USING COMPOSITE IMAGES TO ASSESS ACCURACY IN PERSONALITY ATTRIBUTION TO FACES

Abstract

Several studies have demonstrated some accuracy in personality attribution using only visual appearance. Using composite images of those scoring high and low on a particular trait, the current study shows that judges perform better than chance in guessing others' personality, particularly for the traits conscientiousness and extraversion. This study also shows that attractiveness, masculinity, and age may all provide cues to accurately assess personality and that accuracy is affected by the sex of both of those judging and being judged. Individuals do perform better than chance at guessing another's personality from only facial information, providing some support for the popular belief that it is possible to accurately assess personality from faces. However, this accuracy is somewhat limited.

Key words: social perception, facial appearance, accuracy, zero-acquaintance, stereotype

Introduction

Judging attractiveness of human faces takes only a moment, and we also classify faces for broad and tangible qualities like age and sex. Alongside these attributions we also examine more subtle social signals predicting the behaviour and personality of others, such as deciding whether we think someone is an extravert or an introvert, based on their appearance. Facial characteristics influence attributions of various personality characteristics and, because of their prominent and (in most cases) permanent display), can play an important role in social perception.

Many individuals believe the face provides important guides to character (Hassin & Trope 2000, Liggett 1974) and there are also studies showing that observers can make reliable and somewhat accurate judgements of others' personality traits on the basis of very little information. Several studies have examined accuracy of personality attributions and many utilise the five factor model of personality (or the Big 5) proposed by Norman (1963). The factors are extraversion, agreeableness, conscientiousness, neuroticism, and intellect-openness. Passini and Norman (1966) examined small groups of undergraduates who were placed in groups without verbal interaction for 15 minutes and asked to rate each other using scales corresponding to the 'Big 5' personality factors. They found that correlations between self and others' ratings were significantly greater than chance for extraversion, conscientiousness and openness.

Replicating this study, Albright, Kenny, & Malloy (1988) also found that when judges were asked to rate strangers they met in person without interaction on personality factors, there was a high degree of agreement

between different judges on the personality characteristics attributed. The judgements were also significantly correlated with the targets' own self-ratings for extraversion and conscientiousness. Watson (Watson 1989) also found evidence for accuracy when judging extraversion and conscientiousness. This paradigm was referred to as "zero acquaintance" and there are now many studies which reinforce the original findings (see Kenny, Albright, Malloy, & Kashy 1994 for review). The phenomena of consensus and accuracy in personality attributions from faces have also been identified in cross-cultural studies. They can be found using photographs of still faces (Albright et al. 1988), video footage (Kenny, Horner, Kashy, & Chu 1992), and also using acquaintances' judgements of targets' personality in comparison with the unfamiliar judges' estimations (Borkenau & Liebler 1993). Amongst these studies there have sometimes been indications of sex differences in accuracy. For example, Ambady, Hallahan, and Rosenthal (1995) report that women are more accurate judges of strangers' personality than men.

Accuracy in rating has also been documented for traits not related to the Big 5. Berry and Brownlow (1989) found that unfamiliar judge's ratings of male babyfacedness (possession of infant like facial traits) were positively correlated with the face owner's self-reported approachability and warmth, but negatively related to self-reported aggression. For female faces, babyishness was associated with low self-reported levels of physical power and assertiveness. Bond, Berry, and Omar (1994) have demonstrated that individuals with faces rated as having low honesty are more likely to volunteer for experiments that involve them deceiving others than people whose faces are judged to look more honest. There is also evidence that intelligence can

be inferred from facial information (Zebrowitz, Hall, Murphy, & Rhodes 2002) and that personality can also be manifested in the environments that people construct around themselves, in that judges can accurately infer some personality traits from brief viewing of targets' bedrooms and offices (Gosling, Ko, Mannarelli, & Morris 2002).

The consistency in attributions must be due to certain visible characteristics in the perceived. Three likely candidates which have received much attention in stereotype research are masculinity, attractiveness, and age. Males and females differ in facial form, and certain behavioural traits such as dominance-submissiveness are thought to be associated with one sex more than the other (it is essentially immaterial to the issue of consistency of attributions whether such stereotypes are actually accurate, although of course, this would be relevant to attribution accuracy). By extrapolation, observers may perceive the differences in the masculinity of faces within members of the same sex as relating to the dominance of the owner of that face (Perrett et al. 1998). As well as potential sex stereotypes, other general stereotypes also exist. For example, there exists a pervasive "what is beautiful is good" stereotype (Dion, Berscheid, & Walster 1972), in which varied positive personality attributions are projected on to those possessing attractive faces (e.g., Feingold 1992). There also exists a "baby-face" stereotype (Berry & McArthur 1986) whereby individuals whose faces most resemble infants are seen as warmer, less likely to exhibit antisocial behaviour, more submissive, more naive, and more irresponsible than those with more mature faces (Zebrowitz & Montepare 1992). This may reflect attribution based on similarity to a particular group, and since immaturity is associated with childhood,

childlike faces are perceived as immature (Berry & McArthur 1985). While baby-facedness may not be the same as perceived age, infant-like faces do appear younger than more mature looking faces. Given their prominent role in social perception, any of these traits may provide cues to accurate personality attributions. Accuracy could potentially be mediated by self-fulfilling prophecies (Snyder, Tanke, & Berscheid 1977), the expressive habits of individuals (Malatesta, Fiore, & Messina 1987), active manipulation, such as use of grooming aids (Cash 1990), or putative links to biological mechanisms, such as those between face shape, personality and hormone levels (Enlow 1982, Mazur & Booth 1998).

