HUMAN FACE ATTRACTIVENESS ASSESSMENT: THE ROLE OF EXTRAVERSION AND VERBAL INTELLIGENCE ON THE SIDE OF THE ASSESSOR AND THE ASSESSED

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Abstract: Extraversion plays a role in the behaviour and face assessment. Intelligence is discussed from two points of view: (1) as a feature carrying evolutionary information and (2) as a feature that enables the observer to detect information from the face. The aim of this research is to study (1) the role of verbal intelligence and (2) the role of extraversion within the process of attractiveness and intelligence evaluation of composite faces. Results are in favour of the evolutionary assumptions. The verbal intelligence of the observers (N=2106, M=24.10y, SD=10.15) is associated with the preference of extraversion in faces, the preference of higher intelligence, and with the ability to identify the level of intelligence from face. Moreover, extraversion of the observer is connected to the preference and assessment of the intelligence of the face.

Keywords: Face attractiveness assessment, extraversion, verbal intelligence, composite faces.

1 Introduction

The human face has been in the centre of interest for scientists in a number of scientific disciplines, professional knowledge led directly to rapid progress in understanding many aspects of face perception and processing. The face is usually the first visual information available to humans in social contact and is continuously visible during most types of interactions (Little, Jones, & DeBruine, 2011b). Therefore, it is more than understandable that a face becomes a part of our implicit personality theories.

Implicit personality theories (Schneider, 1973) are cognitive structures that are composed of attributed personality traits and their interrelations. The link between these implicit theories and stereotypes about group members become apparent when we consider the group membership as one of the personal attributes that are associated with other attributes from the same implicit theory (Ashmore, 1981). A very good example in this area is the link between facial attractiveness and extraversion. Physical attractiveness is associated with some implicit personality theories (attributed personality traits). The level of attractiveness is associated with interpersonal abilities and traits in the area of sociability, respectively extraversion, and the consequences of these abilities, respectively popularity (Eagly, Ashmore, Makhijani, & Longo, 1991).

The link between attractiveness and extraversion is apparent in the process of selecting a partner. In assessing the attractiveness of the human face, people can make decisions based on personality traits that match their ideal partner. If a person appreciates the personality trait extraversion, he/she may prefer an extraverted face because it means that the person can really be extraverted. The reason for relying on personality attributions of the other person is that facial information is more accessible than stable behaviours (Little, Burt, & Perrett, 2006b).

Not only do people prefer faces that represent an ideal partner but as it seems these preferences can be influenced by the assessor's own personality. Little, Burt, & Perrett (2006a) found out that the preference of extraverted male faces is relatively direct. Male faces, which are attributed to a higher degree of extraversion, are preferred by women who are extraverted as well. Couples often resemble each other. This similarity is fueled by an evolutionary mechanism that can be observed in various animal species (Burley, 1983); it is a nonrandom mating called assortative mating, in which the pair is formed on the basis of a phenotype. In this case, we could say it is a positive assortative mating strategy (homogamy) because people choose partners on the basis of similarity with themselves (Thiessen & Gregg, 1980).

Extraversion can be attractive for evolutionary reasons. The continuity of extraversion as a personality trait reflects a compromise between reproductive benefits and costs (Ashton & Lee, 2007). Extravert behaviour facilitates the establishment and preservation of social relations (Ashton & Lee, 2007) and supports the social status (Anderson, John, Keltner, & Kring, 2001). On the other hand, extravert behaviour is associated with competitive behaviour and its possible consequences (Lund et al., 2007). The mentioned compromise leads to the fact that extraverts are usually more successful when selecting a partner as introverts, but are also more likely to be injured (Nettle, 2005). We can contemplate that if extraversion is visibly reflected in the face of a person, the socially desirable characteristics from it may increase the overall interest in such a partner. It can lead to the evaluation of an extraverted face as being attractive in the sense of "what is good is beautiful" hypothesis (Little et al, 2006b).

In addition, extraverts usually have a symmetrical face that is generally considered to be one of the most attractive faces (Zaidel & Hessamian, 2010). The relationship between facial symmetry and attractiveness is stable, the face is more attractive if it is symmetrical. This relationship is valid even when one side of the face is removed from the photograph, when only the left or right side of the face is presented (Scheib, Gangestad, & Thornhill, 1999). Moreover, this knowledge suggests that the established connection between facial symmetry and attractiveness arises because symmetry is covariated with other attractive facial features more than that symmetry is perceived as attractive by itself. The relationship of extraversion and symmetry of the face arises because they have a common basis. Developmental stability leads to a symmetrical face phenotype and extraverted personality (Pound, Penton-Voak, & Brown, 2007). For this reason, we can say that an extravert face carries evolutionary information since it signals person's quality as a mate.

