

## WHEN LEFT IS RIGHT: THE PREFERENCE FOR THE LEFT SIDE OF THE FACE IN ATTRACTIVENESS AND EVALUATION RATINGS

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**Abstract:** The dominance of the right hemisphere in facial perception emerges as a presumption of a preference for the left part of visual field over the right. The outcomes of several studies are not consistent in verifying this hypothesis. This research tested the preference for the left visual field using male and female mirror images of the right half of the face and the left half of the face in two tasks – an attractiveness assessment and in a specialized facial-evaluation task – by both male and female evaluators. Subjects (N = 2,267) were Slovak females (N = 1,356; 59.8%) and males with a mean age of 24.01 years. The Chi-Square Test showed a strong, statistically significant (sig. = 0.000) preference for the perception of the left half of a human face in both tasks; in both males and female evaluators. This tendency was the most prevalent in the female face composites and in the attractiveness assessment.

**Keywords:** Visual field, dominance, face perception, hemisphere.

### 1 Introduction

Facial perception is considered to be a special type of visual perception for various reasons. Facial perception, unlike the perception of other “non-facial” objects, shows the signs of an inborn characteristic (Maguinness and Newell, 2014), the processing style used for recognizing faces is unique, as it is not present when we perceive other objects and, from numerous studies, it also seems, that there are face-specific neural representations of facial perception (McKone and Robbins, 2014).

Within the uniqueness of the process of facial perception, several brain regions involved in this activity have been identified. The first cases that stressed the specificity of facial perception were connected with prosopagnostic patients, who did not show any sign of damage within visual perception, except in face recognition. One of the first well documented cases comes from 1947 by Bodamer (Ellis and Florence, 1990) and turns attention towards the fusiform gyrus region. Further studies revealed that the most specific forms of prosopagnosia are due to lesions of the right posterior network including the fusiform face area and the occipital face area, whereas face identification defects are mainly observed within left temporal-occipital lesions (Gainotti and Marra, 2011).

Except for wide research that considered the areas of the brain specifically involved in facial perception – e.g. occipital face area – OFA (Pitcher, Walsh, and Duchaine, 2011), fusiform face area – FFA (Fairhill and Ishai, 2007), superior temporal sulcus – STS (Pitcher, Walsh, and Duchaine, 2014), intraparietal sulcus – IPS (Hoffman and Haxby, 2000), auditory cortex (Campbell, 2014), limbic system and amygdala (Williams and Mattingley, 2004; Pitcher, Shrutí, Rauth, and Ungerleider, 2017), or anterior temporal lobe (Kriegeskorte, Formisano, Soger, and Goebe, 2007) studies opened the question of lateralization of functions connected with facial perception. Generally, there is a tendency to stress the importance of the right hemisphere (De Renzi, Perani, Carlesimo, Silveri, and Fazio, 1994; Burt and Perrett, 1997; Yovel, Tambini, and Brandman, 2008). From brain trauma case studies it has emerged that the consequences of lesions were more evident if the right hemisphere was damaged (De Renzi, Perani, Carlesimo, Silveri, and Fazio, 1994) affecting e.g. specific processes of configural features perception (Abbott, Wijerante, Hughes, Perre, and Lindell, 2014). This has been followed by studies in which the importance of the left and right visual fields were compared (Franklin and Adams, 2010) or studies on left-left vs. right-right facial symmetry (Nicholls, Wolfgang, Clode, and Lindell, 2002; Chen, Liu, and Fu, 2007).

During facial perception, each hemisphere processes the information that is presented in the contralateral visual field. That means that information from the left visual field is sent to the right hemisphere, whereas information from the right visual field is sent initially to the left hemisphere (Jung et al., 2017). The outcomes of the studies mentioned are not consistent with the initial presumption, that the left visual field and right hemisphere are generally more important for facial perception than the right visual field and left hemisphere. E.g. faces rated in a sexual context gave a better prediction of attractiveness rating for faces shown in the left rather than the right visual field, whereas faces rated in a nonsexual context gave a better prediction of attractiveness of faces shown in the right rather than the left visual field (Franklin and Adams, 2010). Different results favouring the right or left hemisphere also emerged from the study by Zhai and colleagues, where they found that the perception of a father’s face involves the left inferior parietal lobule and left middle frontal gyrus/right middle frontal gyrus/right inferior frontal gyrus, whereas the perception of a mother’s face involves the right inferior parietal lobe and frontal network (Zhai, Yu, Zhang, Chen, and Jia, 2016).

