

Rembrandt's Portraits: Approach or Avoid?

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Researchers have postulated that humans' more intense emotions are controlled by their right brain hemisphere [1,2]; functional magnetic resonance imaging (fMRI) evidence confirms that the right brain is specialized for social and emotional functions [3]. This results in the predominant display of emotional expression on the left side of the face, which researchers have demonstrated repeatedly [4,5]. Yet the seminal work of R.J. Davidson has spearheaded

the hypothesis that the left and right cerebral hemispheres govern approach and avoidance behavior, respectively [6–10]. If this is the case, in humans the lower two-thirds of the right side of the face (which includes the lower eyelid, nose, cheek, lips and neck), because of innervations by the left hemisphere, should display positive emotions, while the comparable part of the left side of the face (innervated by the right hemisphere) should

ABSTRACT

In 74% of Rembrandt's female portraits, the subject's left cheek faces the viewer. However, this occurs in only 26% of his male portraits. This asymmetry is consistent with viewers' assessment of Rembrandt's left-cheeked male portraits as preferably avoided, which may indicate that aggressive dominance is governed by the contralateral right hemisphere of the brain, while the rating of left-cheeked female faces as preferably approached may indicate sexual attractiveness. Rembrandt's exposed-cheek gender difference suggests that both sexual selection and dominance are governed by the more emotionally oriented right cerebral hemisphere.

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Fig. 1. (a) Rembrandt van Rijn, *A Man in Oriental Costume*, 1633 (left-facing male). (b) Rembrandt van Rijn, *Self-Portrait*, 1657 (right-facing male). (c) Rembrandt van Rijn, *Saskia*, c. 1634 (left-facing female). (d) Rembrandt van Rijn, *A Woman in Fanciful Costume* (right-facing female).



a.



b.



c.



d.

