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The Role of Intelligence in Female Face Perception: Verbal Not Visual-Spatial IQ Intervenes with Intelligence Assessment in Face Composites

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Abstract

Study concentrates on the relation between intelligence (verbal and visual-spatial) of the observers and their ability to detect the intelligence from the face features of the others. It also studies the connection of intelligence of the observer with their preferences for attractiveness of the female faces, which differ in the levels of visible intelligence. Subjects involved in the study were 415 Slovaks (all of European race; 284 (68,4%) females) with the mean age 21,39 years (st. dev=6,254). Results show, that people who detect the intelligence from the female face composite better, score higher in intelligence than the others. Also, subject who assigned as the prettiest the face which was the most intelligent scored significantly higher in intelligence as those who were attracted more by middle and low intelligent faces. An important finding is, that observed connection applies for verbal intelligence only and not for visual-spatial intelligence.

Keywords: Face perception, attractiveness, verbal intelligence, visual-spatial intelligence

Introduction

Human face recognition and assessment is important capability within the human functioning in social systems. For the survival of the individual it is essential to be able to discriminate whether the face of the other person belongs to the man or woman, whether it expresses friendly or hostile attitudes, whether it looks healthy or stricken, and also, whether it reflects specific features as dominance, femininity, or intelligence... or whether it is “just” attractive for the observer. All these abilities have been formed during the development of our mankind and play critical roles in our life.

Evolutionary biologists explain the meaning and importance of specific features visible in female faces. E.g. attractive face is characteristic with young appearance (Cunningham, 1986; Ebner, 2008), symmetry (Perrett et al., 1999; Zaidel & Hessamian, 2010), presence of sexually dimorphic features (Rhodes, Chan, Zebrowitz, & Simmons, 2003), positive emotions (O'Doherty et al., 2003; Golle, Mast, & Lobmaier, 2014; Sun et al., 2015), average (Langlois, Roggman, & Musselman, 1994) or with healthy skin (Fink, Bunse, Matts, and D´Emiliano 2012) while all these variables are proved to be the common signs of "good genes" (Gangestad, 1993; Scheib, Gangestad, & Thornhill, 1999) and overall health of the beholder.

One of the features that may play an important role in human face assessment is intelligence. It can be studied from two points of view - first of all as a feature present and visible in the human face and carrying (evolutionary) important information and second – the feature that helps the observer to detect the important information from the human face.

Intelligence has been connected with the complex ideal of human beauty long times ago (Etcoff, 1999). The outcomes of current researches show, that attractive people of both sex are considered to be more intelligent than unattractive people (Zebrowitz, Hall, Murphy, & Rhodes, 2002; Kazanawa, 2011). This tendency is not just the simple outcome of generally known "halo effect" (Colman, 2001), but reflect the deep evolutionary principles of mate selection (Miller & Todd, 1998). It is not just that attractive faces are considered to be also intelligent, but the faces which show the signs of intelligence are perceived as more attractive, too (Talamas, Mavor, and Perrett, 2016). Similarly as with physical attractiveness, intelligence is suggested to indicate "good genes" (Miller, 2000; Prokosch, Yeo, & Miller, 2005). From this perspective people should consider the intelligent faces as more attractive than the ones lacking the signs of intelligence. However, the outcomes of researches are not always clear – e.g. Perrett (2010) states, that men are typical with the lack of interest in intelligence and, also, smarter-looking women are considered to be more masculine, which lowers their femininity and therefore also their attractiveness. Besides the connection between intelligence and attractiveness, there is a question, whether we are capable to detect the level of intelligence from the face. Past researches show, that people tend not only to consider the intelligent face as attractive, but that they are also able to judge intelligence from the facial qualities of persons (Zebrowitz, Hall, Murphy, & Rhodes, 2002; Anderson, 1921). Again, the sex of the observer influences the accuracy of intelligence assessment (Murphy, Hall, & Colvin, 2003; Murphy, 2007). Demuthova (2016) shows that intelligent female face is universally (in men and women, too) considered as the prettiest. Also, men and women are similarly accurate when assigning the most intelligent female

face. Differences were found in male face assessment; both – men and women - did not clearly differ between middle and high intelligent male face in attractiveness, nor in the intelligence assessment task.