Another feature visible in the faces evaluated as a sign of "good genes" and overall health of the beholder can be intelligence (Miller, 2000; Prokosch, Yeo, & Miller, 2005). In this research, intelligence is discussed from two points of view: (1) as a feature visible in the face, carrying evolutionary information and (2) as a feature that enables the observer to detect relevant information from the human face.

(1) Intelligence has been connected with the beauty ideal for a long time (Etcoff, 1999). In general, attractive faces are considered to be more intelligent than unattractive faces (Zebrowitz, Hall, Murphy, & Rhodes, 2002; Kazanawa, 2011). And vice versa, the faces which show the signs of intelligence are perceived as more attractive (Talamas, Mavor, & Perrett, 2016; Demuthova, 2016). The explanation for the mentioned association between intelligence and attractiveness is provided by the "good genes" hypothesis. According to the hypothesis, attractive faces are a signal for a mate quality. The preferences for attractive individuals has evolved due to the enhancement of reproductive success (Berry, 2000; Zebrowitz & Rhodes, 2002). Therefore, attractive faces may signal high intelligence (Zebrowitz et al., 2002). Attractivity of intelligent faces may have arisen because "more intelligent mates conferred survival benefits on their offspring through the heritability of intelligence or through their ability to provide better parental care and more resources" (Zebrowitz & Rhodes, 2004, p. 169).

(2) Research in person perception has documented high accuracy in judging intelligence and health from facial appearance (Zebrowitz & Rhodes, 2004). As was proven by several research studies (Zebrowitz, Hall, Murphy, & Rhodes, 2002; Anderson, 1921), people are able to detect the level of intelligence from a face. Higher intelligence of the observer enables them to respond adequately to social situations and make good social judgements (Taylor, 1990). From this reason, we can assume that more

intelligent people make more accurate assessments about the intelligence of the judged face. As was found out by Borkenau & Liebler (1995), there was a strong correlation between the observer's intelligence and perceived intelligence from a face. In contrast, Kleisner, Chvatalova, & Flegr (2014) found out, that the accuracy of the perceived intelligence correlated with the intelligence of the observer only in men.

The evolutionary advantage to detect intelligence from a face is quite straightforward, already subtle deviations from average attractiveness can signal low fitness (Zebrowitz & Rhodes, 2004). People with asymmetrical faces can be perceived as having lower intelligence and health than those with symmetrical faces even though this perception may be erroneous (Rhodes et al., 2001, Zebrowitz et al., 2002), but the benefits of acquiring a high-quality mate are higher than the possibility to fail in responding to the mate fitness information (McArthur & Baron, 1983).

As mentioned above, at the individual level, people may exhibit different preferences for an ideal partner, which originate from the premise that people prefer partners who have similar personality traits as they do. Assortative mating occurs in many areas, from socio-economic, educational, psychological to physical (Domingue, Fletcher, Conley & Boardman, 2014; Silventoinen et al., 2003). To be an extravert and to obtain an extravert partner has an evolutionary advantage, as well as, to be intelligent and to have an intelligent partner. Extraversion and intelligence represent specific features visible in the faces which can be signs of "good genes" and overall health of the beholder. Within the meaning of assortative mating premise, one's own mate quality is related to the choice of a high-quality mate. Therefore, the aim of this research is to study (1) the role of verbal intelligence and (2) the role of extraversion within the process of attractiveness and intelligence evaluation of composite faces.

2 Method

Composite faces - Stimuli were composite introvert/extravert faces and faces representing three different levels (low, middle and high) of intelligence.

Extravert/introvert faces - The used stimuli are composite faces of extravert/introvert male and female faces prepared by Penton-Voak et al. (2006). Any face is a composite 10% of participants (15 faces) scoring highest and 10% scoring lowest on the big five self-report personality dimension - extraversion. The mean X and Y coordinates of each feature point were calculated to generate average shape information. The procedure in this task was to answer the question: "Which face do you like more?" and to choose from two possibilities: an extravert face or an introvert face.

Faces representing three different levels of intelligence - The stimuli are composite faces prepared by Kleisner, Charvatova, & Flegr (2014). Three photographs of female faces (see picture 1) and three photographs of male faces representing three levels of intelligence were used. The more is a face intelligent the more it shows overall dilations in the area between the eyes and mouth, the root of the nose is enlarged, and the nose is prolonged. The area of the chin is more constricted. By contrast, faces with a lower attribution of intelligence have eyebrows closer to each other, the base of the nose is narrowed, the nose is shorter, and the area of the chin is dilated (Kleisner, Charvatova, & Flegr, 2014). The procedure in this task was to choose the prettiest face from three faces and after several other tasks, these three faces appeared again with the task to choose the most intelligent one.