Another type of study emerged from interest in the perfect symmetry of the face. From an evolutionary point of view, facial symmetry (as well as symmetry of the overall organism) is considered an indicator of developmental stability (Simmons, Rhodes, Peters, and Koehlerb, 2004). Symmetry deviations are then the result of the failure of an organism to cope with various adverse environmental (e.g. climate, pollution, malnutrition, parasitism) or genetic (inbreeding, mutation, etc.) factors (Moller and Anders, 1997). Since these qualities may be hereditary, a preference for symmetry in human faces may have been favoured by natural selection (Penton-Voak and Perrett, 2000) and has been proven to be considered as attractive (Scheib, Gangestad, and Thornhill, 1999; Jones, DeBruine, and Little, 2007; Little, Jones, DeBruine, and Feinberg, 2008). As a consequence, the more symmetrical a face the higher the attractiveness rating should be.

An attempt to verify this presumption brought a new research area focused on the judgement of the attractiveness of faces which have been made using mirror images of the left or right face sections and thus considered to be perfectly symmetrical. From the point of view of symmetry and thus the level of attractiveness, there should be no difference in judgements for left-left or right-right facial composites as they are both perfectly symmetrical. However, results show, that the attractiveness ratings differ according to the section (left, or right) from which the mirror image was made (Butler and Harvey, 2005; Parente and Tommasi, 2008) with a preference for the left side of the face. Again, these findings are not universal; there are also different results depending on the specifics of the judgements – e.g. in the observation of emotions, the left-left facial composite over the right-right composite was assigned with greater importance (Nicholls, Wolfgang, Clode, and Lindell, 2002; Chen, Liu, and Fu, 2007). On the other hand, Zaidel and Cohen (2005) did not reveal any significant differences between left-left and right-right composites in attractiveness assessments. In another study Zaidel with colleagues, found that subjects significantly rated right-right composites of ordinary women’s faces as being more attractive than left-left, whereas men’s right-right versus left-left was not significantly different (Zaidel, Chen, and German, 1995).

### 2 Problem

From the mentioned results and numerous other studies, it seems that the preference for right hemisphere and left visual field in facial perception is not uniform in all cases. First of all, the results may vary according to the type of evaluation task connected to facial perception (e.g. attractiveness evaluation vs. emotional expressiveness). Also, they could differ according to

the familiarity of the face (mother vs. father vs. unknown person), situational context in which the face is presented (sexual vs. nonsexual context), and on the sex of the observer (man vs. woman) as well as the sex of the facial composite (female vs. male). Therefore, we designed research on a large sample (over 2.5 thousand) of men and women, which required various evaluations of male and female facial composites using the right of left part of the face in order to determine whether:

- the subjects prefer the left or right half of the face as represented by mirrored face symmetrical composites made from either the left (left-face symmetrical composite) or right half of the face (right-face symmetrical composite) in attractiveness rating;
- there is any difference in the preference for left- or right-face symmetrical composites according to the sex of the facial composite and the sex of the evaluator in attractiveness rating;
- the subjects prefer the left or right half of the face in the evaluation task;
- the subjects that rely on the left half of the face in the evaluation task also prefer the left-face symmetrical composite within the attractiveness rating (and vice versa: subjects that rely on the right half of the face in evaluation task also prefer the right-face symmetrical composite within the attractiveness rating).

### 3 Procedure and Methods

The participants took part in the research voluntarily. After a short exposition of the main ideas of the research and after granting oral consent they continued by completing a battery of questionnaires, tests and sets of questions and tasks. Only the main area of research was disclosed to the participants, otherwise they were blind to the aims of the specific tasks and questions.

#### 3.1 Preference for Left- or Right-Face Symmetrical Composites in the Rating of Attractiveness

To determine the preference for either left- or right-face symmetry in the attractiveness rating, four facial composites were used – two female faces and two male faces (Fig. 1 and 2).

Fig. 1: Female face composites made as a mirror picture from the left half of the photograph of the original female face (left picture) and the right half of the original face (right picture) (Jebreil, 2015).

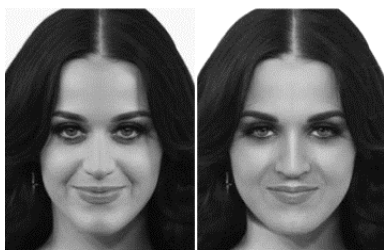


Fig. 2: Male face composites made as a mirror picture from the right half of the photograph of the original male face (left picture) and the left half of the original face (right picture) (Beaird, 2009).



Two female face composites were made with mirror images of the left or right face sections of the original face. The left section is the left half of the picture, as seen by the observer (the right half of the face of person who has been photographed). The original face was not included in the battery. Similarly, two male composites were made and were presented in the opposite order as the female facial composites. Whereas the first of the two female pictures represented the left-left face composite and the second the right-right face composite, in males the first picture referred to the right-right mirror face composite and the second to the left-left. The aim was to avoid the “same-choice” effect, which could affect the results. The subjects were asked to choose the most attractive female and male face composite.