Studying the connection of the intelligence present in the human face together with the intelligence of the observer is quite rare. Higher intelligence (mainly "social intelligence" – see Sternberg, 2002) enables the person to recognize and response adequately to social cues and make better social judgments (Taylor, 1990) about the others. Therefore we assume that people with higher intelligence should make more accurate assessments about the intelligence of perceived face. There have been few attempts to evaluate this ability – e.g. Borkenau & Liebler (1995) proved the strong correlation between the measured intelligence of the observer and perceived intelligence from the facial qualities. Kleisner, Chvatalova, and Flegr (2014) found out, that both men and women were able to accurately evaluate the intelligence of men by viewing facial photographs, however, the perceived intelligence correlated with IQ of the observer only in men.

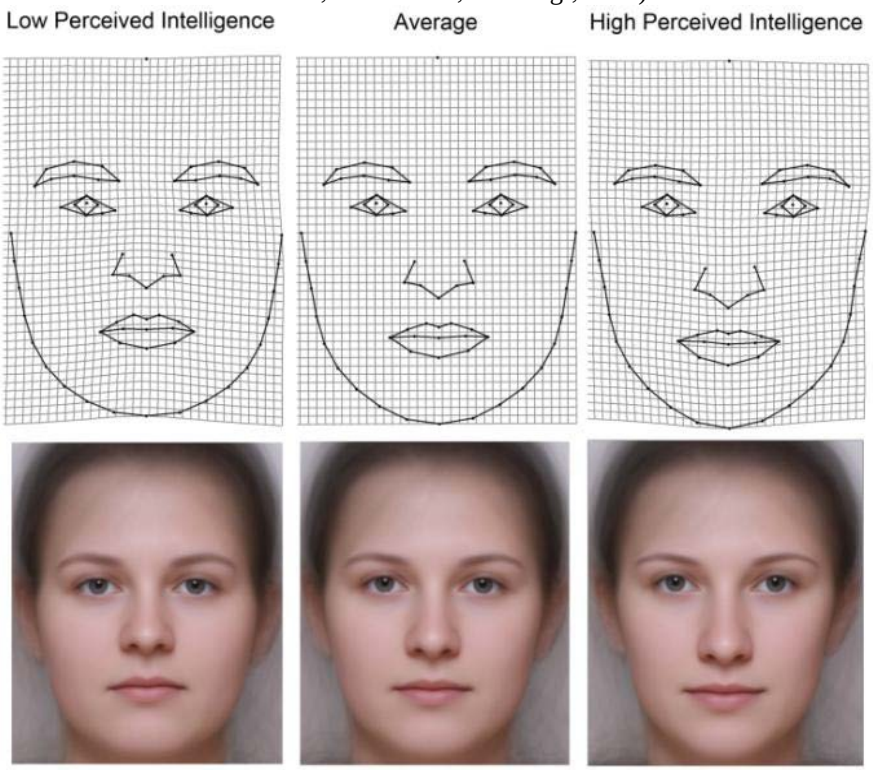
Although a number of studies have examined the perception and assessment of intelligence, they resulted in different outcomes. First of all, it seems it is important do differ whether the male, or female face is being assessed (Perrett, 2010). Also, the sex of the evaluator is the important variable (Murphy, 2007). The concept of "social intelligence" (Sternberg, 2002) points to a possibility, that different results of mentioned researches might be caused not only by the sex of the observer, or by the sex of the perceived and assessed face, but also by the "type" of the intelligence involved in the assessment. Neuroscientists stress the fact that within the face recognition the process of face perception is complicated and very complex and involves various and different brain regions (Haxby & Gobbini, 2011). None of mentioned studies described the specific role of the type of intelligence which may be important for intelligence evaluation. The specific aim of this research is to study the role of the type of the intelligence (verbal and visual-spatial) within the process of attractiveness and intelligence evaluation of the female face composites, which vary in the level of intelligence present in facial cues.