Figure 1: Composite female faces representing three levels of intelligence (Kleisner, Charvatova, & Flegr, 2014)

Measurement of the Intelligence - The Test of Intellectual abilities (Vonkomer, 1992) has been used to measure verbal intelligence. The test is standardized in the Slovak population. The subtest of verbal abilities consists of twenty items. The task is to create a word from the group of letters arranged in incorrect order using all of the letters. The word is a noun in singular and basic form (since Slovak language has declinations in nouns). The subtest was taken under a time limit.

Personality traits - Personality Inventory KUD (Miglierini & Vonkomer, 1986) was used for quick assessment of personality traits. These personality traits are included: dominance/submissiveness, rationality/sensuality, and extroversion/introversion. Each trait is represented by 8 items, with these possible answers: agree/disagree/neither. Sample items: "I'm calm even if I decide about something that I really care about", "Generally, I act upon a predetermined schedule". Only extraversion/introversion is analyzed in this research.

Research sample - The research sample consists of 2106 participants (M=24.10, SD=10.15), from which 1253 are female (59.4%) and 853 participants are male (40.4%). Participants gained the mean score in verbal intelligence 15.42 points which equals 6-7th sten (in compliance with Slovak norms).

3 Results

First, we analyzed participant's face preferences using one-sample chi-square to compare the number of trials on which participants chose the more extravert face as the more attractive with what would be expected by chance alone. Similar results are provided by the comparison of extravert/introvert male face preference and extrovert/introvert female face preference (tab. 1). The number of participants who prefer extravert male face over introvert male face differs significantly (X^2=52.457; df=1; Sig=0.000). In addition, the preference of the extravert female face shows the same tendency as in the case of the extrovert male face, the number of participants who prefer extravert female face is significantly higher than the number of participants who prefer introvert female face (X^2=542.516; df=1; Sig=0.000).

Table 1: One sample Chi-Square for the attractiveness of the images of introvert/extrovert faces

	Observed N	Expected N	Residual	Chi Square	Sig
Introvert male face preference	873	1038.0	-165.0	52.457	0.000
Extrovert male face preference	1203	1038.0	165.0		
Introvert female face preference	507	1037.5	-503.5	542.516	0.000
Extrovert female face preference	1568	1037.5	503.5		

We analyzed participant's face preferences using one-sample chi-square to compare the number of trials on which participants chose the most intelligent face as the best choice (tab. 2). We have obtained similar results as in the first comparison, the most intelligent face is considered to be the most attractive in both cases - male face (X2=677.066; df=2; Sig=0.000) and female face (X2=827.555; df=2; Sig=0.000). Results show that the most

intelligent face (regardless the sex of the face) is considered to be the prettiest, and participants, in general, prefer extravert female and male faces. Results are in favour of the evolutionary assumptions.

Table 2: One sample Chi-Square for the attractiveness of the images of faces according the level of intelligence

	Observed N	Expected N	Residual	Chi Square	Sig
Low intelligence male face preference	151	697.3	-546.3	677.066	0.000
Middle intelligence male face preference	860	697.3	162.7		
Highest intelligence male face preference	1081	697.3	383.7		
Low intelligence female face preference	199	697.0	-498.0	827.555	0.000
Middle intelligence female face preference	626	697.0	-71.0		
Highest intelligence female face preference	1266	697.0	569.0		

Next, we analyzed the possible differences of verbal intelligence of the observer according to their preference of extraversion in faces using the t-test, the preference of higher intelligence, and the ability to identify the level of intelligence from faces using ANOVA.

Participants with the extravert male face preference manifest higher scores of verbal intelligence (t=-2.628; Sig=0.009) than the participants with introvert male face preference. A very similar result was found in the participants with the preference of an extravert female face, they are significantly more verbally intelligent than the opposite group (t=-3.590; Sig=0.000).

Table 3: Observed differences in verbal intelligence according to extrovert/introvert face preference

	N	M	SD	t	Sig
Introvert male face preference	871	15.20	3.373	-2.628	0.009
Extravert male face preference	1203	15.57	2.913		
Introvert female face preference	507	14.99	3.385	-3.590	0.000
Extravert female face preference	1566	15.56	2.995		

Through the analysis of the differences of verbal intelligence of the observer according to their preference of higher intelligence, we have found out that the group of participants who prefer the highest intelligence in male faces are themselves the most verbally intelligent (M=15.66) with declining level of intelligence in compliance with the intelligence preference in male faces [middle intelligence male face preference: M=15.37, low intelligence male face preference: M=13.92]. These differences are significant (tab. 4).

