M = .07$, SD = .16). This finding suggests that lower status speakers are less comfortable when narrating an anger event. Thus, the somewhat higher levels of social smiles could plausibly be considered an appeasement display. However, as mentioned above, speakers overall showed rather high levels of Duchenne smiles in this situation, suggesting that Duchenne smiles and not social smiles were used to signal positive intent while discussing anger.

4.2.6. Mimicry effects

EMG activity was averaged for each 15-s epoch. To assess mimicry, correlations between speakers' and listeners' mean EMG activity were computed across epochs. High correlations signal the presence of simultaneous activation and deactivation of specific muscles for speakers and listeners. A 2 (sex) × 2 (narrative: happy, angry) × 3 (speaker status: same, inferior, superior) with the repeated measures factor muscle site was conducted on the *z*-transformed correlations. Means will be presented as correlation coefficients.

A significant main effect of muscle site, $F(3, 492) = 43.71$, $p < .001$, as well as a sex × emotion, $F(1, 164) = 6.98$, $p = .009$ and a muscle site × emotion × sex interaction, $F(3, 492) = 4.11$, $p = .007$, emerged. Overall, correlations were lowest for *Corrugator Supercilii*, $r = .08$, followed by *Levator LAN*, $r = .44$, and *Orbicularis Oculi*, $r = .59$, and *Zygomaticus Major*, $r = .54$, for which correlations did not differ significantly. Thus, as predicted by hypothesis 3, the muscle that indexes frowning was found to be least likely to be simultaneously activated when two interaction partners actually talked to each other. By contrast, the two muscles that index smiling, *Zygomaticus Major* and *Orbicularis Oculi*, showed considerable coherence between interaction partners.

4.2.6.1. Status and sex. No main effect or interaction involving status emerged. Thus, contrary to hypothesis 2, low status listeners did not mimic high status speakers more than vice versa or listeners in same status dyads.

The sex × emotion interaction was qualified by a muscle site × sex × emotion interaction. Post hoc analyses ($p < .05$) revealed that for *Corrugator Supercilii* no differences as a function of emotion or sex emerged. For *Levator LAN* the emotion × sex interaction was significant, $F(1, 182) = 16.46$, $p < .001$, such that women showed significantly more mimicry during anger narratives, $r = .50$, than during happy narratives, $r = .25$, whereas the reverse was true for men (happy: $r = .64$, anger: $r = .33$). A similar pattern was obtained for *Orbicualris Oculi*, $F(1, 178) = 5.52$, $p = .020$, and *Zygomaticus Major*, $F(1, 178) = 3.44$, $p = .065$. Whereas women showed about equal levels of mimicry during happy (*Orbicularis Oculi*: $r = .58$; *Zygomaticus Major*: $r = .46$) and anger narratives (*Orbicularis Oculi*: $r = .62$; *Zygomaticus Major*: $r = .53$), men showed significantly more mimicry during happy (*Orbicularis Oculi*: $r = .68$; *Zygomaticus Major*: $r = .66$) than during anger narratives (*Orbicularis Oculi*: $r = .49$; *Zygomaticus Major*: $r = .50$).

4.3. Discussion

In sum, as predicted by hypothesis 1, the frequently reported observation that women smile more (e.g., Fischer, 1993) was replicated for time spent smiling. However, this effect emerged only for Duchenne smiles. Interestingly, participants did not show non-Duchenne smiles very often, even though the pattern of such smiles was congruent with the notion that these smiles are shown in response to social demands. Rather, participants showed high levels of Duchenne smiles, especially in conditions where status was salient.

No emotion effects emerged for *Corrugator Supercilli* and *Levator LAN*, suggesting that participants did not frown or sneer more when narrating an anger event than when narrating a happy event. It is interesting to speculate as to the reasons for this. It has been suggested elsewhere (e.g., Matsumoto, 1996) that for members of an individualistic country such as Canada, it is less appropriate to show anger to strangers than to ingroup members. In fact, individuals have been found to show less negative and more positive expressions when relating a negative event in the presence of another person (Lee and Wagner, 2002). Similarly, in a recent study we found that participants showed anger to friends but not to strangers (Hess, 2009b). Thus in the present context, overt expressions of anger may simply have been perceived as inappropriate, as the speaker could not be sure that the listeners would not misinterpret this behavior as directed at them rather than reflecting a reaction to the situation.

