Trait Perceptions of Dynamic and Static Faces as a Function of Facial Maturity and Facial Expression

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ABSTRACT

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Facial structure and emotional expressions are two of many facial attributes that have been found to impact first impressions. Moreover, some facial expressions tend to resemble structural facial categories. In particular, surprised faces tend to resemble the faces of babies, and both surprise and babyfaceness contribute to similar trait attributions. Studies have also shown that emotion identification is enhanced in moving faces, yet previous research on the impact of babyfaceness and emotional expressions has not investigated impressions in moving faces. The current study investigated the impact of babyfaceness and surprise on impressions of dominance and affiliation in both moving and non-moving faces. Babyfaceness was found to decrease perceived dominance and increase perceived affiliation, but these effects were moderated by emotional expression. Surprised expressions increased perceived affiliation, but this effect was attenuated by facial movement. Movement also increased perceived affiliation, but only for faces that were low in babyfaceness. Theoretical interpretations and practical applications are discussed.

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Introduction

First impressions from faces can influence stereotypes, expectations, and behavior toward others; a first impression can influence whom we like and dislike, whom we respect and disrespect, whom we fear and whom we approach, and so on. First impressions are made rapidly and often with minimal information. One might caution that facial appearance is not a reliable agent for judgments, however, people tend to agree on which facial appearance markers are associated with particular traits. Inferring traits from faces may even have an adaptive value. The ecological theory of face perception posits that a person's facial appearance offers information about the types of interactions that can be afforded to a person (see Zebrowitz, 2006, for an overview). It may therefore be adaptive to notice particular facial qualities and to generalize those qualities to similar others. Research shows that people are able to generalize, and even tend to overgeneralize the attribution of traits to people who have facial qualities representative of certain social categories. Attractive people, for instance, are often attributed more positive qualities than unattractive people (Eagly, Ashmore, Makhijani, & Longo, 1991), and adults with babyish faces are attributed qualities that are associated with babies (Zebrowitz, 2006; Zebrowitz, Kikuchi, & Fellous, 2007; Zebrowitz-McArthur & Montepare, 1989). Other less stable qualities such as emotional expressions can also influence judgments. Certain emotions are also similar to certain structural categories. In particular, babyfaceness is not only structurally similar to fear and surprised expressions (Marsh, Adams, & Kleck, 2005; Sacco & Hugenberg, 2009; Zebrowitz et al., 2007), but people tend to attribute similar traits to babyfaced and fearful/surprised faces (Marsh et al., 2005; Zebrowitz et al., 2007). Most of the previous research on babyfaceness and

emotion has focused on impressions of static faces; however, it is pertinent to investigate impressions in dynamic faces as well. The present study will determine whether the effects of babyfaceness and surprise expressions on trait impressions also hold true for dynamic faces and whether the relative impact of a babyish structure and surprise expressions differ for static and dynamic faces.

Babyfaceness and Emotional Expression

Babies have particular facial qualities that are easy to identify. It is important to be able to identify a baby to attend to his or her need for protection and affiliation. Perhaps out of this natural inclination to attend to babies comes babyface overgeneralization. This refers to the tendency for people to attribute babyish qualities to individuals whose faces resemble babies' faces. Babyfaced adults, for instance, tend to be perceived as more submissive, warm, and affiliative than mature-faced adults (Zebrowitz-McArthur & Montepare, 1989; Zebrowitz et al., 2007).

While babyfaceness is generally a stable characteristic, other, more transient, facial characteristics also contribute to impressions. Facial expressions, for example, are an effective means of forming an impression of a person's current state. However, in a first impression, a particular expression may cause the perceiver to infer stable personality traits based on that momentary expression. People who express anger are perceived as more dominant and less affiliative, those who express happiness are perceived as higher in dominance and affiliation, and those who express fear or surprise are perceived as less dominant and moderately affiliative (Knutson, 1996; Marsh et al., 2005; Montepare & Dobish, 2003).

Research has shown that babyfaceness and emotion expressions are related.

Marsh et al. (2005) argued that certain facial expressions may have evolved to imitate babies or mature adults. Specifically, they suggest that it is advantageous for expressions of anger to mimic powerful adults and for expressions of fear to mimic powerless babies. Some of the features that make a face babyish (e.g., large eyes) are indeed present in a fear expression. Empirical evidence that fear and anger are associated with babyfaceness/maturefaceness includes a study by Sacco and Hugenberg (2009), who found that the accurate identification of fear and anger was enhanced in faces that were manipulated to have babyish or mature facial qualities, respectively. Specifically, larger eyes enhanced the accurate perception of fear and smaller eyes enhanced the accurate perception of anger. In a separate study, these researchers found the same effect by making the faces rounder or thinner, a babyish/mature facial quality that, unlike eye size, is not related to facial expression.

Additional evidence supporting the Marsh et al. hypothesis was provided by Zebrowitz et al. (2007). Using connectionist modeling, they trained a neural network to differentiate the facial metrics of neutral expression babies and adults and then tested the network on faces that varied in emotion expression. The baby unit trained on eye region metrics was activated more for surprise (an expression structurally similar to fear) than for neutral or angry expressions. The same study also asked judges to rate the babyfaceness of the photographs and found higher babyfaceness ratings for surprised than for neutral or angry expressions. A second part of the study investigated trait attributions to different facial expressions and found that surprised expressions were perceived as less dominant and more affiliative than neutral faces, and that this effect was partially mediated by higher babyfaceness ratings and higher babyface

network activation (eyes-only) by surprised faces. These results make sense in terms of the evolutionarily adaptive perspective; surprised or startled expressions need to resemble babies because they may require care or relief.