Methods

Female face assessment

For the evaluation of intelligence in female face, the stimuli made by Kleisner, Charvatova, and Flegr (2014) were used (see picture 1).

Picture 1 Female face composites representing three levels of intelligence (Source: Kleisner, Charvatova, and Flegr, 2014)



Three photographs of female faces represented three levels of intelligence. Basically, ―faces that garner a higher attribution of intelligence show overall dilations in the area between the eyes and mouth. Further grid deformations cover the distance between the eyebrows, an enlargement at the root of the nose, and a markedly prolonged nose. The area of the chin tends to be constricted. By contrast, faces with a lower attribution of intelligence are characterized by constriction in the area between the mouth and eyes, eyebrows closer to each other, the base of the nose is rather narrowed, the nose is shorter, and the area of the chin is strongly dilated― (Kleisner, Charvatova, and Flegr, 2014).

We used the pictures (not schematic drawings) of three female face composites within the larger test battery. Subjects were asked to choose the prettiest face from these three female faces and after several other tasks (various evaluations of several other faces, questionnaires, etc.) three faces appeared again with the task to choose the most intelligent one. The amount of inserted tasks between these two evaluations avoided possible comparison with previous rating.

Intelligence measurement

For the measurement of verbal and visual-spatial intelligence two subtests of the "Test of the level of mental abilities" (Vonkomer, 1992) has been used. The test has been standardized to Slovak population. The subtest for measuring the verbal abilities consisted of twenty items. The task was to create a word from the group of letters (different for each task) using all of them. The first letter from the word was set and the word had to be a noun in singular and basic form (Slovak language has declinations in nouns). Each task had only one correct solution.

The subtest for measuring the visual-spatial abilities consisted of twenty items, too. Each task consisted of drawing of 3-dimensional prism made of bricks from which some missed. Participant had to state how many bricks missed to fulfil the whole prism and to write down this number.

Subjects

Subjects were 415 participants, from which 284 (68,4%) were female. The mean age of the sample was 21,39 years (st. dev=6,254; with minimum 18 and maximum 67 years of age). Subjects reached the mean score in verbal IQ test=15,3 points which represents 6-7 sten (according to Slovak norms). In visual-spatial IQ the mean score of the sample was 12,09 (sten 5). IQ in the sample was not distributed normally (for verbal IQ the significance in Kolmogorov-Smirnov test=0,000; for visual-spatial IQ the significance in Kolmogorov-Smirnov test=0,000). Nonparametric tests (Kruskal-Wallis) were used for further analysis within the SPSS statistical program, version 17.0. All participants declared their belonging to European race.

Results

First part of evaluation focused on the connection between the intelligence (verbal and visual-spatial) of the observers and their preferences to choose the most attractive face from the female face composites representing three levels of intelligence. From the Table 1 it is obvious, that the majority of subjects (N=313; 75,4%) considered the most attractive the most intelligent female face.

The Kruskal-Wallis test detected the significant differences (asymp. sig=0,000) in the levels of verbal intelligence between those, who assigned as the prettiest face the composite with low, middle, and high level of intelligence. The analysis was made on whole sample as there were no statistically significant differences between males and females in the way how they rated the attractiveness of female face composites.

From the results it is obvious that the higher the level of verbal intelligence of the observer is, the bigger is the probability of assigning the

more intelligent female face composite as the most attractive. However, this rule does not apply for the visual-spatial intelligence of the observer; table 1 shows, that there were no significant differences (asymp. sig.=0,311) in visual-spatial intelligence of the subjects who rated the attractiveness of three female face composites. Moreover, subjects who assigned the middle intelligent face as the most attractive scored in visual-spatial IQ on the highest level. Also, participants who assigned the most intelligent face as the most attractive reached the lowest levels of visual-spatial intelligence. Therefore there is not the clear tendency for the connection between visual-spatial intelligence and attractiveness preference for female faces distinctive in intelligence as it was within verbal intelligence. From these results it seems, that the preference of intelligent female faces and assigning them as the most attractive is connected with the verbal intelligence not with the visual-spatial one.

