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Temporal dynamics of smiling: Human versus synthetic faces

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Abstract

Studies concerned with the effects of temporal aspects of facial behavior have been restricted by methodological limitations. Using facial synthesizers such as Poser software allows one to create dynamic changes in facial expressions with precision. In previous experiments with synthetic humans, we have shown that temporal aspects of facial displays influence the perception of an expression and particularly, the perceived authenticity of a smile. Smiles with a longer onset- and offset-duration were judged as more genuine than their shorter counterparts, and authenticity ratings decreased the longer the smile was held at its apex (Krumhuber & Kappas, 2005). The present studies were designed to investigate the impact of these temporal characteristics of smiles on both person and expression perception and on judgments such as employment decisions. The results of these studies will be compared to those from studies using real faces and possible differences will be discussed.

Introduction

Previous research suggests that the temporal characteristics of smiles influence person perception and the perceived quality of the expression. The systematic variation of different onset-, apex-, and offset-durations has been found to affect trait judgements such as trustworthiness and dominance as well as the perceived authenticity of the smile (Krumhuber, Manstead, & Kappas, submitted; Krumhuber & Kappas, 2005). These findings support the notion that people take temporal qualities of facial expressions into account in making inferences about personal dispositions. A question that has not been addressed is whether these dynamic properties of smiles also influence consequential decisions. There is evidence that smiling during a job interview leads to more positive evaluations of the job applicant (see Edinger & Patterson, 1983; Forbes & Jackson, 1980). However, the impact of different temporal forms of smiles on hiring decisions has not yet been investigated.

Aims

The present study explores the effect of smile dynamics on participants' impression ratings and consequential employment decisions in a simulated job interview setting.
Furthermore, it examines whether these subtle temporal characteristics lead to similar effects in both synthetic and human faces.

Study 1: Synthetic faces

The first study investigated the impact of the temporal variations in smiles in synthetic faces.

Participants

Seventy-two participants (36 men and 36 women, 18-39 years, M = 22.89) from Cardiff University participated either for extra course credit or for payment of £3.00.

Stimulus material

Stimuli were synthetic faces generated using Poser 4 (Curious Labs). The three different female faces chosen for study (see Figure 1) were rated similarly with respect to attractiveness and trustworthiness in a pilot study (N=16).
For each face, a neutral expression and two dynamic smile expressions differing in onset-, apex-and offset duration were generated at a frame rate of 30 images per second. Smiles with a long onset-(16 frames) and offset-duration (64 frames) and a relatively short apex-duration (40 frames) were

classified as genuine smiles. Fake smiles were characterised by a short onset-(4 frames) and offset-duration (5 frames) and a long apex-duration (111 frames). Parameters were derived from a previous study (Krumhuber & Kappas, 2005) showing that perceived genuineness of smiles increased as a function of onset- and offset-duration, and decreased as a function of apex-duration. All smile stimuli lasted 120 frames (i.e., 4 seconds).
Stimuli were accompanied by an audio recording from a simulated job interview situation in which the interviewer always used the same script.

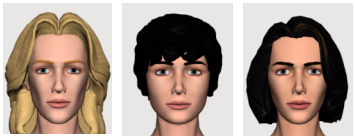

Figure 1. Three Poser female characters used in Study 1.

Procedure

Participants were shown short video excerpts (30 sec.) depicting a job interview situation. In each excerpt one of the 3 interviewees responded to a mildy amusing utterance made by the interviewer with a neutral expression, a fake smile or a genuine smile.
The sequence of facial expressions was counterbalanced across encoders. Stimuli within each set were presented in a random order using Medialab (Empirisoft).
Participants rated each encoder on a 7-point scale (1 = not at all, 7 = very) with respect to each of 20 attributes. In addition, they had to judge a) how suitable the person for the job was (suitable), b) how likely it was that this person would be short-listed for further interview (short-listed), and c) how likely this person would be to be selected for the position (selected). For each employment decision participants were also asked to indicate how confident they were about the judgement they had just made (on a 7-point scale).

Results

Data reduction

The 26 ratings made by participants were subjected to principal components analysis to guide scale construction. This enabled the construction of four scales:
1) job (α = .93): reliable, interested, involved, trustworthy, motivated, competent; suitable, short-listed, selected;
2) person (α = .89): sociable, likeable, kind, friendly, warm, attractive;
3) expression (α = .80): tense, polite, formal, charming, flirtatious, seductive, spontaneous, genuine;
4) confidence (α = .95): confidence/suitable, confidence/short-listed, confidence/selected.

