

**CONSISTENCY OF THE RELATION BETWEEN INDIVIDUAL
FACIAL CUES AND THE PERCEIVED SUGGESTIBILITY AND
TRUSTWORTHINESS ACROSS VARYING FACIAL
EXPRESSIONS**

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Abstract. Visual characteristics of faces used in making appearance-based trait inferences include physical morphological cues and cues of emotional expression. It is not clear whether perception of personality from individual facial morphology remains consistent despite the expressive variability. Here, pictures of happy, neutral and “serious” faces of the same individuals were evaluated for selected personality traits. A significant correlation between evaluations of faces perceived as more baby-faced, feminine or benevolent, and evaluations of perceived suggestibility and trustworthiness remained consistent when measured as responses to faces with different expressions. Thus, expression-invariant perceived personality cues of suggestibility are present in the human face similarly to what has been known about the cues of trustworthiness.

Keywords: trait inferences; facial expressions; personality perception, suggestibility, trustworthiness

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1. Introduction

Face perception is probably one of the most highly developed visual perceptual skills in humans as it serves a very significant purpose in our daily existence, allowing us to draw rather important conclusions about the person next to us (Haxby, Hoffman, and Gobbini 2000). We seem to have the capacity to perceive the identity of a virtually unlimited number of faces and to make trait inferences even in the situations where our cognitive resources are constrained (Todorov and Uleman 2003). While perceiving identity is mostly veridical, perceiving traits of personality from facial appearance is problematic. However, there is some evidence, a “kernel of truth” in that appearance-based social perception of some

traits such as extraversion, emotional stability, intelligence, aggressiveness, or disagreeableness can be veridical (Borkenau, Brecke, Möttig, and Paelecke 2009, Carré et al. 2009, Gardiner and Jackson 2010, Kramer, King, and Ward 2011, Penton-Voak et al. 2006, Zebrowitz et al. 2002). Surprisingly, it seems that some facial cues associated with occupation (Oldmeadow, Sutherland, and Young 2013) and political attitudes (Samochowiec, Wänke, and Fiedler 2010) can be also reliably picked up by the perceivers. Despite these findings evaluations of true personality traits mostly remain close to the chance level and/or the effects are weak. In many cases the appearance-based first impressions may be even counter-productive (Olivola and Todorov 2010b). However, regardless of the often posed questions about the reliability of the attempts to prove that “judging the book by its cover” is possible in personality perception, people consistently try to evaluate other individuals simply by mere external observation, including the encounters at zero acquaintance.

Recent evidence from Willis and Todorov (2006) confirms the idea proposed by Bargh (1984) that the process of trait inference is automatic and unintentional. The two main varieties of facial cues for trait perceptions are based on (1) a relatively stable set of attributes related to individual facial morphology invariantly present across different facial expressions and (2) on the relatively more variable dynamic cues of facial expression.

From numerous studies we know that facial expressions influence the way we perceive other people (Knutson 1996, Knyazev, Bocharov, Slobodskaya, and Ryabichenko 2008, Montepare and Dobish 2003, Mueller and Mazur 1997). Knutson (1996) has argued that people may use others’ emotional facial expressions as heuristic for making interpersonal inferences with regard to personality traits. Similarly, Todorov (2008) argues that face evaluations are extensions of functionally adaptive systems for understanding the communicative meaning of emotional expressions (i.e. approach-avoidance). Faces of people who are not intentionally displaying an emotion expression or faces deliberately chosen as neutral by researchers nevertheless vary in their emotion demeanor (Malatesta, Fiore, and Messina 1987, Montepare and Dobish 2003, Oosterhof and Todorov 2008, Said, Sebe, and Todorov 2009), which leads to the emotion over-generalization hypothesis. The hypothesis states that people with stable individual facial features resembling actual emotion cues will be perceived as having behavioral traits suggested by that specific emotion expression (Zebrowitz and Collins 1997). Thus, it is reasonable to think that both – expression cues and emotion-invariant morphological cues indicative of personal identity – significantly influence trait perceptions. Moreover, these two types of cues are often perceptually integrated or confounded to an extent which makes it difficult to estimate their relative share in leading to facial cues based on trait evaluation. For example, perceived friendliness (sociability) depends on both the friendly facial expression of the person we meet for the first time and also on the “type” of his/her face carried by the emotion-invariant morphological attributes of the face implemented in certain features and feature configurations of each particular facial