Status had an effect on smiling duration such that speakers in dyads with a status differential smiled more. This pattern suggests that in such dyads more care was taken to engage the other. This may be a function of the status manipulation, as we had used a manipulation that evoked the need to be emotionally intelligent. Interestingly, even though smiling in this context can be considered largely social, participants showed predominantly Duchenne smiles. This suggests that normal, emotionally competent individuals are very much able to show a believable smile in social contexts that demand smiling.

As regards mimicry, in accordance with hypothesis 1, women seem indeed intent to 'be nice' by mimicking the smiling behavior of their interaction partners regardless of context. By contrast, men's mimicry behavior was more sensitive to context and they mimicked smiles to a lesser degree in an anger than in a happy context. Further in support of hypothesis 3, anger expressions (i.e., frowning), which were rare, but nor entirely absent, were not mimicked. Contrary to hypothesis 2, status had no effect on mimicry. That is, low status listeners did not react to the display rule to show congruent mimicry nor did mimicry seem to be used by them as an ingratiate strategy. It may be argued that display rules should have less impact because mimicry is a reflex-like behavior—but examples such as the greeting smile (Eibl-Ebesfeldt, 1989) suggest that well learned display rules can have an impact on behaviors in this class.

5. Study 2

In sum, Study 1 showed in a dyadic interactive setting that status and gender impact on emotion expression. Interestingly, a different pattern of smile mimicry was found for men and woman. Specifically, mimicry by men was more sensitive to the emotion context than was mimicry by women. This contrast with the predominant view that women show more intense but not qualitatively different mimicry (Dimberg and Lundqvist, 1990), which was based on men's and women's reaction to still photographs.

By contrast, no influence of status on mimicry emerged. However, in the present study men and women interacted in same sex pairs and as mentioned above, social role effects such as the impact of expressive norms and rules may play a more important role in mixed sex dyads (Aries, 1976, 1996; Maccoby, 1990, 1998). Hence it is possible that status effects—such as the prediction that low status individuals, because they are more bound by display rules (LaFrance and Hecht, 2000), should mimic more—are more likely to emerge for mixed sex dyads.

Study 2 was designed to assess the impact of status and gender on mixed sex interactions. We predicted that (1) gender effects would be smaller than in Study 1, but (2) status effects would emerge more clearly.

5.1. Method

5.1.1. Participants

Seventy-two mixed sex dyads aged between 18 and 30 years participated; the members of the dyads did not previously know each other. Participants were recruited in classrooms and public areas at the University of Quebec at Montreal. All participants were fluent in French. Prior to the research appropriate IRB approval had been obtained.

5.1.2. Procedure and dependent variables

The same procedure and dependent variables as in Study 1 were used. However, due to technical problems with one amplifier *Levator LAN* could not be consistently recorded.

5.2. Results

5.2.1. Manipulation check

To assess whether the task elicited the corresponding emotional states in speakers, we assessed whether difference scores from baseline for self-reported emotional state differed from 0. For the happy condition the one sample *t*-test was significant for speaker cheerfulness ($M = .64$, SD = 1.20, $t(71) = 4.51$, $p < .001$). For the anger condition the one sample *t*-test was significant for both speaker cheerfulness ($M = -1.47$, SD = 1.78, $t(72) = 7.00$, $p < .001$) and speaker irritation ($M = .65$, SD = 1.87, $t(70) = 2.92$, $p = .005$). Thus, as in Study 1, speaking about an emotional event elicited a congruent emotional state.

5.2.2. Length of the interaction

Interactions lasted on average 185 s (SD = 127), ranging from 30 to 856 s. No main effects or interactions as a function of emotion condition, sex, or status emerged.

5.2.3. The influence of gender and status on speaker smiling

As in Study 1, we found only non-significant *Corrugator Supercilii* effects, hence, we assessed speaker smiling in terms of percent spent showing Duchenne and non-Duchenne smiles.