In this study we created composite images of individuals who had rated themselves as high or low on each of the five-factor traits. We had the resulting images rated for the same traits so that we could assess accuracy and determine whether there were consistent facial cues to accurate personality attribution. Galton (1878) devised the basic technique of combining individual images to produce composites. Galton was also interested in how behaviour may be reflected in faces and he produced, amongst other images, a composite image of criminals. Composite creation techniques have been developed in recent years, yielding ever more realistic looking composites (Benson & Perrett 1993, Tiddeman, Burt, & Perrett 2001). Characteristics common to the individual faces combined in composites are maintained and highlighted, while idiosyncratic variations that are not common to the set are ‘averaged out’. Therefore, if individuals high or low on a particular trait have similar facial appearance, the facial characteristics they

have in common should be maintained in composites, while characteristics they do not share will disappear.

Methods

A). Making average faces based on self-rated personality

Participants

68 males (aged 18-24, M = 20.1, SD = 1.4) and 123 females (aged 17-32, M = 20.7, SD = 2.5) participated in this part of the study.

Materials

A 40-item questionnaire was administered that was developed from trait pairs presented in McCrae and Costa (1987). McCrae and Costa (1985) present an 80-item questionnaire, and McCrae and Costa (1987) present the five-factor loadings with varimax rotation for 738 raters judging one of their peers for these 80 adjective pairs. To reduce this questionnaire to the most valid 40 items, the 8 highest loading questions from each factor were taken. The questionnaire was presented via a computer with participants using a mouse to click the point on a 7-point scale between the 40 adjective pairs. The forty pairs can be seen in the Appendix.

Photography

Each participant was photographed to provide a full-face colour image. Photographs were taken with a digital camera (resolution set at 1200x1000 pixels) under standardised diffuse lighting conditions and against a constant background. Participants were asked to pose with a neutral facial expression

and were asked to pull their hair back from their face. Participants were also asked to any remove spectacles and males were clean shaven in appearance.

Factor analysis of personality questionnaire

Factor analysis extracting 5 factors and using varimax rotation was carried out separately for males and females. The five factors accounted for 48.9% (1= 12.3, 2= 10.0, 3= 9.4, 4= 8.8, 5= 8.5) of the variance of the original scores in females and 52.9% (1= 15.7, 2= 10.7, 3= 10.5, 4= 9.3, 5= 6.6) of the variance of scores in males. For females, factor 1 was labelled extraversion, factor 2 conscientiousness, factor 3 neuroticism, factor 4, agreeableness, and factor 5 openness to experience. For males, the factors were labelled similarly apart from factor 4 which was labelled openness to experience and factor 5 which was labelled agreeableness. The factor loadings for the adjective pairs can be seen in the Appendix. As can be seen in the Appendix, the 40-item questionnaire appears to capture the big 5 factors for both males and females.

Making the composite faces

From the factor analysed personality scores the 15 highest and lowest scorers on the five-factors for males and females were selected to make up the composites. Fifteen faces was deemed sufficient to capture the average configuration of high and low scoring individuals, as the perception of individuality or distinctiveness in composite images changes little after the merging of 6 images (Little & Hancock 2002). The average mean difference between the highest rated 15 and lowest rated 15 was 2.68 for men and 3.24

for women. For both males and females, the personality scores of the individuals selected as high for each trait were significantly higher than those selected for the low group for the relevant trait (all $p < .001$), while no difference was found between the high and low groups for any of the personality traits for which the individuals were not selected (all $p > .31$). For example, the high extravert group had significantly higher scores for extraversion than the low extraversion group but did not significantly differ on any other personality trait

For each set of 15 face images a single composite face was produced for a total of 20 composites: 2 (high, low) X 5 (personality traits) X 2 (male, female). The composite faces were created using specially designed software. Key locations (174 points) were manually marked around the main features (e.g., points outline, eyes, nose, and mouth) and the outline of each face (e.g., jaw line, hair line). The average location of each point in the 15 faces for each composite was then calculated. The features of the individual faces were then morphed to the relevant average shape before superimposing the images to produce a photographic quality result. For more information on this technique see Tiddeman, Burt, and Perrett (2001). The male and female composite images can be seen in Figure 1.