phenotype that remain consistently identifiable despite varying emotional expression. Perceived dominance, even when experimentally decoupled from facial gender cues appears to be associated with more anger and less friendliness (Hess, Thibault, Adams, and Kleck 2010, Todorov, Said, Engell, and Oosterhof 2008). Higher degrees of sincerity, sociability, openness, extraversion, and competence, but lesser levels of independence and masculinity are attributed to smiling persons (Borkenau and Liebler 1995, Reis et al. 1990).

However, there is also strong evidence that certain facial morphological cues or feature configurations that do not pertain to expressive characteristics and do not necessarily vary with expression play no less important role in facial personality perception (Oosterhof and Todorov 2008, Zebrowitz, Fellous, Mignault, and Andreoletti 2003). These *invariant* personal facial attributes include certain typical featural and configural cues allowing to categorize and rate faces in terms of attractiveness, facial masculinity and femininity, facial maturity and dominance/aggressiveness/threat (Little and Perrett 2007, Paunonen, Ewan, Earthy, Lefave, and Goldberg 1999, Todorov et al. 2008). The listed measurable non-emotional cues are proved to represent the kinds of basic qualities that have a remarkable effect on facial personality perception (Zebrowitz 1997). Consequently, there is substantial evidence that both facial expressions and emotion-invariant identity related morphological physical cues of personal appearance play their part in forming an impression of someone.

Recently, advancements in face perception study methods have made it possible *in principle* to begin to answer the question about what precisely are the psychophysically measurable visual cues that determine face-based perceptual inferences. For example, the statistical (Western) face model allows manipulation of social judgments about individuals (Walker, Jiang, Vetter, and Sczesny 2011, Walker and Vetter 2009). Facial stereotype visualization through image averaging allows to yield psychophysical basics of the stereotypes (Oldmeadow, Sutherland, and Young 2013). Reverse correlation techniques, including the procedures used for calculation of classification images provide a data-driven approach allowing to model internal representations used in social perception of personality traits (Dotsch and Todorov 2012). Morphing between facial expressions experimentally dissociated from facial identity allows studying brain mechanisms of categorical and continuous representation of affective social cues (Harris, Young, and Andrews 2012). Despite these advancements, the affective and emotion-invariant cues of social perception have been mostly studied either in isolation or as confounded, i.e. without explicit attempts to disentangle their effects precisely (see, however, some works on trustworthiness perception – Flowe 2012, Oosterhof and Todorov 2008, 2009). Perceived suggestibility also belongs to this group.

Earlier we found that perceived suggestibility was significantly correlated both with a certain basic facial quality derivable from a face regardless of its expression (i.e. neotenous face or “baby-face”) and also with a certain facial expressional quality (i.e. merriness aka happiness) (Bachmann and Nurmoja 2006). However,

because only faces taken from subjects who were asked to remain neutral in their facial expression during photography were used, the possible unintentional variability of expressive qualities of the faces was not controlled. Despite the instruction to remain neutral there may have been different shades of expression in different individual faces. (See, for example, Said et al. 2009, on how a neutral face may be interpreted as expressively specific.) Therefore, a simple question can be asked – whether individual faces perceived to be neotenous (baby-faced) and whose expression along the merriness dimension is experimentally varied from happy, to neutral, to “serious” nevertheless have a consistently similar correlation with perceived suggestibility. (“Serious” is taken into quotation marks because of the Estonian sample of subjects and in the Estonian language the word “serious” (aka *tõsine*) has the connotations placing it away from the “neutral” point along the merriness/happiness dimension and shifting it to the opposite side from the “happy” expression. Thus, our term “serious”/*tõsine* refers to an expression typically perceived as a combination of serious, concerned, worrying, slightly threatening, sad, angry-ish.) In order to better relate the experimental inquiry of this question to several already well studied socially important appearance-based trait-perception results we also examine the effects of perceived trustworthiness, honesty, intelligence, and dominance. As the main aim, we wanted to see whether perceiving personality traits – suggestibility and trustworthiness from individual faces is resistant to the “masking” effects from the expressive variables. Additionally to babyfacedness/maturity, several other, also frequently studied physical facial dimensions were used for evaluation: attractiveness/unattractiveness, femininity/masculinity, malevolence/benevolence. (The quality of “malevolence” – Estonian *pahatahtlikkus* – has an established connotative association with such English adjectives as “dangerous”, “mean”, “bad”, “threatening”, “aggressive”, etc. For Estonian subjects there is no ambiguity in understanding the meaning of this term.)