Despite the considerable evidence for parallel effects on impressions of a babyish facial structure and fear/surprise expressions, the question that remains is whether the effects of babyfaceness and fear/surprise are additive or interactive. For example, are differences in impressions of babyfaced vs. maturefaced individuals attenuated when all have surprised expressions as compared with neutral expressions? Alternatively, are the effects of facial maturity and facial expression on impressions two independent main effects? Zebrowitz and Voinescu (1994) addressed this question using smiling and frowning expressions in schematic faces. For impressions of social goodness, the effect of expression and facial maturity was additive. Babyfaced adults were rated significantly higher in social goodness than maturefaced adults, regardless of the emotional expression. Smiling increased social goodness and frowning decreased social goodness in both babyfaced and maturefaced individuals. For social weakness, the effect was interactive. Compared with a neutral expression, smiling increased the perceived weakness of maturefaced but not babyfaced adults, while frowning decreased the perceived weakness of babyfaced but not maturefaced adults. Whereas these results suggest that whether facial expression and facial maturity will have additive or interactive effects depends on the particular impression, no research has extended the findings to real faces or to other emotion expressions. The present study attempted to fill this gap in the literature.

Based on previous research, we hypothesized that babyfaced and surprised faces

would be perceived as less dominant than mature faces and neutral faces, respectively, regardless of facial movement. However, surprise was expected to moderate impressions of dominance for maturefaced but not babyfaced people. This prediction was based on the knowledge that a surprised face looks similar to a baby's face. When a babyfaced person looks surprised, he or she does not look much different than he or she normally does. When a maturefaced person looks surprised, the effect is likely more noticeable and also makes the face look more babyish, reducing impressions of dominance. Support for this reasoning comes from the study by Zebrowitz and Voinescu (1994), which found that frowning (anger) increased perceived dominance in babyish faces but not in mature faces. The finding that anger had more influence on the perceived dominance of babyfaced adults than maturefaced adults can be explained by the idea that the difference between neutral and anger expressions is more salient in babyfaced adults than in maturefaced adults whose faces already look somewhat angry (e.g., Zebrowitz et al., 2007). This suggested that surprise would have more influence on the perceived dominance of maturefaced than babyfaced adults because the difference between neutral and surprise expressions should be more salient in maturefaced adults than in babyfaced adults, whose faces already look somewhat surprised.

Whereas the effect of anger expressions on perceived dominance was moderated by babyfaceness, Zebrowitz and Voinescu (1994) found only main effects on perceived social goodness, which may reflect strong decreases in perceived social goodness of angry people. In contrast, we expected that surprise expressions would moderately increase perceived affiliation, with stronger effects for maturefaced than babyfaced

adults, who already are perceived as high in affiliative tendencies.

Dynamic Faces

Another shortcoming in the existing research examining the influence of facial expressions and babyfaceness on trait impressions is that most studies have been based on static photographs of posed expressions. One exception is a study by Zebrowitz-McArthur and Montepare (1989), who found parallel effects of babyfaceness in moving and static faces, with rated babyfaceness of neutral expression faces significantly predicting impressions of weakness in both. Although no research has compared trait impressions of dynamic vs. static emotion expression faces, there is reason to expect stronger effects for dynamic faces, since emotions are more accurately identified in dynamic faces, an effect posited to be due to the observed change from a neutral expression to an emotional expression (Ambadar, Schooler, & Cohn, 2005; Bould & Morris, 2008). Although babyfaceness and associated traits are perceivable in moving faces, it is unclear how emotion in a moving face affects these perceptions, since the moving faces in the Zebrowitz and Montepare (1989) study were all reciting the alphabet and had relatively neutral expressions. It is also unclear what cues will dominate first impressions of moving faces that vary in both babyfaceness and emotional expressions, especially when the expression is physically similar to a baby's face. The present study sought to investigate the effects of emotional expression (surprise) and babyfaceness on impressions of dominance and affiliation in both static and dynamic faces. Based on evidence that accurate emotion identification is stronger for dynamic faces, the attenuating effect of surprise on perceived dominance was expected to be stronger in the dynamic condition than in the static condition.

Impressions of neutral faces (both babyish and mature) were expected to be no different in the static and dynamic conditions because the advantage of dynamic faces is that the emotion cues are more salient.

In summary, we predicted, based on previous research, that both babyfaceness and surprise expressions would be related to perceptions of lower dominance and higher affiliation. We also expected that the effect of surprise would be stronger on impressions of maturefaced than babyfaced adults because the emotion would be more noticeable in faces that do not already look surprised. Finally, we predicted that facial movement would strengthen the effect of surprise on impressions because emotions would be more salient in moving faces than in non-moving faces.

Method

Participants

Eighty-nine students (72% female) from Brandeis University acted as participants. The mean age was 19 years and participants were mostly Caucasian (89%). They were recruited on campus using advertisements and paid for their participation or participated to partially fulfill course credit.

Materials

A subset of faces from the Database of Moving Faces and People (O'Toole et al., 2005) was used as target faces. This subset is comprised of 28 female Caucasian targets: selected from the entire set based on preliminary ratings of 42 static faces, which showed a front-facing neutral-expression "mug shot." These faces were rated by ten graduate student volunteers on attractiveness and babyfaceness (scale anchors 1 = low attractiveness/babyfaceness and 7 = high attractiveness/babyfaceness), with the 28

selected faces determined to be average in attractiveness (M = 3.64, SD = 0.49, range 2.8 to 4.2) and to range in babyfaceness from 2.2 to 5.2 (M = 3.4, SD = 0.84). The same volunteers also provided the perceived age in years of the target faces, which ranged from 23 to 34 (M = 27, SD = 3.08). Another five graduate volunteers rated the faces for smiling (scale anchors 1 = no smile and 7 = big smile) and faces were determined to be not smiling (M = 2.02, SD = 0.91).