Figure 1 around here

B). Rating the composite faces for perceived personality

Participants

Forty participants (15 male, 25 female, aged 19-35, mean = 22.9) rated the composite faces for perceived personality. Thirty-three of these individuals rated the faces for perceived attractiveness, masculinity and age.

Ratings

Participants were asked to rate the 20 composite faces for: agreeableness, conscientiousness, extraversion, neuroticism, openness to experience, attractiveness, masculinity and age. Ratings were on a 7-point scale (1=very low, 7=very high) except for age judgements, for which participants were asked to guess at the actual age of the face.

Faces were presented to participants on computer screen individually and in a random order. Rating the face from 1-7 brought up the next face. Participants rated the faces on a single dimension at a time (e.g., if asked to rate agreeableness, all faces were rated for agreeableness followed by the next rating block) and the order in which the traits were rated was randomised between participants. There was no time limit for the ratings. Due to the length of the rating task, participants were given the option of not rating the physical traits (attractiveness, masculinity, age).

Results

Calculating difference scores

Difference scores were calculated for each type of rating of low and high personality trait face pairs (high-low). For example, if a participant judging extraversion rates 7 for the high extravert face and 5 for the low extravert face

this would give a difference score of +2. This single score thus represented whether judges were accurate, as indicated by a positive score, or not and allowed comparison between accuracy and trait.

Reliability of raw ratings

Co-efficient α was calculated for each trait across the 20 rated faces (40 participants for judgements of agreeableness, conscientiousness, extraversion, neuroticism, and openness, and 33 participants for judgements of attractiveness, masculinity, and age). This revealed moderate to high agreement for all traits (age = .84, masculinity = .98, agreeableness = .76, conscientiousness = .79, extraversion = .83, neurotic = .64, openness = .56) bar attractiveness which was relatively low (.35, but splitting by sex of face revealed greater agreement within each sex, female = .54 and male = .55).

Accuracy by trait

Using 1-sample t-tests against chance (0), for female faces, a significant difference was found for rated agreeableness for the agreeableness faces (t_{40} = 2.1, p = .039), rated conscientiousness for the conscientiousness faces (t_{40} = 2.6, p = .014), rated extraversion for the extravert faces (t_{40} = 2.4, p = .026), and neuroticism for neuroticism faces (t_{40} = 2.2, p = .033). Only the extravert faces rated for extraversion (t_{40} = 2.4, p = .022) were significantly different from chance for the males. For females, the score for openness to experience faces did not significantly differ from chance (t_{40} = 2.0, p = .057) but was very close to the 0.05 criterion for significance. For males, scores for face pairs rated for the relevant personality trait did not significantly differ for

agreeableness (t_{40} = -0.7, p = .52), neuroticism (t_{40} = 0.7, p = .50), or openness to experience (t_{40} = 0.6, p = .58), and there was marginal trend for a relationship with conscientiousness (t_{40} = 1.7, p = .098). All significant differences were in line with accurate ratings (as in fact were the non-significant differences, in all but one case). Mean difference scores can be seen in Table 1.

Table 1 around here

Attractiveness, masculinity, and age

Difference scores were also calculated for composite pairs rated for attractiveness, masculinity, and age. Again using 1-sample t-tests against chance, for attractiveness ratings, significant differences for the female agreeableness pair (t_{32} = 2.8, p = .008) and the male neuroticism pair (t_{32} = 2.5, p = .018) were found. The high agreeable face was rated higher than the low agreeableness face for females and the high neuroticism face was rated higher than the low neuroticism faces for males. For females, conscientiousness (t_{32} = 0.9, p = .37), extraversion (t_{32} = -0.4, p = .68), neuroticism (t_{32} = 0.6, p = .55), and openness to experience (t_{32} = 0.7, p = .47) face pairs did not generate a difference score that was different from chance. For males, conscientiousness (t_{32} = -1.8, p = .083) and openness to experience (t_{32} = -1.8, p = .083) faces pairs had difference scores that were marginally significant while agreeableness (t_{32} = 0.6, p = .55) and extraversion (t_{32} = -0.2, p = .88), face pairs did not generate a difference score that was different from chance. Mean difference scores can be seen in Table 2.

Table 2 around here

For ratings of masculinity, significant differences for the male agreeableness pair (t_{32} = -2.1, p = .044), the male extraversion pair (t_{32} = -2.1, p = .040), and the female neuroticism pair (t_{32} = -2.1, p = .044) were found. The high agreeableness face was rated lower than the low agreeableness face and the high extraversion face was rated higher than the low extraversion face for males. The high neuroticism face was rated lower than the low neuroticism faces for females. There was a marginally significant effect for a similar pattern for agreeableness in females (t_{32} = -1.9, p = .062), with low agreeableness faces appearing more masculine. For females, conscientiousness (t_{32} = -1.6, p = .13), extraversion (t_{32} = 0.4, p = .66), and openness to experience (t_{32} = 0.0, p = 1.0) face pairs did not generate a difference score that was different from chance. For males, conscientiousness (t_{32} = -0.2, p = .87), neuroticism (t_{32} = -0.1, p = .90), and openness to experience (t_{32} = 0.5, p = .63) face pairs did not generate a difference score that was different from chance. Mean difference scores can be seen in Table 2.