Table 1 The Kruskal-Wallis test of the differences in verbal and visual-spatial intelligence of the observers according to the choice for the most attractive female face composite

The level of intelligence in perceived female face composite	Choices for the prettiest female face	The level of verbal intelligence of the evaluator			The level of visual-spatial intelligence of the evaluator		
	N	Mean rank	Chi-sq.	Asymp. Sig.	Mean rank	Chi-sq.	Asymp. Sig.
Low	16	163,18	16,690	,000	206,34	2,336	,311
Middle	86	187,16			225,44		
High	313	221,38			203,29		
Total	415						

The second question is, whether the ability to detect intelligence from the female face composites is connected with the type of the intelligence of the observer. Table 2 shows the results of Kruskal-Wallis test of the differences in verbal and visual-spatial intelligence of the observers according to the choice for the most intelligent female face composite. Again, there were no statistically significant differences between males and females in the way how they rated the intelligence of female face composites.

Table 2 The Kruskal-Wallis test of the differences in verbal and visual-spatial intelligence of the observers according to the choice for the most intelligent female face composites

The level of intelligence present in perceived female face composite	Choices for the most intelligent female face	The level of verbal intelligence of the evaluator			The level of visual-spatial intelligence of the evaluator		
	N	Mean rank	Chi-sq.	Asymp. Sig.	Mean rank	Chi-sq.	Asymp. Sig.
Low	51	148,79	25,343	,000	225,57	1,340	,512
Middle	131	188,85			207,82		
High	233	231,78			204,26		

In this case participants were asked not to assign the most attractive face but to state, which face is the most intelligent by their opinion. The

results were very similar to the outcomes of the previous task (see table 2) – there were significant (asymp. sig=0,000) differences in the levels of intelligence of the observers who detected the intelligence of the female face correctly (N=233) and those who assigned as the most intelligent the least (N=51) or middle (N=131) intelligent faces. The more accurate the evaluation was the higher level of the intelligence the assessor gained. However, this applies for the verbal intelligence only; there were no significant differences (asymp. sig.=0,512) spotted in visual-spatial intelligence.

From the results it is obvious, that the intelligent female face (composite) was generally considered as pretty, and that people in majority did not have a problem to detect right the intelligence from the female face. When the differences in intelligence of the observer/evaluator were studied, it seems that intelligence of the observer intervenes with the way how the person rates the female face. The more intelligent the observer was, the better (more accurate) his/her estimate of intelligence of the female face composite was. Also, the most intelligent faces were also the prettiest for the participant with the highest intelligence scores. An important finding is, that these relations apply only for the verbal, but not visual-spatial intelligence of the evaluator.

Discussion

The interesting finding was that the better the estimation of intelligence of the female face is, the higher intelligence gained the observers in the IQ tests. The possible explanation lies in the core of the definition of intelligence. As it is (besides many other capabilities) also the ability to make the right social judgments (Taylor, 1990), its presence and higher levels could favour in face assessment those who score higher. Intelligence therefore enables to make proper estimations and also to assess more correctly the presence of intelligence in human faces. Within this explanation another component may play role. Recent studies brought new knowledge connecting the assessment of intelligence and attractiveness. E.g. Talamas, Mavor, and Perrett (2016) showed that participants who scored better (higher) on intelligence tasks were more likely to endorse the perceived attractiveness-intelligence correlation. Within these means, it is possible, that more intelligent evaluators did not really differ between the attractiveness task (to point to the most attractive female face) and assessment task (to point to the most intelligent task), because they see them as strongly connected.