Hypothesis 1: Personality traits perceived from faces depend on facial expression.

Hypothesis 2: The evaluations of the ‘suggestibility’ and ‘trustworthiness’ traits from individual faces belonging to facial image sets with different expressions will show a consistent (positive or negative) and significant correlation between the faces belonging to the same trait category regardless of these expressive differences.

Hypothesis 3: Perceived ‘babyfacedness’ (neoteny, immaturity) has an effect on and correlates with suggestibility in different expressive categories of faces (merry, neutral, “serious”), extending and confirming the earlier findings of Bachmann and Nurmoja (2006).

2. Method

2.1. Participants

Sample 1. Sample 1 (targets) consisted of 101 participants (31 men and 70 women) with the mean age of 20.7 years ($SD = 3.1$), ranging from 17 to 36 – undergraduate students from different universities.

Sample 2. Sample 2 (raters) consisted of 232 participants (72 men and 154 women) with the mean age of 23.5 years ($SD = 6.9$), ranging from 18 to 52; 97.8% were undergraduate students, 2.2% were already working professionals from different fields. On average, the raters were about 3 years older but with the same varied educational background than the targets. A relatively large sample is necessary also because traits of raters are known to influence ratings (Fajkowska, Zagórska, Strelau, and Jaśkowski 2012) and with a large sample it can be reasonably expected that the raters' traits distribute evenly.

Informed consent was taken from the participants and all procedures were in accord with principles stated in the Declaration of Helsinki.

2.2. Stimuli, materials, and procedure

Standardized digital photographs were taken of each participant from Sample 1 (head and shoulders) in front-view using digital camera Olympus C-310 Zoom. Face images were in color and approximately 1600×1200 pixels in size. Each participant was photographed three times: a) with *neutral* facial expression; b) with *happy* (merry) facial expression, and c) with *serious* (Estonian *tõsine* bearing the connotation of “concerned”, “worrying”) facial expression. They were instructed to be as natural and “un-theatrical” as possible in their posing, and to demonstrate the expressions in the way they know they do in everyday situations when feeling that particular emotion. After photography, it was ascertained that the three expressive qualities were well recognizable and different in each case. All photos were transformed from color to grayscale and adjusted with ACDSee Pro 2.0 software to standardize their frame, size and background. We grouped the total of 303 facial photos (101 participants \times 3 expressions) into three sets, each set of 101 photos contained either happy, neutral or “serious” expressions presented in the frontal view, considered as three levels of the independent variable “expression”.

Participants from Sample 2 formed three independent subgroups (according to the university study groups) and were assigned to make ratings of facial qualities (on a 7-point bi-polar scale) they perceived in the photos of their set. Participants rated: (i) certain basic physical facial qualities (child-like / mature-like; attractive / unattractive), (ii) qualities of basic physical-morphological cues prone to suggest also psychological characteristics (masculine / feminine; malevolent / benevolent), or (iii) personality traits that subjects think they can infer from facial appearance (suggestible / not suggestible; trustworthy / non-trustworthy). During each evaluation session the photos of targets were presented, one at a time, using PowerPoint

presentation software controlled by an experimenter (the first author) and each photo was displayed for evaluation for 10 seconds. Ratings were given individually without interaction between the raters. Orders of the evaluated traits were counterbalanced between raters in the subgroups; orders of the faces shown were similarly counterbalanced.

To exert control over any possible spatial lateralized response bias, the lateral polarity of the scales was reversed and reversion factor was counterbalanced between subjects. Each rater was asked to inform the experimenter if they recognized any of the target participants by marking so on their answer sheet (these evaluations were not taken into account in our analyses). Thus we used the zero-acquaintance conditions.