For ratings of age the differences for the male extraversion pair (t_{32} = 2.2, p = .032), the male neuroticism pair (t_{32} = -3.0, p = .005), the male openness to experience pair (t_{32} = 2.7, p = .010), and the female conscientiousness pair (t_{32} = -3.5, p < .001) was found with the high extraversion, neuroticism, and openness to experience faces appearing older than low traits faces for males and the high conscientiousness face being

rated as younger than the low conscientiousness for females. For females, the difference score for extraversion had a trend towards significance (t_{32} = 2.2, p = .094) while the agreeableness (t_{32} = -0.7, p = .49), neuroticism (t_{32} = 0.1, p = .92), and openness to experience (t_{32} = -0.5, p = .66) face pairs did not generate a difference score that was different from chance. For males, agreeableness (t_{32} = 0.2, p = .85) and conscientiousness (t_{32} = -1.4, p = .17) face pairs did not generate a difference score that was different from chance. Mean difference scores can be seen in Table 2.

Relationships across traits and faces

A repeated measures ANOVA (5x5x2x2) was conducted with 'trait', 'face', and 'sex of face' as within-participant factors and 'sex of rater' as a between-participant factor. This revealed a significant within participant effect of 'trait' ($F_{4,152}$ = 3.2, p = .014) and significant interactions between 'face' x 'trait' ($F_{16,608}$ = 3.2, p < .001), 'face' x 'trait' x 'sex of rater' ($F_{16,608}$ = 2.8, p < .001), and 'face' x 'trait' x 'sex of face' ($F_{16,608}$ = 2.3, p = .003). No other significant effects or interactions were found (all p > .14).

The significant effect of 'trait' x 'face' can be seen in Figure 2. There are many relationships in the data showing cross-talk between face and trait and the discussions below focus on differences related to accuracy in trait ratings. Figure 2 shows that for four of the five traits pairs differ most on their own rated trait. The predicted means taking into account ratings on different traits show that conscientiousness, extraversion, neuroticism, and openness rating differences have the most positive difference score for their relevant traits at levels comparable to or greater than the original raw scores. The

agreeableness face pair differed most on rated conscientiousness suggesting that there was little accuracy in judging agreeableness but those individuals who are agreeable have faces that appear more conscientiousness. Other interactions are not followed up here.

Figure 2 around here

Discussion

This study shows that, when judging composite facial images, individuals are able to infer the personality of others somewhat accurately based only on facial information. This may mean that individuals are indeed correct in thinking their judgements of others' personality based only on facial information are accurate (Hassin and Trope, 2000; Ligget, 1974). Such judgements are far from perfect, particularly considering that we only examined extremes of personality scores – accuracy is likely to be lower when individuals are more similar in personality.

Analysis of individual traits revealed that some traits were judged with more accuracy than others. In previous studies accuracy was most consistently seen for judgements of extraversion and conscientiousness (Albright et al. 1988, Passini & Norman 1966, Watson 1989) which also appears to be reflected in the current study. In the original ratings, across both males and females, both extraversion and conscientiousness face pairs were rated accurately (though $p = .096$ for male conscientiousness pair). For the female faces there were also indications of significantly accurate judgements

for agreeableness and neuroticism. This potential sex difference is discussed in more detail below.

The repeated measures analysis revealed that overall there was a trait by face interaction. Ratings of conscientiousness, extraversion, neuroticism, and openness faces were most different in regard to their relevant trait. The agreeableness face pair rated for agreeableness produced a difference score near 0. This analysis confirms much of what was seen in the analysis of original difference scores. Ignoring sex of face, judges were more accurate than chance at estimating others' personality traits with the largest differences being for conscientiousness and extraversion. Two interactions suggested that accuracy was influenced by both the sex of the face judged and the sex of the rater, though the small sample size of raters means we draw no strong conclusion from the latter interaction.

Looking at the raw scores, accuracy is higher when judging female than male faces. This may partially reflect the way in which the composite images were made. The average mean difference between the highest rated 15 and lowest rated 15 was greater in the women than the men (male = 2.68, female = 3.24). This is likely due to the size of the pool from which the participants were drawn – nearly double the number of females participated in the first part of the study and so a greater potential for variation in personality. The difference means that the male composites were less extreme in their actual personality than the females and so we might expect it to be harder to accurately judge their personality. Of course that male and female faces are judged differently may also reflect that female faces contain more cues to their actual personality than do male faces.