The 28 selected static, neutral expression targets were present in the database in dynamic neutral and dynamic surprise conditions. Dynamic neutral expressions depicted targets showing facial movement resulting from talking (with no sound played). Dynamic surprise expressions were elicited by O'Toole et al. (2005) by recording targets while they watched a series of television and movie clips designed to elicit a number of emotions, and one of several experimenters subjectively determined whether each video contained a surprise (or other) expression. These recordings were subsequently cut into shorter video clips which were judged to contain one primary emotion. However, as O'Toole et al. (2005) acknowledge, some clips contained more than one emotion. In addition, the researchers did not obtain intensity ratings of their emotion clips and, in the opinion of the current researchers, the surprised expressions are subtle. To eliminate extraneous emotions and increase the intensity of the surprise expression, we cut the O'Toole videos into shorter clips with the peak of the surprise expression being displayed at the end of the clip. Static surprised faces were constructed using Adobe Photoshop, by capturing the peak of the expression from the dynamic surprise videos (same expression as shown at the end of the dynamic surprise video clips). Despite our efforts to maximize the look of surprise, the surprised

expressions were subtle. Nevertheless, manipulation checks reported below reveal that they were judged as more surprised than the neutral expressions. All videos were cut to a length of approximately 1.25 seconds using Adobe Premiere.

Face Ratings

Participants used 7-point bipolar scales to rate six trait impressions which have been found to be related to babyfaceness and fear/surprise in previous research: submissive/dominant, physically weak/physically strong, naïve/shrewd (from here on referred to as "dominance"), cold/warm, untrustworthy/trustworthy, and unsociable/sociable (referred to as "affiliation"). Participants also rated the babyfaceness and emotions (fear, surprise, anger, happiness, and sadness) of target faces. Although faces were preselected to be average in facial attractiveness, they were also rated on attractiveness to use as a control variable in the analyses, since attractiveness is related to trait perceptions. Rating scales were presented on the computer screen after the stimulus clip was displayed.

Design

Participants were randomly assigned to one of five blocks of faces. In a baseline block, participants rated all 28 faces in the static neutral condition only. In the remaining four blocks, all faces were shown and all conditions were represented, but only one version of each face was presented, e.g., one subject may have seen Target A (static neutral), Target B (static surprise), Target C (dynamic neutral), Target D (dynamic surprise), and so on, while another subject may have seen Target A (static surprise) Target B (static neutral), Target C (dynamic surprise), Target D (dynamic neutral), and so on. Thus, across all raters, each target face received ratings in each of

the four conditions (static neutral, static surprise, dynamic neutral, and dynamic surprise), but no face was seen by the same participant more than once to reduce effects of repeated exposure. Target faces were separated into static and dynamic blocks, each containing randomly presented neutral and surprised faces. Block order was counterbalanced across subjects.

Procedure

Participants completed the experiment on a computer in the laboratory. The researcher told the participant that we were conducting a study on first impressions and that he/she would be asked to make ratings of several attributes for a series of faces shown on a computer screen. Participants were informed that they would see each stimulus face 13 times and be asked to make a different attribute rating each time. MediaLab software was used to present the faces and record responses. Each face was displayed (static faces) or played (dynamic faces) for approximately 1.25 seconds. After the face was shown, the participant rated the target face on one of the 13 scales. All faces were rated on one scale after which the faces were shown again for the next rating. The traits scales came first, with the order randomized across participants, followed by babyfaceness and attractiveness ratings (also randomized), with emotion ratings coming last (order of emotion ratings randomized). The rating scales appeared on the screen alone after the face had been shown. Participants made their judgments by using a mouse to click the appropriate point on the rating scales. The entire experiment lasted approximately 45 minutes.

Results

Several ratings were dropped for some target faces due to experimental errors.[1] Despite the loss of data, there were enough ratings to obtain a mean rating for each face.

Reliability of Measures and Trait Composites

Rater reliabilities were calculated separately for each rating by block/movement condition and then averaged across blocks. To increase reliabilities, static (both neutral and surprise) trustworthy ratings were dropped from three raters in Blocks 1 and 4 and static (neutral and surprise) sociable ratings were dropped for two raters in Block 4. Cronbach alphas ranged from 0.61 to 0.96, with an overall mean of 0.82 (See Table 1 for breakdown). The high inter-rater reliabilities for the ratings and trait composites justified data analyses utilizing mean ratings for each face across judges as the unit of analysis.

A principal-components factor analysis with varimax rotation was performed on the six trait ratings of each face, both within and across all movement/emotion conditions (with similar results). The results revealed the two expected dimensions, with ratings of submissive/dominant, physically weak/physically strong, and naïve/shrewd loading on one factor and ratings of unsociable/sociable, cold/warm, and untrustworthy/trustworthy loading on a second factor (see Table 2 for factor loadings across all conditions). We therefore created a dominance composite by averaging ratings

[1] In the static neutral condition; 10 subjects' anger ratings were dropped for one face and 17 anger ratings were dropped for another face, 17 sad ratings were dropped for two faces, 10 happiness ratings were dropped for two faces, and 10 surprise ratings were dropped for one face. In the static surprise condition; 7 sociable ratings were dropped for one face and 7 of each rating (angry, attractive, babyfaceness, dominance, fear, happiness, shrewd, sad, sociable, strong, surprise, trustworthy, and warm) were dropped for another face.

of the first three traits for each face and an affiliation composite by averaging ratings of the last three traits for each face. This yielded five ratings of dominance and five ratings of affiliation for each target person (baseline, neutral static, surprised static, neutral dynamic, surprised dynamic).