5.2.3.1. Duchenne smile. A significant main effect of speaker sex, $F(1, 130) = 3.94$, $p = .049$, emerged such that women ($M = .66$, SD = .29) spent more time smiling than men ($M = .55$, SD = .33). No other significant main effects or interactions emerged.

5.2.3.2. Non-Duchenne smile. No significant main effects or interaction emerged. As in Study 1, the percentage of time spent showing non-Duchenne smiles was small (6%) compared to the time spent Duchenne smiling (60%).

5.2.4. Mimicry effects

A 2 (speaker sex) × 2(narrative) × 3(speaker status) analysis of variance with the repeated measures factor muscle site on the *z*-transformed correlations yielded a significant main effect of muscle site, $F(2, 232) = 34.09$, $p < .001$ as well as a significant emotion effect, $F(1, 116) = 6.31$, $p = .013$. As in Study 1, post hoc tests ($p < .05$) showed that activity of the *Corrugator Supercilii* was mimicked significantly less ($r = .02$) than activity of the *Orbicularis Oculi* ($r = .57$) and the *Zygomaticus Major* ($r = .53$). Further, participants mimicked significantly more during happy ($r = .65$) than during angry narratives ($r = .39$).

5.3. Discussion

In sum, as predicted, fewer gender effects were found in the mixed sex than in the same sex dyads. In fact, only the well established finding that women smile more than men was replicated and even this effect was smaller in Study 2 ($d = .35$) than in Study 1 ($d = .48$). Again, we found that participants mainly showed Duchenne smiles and only rarely social smiles, suggesting, especially for the anger condition—where participants did not experience any felt happiness—that most people are able to consistently produce a believable smile with markers for genuineness.

We replicated the finding from Study 1 that even though smiles shown during an anger narrative were mimicked, frowns were not. Overall the results for mimicry replicated the results for men in Study 1, i.e., participants mimicked smiles shown in both the happy and the angry condition, but mimicked less in the latter than in the former.

5.4. General discussion

The present research investigated dyadic interactions through the lens of facial mimicry. A first goal was to investigate whether listeners would mimic a speaker's facial expressions in a dyadic, interactive setting and whether this would be the case for both happiness and anger contexts. Second, we investigated whether sex and status had an impact on facial mimicry based on the assumption that facial mimicry is an affiliative behavior and as social demands towards affiliativeness are higher for women than for men, women should mimic more. Further, as low status individuals have been claimed to be more bound by display rule norms (LaFrance and Hecht, 2000) and a norm for showing congruent facial exists (Hess et al., submitted for publication) we predicted that they would mimic more than high status individuals. In addition, mimicry could be used as an ingratiation strategy by low status individuals. In Study 1 these hypotheses were investigated for same sex and in Study 2 for mixed sex dyads. Following observations that gender effects tend to be smaller in mixed sex dyads, whereas social rule norms have a stronger effect in these dyads (Aries, 1976, 1996; Maccoby, 1990, 1998) we predicted for Study 2 fewer gender effects on facial expressivity, but stronger status effects as these were expected to be mediated through display rule adherence.

The results showed that, as predicted, in a dyadic interactive setting anger expressions were not mimicked. By contrast, speakers showed high rates of Duchenne smiling in both happy and anger contexts and these smiles were mimicked. By contrast, rates of non-Duchenne smiling were low.

These overall effects were qualified to some extent by sex and to a lesser extent by status. In both same sex and mixed sex dyads, women were found to smile more overall. However, women did not consistently show more mimicry. Rather, sex effects on facial mimicry were qualified by emotion content and the gender composition of the dyad. Men in same sex dyads and both sexes in mixed sex dyads mimicked more during happy than during anger narratives, whereas the level of mimicry by women in same sex dyads did not differ according to emotion content.