3. Results

Emotional expressions had a clear effect on the perception of personality traits under investigation. This supports the first hypothesis replicating the generally accepted regularity that affective cues influence personality perception. ANOVA showed a significant effect of expression on ratings of perceived suggestibility ($F(2, 302) = 22.96, p < 0.001$), honesty ($F(2, 302) = 34.87, p < 0.001$), trustworthiness ($F(2, 302) = 33.22, p < 0.001$), intelligence ($F(2, 302) = 12.65, p < 0.001$) and dominance ($F(2, 302) = 5.66, p = 0.004$). Post hoc tests (Tukey's HSD, $p = 0.05$) indicated that expressions fell into three groups in terms of suggestibility, honesty and trustworthiness ratings: (1) happy expressions received significantly higher ratings of suggestibility ($M = 3.51, SD = 0.41$), honesty ($M = 4.87, SD = 0.62$) and trustworthiness ($M = 3.35, SD = 0.60$) than other expressions; (2) neutral expressions received significantly lower ratings of suggestibility ($M = 3.75, SD = 0.60$), honesty ($M = 4.36, SD = 0.67$) and trustworthiness ($M = 3.84, SD = 0.66$), and (3) "serious" expressions received the lowest ratings of suggestibility ($M = 4.04, SD = 0.63$), honesty ($M = 4.09, SD = 0.70$) and trustworthiness ($M = 4.08, SD = 0.67$). In terms of the ratings of intelligence and dominance, expressions fell into two groups: (1) happy expressions received higher ratings of intelligence ($M = 3.56, SD = 0.59$) than neutral ($M = 3.89, SD = 0.63$) and "serious" ($M = 3.98, SD = 0.65$) expressions, which did not differ significantly from each other, and (2) happy expressions received significantly higher ratings of submissiveness ($M = 4.18, SD = 0.58$) than "serious" ($M = 3.87, SD = 0.70$) expressions, while neutral ($M = 4.06, SD = 0.68$) expressions did not differ significantly from either of them.

Facial maturity had an effect on perceived suggestibility and dominance ratings – neutral faces perceived to be more childlike were also perceived to be more suggestible ($F(2, 98) = 7.67, p < 0.001$) and submissive ($F(2, 98) = 10.07, p < 0.001$). This effect remained also with happy ($F_{\text{suggestibility } 2, 98} = 11.20, p < 0.001$; $F_{\text{dominance } 2, 98} = 12.83, p < 0.001$) and "serious" ($F_{\text{suggestibility } 2, 98} = 11.12, p < 0.001$; $F_{\text{dominance } 2, 98} = 5.46, p = 0.01$) expressions categories. Results indicate that facial