Surprise Manipulation Check

As a manipulation check, five one-way ANOVAs tested the effect of expression (neutral or surprise) on each emotion rating. Results revealed significant differences between emotion ratings in the neutral and static faces for all emotions: for surprise ratings, $F(1,110) = 206.94$, $p < 0.001$; for fear ratings, $F(1,110) = 35.29$, $p < 0.001$; for sadness, $F(1,110) = 8.35$, $p < 0.01$; for anger ratings, $F(1,110) = 5.09$, $p < 0.05$, and for happiness ratings, $F(1,110) = 17.79$, $p < 0.001$. The means for surprise and fear were higher in the surprised condition than in the neutral condition and, in the surprised condition, the mean of the surprise ratings was higher than the means of all other emotions (see Table 3 for mean emotion ratings in both expression conditions). Two additional one-way ANOVAs with Bonferroni post-hoc comparisons tested the effect of emotion type (as a categorical variable) on rating, separately for the neutral and static faces; this test allowed for comparisons to be made between each emotion rating to determine if there were significant differences between the effect of surprise vs. other emotions on mean ratings. Results of this analysis showed significant differences between emotion ratings in the surprised condition, $F(4,271) = 25.97$, $p < 0.001$, with surprised ratings being significantly higher than all other emotion ratings. There was also a significant effect of emotion in the neutral condition, $F(4,273) = 27.34$, $p < 0.001$, with surprise ratings being significantly lower than all other emotion ratings

(see Table 4 for Bonferroni post-hoc differences within the surprised and neutral conditions).

Baseline Babyfaceness Ratings vs. Within-Condition Ratings

We predicted that the effect of babyfaceness on trait ratings would be moderated by facial expression and facial movement, suggesting that babyfaceness itself may differ as a function of expression and/or movement just as trait ratings do. In other words, pure facial structure at baseline (non-moving, with a neutral expression) will change depending on whether the face is moving and/or expressing an emotion. Therefore, the most appropriate measure of facial maturity for testing interactions of expression and movement on trait impressions was babyfaceness ratings that were taken at baseline, rather than babyfaceness ratings made within specific emotion/movement conditions.

We examined the correlations between perceived babyfaceness at baseline and perceived babyfaceness within the different emotion and movement conditions to test the suggestion that babyfaceness might be different across conditions. Indeed, baseline babyfaceness was significantly correlated with ratings of the same faces in the static neutral condition, $r = 0.91$, $p < 0.01$, which is essentially a measure of reliability, as it contained the same facial stimuli rated by other judges. Baseline babyfaceness was also correlated with ratings of the same faces in the static surprised condition, $r = 0.78$, $p < 0.01$, and dynamic neutral condition, $r = 0.77$, $p < 0.01$, but not in the dynamic surprise condition, $r = 0.11$, $p = 0.60$.

Overview of Regression Analyses Predicting Trait Impressions

Separate multiple regression analyses were run on each trait composite. Baseline babyfaceness was entered as the main predictor variable to replicate previously

documented differences in impressions of static, neutral expression adults who vary in facial maturity, and it provided an appropriate measure of facial maturity for testing interactions with movement and expression. In contrast, as described above, babyfaceness ratings taken within conditions with movement or expression manipulations were influenced by those manipulations.

Expression (dummy-coded) and baseline babyfaceness x expression were entered to determine whether impressions of faces would differ by expression type and whether impressions of faces varying in babyfaceness would be moderated by surprise expressions. Movement (dummy-coded) and baseline babyfaceness x movement were entered to determine whether impressions of faces would differ by movement and whether impressions of faces varying in babyfaceness would be moderated by movement. Expression x movement was entered to determine whether previously reported differences in impressions of surprise vs. neutral expression faces would be moderated by movement. Finally, baseline attractiveness and a composite of "other negative emotions" (mean of sad, angry, and unhappy)[2] were entered as control variables to ensure that the predicted effects of facial maturity and surprise expression were not confounded with variations in these facial qualities. All variables were standardized.

To further investigate significant interactions, four additional multiple regression analyses were run on each trait composite: two regressions investigated the effects of expression x babyfaceness on (a) static faces only and (b) dynamic faces only; two regressions investigated the effect of movement x babyfaceness on (c) neutral faces only

[2] Fear was not controlled because it is structurally similar to surprise and a factor analysis on emotion ratings revealed a loading of surprise and fear on one factor and sadness, anger, and happiness (reversed) on another factor.

and (d) surprised faces only. Interactions were also plotted by high and low baseline babyfaceness ratings, defined respectively as one standard deviation above/below the mean, to look at differences between baseline babyfaceness as a function of expression and/or movement.