As well as general accuracy it appears that some traits are more accurately judged depending on whether male or female faces are being rated. There appeared to be higher accuracy for conscientiousness in male faces and neuroticism and openness for female faces. Again this may reflect differences in sample size between male and females or that the validity of cues differs depending on the judged face either in the face themselves or the attention judges pay to particular traits in male and female faces.

The use of composite faces in this study shows that there exist consistent cues to the personality of an individual which are available from their face. As reviewed in the introduction, three likely candidates which have received much attention in stereotype research are attractiveness, masculinity, and age. For female faces, the high agreeableness composite was more attractive than the low agreeableness composite and for male faces the high neuroticism composite was more attractive than the low neuroticism composite.

Attractiveness could then be a cue to accurate personality attribution, although in fact judges were not accurate in assessing agreeableness. Of course, if men base their partner choice on attractiveness judgments they are also expressing a preference for partners who are actually agreeable. This suggests that even without conscious information about personality, individuals may make other potentially important judgements based on a link between facial appearance and personality. The attractiveness of the high neurotic male composite is somewhat surprising but may be explained by the fact that this face was also seen as over a year younger than the low neurotic composite. It is possible that a preference for youth (Buss 1989) explains the

attractiveness of the high neurotic male composite. The one year difference in age is not large and the exact interplay between neuroticism, youth and preferences remains to be examined.

Masculinity judgments also differed between high and low face pairs. In female faces masculinity related negatively to agreeableness (p = .062) and significantly positively to neuroticism, and in male faces masculinity was significantly negatively related to agreeableness and positively to extraversion. Such findings are consistent with perceptions of computer graphic manipulations of sexual dimorphism which show that masculinity is negatively related to personality traits associated with agreeableness (e.g., warmth, cooperativeness, Perrett et al., 1998). Though perceived masculinity was related to real personality it appears that this trait was not used to accurately assess personality as out of all the traits agreeableness showed lowest overall accuracy.

Age judgements were related to conscientiousness in female faces and extraversion, neuroticism and openness in male faces. The high conscientiousness composite was rated as younger than the low conscientiousness composite for female faces and the high extravert, high openness, and low neuroticism composite faces were rated as older than their counterparts. Again this shows that perceptual age is a potential cue to accurate personality attribution.

Previous studies demonstrate accuracy in perceived personality using more information than that shown here. Even in still facial photographs more information is available to judges, such as clothing and hair style. Here judges were accurate based only on facial information. Accuracy of

personality based on facial information may come about via self-fulfilling prophecies (Snyder et al. 1977), whereby facial appearance affects social perception leading individuals to behave in the way they are perceived to. However, the causal direction could operate in the opposite direction, with personality and behaviour affecting facial appearance. People with a tense irritable temperament may tense certain facial muscles in a way that yields different jaw development from that shown in people who are more relaxed (Kreiborg, Jensen, Moller, & Bjork 1978). Personality may also be seen in expressive habits. There is evidence that the personality dispositions of elderly people are reflected in their faces, with those of a hostile disposition tending to look angry even when posing in a neutral expression (Malatesta et al. 1987). Accuracy can also be mediated through the environment, for example, Cash (1990) reports that those who are highly sociable may choose grooming aids that have a beneficial effect on their appearance. Another potential source of accuracy comes from a biological link between personality and facial appearance. For example, testosterone is proposed to be responsible for masculine male facial traits (Enlow 1982) and is also linked to male dominance behaviours (Mazur & Booth 1998), potentially providing a biological link between the two. The reasons why personality is accurately perceived remain to be studied and assessing the cues that people use may be an important source of data in addressing this question.

The idea of judging an individual's personality from their appearance may be seen as inherently undesirable (e.g., the common phrase "don't judge a book by its cover") but this in no way implies that it is not important to attempt to understand this area. In fact, the evidence that people appear to

make personality judgements based on only minimal information despite society's discouragement implies that this is an area of fundamental importance in social perception.

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Table 1: Mean difference scores for personality face pairs rated for their relevant trait for male and female faces

	Difference score on relevant trait	
	male	**female**
Agreeableness	**-.13**	**.43***
Conscientiousness	**.43**	**.55***
Extraversion	**.53***	**.53***
Neuroticism	**.15**	**.48***
Openness to experience	**.10**	**.45**

***Significant at $p < 0.05$**

Table 2: Mean difference scores for personality face pairs (rating for high minus rating low) for each personality factor and for male and female faces. Positive scores indicate that the high scoring composite face is seen as more attractive, masculine or old and negative scores indicate that the low scoring composite is seen as more attractive, masculine or old.