The present study is the first investigation of facial mimicry in the type of interactive dyadic setting that has been previously used for the investigation of postural mimicry (e.g., Chartrand and Bargh, 1999; Lakin and Chartrand, 2005). In this setting, we found that both men and women mimic smiles but not frowns. The lack of anger mimicry is congruent with the notion that anger expression is generally disapproved in Western culture (Parkinson et al., 2005) and hence suppressed in social interactions among strangers (Lee and Wagner, 2002; Matsumoto, 1996). However, anger is not only a socially proscribed emotion, but it also directly signals low affiliative intent. In fact, basic facial emotion expressions by themselves signal various degrees of affiliation. Thus, the same individual is perceived as highly affiliative when showing happiness and as unaffiliative when showing anger and disgust, and as neither affiliative nor unaffiliative when showing sadness and fear (Hess et al., 2000; Knutson, 1996).

This implies that mimicking anger in a situation where the anger could conceivably directed at oneself—a situation more likely in an interactive setting than in response to a still photo—would not fulfill the affiliation goal that is normally served by emotional mimicry. By contrast, the mimicry of smiles shown during an anger narrative serves this purpose, yet the context as such is clearly less affiliative. This latter notion is supported by the observation that participants rate a person who had presented the anger narrative significantly less likeable—even though this effect was somewhat qualified by gender and status (Hess et al., 2008). That women in same sex dyads mimic equally in anger and happy contexts, may be derivative of the observation that women tend to smile more in a variety of negative contexts (e.g., LaFrance et al., 2003) and tend to behave in a more gender stereotypical way in same sex compared to mixed sex interactions (Aries, 1976, 1996; Maccoby, 1990, 1998).

In sum, the overall high rate of Duchenne smiling by speakers and its mimicry by listeners is congruent with the notion that mimicry serves to signal affiliation (Chartrand and Bargh, 1999; Chartrand et al., 2005; Lakin et al., 2003), hence participants preferentially mimicked affiliative facial behavior. The absence of anger mimicry and the finding of different patterns of mimicry for men and women in same sex dyads in the interactive setting employed here underline that videos and still photos—even if evocative—are not the same as a real life human interaction partner and that care has to be taken when generalizing from such materials.

No effect of status on mimicry was found. That is, in the present context, mimicry was not used as a form of ingratiation behavior, even though status did influence the speakers' smiling behavior in Study 1. Overall, speakers smiled more in conditions where status had been made salient. Only for non-Duchenne smiles during anger narratives did lower status speakers smile more. The pattern for anger narratives is congruent with Averill's notion (1997) that anger has an entry requirement of power. That is, for a sender to legitimately signal anger, the sender must have power in the situation. In Study 1, low status individuals seem to be more uncomfortable as indexed by the shorter amount of time spent narrating an anger event, and hence aimed to end the situation more quickly and spent more time smiling in appeasement as social smiles are more often interpreted as appeasement smiles (see Hess et al., 2002). As implicit in Averill's view and as predicted by Brody and Hall (2000), this appeasement is more related to a social role transgression than to the low status per se, as can be

seen by the absence of such effects for happiness narratives. However, even though social norms have been suggested to have a stronger effect in mixed sex dyads (Aries, 1976, 1996; Maccoby, 1990, 1998) this was not the case here. One may speculate that it is possible that another social norm, one not related to status, was more potent in the present situation—the norm to be a good listener. The workings of this norm may explain why in Study 2 mimicry by both men and women were found to be more sensitive to the emotion content and hence mimicked less during anger narratives.

Brody and Hall (2000) propose a model whereby gender differences in smiling can be explained by a number of affective, motivational, and cognitive factors, including social knowledge and situational cues. The present study provides support for this notion. Gender differences emerged more consistently in same sex dyads and only in these dyads did status effects emerge. In fact, only one consistent sex effect emerged—as in most studies on smiles—women were found to show more Duchenne smiles. However, both smiling and facial mimicry were moderated by emotional context, status, and the gender composition of the dyad as suggested by Brody and Hall (2000). Overall these findings suggest that it would be facile to ascribe more mimicry to women or men or to consider smiling a consistent ingratiating behavior. Rather, emotional expressivity and facial mimicry in interactive social settings are subject to the interaction of emotional context, sexual stereotypes, and social norms.

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