Regression Analysis Predicting Dominance

The multiple regression analysis for the dominance composite revealed main effects of baseline babyfaceness ($\beta = -0.66$, $p < 0.001$), reflecting lower dominance ratings with higher babyfaceness, and expression ($\beta = -0.65$, $p < 0.01$), reflecting lower dominance ratings for surprise than neutral expressions, as predicted. There was also a baseline babyfaceness x expression interaction ($\beta = 0.35$, $p < 0.05$) reflecting a stronger effect of babyfaceness for neutral faces ($\beta = -0.479$, $p < 0.001$) than for surprised faces ($\beta = -0.432$, $p < 0.01$) or, to put it another way, a stronger tendency for surprise expressions to decrease the perceived dominance of low-babyfaced than high-babyfaced women (see Figure 1). Finally, higher values of baseline attractiveness predicted significantly higher ratings of dominance ($\beta = 0.17$, $p < 0.05$). All other effects were non-significant. The results of the main regression analysis are summarized in Table 5.[3]

Regression Analysis Predicting Affiliation

The multiple regression analysis for the affiliation composite revealed a main effect of baseline babyfaceness ($\beta = 0.25$, $p < 0.001$), reflecting higher affiliation with increasing babyfaceness, but no main effects of expression or movement. There was a

[3] A second multiple regression was also run with rated surprise instead of manipulated (dummy-coded) expression and this analysis showed similar results. For the dominance composite, the only difference between the regressions using rated surprise vs. manipulated expression was a moderate effect of baseline babyfaceness x rated surprise vs. a significant effect of baseline babyfaceness x manipulated expression.

significant baseline babyfaceness x expression interaction ($\beta = -0.21$, $p < 0.05$), reflecting a significant positive effect of babyfaceness in neutral faces ($\beta = 0.136$, $p < 0.05$), replicating previous research, but no effect for surprised faces ($\beta = -0.097$, $p = 0.229$). This result reflected a tendency for surprise expressions to raise the perceived affiliation low-babyfaced women while lowering it for high-babyfaced women (see Figure 2). A baseline babyfaceness x movement interaction was also significant ($\beta = -0.24$, $p < 0.01$), reflecting a significant positive effect of babyfaceness for static faces ($\beta = 0.128$, $p < 0.05$), replicating previous research, but no effect for dynamic faces ($\beta = 0.046$, $p = 0.537$). This result reflected a tendency for dynamic displays to increase ratings of affiliation of low-babyfaced women to the level of high-babyfaced women (see Figure 3). Finally, a movement x expression effect emerged ($\beta = -0.63$, $p < 0.001$), reflecting a strong negative effect of movement on perceived affiliation for surprised faces ($\beta = -0.472$, $p < 0.001$), but no effect of movement for neutral faces ($\beta = 0.054$, $p = 0.714$). Thus, there was a tendency for movement to decrease the perceived affiliation of surprised faces but not neutral faces. Surprised faces were perceived as less affiliative than neutral faces in the dynamic condition with no significant difference in the static condition (see Figure 4). The two control variables also significantly predicted affiliation ratings (baseline attractiveness, $\beta = 0.25$, $p < 0.001$; other negative emotions, $\beta = -0.66$, $p < 0.001$) (see Table 5).[4]

[4] A second multiple regression was also run with rated surprise instead of manipulated (dummy-coded) expression and this analysis showed similar results. For the affiliation composite, the significant main effect of movement was lost when rated surprise was entered instead of manipulated expression.

Discussion

We expected to find decreases in perceived dominance and increases in perceived affiliation associated with both babyfaceness and surprise expressions. The effect of surprise was expected to be stronger for impressions of maturefaced than babyfaced adults because the emotion would be more noticeable in faces that do not already look surprised. Facial movement was predicted to strengthen the effect of surprise on impressions because emotions would be more salient in moving faces than in non-moving faces, as evidenced in previous research.

As predicted, babyfaceness was negatively related to ratings of dominance and positively related to ratings of affiliation, replicating previous research findings (Zebrowitz-McArthur & Montepare, 1989; Zebrowitz et al., 2007). Also consistent with previous research (Knutson, 1996; Marsh et al., 2005; Montepare & Dobish, 2003; Zebrowitz et al., 2007), surprised faces were rated as less dominant than neutral faces. There was no such effect of surprise on ratings of affiliation, which is somewhat consistent with previous research showing only moderate or no effects of fear (which resembles surprise) on rated affiliation (Knutson, 1996; Montepare & Dobish, 2003).

Surprise expressions decreased perceived dominance from neutral more for maturefaced women than for babyfaced women, although the effect was significant across the whole range of facial maturity. This effect is consistent with the hypothesis that surprise would be more noticeable in maturefaced women than in babyfaced women who already look surprised, resulting in a stronger effect of surprise on maturefaced women than babyfaced women. Surprise also increased the perceived affiliation of maturefaced women, which is somewhat consistent with the same hypothesis, but it

decreased the affiliation of babyfaced women. This finding is inconsistent with the hypothesized direction of the surprise effect, as surprise was expected to increase ratings of affiliation for both maturefaced and babyfaced targets. Previous research has found that fear (which looks like surprise) has a moderately positive relationship with perceived affiliation (Knutson, 1996; Marsh et al., 2005; Montepare & Dobish, 2003).

Another possibility is that surprise was perceived as a negative emotion in targets that were high in babyfaceness; not only is surprise a relatively ambiguous emotion which can signal either positive or negative emotion, but it was also somewhat subtle in our manipulation. If surprise was indeed perceived as a negative emotion in this study, it seems that it was only perceived that way for high-babyfaced targets. The less salient observation of surprise in babyfaced targets, who already look surprised, may have led participants to perceive surprise in babyfaced targets as a general, or less distinctive, negative emotion. But for maturefaced targets, who do not already look surprised, the surprise manipulation may have been more noticeable and may have more uniquely resembled surprise, resulting in affiliation ratings in the expected direction. Similarly, since surprise expressions look like babies' faces, displays of surprise may make maturefaced people appear more babyish, and therefore more affiliative, but may have no effect on the babyishness of people who already look babyish.