	Attractiveness		**Masculinity**		**Age**	
	male	**female**	**male**	**female**	**male**	**female**
Agreeableness	.15	**.64***	**-.36***	-.39	.06	-.24
Conscientiousness	.36	-.21	-.03	-.33	-.45	**-1.12****
Extraversion	.03	-.09	**.39***	.09	**.67***	.61
Neuroticism	**.48***	.15	-.03	**-.36***	**-1.06***	.03
Openness to experience	-.36	.15	.09	.00	**.97***	-.18

***Significant at $p < 0.05$/**Significant at $p < 0.01$**

Figure 1: Composite facial images based on self-reported personality

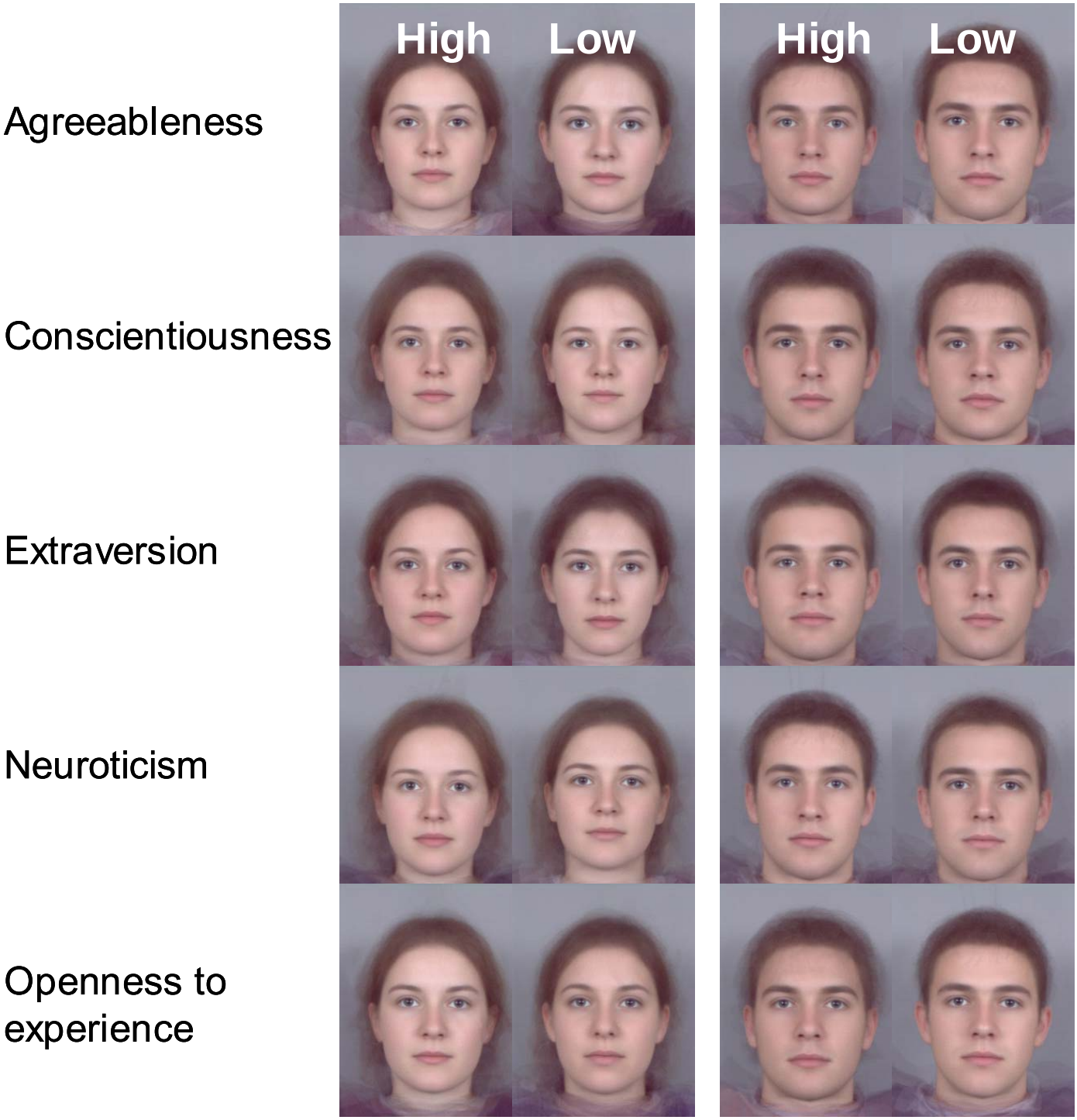
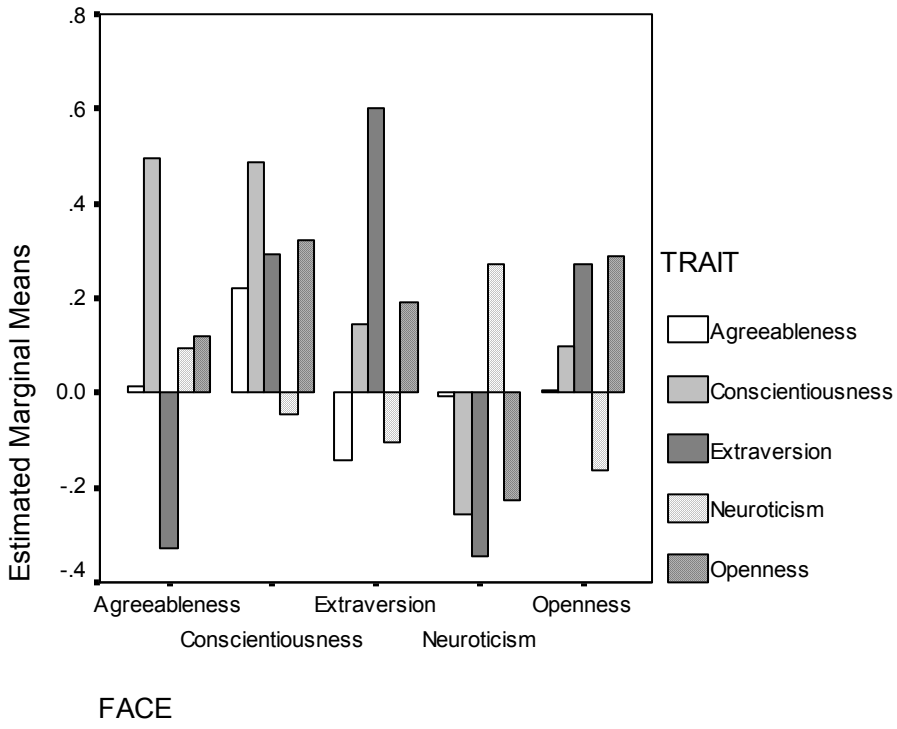