Very similar are the results of the verbal intelligence comparison according to the attractiveness evaluation of female faces (F=7.938; Sig=0.000). The most verbally intelligent participants

are those who prefer the highest intelligence female face (M=15.61).

Table 4: Observed differences in verbal intelligence of the observer according to intelligence male and female face preference

	N	M	SD	F	Sig
Low intelligence male face preference	151	13.92	3.994	20.959	0.000
Middle intelligence male face preference	859	15.37	3.262		
Highest intelligence male face preference	1080	15.66	2.813		
Low intelligence female face preference	198	14.75	4.305	7.938	0.000
Middle intelligence female face preference	625	15.24	3.175		
Highest intelligence female face preference	1266	15.61	2.858		

As we were interested in the role of verbal intelligence in the process of evaluation of intelligence from human faces, we analyzed the possible differences of verbal intelligence of the observer according to their ability to identify the level of intelligence from faces using ANOVA. Different results are provided by the comparison of the level of intelligence assessment in male faces and the level of intelligence assessment in female faces (tab. 5). The verbal intelligence of participants correctly identifying the highest intelligence of the male face doesn't significantly differ from the other groups (F=0.042; Sig=0.959). On the other hand, the difference in verbal intelligence of the observers is significant in the case of the female face assessment. The group of participants who correctly identified the highest intelligence in the female composite face is the most verbally intelligent group (F=8.670; Sig=0.000).

Table 5: Observed differences in verbal intelligence of the observer according to intelligence male and female face assessment

	N	M	SD	F	Sig
Low intelligence male face	248	15.41	3.151	0.042	0.959
Middle intelligence male face	816	15.47	3.183		
Highest intelligence male face	982	15.43	3.057		
Low intelligence female face	320	14.89	3.823	8.670	0.000
Middle intelligence female face	808	15.29	3.163		
Highest intelligence female face	963	15.68	3.130		

Lastly, we analyzed differences between participants in extraversion according to their preference of the intelligence of the observed face. As can be seen in table 6, participants with the preference of the highest intelligence in male faces are typical by highest extraversion, the difference is statistically significant (F=6.670; Sig=0.001). The same tendency is apparent when the participants are asked to choose the more attractive female face, those who have the preference for the highest intelligence female face are the most extravert (F=5.360; Sig=0.005).

Table 6: Observed differences in extraversion of the observer according to intelligence male and female face preference

	N	M	SD	F	Sig
Low intelligence male face preference	145	9.88	4.010	6.670	0.001
Middle intelligence male face preference	784	10.79	3.661		
Highest intelligence male face preference	1013	11.03	3.495		
Low intelligence female face preference	182	10.39	3.926	5.360	0.005
Middle intelligence female face preference	564	10:55	3.742		
Highest intelligence female face preference	1195	11.05	3.485		

4 Discussion

Extraversion is a trait that is considered to be one of the frequently desired personality traits in a partner. The advantages of having an extraverted partner are in the establishment of social relationships (Ashton & Lee, 2007) and a higher social status (Anderson et al, 2001). For this reasons, people who have facial features resembling extraversion are evaluated as more attractive. We tested this possibility. As we found out, the number of participants who prefer extravert male face over the introvert male face is significantly higher. Extravert male face is considered as more attractive by 57% of participants. The same tendency, even more straightforward, manifested as well when the participants evaluated the attractiveness of female faces. The number of participants preferring extravert female face was higher than the preference of introvert female face, namely 74.3% of the research sample evaluate the extravert female face as attractive.

We can conclude that in addition to the fact that extraversion manifested in a face is attractive in a partner choice, it is more attractive than introversion regardless the sex of the assessor and the sex of the assessed. The evaluation of an extraverted face as being attractive is in compliance with the "what is good is beautiful" hypothesis (Little et al, 2006b). It can be contemplated that the developmental stability connected with extraversion (Pound, Penton-Voak, & Brown, 2007) carries not only evolutionary information in the form of person's quality as a partner. Extraversion as a trait can be understood as a consequence of the strength of response to naturally rewarding stimuli (like sex, food and physical pleasure). Extraverted people invest more time and energy on acquiring the stimuli because they are more salient for them than for introverted people (Eysenck, 1976; Swickert et al., 2002). These stimuli are rewarding because they are fitness enhancing and extraverts are more successful in mating and as well in attaining fitness relevant resources (Nettle, 2005).