masculinity is a physical quality that has a significant effect on all perceived personality traits in our study; higher masculinity ratings were related to lower ratings of suggestibility ($F(2, 98) = 4.13, p = 0.02$), honesty ($F(2, 98) = 21.20, p < 0.001$), trustworthiness ($F(2, 98) = 29.33, p < 0.001$) and intelligence ($F(2, 98) = 30.18, p < 0.001$), and higher ratings of dominance ($F(2, 98) = 5.05, p = 0.01$). The similar effect could also be found in faces with happy ($F_{\text{suggestibility } 2, 98} = 3.97, p = 0.02$; $F_{\text{honesty } 2, 98} = 26.28, p < 0.001$; $F_{\text{trustworthiness } 2, 98} = 32.95, p < 0.001$; $F_{\text{dominance } 2, 98} = 7.97, p < 0.001$; $F_{\text{intelligence } 2, 98} = 30.11, p < 0.001$) and “serious“ ($F_{\text{suggestibility } 2, 98} = 10.76, p < 0.001$; $F_{\text{honesty } 2, 98} = 21.75, p < 0.001$; $F_{\text{trustworthiness } 2, 98} = 22.49, p < 0.001$; $F_{\text{dominance } 2, 98} = 5.59, p = 0.01$; $F_{\text{intelligence } 2, 98} = 17.54, p < 0.001$) expressions categories. Male neutral faces in general got higher ratings of masculinity ($F(1, 98) = 308.22, p < 0.001$) and dominance ($F(1, 98) = 6.20, p = 0.01$), but lower ratings of benevolence ($F(1, 98) = 12.23, p < 0.001$), attractiveness ($F(1, 98) = 18.29, p < 0.001$), suggestibility ($F(1, 98) = 16.41, p < 0.001$), honesty ($F(1, 98) = 27.97, p < 0.001$), trustworthiness ($F(1, 98) = 39.17, p < 0.001$), and intelligence ($F(1, 98) = 27.94, p < 0.001$). The same effects occurred also in the “serious“ expression category condition ($F_{\text{masculinity } 2, 98} = 303.02, p < 0.001$; $F_{\text{dominance } 2, 98} = 11.49, p < 0.001$; $F_{\text{benevolence } 2, 98} = 24.34, p < 0.001$; $F_{\text{attractiveness } 2, 98} = 16.82, p = 0.01$; $F_{\text{suggestibility } 2, 98} = 23.98, p < 0.001$; $F_{\text{honesty } 2, 98} = 30.04, p < 0.001$; $F_{\text{trustworthiness } 2, 98} = 30.82, p < 0.001$; $F_{\text{intelligence } 2, 98} = 19.19, p < 0.001$). Happy expressions produced two noteworthy results – no significant differences in suggestibility ($F(1, 98) = 3.68, p = 0.06$) and dominance ($F(1, 98) = 3.12, p = 0.08$) ratings were noticed when comparing male and female faces. Differences between male and female faces did not occur also in ratings of facial maturity ($F(1, 98) = 0.27, p = 0.60$), and this effect remained also in happy ($F(1, 98) = 0.25, p = 0.62$) and “serious“ ($F(1, 98) = 2.54, p = 0.12$) expression category conditions. While benevolence was added to our list of facial qualities because it seems to be an intriguing attribute having to do both with expressional and configural facial information we found a significant effect for facial benevolence on all rated traits – higher benevolence ratings yielded higher ratings of suggestibility ($F(2, 98) = 10.33, p < 0.001$), honesty ($F(2, 98) = 74.25, p < 0.001$), trustworthiness ($F(2, 98) = 54.03, p < 0.001$), intelligence ($F(2, 98) = 21.61, p < 0.001$) and submissiveness ($F(2, 98) = 9.06, p < 0.001$). Importantly, this was evident with happy expression categories of faces ($F_{\text{suggestibility } 2, 98} = 3.40, p = 0.04$; $F_{\text{honesty } 2, 98} = 31.75, p < 0.001$; $F_{\text{trustworthiness } 2, 98} = 31.25, p < 0.001$; $F_{\text{dominance } 2, 98} = 4.40, p = 0.02$; $F_{\text{intelligence } 2, 98} = 8.51, p < 0.001$) as well as “serious“ ($F_{\text{suggestibility } 2, 98} = 14.88, p < 0.001$; $F_{\text{honesty } 2, 98} = 32.08, p < 0.001$; $F_{\text{trustworthiness } 2, 98} = 30.93, p < 0.001$; $F_{\text{dominance } 2, 98} = 10.34, p < 0.001$; $F_{\text{intelligence } 2, 98} = 15.71, p < 0.001$) expression category of faces. Facial attractiveness had an effect on several perceived personality traits – higher ratings of attractiveness were related to higher ratings of honesty ($F(2, 98) = 19.46, p < 0.001$), trustworthiness ($F(2, 98) = 30.28, p < 0.001$), and intelligence ($F(2, 98) = 44.45, p < 0.001$). Notably, this effect was present with neutral as well as in happy ($F_{\text{honesty } 2, 98} = 12.28, p < 0.001$; $F_{\text{trustworthiness } 2, 98} = 22.36, p < 0.001$; $F_{\text{intelligence } 2, 98} = 48.19, p < 0.001$) and “serious“ ($F_{\text{honesty } 2, 98} = 15.45, p < 0.001$; $F_{\text{trustworthiness } 2, 98} = 21.29, p <$

0.001; $F_{\text{intelligence } 2,98} = 30.15$, $p < 0.001$) facial expression categories. As for suggestibility and dominance scale, only happy faces seemed to have been affected by facial attractiveness – happy faces that had higher attractiveness ratings had also higher ratings of suggestibility ($F(2, 98) = 3.20$, $p = 0.05$), and submissiveness ($F(2, 98) = 3.84$, $p = 0.03$).