Figure 2: Estimated means of difference scores by trait and face from Face by Trait ANOVA.



Appendix: Factor loadings of 40-item questionnaires for males and females.

Table A: factor loadings of 40-item personality questionnaire for males (for trait, a = agreeableness, c = conscientiousness, e = extraversion, n = neuroticism, o = openness to experience). Loadings over 0.4 in larger type.

			factor 1	factor 2	factor 3	factor 4	factor 5
trait	low	high	Extraversion	Conscientiousness	Neuroticism	Open to experience	Agreeableness
a	Antagonistic	Acquiescent	0.02	0.37	-0.12	0.02	**0.44**
a	Callous	Sympathetic	**0.59**	0.06	0.27	0.04	0.36
a	Flexible	Stubborn	0.07	-0.06	-0.06	-0.13	**-0.52**
a	Forgiving	Vengeful	**-0.44**	0.07	0.06	0.28	-0.29
a	Lenient	Critical	-0.12	0.10	0.10	0.00	**-0.75**
a	Ruthless	Soft-hearted	**0.59**	0.02	0.31	-0.13	0.18
a	Selfish	Selfless	**0.40**	0.02	-0.12	-0.01	0.36
a	Trusting	Suspicious	-0.28	0.11	0.33	0.23	-0.35
c	Careless	Careful	0.04	**0.65**	0.19	0.04	-0.06
c	Conscientious	Negligent	-0.25	**-0.73**	-0.05	0.04	-0.02
c	Late	Punctual	-0.04	**0.60**	-0.23	-0.30	0.01
c	Lazy	Hardworking	-0.05	**0.74**	-0.18	-0.01	0.05
c	Persevering	Quitting	-0.33	-0.37	0.02	-0.33	0.05
c	Self-disciplined	Weak-willed	0.07	**-0.79**	0.27	-0.04	0.06
c	Undependable	Reliable	0.04	**0.61**	-0.22	-0.12	0.23
c	Well-organised	Disorganised	0.13	**-0.53**	0.25	-0.06	0.28
e	Friendly	Aloof	**-0.76**	-0.24	-0.07	0.13	-0.08
e	Inhibited	Spontaneous	**0.45**	-0.08	-0.26	**0.60**	0.09
e	Joiner	Loner	**-0.76**	-0.14	0.18	0.09	0.04
e	Quiet	Talkative	**0.77**	0.03	-0.04	0.20	-0.15
e	Reserved	Affectionate	**0.67**	-0.18	-0.11	0.11	0.12
e	Sober	Fun loving	**0.48**	-0.38	-0.32	0.30	0.12