Analysis of variance

A MANOVA with repeated measures on the facial expressions factor was performed on these 4 dependent variables. Facial expression had a highly significant impact on job, $F(2, 140) = 11.05$, $p < .001$, person, $F(2, 140) = 40.70$, $p < .001$ and expression ratings, $F(2, 140) = 35.24$, $p < .001$. Interviewees displaying dynamic genuine smiles were evaluated more favorably on the job, person, and expression scales than were their fake smiling or non-smiling counterparts (see Figure 2). They were also judged to be more suitable, and more likely to be short-listed and selected for the job. Overall, the neutral expression was perceived as most negative with low ratings on these 3 dependent measures. Confidence ratings were not significantly affected by quality of facial expression, $F(2, 140) = 2.59$, $p > .05$.

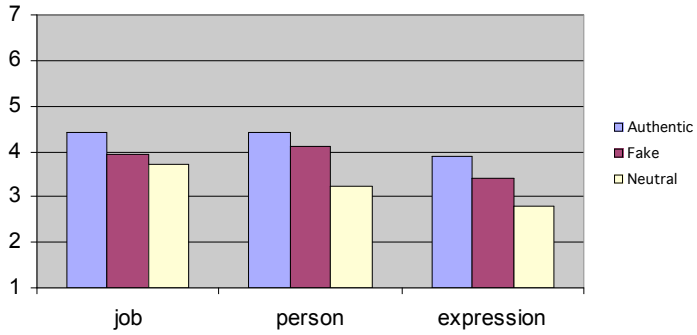

Figure 2. Mean ratings on dependent measures (scale 1-7) for synthetic faces.

Study 2: Human faces

The second study investigated the effects of temporal variation in smiles in human faces.

Participants

Seventy-two participants (36 men and 36 women, 18-38 years, M = 22.89) from Cardiff University participated either for course credit or for payment of £3.00.

Stimulus material

Three females (see Figure 3) were chosen who were rated similarly with respect to attractiveness and trustworthiness in a pilot study (N = 16). Each character displayed a neutral expression, a dynamic genuine and fake smile. To construct dynamic smile expressions with standardized timing parameters, smile parameters were extracted from the original videos of the females using a statistical model of lower face texture.

The resulting parameter then represented a smile as a measure of texture variation, where a full-smile represented a maximum change in texture variation with respect to a neutral mouth. Varying the onset- apex- and offset-durations of this parameter equated to reordering lower face textures from the original video, and resulted in the creation of smiles with the same temporal properties as in the first study.

Figure 3. Three human female characters used in Study 2.

Procedure

The procedure was exactly the same as in the first study, including the use of the same audio script.

Results

Data reduction

As in Study 1, items were grouped into four scales that had good internal consistency: job (α = .95), person (α = .87), expression (α = .77), confidence (α = .95).

Analysis of variance

The results were very similar to those found in Study 1. Facial expression had a highly significant effect on all dependent measures: job, $F(2, 140) = 19.49$, $p < .00$, person, $F(2, 140) = 42.35$, $p < .001$, expression, $F(2, 140) = 30.24$, $p < .001$, and confidence, $F(2, 140) = 4.07$, $p < .05$. Interviewees showing a genuine smile received more positive ratings with respect to job attributes, trait adjectives, and expression items than did their fake smiling or non-expressive counterparts. They were also judged to be more suitable and more likely to be short-listed and selected for the job. The mean

differences between dynamic genuine and fake smiles were more pronounced than in the first study, suggesting that participants were more critical in their evaluations of fake smiles in human faces than in synthetic faces (see Figure 4).

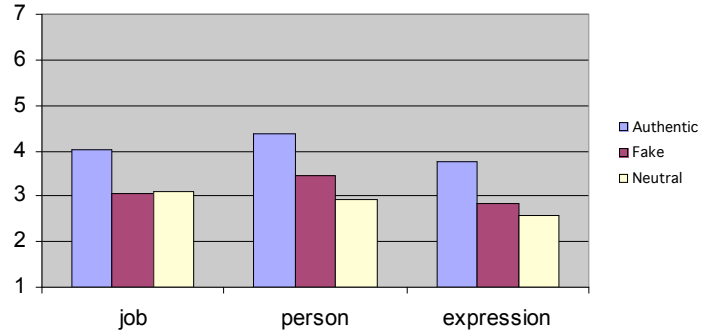

Figure 4. Mean ratings on dependent measures (scale 1-7) for human faces.

DISCUSSION

The results show that impression ratings and employment decisions are significantly influenced by the temporal characteristics of smiles. Interviewees were judged more positively and were considered to be more suitable for the job when they displayed a genuine smile than a fake smile or neutral expression. These effects were highly similar for synthetic and human faces. Interestingly, the differentiation between genuine and fake smiles was larger with the human face stimuli. Given that exactly the same timing parameters were used in the two studies it seems that participants were more critical when evaluating fake smiles in human than in synthetic faces. The finding that confidence ratings were only influenced by the quality of expression in human faces is consistent with this assumption. An interesting avenue for future research will be to determine the effect of smile dynamics on behavioural reactions that have monetary consequences.

References

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