It is also possible, that some evaluators did not really assess the intelligence within the intelligence task, but for another reason. They could be – unconsciously – influenced more by the overall attractiveness of the intelligent face. This can also happen easily in cases of evaluators for which

the task about assessing the level of intelligence of the face is not clear enough (e.g. they do not have clear criteria of the assessment of intelligence from the face). In such cases e.g. Kahneman (2011) stresses, that people often simplify the difficult tasks and replace them – unconsciously – by easier ones. Therefore, it would be beneficial to study whether people really assigned the same faces as pretty and as intelligent, too. However, from the results presented, it is obvious, that this possibility cannot explain all cases – the numbers of choices in the attractiveness task and in the assessment task do differ. However, it can play still some role in some cases.

The similar mechanism can also explain the fact why more intelligent observers assigned the most intelligent face as the prettiest as well as why they were more successful in the right intelligence estimation as those who were less intelligent. We may assume that people, who are more intelligent, meet the intelligent people more often and operate in environment with the presence of more intelligent people, too. All these people then possess the faces in which the "intelligence" features are present. This creates an environment in which the face with intelligent features is very frequent (including the face of the assessor). As Kant (2005) states, our "ideal" prototype of attractive human face is influenced by the "types" of faces we meet during our life. The result is that it is possible that for more intelligent people the intelligent face becomes a reference (or a prototype) for evaluation of other faces. It also creates the specific sensitivity towards face-specific (in this case intelligence) features. Already Zhuang, Zhang, Xu, and Hu (2014) found out that males who evaluated faces were extremely good in differentiation of self-similar facial cues. This may point to a possibility, that when subjects evaluate the intelligence in faces, they assess as more intelligent and s more attractive the face which is (in its features) more similar to their own face features and they also make more precise distinction between the various levels of intelligence features present in observed faces.

However, all these arguments discuss only the relationship between the level of intelligence and the assessment of human face, not the interesting finding, that the connection between and the assessment was present in case of verbal intelligence, but not in the case of visual-spatial intelligence. Neuroscientists within the face recognition stress the fact that the process of face perception is complicated and very complex. Face recognition of familiar faces and face identification differ from the process of face perception focused on extracting the meaning of facial expressions as well as from the process of eyes gaze perception (Haxby and Gobbini, 2011). Functional neuroimaging has revealed a core set of brain areas that are activated during face perception, including fusiform face area – FFA (McCarthy, Puce, Gore, & Allison, 1997), the occipital face area – OFA (Gauthier et al., 2000), and posterior superior temporal sulcus – fSTS (Puce

et al., 1998) all located in occipitotemporal cortex (Haxby, Hoffman, and Gobbini, 2000) showing the right hemisphere dominance (Kanwisher and Barton, 2011). Except them, also many other brain regions are involved within the extended system as e. g. amygdala (emotions), medial prefrontal cortex (personal traits) or inferior parietal and frontal operculum (facial expression) (Haxby and Gobbini, 2011). These information become very interesting from the point of view of researches which, on the other hand, concentrate on differences between brain regions involved when using verbal and non-verbal (e.g. visual-spatial) intelligence (Wallace et al., 2010). Further research concentrated on neuroimaging may bring more information on possible connections between the activities within the brain functioning in verbal tasks and human face assessment.

Our research brought new questions and inspirations for the further research. As it was already written, the examination of the ways how people evaluate faces when assessing them in attractiveness and when estimating the intelligence would be interesting together with analysis of similarities and differences of these two processes. Certainly, the evaluation of male face composites would be enriching, too. Also, it seems that verbal intelligence helps to assess the human faces in intelligence assessment. It is questionable, whether it influences also some other assessment – e.g. presence of some personality features in the human face, and whether these are again connected with verbal, or some other "type" of intelligence. Finally, our study rises stimuli for brain research concentrating on areas involved in different tasks concerning the face recognition and areas active within different "types" of intelligence tasks.

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