e	Sociable	Retiring	-0.73	0.02	0.04	-0.16	0.29
e	Warm	Cold	-0.88	-0.15	0.01	-0.10	0.02
n	At ease	Nervous	-0.16	-0.10	0.58	-0.09	-0.36
n	Insecure	Secure	0.05	0.17	-0.78	0.12	-0.16
n	Relaxed	Highly Strung	-0.12	0.01	0.61	-0.04	-0.36
n	Self-conscious	Comfortable	-0.02	0.18	-0.73	0.07	0.08
n	Self-satisfied	Self-pitying	-0.04	-0.40	0.43	-0.11	-0.13
n	Unemotional	Emotional	0.69	-0.23	0.19	0.29	0.02
n	Vulnerable	Hardy	-0.35	0.16	-0.63	-0.03	-0.23
n	Worrying	Calm	-0.13	0.18	-0.71	-0.06	0.16
o	Broad interests	Narrow interests	-0.08	-0.05	0.07	-0.59	-0.03
o	Complex	Simple	0.17	-0.32	-0.32	-0.50	-0.09
o	Conforming	Independent	-0.16	-0.02	0.01	0.70	-0.02
o	Conservative	Liberal	-0.16	-0.07	-0.18	0.36	0.60
o	Conventional	Original	0.25	-0.23	-0.16	0.73	0.22
o	Daring	Unadventurous	-0.37	0.07	0.43	-0.31	0.07
o	Down to earth	Imaginative	-0.03	-0.15	-0.03	0.63	0.00
o	Uncreative	Creative	0.32	0.08	-0.07	0.61	0.13

Table B: factor loadings of 40-item personality questionnaire for females (for trait, a = agreeableness, c = conscientiousness, e = extraversion, n = neuroticism, o = openness to experience). Loadings over 0.4 in larger type.

			factor 1	factor 2	factor 3	factor 4	factor 5
trait	low	high	Extraversion	Conscientiousness	Neuroticism	Agreeableness	Open to experience
a	Antagonistic	Acquiescent	-0.15	0.03	-0.06	**0.49**	-0.19
a	Callous	Sympathetic	0.24	0.11	0.05	**0.71**	0.09
a	Flexible	Stubborn	-0.18	0.05	0.34	**-0.45**	-0.06
a	Forgiving	Vengeful	-0.10	-0.12	0.22	**-0.58**	-0.02
a	Lenient	Critical	0.04	0.16	0.15	**-0.54**	-0.15
a	Ruthless	Soft-hearted	0.07	-0.04	0.18	**0.75**	-0.25
a	Selfish	Selfless	-0.03	0.09	-0.10	**0.46**	0.13
a	Trusting	Suspicious	-0.18	-0.02	0.37	**-0.44**	-0.09
c	Careless	Careful	0.03	**0.57**	0.05	0.28	-0.08
c	Conscientious	Negligent	0.09	**-0.71**	0.08	-0.13	0.02
c	Late	Punctual	-0.13	**0.41**	-0.17	-0.14	-0.18
c	Lazy	Hardworking	0.06	**0.79**	0.01	0.06	-0.02
c	Persevering	Quitting	-0.07	**-0.54**	0.06	-0.02	-0.42
c	Self-disciplined	Weak-willed	-0.07	**-0.82**	-0.10	0.14	-0.03
c	Undependable	Reliable	-0.11	**0.44**	-0.32	0.17	-0.03
c	Well-organised	Disorganised	0.02	**-0.73**	-0.01	0.05	0.09
e	Friendly	Aloof	**-0.59**	-0.08	0.28	-0.38	-0.14
e	Inhibited	Spontaneous	**0.54**	-0.22	-0.23	-0.10	0.47
e	Joiner	Loner	**-0.67**	0.08	0.24	-0.22	0.19
e	Quiet	Talkative	**0.79**	-0.13	-0.05	-0.15	0.04
e	Reserved	Affectionate	**0.81**	0.07	0.17	0.04	0.13
e	Sober	Fun loving	**0.68**	-0.22	-0.27	0.15	0.28
e	Sociable	Retiring	**-0.75**	-0.08	0.26	-0.10	-0.03
e	Warm	Cold	**-0.47**	-0.08	-0.02	-0.53	-0.14
n	At ease	Nervous	**-0.49**	0.02	**0.54**	-0.06	-0.02
n	Insecure	Secure	0.21	0.12	**-0.63**	0.19	-0.11

n	Relaxed	Highly Strung	-0.10	-0.06	0.68	-0.19	-0.12
n	Self-conscious	Comfortable	0.45	0.22	-0.40	0.00	0.10
n	Self-satisfied	Self-pitying	-0.29	-0.29	0.22	-0.20	-0.09
n	Unemotional	Emotional	0.46	0.06	0.51	0.21	0.19
n	Vulnerable	Hardy	0.12	0.24	-0.61	-0.10	0.28
n	Worrying	Calm	0.18	-0.13	-0.61	0.24	0.08
o	Broad interests	Narrow interests	-0.19	-0.11	0.40	-0.15	-0.42
o	Complex	Simple	-0.11	-0.28	-0.37	0.05	-0.43
o	Conforming	Independent	-0.01	0.03	-0.25	-0.01	0.68
o	Conservative	Liberal	0.23	-0.11	-0.04	0.04	0.51
o	Conventional	Original	-0.05	-0.07	-0.03	-0.02	0.77
o	Daring	Unadventurous	-0.36	0.02	0.35	0.00	-0.31
o	Down to earth	Imaginative	0.09	-0.37	0.09	0.09	0.53
o	Uncreative	Creative	0.05	0.01	0.00	0.09	0.64