Intelligence is as well considered to be very attractive (Etcoff, 1999; Talamas, Mavor, & Perrett, 2016; Demuthova, 2016). Similarly, as extraversion, intelligence can be explained in terms of the "good genes" hypothesis. Intelligent faces may confer survival benefits on the potential offspring because intelligent people have the abilities to provide better parental care and resources (Zebrowitz & Rhodes, 2004). As stated by Moore, Fillipou, & Perrett (2011, p. 206): "A relationship between intelligence and a "fitness factor" could account for the association between facial attractiveness and perceived intelligence, as individuals displaying visible cues to intelligence should be more desirable in a mate choice context".

We tested the possibility if the most intelligent face is evaluated as the most attractive. And again, we obtained similar results as in the case of extraversion, because this result is in conformity with the evolutionary presumption as well. The highest

intelligent face is considered to be the most attractive for male composite faces and for female composite faces as well. 51.3% of the participants prefer the highest intelligence male face [for comparison: lowest: 7.2%, middle: 40.8%]. 60% of the participants have shown the preference for the highest intelligence female face [lowest: 9.4%, middle: 29.7%]. Results show that the most intelligent face (regardless the sex of the face) is considered to be the prettiest.

As we were interested in studying the role of verbal intelligence and the role of extraversion within the process of attractiveness and intelligence evaluation of composite faces, we compared the selected variables against each other to test the possibility of assortative mating. Assortative mating in extraversion towards extravert partners is direct, male faces which are evaluated as to possess a higher degree of extraversion are preferred by women who are extraverted (Little et al, 2006a). This positive assortative mating strategy may be applicable as well in the terms of the premise that one's own mate quality is related to the choice of a high-quality mate. Therefore we can assume that the intelligence and extraversion as psychological constructs representing evolutionary advantages can be mutually attracted characteristics. To test these assumptions we analyzed the differences of verbal intelligence of the observer according to their preference of extraversion in faces, the differences of verbal intelligence of the observer according to their preference of intelligence of the observed faces, and the differences between participants in extraversion according to their preference of the intelligence of the observed face.

The results show that higher verbal intelligence is associated with extravert male face preference and with extravert female face preference. Secondly, as could be seen, higher verbal intelligence is connected to the preference of higher intelligence on human faces regardless the sex of the face. The former relationship is valid as well as in the opposite direction, participants differ in their score of extraversion according to their preference of intelligence on human faces (again, regardless of the sex of the evaluated face). We can consider this results as support for the assortative mating strategy.

The finding that higher verbal intelligence of assessor is connected to the preference of higher intelligence on composite faces can be explained by different possibilities. The mechanism behind the fact why more intelligent assessors consider the highest intelligence composite face as the most attractive can be due to the fact, that highly intelligent participants' environment is occupied more by intelligent people. The social environment of intelligent people includes the faces with visible intelligent features on their faces, which creates a higher frequency of intelligence facial features around the assessor. Since it is a known fact that the nature or hereditary component in intelligence causes greater variation than does environment (Leahy, 1935; Bouchard & McGue, 1981; Deary, Spinath, & Bates, 2006), it can be assumed that highly intelligent people are surrounded by intelligent facial features from their childhood (from their family members) which can form a "norm" for evaluation other faces.

In this research, we have been interested also in the question, if a higher intelligence of the observer enables him/her to make more adequate judgements about the presumed intelligence of a composite face. Research studies have found mixed results on this specific topic. Some have confirmed a strong correlation between the observer's intelligence and perceived intelligence from a face (Borkenau & Liebler, 1995). Others have confirmed mentioned relationship only in men (Kleisner, Chvatalova, & Flegr, 2014). Our result doesn't support any of this conclusions, as we found out a higher verbal intelligence of the assessor facilitates the correct evaluation of intelligence from facial features only while judging a female face, not while judging the male face. This result is similar to the conclusion by Démuthová (2016), regardless the sex of the assessor - men and women did not recognizably differ between middle and high intelligent male face.

At the end, we can conclude that most of our findings are in favour of the evolutionary assumptions. The presence of differences among participants in their preference of faces shows us that people don't generally have an identical idea of an attractive person. Our results show that not only the desired personality (Little et al, 2006b) influences the perception of the attractiveness of a person of the opposite sex, rather, people are in their attractiveness evaluations influenced by their own characteristics (in this case extraversion and verbal intelligence). We cautiously conclude that the characteristics of participants can play a role in assessing the attractiveness of the face.

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