Facial movement also seems to have little effect on the perceived affiliation of babyfaced people. In the current study, movement did not change the affiliation of babyfaced women, although it did raise the affiliation of maturefaced women to the level of babyfaced women. Perhaps the effect of movement, like the effect of surprise, is only effective in maturefaced women who are already perceived as low in affiliation.

For babyfaced women, who are already perceived as high in affiliation, facial movement did not add any cues that were prominent enough to increase affiliation. Nonetheless, the finding that affiliation ratings did not vary with babyfaceness in moving faces is consistent with findings from Zebrowitz-McArthur and Montepare (1989), who found that the babyfaceness stereotype for ratings of warmth did not hold up when faces were moving.

Facial movement also lowered perceived affiliation of surprised faces but not neutral faces. This is consistent with the hypothesis suggesting that the information available in neutral faces would be no different, regardless of facial movement. The decrease in affiliation ratings for surprised faces was opposite of what was expected, but, again, this effect could be due to surprise being perceived as a negative emotion in the present study, as evidenced by the fact that surprise ratings loaded on the same factor as fear ratings. Nevertheless, the effect of movement was greater for surprised faces than for neutral faces, as expected, which was likely due to the aided identification of emotion in dynamic faces suggested by previous research (Ambadar et al., 2005; Bould & Morris, 2008).

The current study extended the research on babyfaceness and emotional expression, as it is the first study to investigate how surprise moderates the babyfaceness stereotype. The results suggest that emotional expressions that resemble babies' faces will have a greater impact on impressions of maturefaced individuals than on impressions babyfaced individuals; changes in babyfaceness and/or emotion are more apparent in mature faces than in babyish faces, and emotions may be more difficult to perceive in faces that already resemble that emotion. Furthermore, this study showed

that facial movement has the ability to alter trait impressions based on emotions, probably because the impact of the emotion is enhanced by movement increasing the emotional salience. This study also revealed that both surprise and movement affect the babyfaceness stereotype in different ways for different traits. The effect of babyfaceness was more robust across changes in expression and movement for impressions of dominance than for impressions of affiliation. Moreover, whereas surprise in some way impacted impressions of both dominance and affiliation, movement only affected impressions of affiliation. Facial movement is likely more related to sociable traits than it is to non-sociable traits, thus connoting social interaction and extraversion more so than qualities related to dominance or power.

This is the first study to investigate the effect of facial movement on impressions related to both babyfaceness and surprise. By investigating facial movement, the current study also offers a basis for first impressions that are made in everyday life. In common everyday interactions, faces are moving, changing, and interacting. In addition, the surprise expressions used in the current study were subtle, as they are in natural (as opposed to posed) emotional displays; yet, significant expression effects were observed, implying that these effects would be robust in real-life interactions. There is already evidence to suggest that babyfaceness affects real-life outcomes such as courtroom decisions (Zebrowitz & McDonald, 2005), and it may also influence preferences for political candidates (Zebrowitz & Montepare, 2005). With the present study, we add to the evidence that suggests how babyfaced and surprised people will be perceived in more natural social contexts. Can we use this knowledge to influence social outcomes? The current study showed that displaying surprise makes both maturefaced and

babyfaced individuals appear less dominant than they are naturally. Thus, if maturefaced people wish to maintain impressions of high dominance, they should attempt to suppress displays of surprise or fear. Babyfaced people, who are naturally perceived as submissive, should attempt to suppress surprise or fear if they wish to maintain what little perceived dominance they may have. On the other hand, in instances in which a person should want to be perceived as affiliative, maturefaced people should show surprise and babyfaced people should suppress it. Facial movement also results in perceived affiliation. Although movement does not affect perceived affiliation for babyfaced people, maturefaced individuals may benefit from being more facially animated if they are attempting to appear affiliative. When expressing surprise, individuals who wish to appear affiliative should avoid a lot of facial movement, but facial movement during non-emotional interaction will have no effect on perceived affiliation. One stipulation to these suggestions, however, is that emotional context may affect impressions of controlled expressions; for example, emotional expressions that are incongruent with the experienced emotion might be perceived differently than emotion-congruent expressions in natural interactions.

Although this study adds to both the theoretical and practical applications of previous research, questions about the effects of facial maturity, emotional expression, and facial movement still remain. Future work may want to further investigate the effect of structural (baseline) babyfaceness on babyfaceness perceived across variations in emotional expression and facial movement. This study showed that structural babyfaceness was similar across most, but not all, combinations of expression and movement. In addition, trait impression results suggest that changes in babyfaceness

across combinations of emotion and movement may affect these impressions. Of particular interest to the current researcher is the question of whether perceived babyfaceness across different expression and movement conditions differs for baseline maturefaced versus babyfaced adults. Another question left open in the current research is whether babyfaceness and/or movement had an effect on the accurate identification of different emotions. We discussed the possibility that babyfaceness might influence the ability to perceive certain emotions, and previous research suggests that movement influences accurate emotion identification as well. Future research would clarify the impact of babyfaceness and movement on emotion identification, and might suggest how emotion identification affects trait impressions. Additional research may also want to investigate how facial maturity, movement, and emotional expressions vary with emotional context.