#### 3.2 Preference for Left or Right Half of the Face in the Evaluation Task

Along with the task of choosing which, in their opinion, was the more attractive of the two pictures, other facial composites were added into the test battery (Fig. 3).

Fig. 3: Face composites blended from male and female halves of the face (Perrett, 2010)



Subjects were asked to judge, which of the faces in Fig. 3 was the more feminine. In reality, each face is half woman and half man. The halves are subtly blended across the midline so that the observer does not notice the join. The first (left) face composite is blended from the left male and right female half of the face, whereas the second (right) face composite is made from the left female and right male half of the faces. The two facial composites are therefore the same except that they are mirror reflections (Perrett, 2010). This task reveals which half of the face the subject preferred for when making decisions on human faces.

#### 3.3 Age and Sex of Evaluators

Data on age and sex were entered into the test battery by participants. Age was stated in years. Participants had to choose between the options: “male”/“female”.

### 4 Subjects

Subjects enrolled in the research on a voluntary basis. Out of 2,512 participants, 245 (9.75%) were excluded from further evaluation due to incomplete or incorrectly completed questionnaires. The final sample (N = 2,267) consisted of Slovak females (N = 1,356; 59.8%) and males. The mean age of the sample was 24.01 years with a minimum of 17 and a maximum of 72.

### 5 Results

#### 5.1 General Preference for Left- or Right-Face Symmetrical Composites in the Rating of Attractiveness

Generally, our sample preferred the left-face symmetrical composite over the right-face symmetrical composite when rating attractiveness. When assessing the female face composite, 1,907 subjects (84.1 %) preferred the left-face symmetrical composite over the right-face symmetrical composite (N = 360). Similar results were gained for the male face assessment: 1,612 (71.1%) of subjects preferred the left-face symmetrical composite over the right-face symmetrical composite (N = 655;

28.9%). These preferences are statistically significant in both cases; a Chi-Square Test for the equality of distributions of choice for left- and right-face symmetrical composites showed, that there are statistically significant differences in these distributions in both the female (sig. = 0.000) and male facial composites (sig = 0.000) favouring the left-face symmetrical composite (Table 1).

Tab. 1: Chi-Square Test For Attractiveness Rating (All Participants)

Symmetric. composite	Observed N	Expected N	Residual	Chi-sq.	Sig.
♀ Left	1,907	1,133.5	773.5	1055.68	0.000
♀ Right	360	1,133.5	-773.5		
♂ Left	1,612	1,133.5	478.5	403.99	0.000
♂ Right	655	1,133.5	-478.5		

### 5.1 Sex Differences in the Preference for Left- or Right-Face Symmetrical Composite in the Rating of Attractiveness

When attention was placed on the differences in facial attractiveness preference for left- or right-face symmetrical composites according to the sex of the observer (evaluator), the results showed that both sexes – male and female – evaluated the attractiveness of the left- and right-face symmetrical composites similarly. Male (Table 2) and also female (Table 3) observers, to a statistically significantly degree, preferred the left-face symmetrical composite to the right-face symmetrical composite in female facial composites as well as in male facial composites.

Tab. 2: Chi-Square Test For Attractiveness Rating (Male Participants)

Symmetric. composite	Observed N	Expected N	Residual	Chi-sq.	Sig.
♀ Left	762	455.5	306.5	412.48	0.000
♀ Right	149	455.5	-306.5		
♂ Left	672	455.5	171.5	129.14	0.000
♂ Right	284	455.5	-171.5		

Tab. 3: Chi-Square Test For Attractiveness Rating (Female Participants)

Symmetric. composite	Observed N	Expected N	Residual	Chi-sq.	Sig.
♀ Left	1,145	678.0	467.0	643.33	0.000
♀ Right	211	678.0	467.0		
♂ Left	985	678.0	307.0	278.02	0.000
♂ Right	371	678.0	-307.0		

### 5.2 General Preference for the Left or Right Half of the Face in the Evaluation Task

The next task which required an assignment of which face from two facial composites was more feminine, in reality detected, whether the subjects use the left or right half of the face composite for the evaluation process (in this case the evaluation of the presence of sexually dimorphic features in the face). Similar to the rating of attractiveness, subjects relied on the left half of the facial composite significantly more than on the right half (Table 4).