The above presented results are consistent with our hypotheses showing that (i) personality traits perceived from faces depend on facial expression, (ii) the evaluations of the 'suggestibility' and 'trustworthiness' traits from individual faces belonging to facial image sets with different expression categories show a consistent (positive or negative) effect regardless of these expressive differences, (iii) perceived 'babyfacedness' (neoteny, immaturity) has an effect on suggestibility in different expressive categories of faces (merry, neutral, "serious"), extending and confirming the earlier findings of Bachmann and Nurmoja (2006).

To extend the analysis of the results in relation to the second and third hypothesis we conducted three separate correlation analyses to test the relationships between different perceived individual morphological cues and perceived personality traits with photos belonging to the three emotional expressions categories (happy, neutral, "serious"). Ratings obtained in each of the three emotional expression sets were analyzed separately. Relationships between perceived facial-morphological and personality traits have almost in all cases remained consistent (being either only positive correlations or only negative correlations) between the three different facial emotional expressions categories depicted by the target photographs belonging to these three categories. Moreover, the significance level of correlations for a particular physical morphological or personality cue was similar despite the specific variety of facial expression. Therefore, categorical differences in expression along the merriness (happiness) dimension from positive over neutral across to negative does not eliminate (or does not even considerably diminish) the influence of the overall basic facial-morphological (personal identity related) cues on the trait perception. This general pattern of results applies to the evaluations of the perceived personality traits as well as physical morphology (e.g. neoteny, masculinity, attractiveness).

Specifically, the most important correlations were as follows (see Table 1). Correlation between babyfacedness and suggestibility was $r = 0.47$ for faces with happy expression, $r = 0.41$ for faces with neutral expression, and $r = 0.43$ for faces with "serious" expression, all significant at level $p < 0.01$. This supports the conclusion that the perception of "babyfaced" persons as highly suggestible in the earlier study (Bachmann and Nurmoja 2006) were not confounded by emotional expression. There were no universal highly significant correlations between babyfacedness and trustworthiness except that only with neutral faces these perceived characteristics were positively correlated. Perceived malevolence had negative correlation with perceived suggestibility; for happy-expression faces $r = -0.22$ ($p < 0.05$), for neutral faces $r = -0.40$ ($p < 0.01$), for "serious" faces $r = -0.62$ ($p < 0.01$), suggesting a possible interaction where perceived low level of suggestibility of a face perceived also as malevolent decreases even more with

Table 1. Correlations between perceived facial qualities with known corresponding physical characteristics (neoteny, masculinity, malevolence, attractiveness) and perceived personality variables “suggestibility”, “honesty”, “trustworthiness”, “dominance/submissiveness”, and “intelligence”

		Suggestible	Honest	Trustworthy	Dominant	Intelligent
Babyfaced	happy	.47**	.17	.11	-.44**	-.05
	neutral	.41**	.19*	.19*	-.44**	.02
	serious	.43**	.04	.09	-.28**	.01
Masculine	happy	-.19	-.61**	-.64**	.13	-.59**
	neutral	-.33**	-.55**	-.61**	.14	-.60**
	serious	-.41**	-.59**	-.62**	.25*	-.59**
Malevolent	happy	-.22*	-.71**	-.72**	.26**	-.52**
	neutral	-.40**	-.81**	-.79**	.32**	-.63**
	serious	-.62**	-.76**	-.76**	.48**	-.61**
Unattractive	happy	.28**	-.46**	-.57**	-.35**	-.78**
	neutral	-.004	-.59**	-.66**	-.23*	-.78**
	serious	-.13	-.60**	-.66**	-.07	-.72**

** . Correlation is significant at the 0.01 level (2-tailed)

* . Correlation is significant at the 0.05 level (2-tailed)