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Table 1

Cronbach Alpha Item Reliabilities by Rating Scale and Movement Condition

Rating	Condition	Item reliability
Angry	Baseline	0.86
	Dynamic	0.92
	Static	0.85
Attractive	Baseline	0.79
	Dynamic	0.89
	Static	0.89
Babyfaceness	Baseline	0.83
	Dynamic	0.88
	Static	0.88
Cold	Baseline	0.72
	Dynamic	0.93
	Static	0.82
Dominant	Baseline	0.83
	Dynamic	0.82
	Static	0.84
Fearful	Baseline	0.78
	Dynamic	0.92
	Static	0.84
Happy	Baseline	0.87
	Dynamic	0.96
	Static	0.83
Naïve	Baseline	0.71
	Dynamic	0.76
	Static	0.77
Sad	Baseline	NA
	Dynamic	0.86
	Static	0.74
Sociable	Baseline	0.80
	Dynamic	0.82
	Static	0.83
Strong	Baseline	0.77
	Dynamic	0.80
	Static	0.76
Surprise	Baseline	NA
	Dynamic	0.96
	Static	0.93

Trustworthy	Baseline	0.66
	Dynamic	0.83
	Static	0.61

Table 2

Factor Loadings from Factor Analysis on Trait Ratings

	Component	
Rating	1	2
Dominant	.935	-.016
Shrewd	.922	-.038
Strong	.871	.135
Sociable	.081	.821
Warm	-.225	.887
Trustworthy	.083	.800

Table 3

Mean Emotion Ratings by Emotional Expression Condition

	Surprise		Fear		Anger		Sadness		Happiness	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Surprise	4.58	1.06	4.00	1.15	3.86	1.09	4.02	1.06	2.74	0.95
Neutral	2.19	0.65	2.88	0.82	3.38	1.20	3.44	1.06	3.65	1.30

Table 4

Bonferroni Post-hoc P-values for Differences in Effects of Expression Type on Ratings in the Surprised and Neutral Emotion Conditions

		Surprise	Fear	Anger	Sadness	Happiness
Surprise	Surprise		0.04	0.00	0.02	0.00
	Fear	0.04		1.00	1.00	0.00
	Anger	0.00	1.00		1.00	0.00
	Sadness	0.02	1.00	1.00		0.00
	Happiness	0.00	0.00	0.00	0.00	
Neutral	Surprise		0.01	0.00	0.00	0.00
	Fear	0.01		0.10	0.04	0.00
	Anger	0.00	0.10		1.00	1.00
	Sadness	0.00	0.04	1.00		1.00
	Happiness	0.00	0.00	1.00	1.00	

Table 5

Summary of Results from Main Multiple Regression Analyses on Dominance and Affiliation Ratings

	Unstandardized β (StdErr)			
Effect	Dominance		Affiliation	
(Constant)	0.35*	(0.17)	0.08	(0.09)
Baseline Babyfaceness	-0.66**	(0.14)	0.25**	(0.08)
Expression	-0.65**	(0.23)	-0.02	(0.12)
Movement	-0.14	(0.27)	0.18	(0.14)
Baseline Babyfaceness x Movement	0.05	(0.17)	-0.24**	(0.09)
Baseline Babyfaceness x Expression	0.35*	(0.17)	-0.21*	(0.09)
Movement x Expression	0.21	(0.36)	-0.63**	(0.20)
Baseline Attractiveness	0.17*	(0.09)	0.25***	(0.05)
Other Negative Emotions Composite	0.05	(0.10)	-0.66***	(0.06)

Note: *significant at p<0.05, **p<0.01, ***p<0.001.

Figure 1. Multiple regression effect of baseline babyfaceness x expression on dominance ratings.

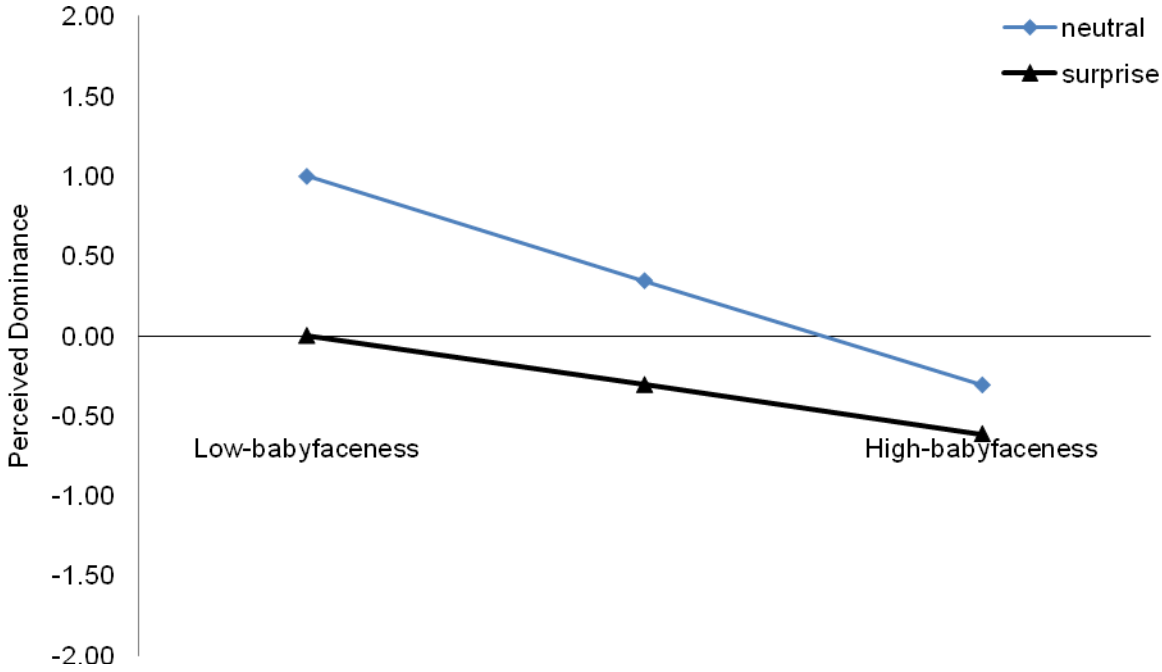

Figure 2. Multiple regression effect of baseline babyfaceness x expression on affiliation ratings.