Tab. 4: Chi-Square Test For Evaluation Task (All Participants)

Evaluation according to the:	Observed N	Expected N	Residual	Chi-sq.	Sig.
Left half	1,333	1,133.5	199.5	70.225	0.000
Right half	934	1,133.5	-199.5		

The tendency to prefer the left half of the face in the evaluation task is not as strong as in the rating of attractiveness; however it is still statistically dominant. It applies to the whole sample of tested participants as well to both women and men individually. The Chi-Square Test for the equality of distribution of choice for the left and right half of the face calculated for female

participants showed a statistically significant (sig. = 0.000; Chi. sq. = 62.879) preference for the left half of the face (N = 824) over the right half (N = 532). Similar results were also gained in the Chi-Square Test for male participants – they also preferred the left half of the face (N = 509) over the right half (N = 402). Even though the preference for the left half of the face in the evaluation task was not so prevalent in the male participants as the female, it was statistically significant (sig. = 0.000, Chi-sq. = 12.568).

### 5.3 Consistency in the Rating of Attractiveness and the Evaluation Tasks

Another question is, whether the subjects who rely on the left half of the face in the evaluation task also prefer the left-face symmetrical composite within the attractiveness rating (and vice versa: subjects that rely on the right half of the face in the evaluation task also prefer the right-face symmetrical composite within the attractiveness rating). Table 5 shows, that the majority (N = 962) of participants who rely on the left half of the face in the evaluation task also considered the male left-face symmetrical composite more attractive. The rest (N = 371) found the male right-face symmetrical composite more attractive.

Tab. 5: Frequency of Choices in the Attractiveness Rating and the Evaluation Task (All Participants)

The preference of symmetrical face composite in attractiveness rating according to left-/right side symmetry	The choice of the half of the face in the evaluation task	
	Left half	Right half
Female composites	Left Right	1,119 788
Male composites	Left Right	214 146
		962 650
		371 284

On the contrary, from those participants who rely on the right half of the face in the valuation task only 284 also considered the right-face male symmetrical composite as more attractive. The majority (N = 650) assigned the left-face male symmetrical composite as the more attractive. It therefore seems, that the tendency to evaluate the left-face male symmetrical composite as more attractive than the right-face male symmetrical composite is stronger than the preference for the left half of the face in the evaluation task. However, both tendencies – in the rating of attractiveness and the evaluation task – favour the left half of the face over the right half. These tendencies are even stronger with the female face symmetrical composites. From 1,333 participants who rely on the left half of the face in the evaluation task 1,119 participants considered the left-face female symmetrical composite as more attractive and only 214, the left-face female symmetrical composite. Again, a large portion (N = 788) of participants who rely on the right half of the face in the evaluation task, considered the left-face female symmetrical composite to be more attractive.

## 6 Discussion

The research showed a strong, statistically significant preference for the left half over the right half of human face in the rating of attractiveness as well as in the specialized evaluation task. These results correspond with research that has proved the superiority of the left visual field (Jung et al., 2017) and right brain hemisphere (Burt and Perrett, 1997; Yovel, Tambini, and Brandman, 2008) in the perception of faces. However, further intensive research focused on various tasks connected with facial perception could clarify the problem more precisely. Neuroscientists stress the fact that the process of facial perception is complicated and varies according to the task. E.g. face recognition of familiar faces and face identification differ from the process of facial perception focused on extracting the meaning of facial expressions as well as from the process of eye gaze perception (Haxby and Gobbini, 2014).

The preference for the left half of the face within facial perception was strongest in the attractiveness rating and in the rating of the female face symmetrical composite. An attractiveness rating is based on an evolutionary derived set of

criteria that provide the best choice of mate. Therefore, we consider our results consistent with the findings of Franklin and Adams (2010), who proved, that faces rated in a sexual context better predicted the attractiveness ratings of faces shown in the left than the right visual field. The reason for the stronger left face preference in female face composites compared to male face composites might be seen in the evolutionary importance of beauty that is detected in facial features. Whereas a female may follow various mating strategies (e.g. long-term mating, short-term opportunistic copulations, extra-pair copulations or serial mating (Gangestad and Simpson, 2000; Greiling and Buss, 2000; Buss, 2006) and therefore their preference for the presence of male attractiveness may not be their primary criteria, males predominantly prefer attractive (and thus healthy – Thornhill and Grammer, 1999) female faces. In this area, we suggest further research leading to an investigation of the possible influence of actual mating strategies on left or right half face preference in ratings.

However, the tendency to choose the left part of the face in the attractiveness rating was also proven to be statistically significant for male faces. Even though it was not as strong as for female faces, it was still statistically significant. This also applies to both female and male participants (evaluators). Therefore, we can evaluate the preference for the left half of the face in attractiveness ratings as universal. Except for the monitoring of the effect of the sex of the evaluator/evaluated face on the preference for the right or left part of the face, the handedness of the face also seems to be a factor, which can also determine choices. According to the results of previous research (e.g., Perrett, 2010; Frässle, Krach, Paulus, and Jansen, 2016) we suggest this area of investigation is very important.

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