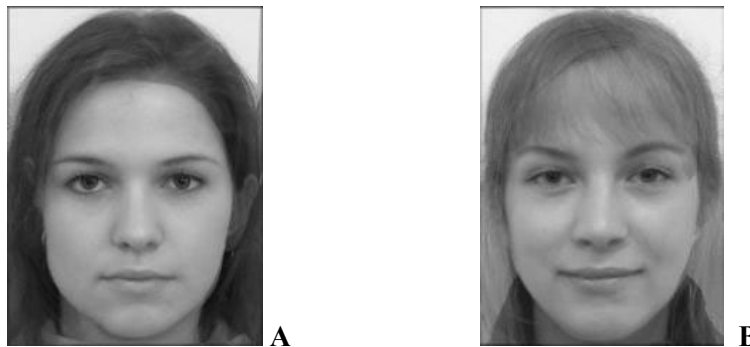


Figure 1. Examples of facial images morphed from the individual faces perceived as benevolent-serious (A) and malevolent-happy (B) and rated as trustworthy and not trustworthy, respectively. Benevolent perceived face was perceived as more trustworthy even if it had a serious expression against the happier expression of the malevolent perceived face.

change of the perceived facial emotion towards negative mood. There was a highly significant negative correlation between perceived malevolence and trustworthiness ($r = -0.72$ for happy faces, $r = -0.79$ for neutral faces and $r = -0.76$ for “serious“ faces; all $p < 0.01$). The less masculine (more feminine) the faces were perceived, the more they were perceived also as suggestible, but the corresponding

correlations were significant only for neutral and serious perceived faces ($r = 0.33$, $p < 0.01$ and $r = 0.41$, $p < 0.01$, respectively). Higher perceived femininity correlated also with higher perceived trustworthiness with three different emotional expressions (all $r > 0.6$, $p < 0.01$). Perceived attractiveness and suggestibility were not correlated when neutral or serious faces were evaluated, but with faces having a happy expression, ratings of unattractive photos were positively correlated with suggestibility. Correlation between attractiveness and trustworthiness was significant with all emotional expressions of faces. The pattern of correlation between physical morphological attributes and perceived suggestibility or trustworthiness as traits remains consistent despite variable expressions of the faces.

4. Discussion

The hypotheses were supported by the results obtained in the present study. A facial expression of emotion had a significant effect on the perceived personality for most of the traits and instances of expression. This is a trivial result consistent with what has been well known about the dependence of inferences about personality on facial emotional cues (Knutson 1996, Knyazev, Bocharov, Slobodskaya, and Ryabichenko 2008, Montepare and Dobish 2003, Mueller and Mazur 1997, Todorov 2008). More importantly, the second and third hypotheses received also support. Facial personality perception according to the suggestibility and trustworthiness as the perceived traits is largely categorically invariant to expressive facial cues. Basic morphological individual facial qualities that cannot be eliminated by expressional variability, such as babyfacedness / maturity, femininity / masculinity, and attractiveness / unattractiveness can have their effects on the perception of suggestibility and trustworthiness independently from or interactively with expressional cues. Particularly, higher perceived babyfacedness was associated with higher perceived suggestibility, replicating the results of Bachmann and Nurmoja (2006), but with controlling the factor of facial expression. Furthermore, expression-invariant femininity and benevolence also predicted high perceived suggestibility and trustworthiness similarly to what higher attractiveness usually does. These results are consistent with other studies (Berry and McArthur 1985, Keating, Randall, Kendrick, and Gutshall 2003, Masip and Garrido 2001, Masip, Garrido, and Herrero 2004, Perrett et al. 1998, Zebrowitz, Voinescu, and Collins 1996, Zebrowitz and Montepare 1992).

In order to illustrate how facial identity-related qualities that have an influence on personality perception may have an effect even if the emotional expressive cues should act so as to have an opposite effect on the perceived trait quality, we present an example capitalizing on the morphing procedure (see Figure 1). We took a random sample of faces belonging to the benevolent perceived female face category having “serious” expressions ($N = 8$) and a random sample of faces belonging to the malevolent-category female faces having happy expressions ($N = 8$) and prepared face morphs for both samples. (Two morphed images

depicting opposite visual categories of trustworthiness can be seen in Figure 1.) Apparently, the mutually counter acting facial expressions do not eliminate the influence of individual facial cues invariant to emotional expression – the happier face appears perceptually nevertheless more malevolent than a “serious” face. In an *ad hoc* additional analysis we compared trustworthiness ratings which were given to the faces belonging to these samples and found a significant difference in the mean ratings of trustworthiness for benevolent-serious faces and malevolent-happy faces ($F(1, 14) = 18.79, p = 0.001$). The corresponding average trustworthiness ratings were: benevolent-serious ($M = 3.86, SD = 0.41$); malevolent-happy ($M = 3.19, SD = 0.15$).