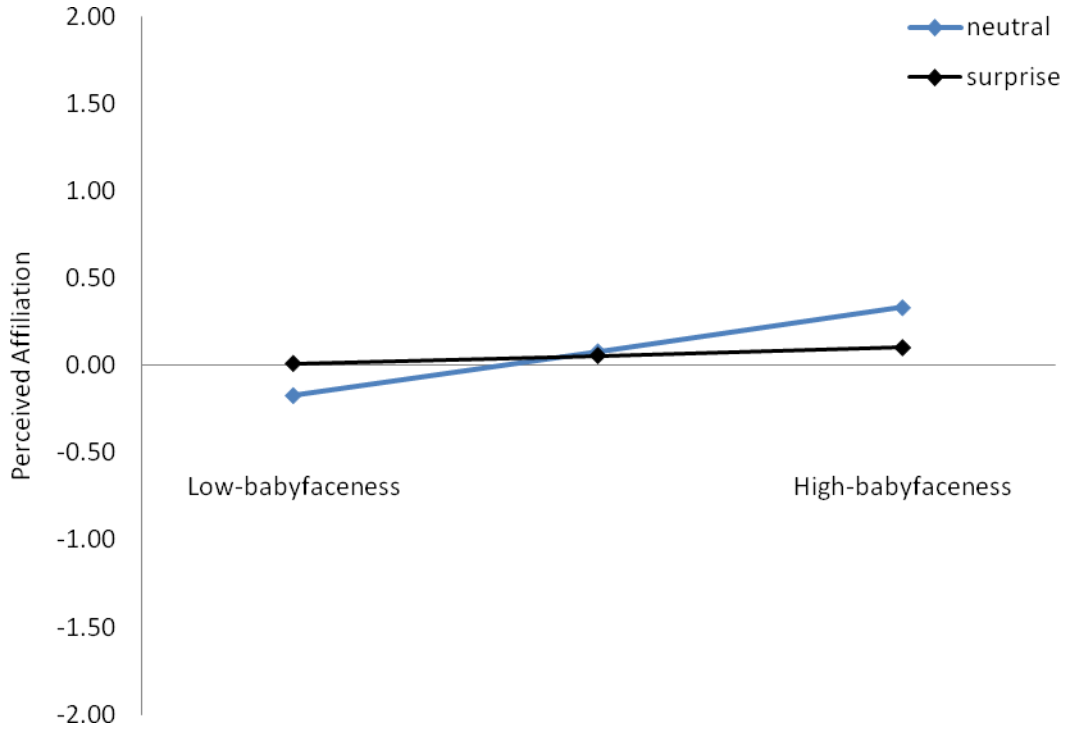

Figure 3. Multiple regression effect of baseline babyfaceness x movement on affiliation ratings.

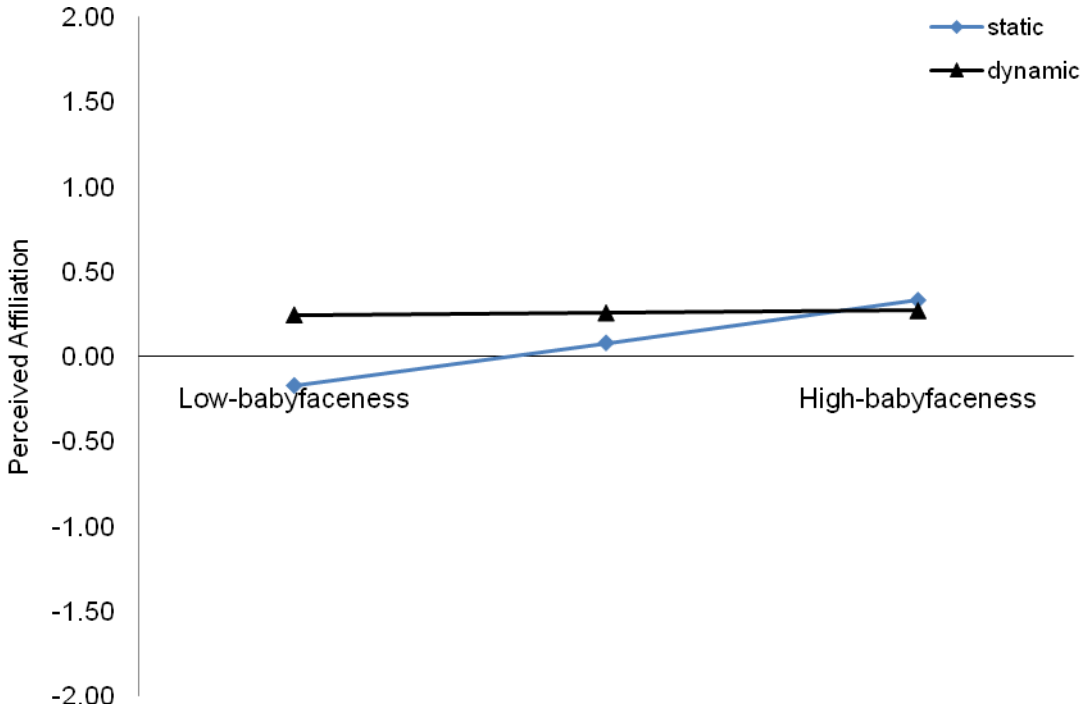

Figure 4. Multiple regression effect of expression x movement on affiliation ratings.