Provided that the category malevolence / benevolence is close to the category of trustworthiness, it is not surprising that the face-based perception of this category is also effectively categorically invariant to emotional expression. The expression-invariant consistency of the effects of the individual perceived facial cues suggests that the known effects of emotional expression on trait perception may be more of an emphasizing nature, instead of being distinctly categorical. An elegant study combining psychophysics and brain imaging recently showed that human brain possesses mechanisms (e.g. located in the superior temporal sulcus) capable of a *continuous* representation of emotion cues from faces (Harris, Young, and Andrews 2012). This capacity is present in addition to the ability to extract emotional expression from faces categorically (e.g. aided by amygdala processes).

Surprisingly, we found almost no correlations between facial babyfacedness and trustworthiness whereas earlier research has found that neotenous faces tend to lead to higher trustworthiness perception, probably as mediated by the dominance/submissiveness dimension (Todorov 2011). Unexpectedly, a weak correlation appeared only in case of neutral faces, indicating that only babyish faces with neutral expressions were perceived to be more trustworthy. Data from Oosterhof and Todorov (2009) showed that trustworthiness perception is highly sensitive to the well perceived emotions of anger and happiness. Is it just a noise in our data or a hint that in some cases facial expressions rather disturb the process of facial personality perception remains to be answered in subsequent research. Perhaps perceived maturity is associated mainly with the dimension of dominance/submissiveness while perceived trustworthiness – with the dimension of valence (affiliation). When engaged in some specific circumstances, these dimensions are truly orthogonal (e.g. Todorov et al. 2008). For example, Oosterhof and Todorov (2008) showed that expression-sensitive trustworthiness evaluation did not correlate with maturity-cues unless internal features that were linked with the trustworthiness-features were masked.

It is argued that emotional expressions “fuel trait impressions” (Montepare and Dobish 2003): in situations of zero-acquaintance where we have to make rather quick decisions about another person, the quickest way to decide who stands before us is via facial expressions. But this is a process that has to be continued and supplemented. The question about someone’s personality comes to our mind later, probably at the moment we already have determined (with the help of facial

expression signals) to approach that person. The process of facial personality perception seems to follow a very rational logic – first we use the pieces of information that are necessary to decide the *state* of the person next to us and then we can form a longer lasting impression (*trait* inference). Another recent functional approach to trait inferences based on 2D space of valence/trustworthiness and power/dominance (Todorov et al. 2008, Todorov 2011) also uses the approach-avoidance mechanisms in order to explain person perception. Yet, the issue about whether expressive cues are processed ahead of the more stable morphological cues is open because the speed of processing of both of these cues can be equally fast, remaining below 100 ms and including subliminal fast effects (Borkenau et al. 2009, Brosch et al. 2010, Carré et al. 2009, Hannula et al. 2005, Olivola and Todorov 2010a, Todorov et al. 2009).

Faces always provide us more than just emotional cues – emotions add strength and hue to our opinions -- but the basis of our judgments comes from something more solid and stable invariantly inferable over varying expressions. Our present results are consistent with this at least with regard to evaluations of suggestibility and trustworthiness. Nevertheless, because basic morphological attributes of faces can be somewhat distorted, masked or transformed because of the configural variability brought in by expressive changes in faces, it is important to explore what kinds of basic facial morphology-based cues to the stereotypically perceived personality traits tolerate variability in expression (Zebrowitz and Collins 1997). Our present results show this kind of tolerance for neotenous, masculinity/femininity related, and malevolence (threat-) related cues as related to the perception of suggestibility and trustworthiness.

What these cues precisely are may not be easy to ascertain, but as a first step it is advisable to use the methods of data-driven approaches in order to produce computer-generated morphed images or classification images to see how the prototypical faces representing low versus high suggestibility cues invariant to different emotional expressions would look like (for the useful methods see Dotsch and Todorov 2012, Harris, Young, and Andrews 2012, Oosterhow and Todorov 2008, Mattavelli et al. 2012, Walker and Vetter 2009). It is likely that there will be a resemblance to the face space developed along the dominance (power) dimension. But what the other principal dimension(s) would be, if any, remains to be found out.

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