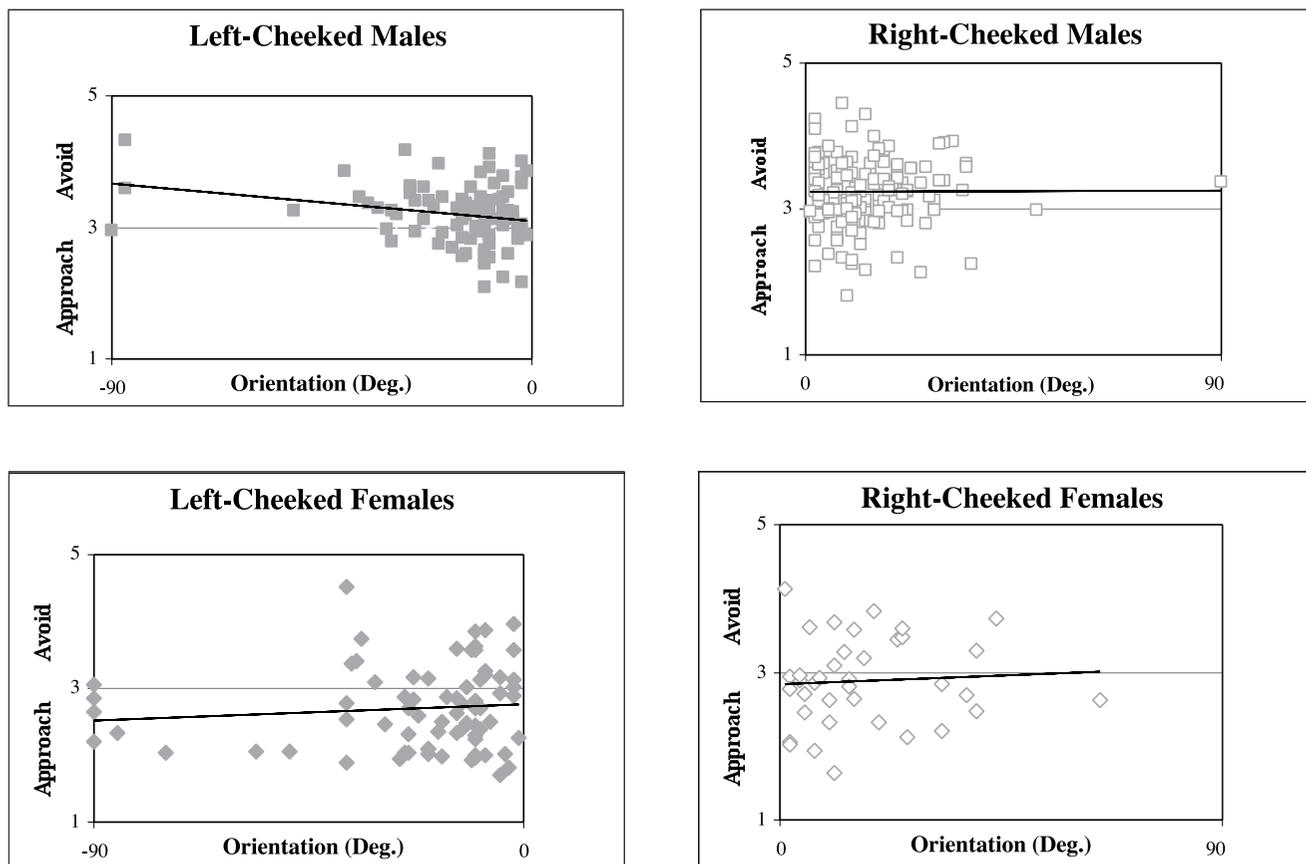


Fig. 2. Histograms of the distribution of each of 373 Rembrandt portrait angles as a function of the subjects' ratings of approach/avoidance (collapsed over 73 subjects' ratings). (© James A. Schirillo) Upper left (closed squares): left-cheeked males (-90° to -1° orientation); upper right (open squares): right-cheeked males ($+1^{\circ}$ to $+90^{\circ}$ orientation); lower left (closed diamonds): left-cheeked females (-90° to -1° orientation); lower right (open diamonds): right-cheeked females ($+1^{\circ}$ to $+90^{\circ}$ orientation). Linear regressions are plotted for each graph: 2 (not shown) indicates a rating of "mildly approach," 3 indicates "neutral," and 4 (not shown) indicates "mildly avoid."

display negative emotions [11]. It has now been shown that, while the two sides of the face show different emotions (i.e. the left side negative emotions and the right side positive emotions), the preponderance of emotional expression is on the left side of the face [12,13]. This makes it particularly interesting to better understand just why emotions are differentially displayed.

We show here that these facial asymmetries with regard to display of emotions produce approach/avoidance responses in viewers of portraits painted by Rembrandt, depending on the gender of the person being portrayed. This is significant because in 74% of Rembrandt's female portraits the left cheek faces the viewer (Fig. 1c), while, conversely, the right cheek faces the viewer in 74% of his male portraits (Fig. 1b). Our finding suggests that the social constraints exhibited during facial displays are asymmetrical by portrait gender, resulting in differential approach/avoidance behavior.

Seventy-three undergraduates (23 males; age range 18–21 years) with no

prior experience with experimental research performed the experiment in exchange for introductory psychology course credit. Their age, gender and handedness did not contribute significantly to the results. All procedures were approved by the Institutional Review Board of Wake Forest University and were performed in accordance with the ethical standards established by the 1964 Declaration of Helsinki.

Three hundred seventy-three of Rembrandt's portraits [14] were scanned in black and white, then cropped to include as little background/clothing information as possible and scaled to a uniform size. Given that subjects' viewing distance from the screen on which the portraits were displayed varied, the images ranged from $\sim 11^{\circ} \times 11^{\circ}$ to $\sim 17^{\circ} \times 17^{\circ}$ of visual angle. Each image was displayed for 5 seconds, and responses were recorded manually during a 3-second blank gray screen inter-trial interval. All the pictures were viewed as Rembrandt painted them (i.e. not mirror reversed). The subjects' task was to rate whether they would

rather approach or avoid each individual portrait on a 5-point scale, with 1 indicating a rating of "strongly approach," 2 "mildly approach," 3 "neutral," 4 "mildly avoid," and 5 "strongly avoid." The angle at which each portrait faced the viewer was measured with -90° and $+90^{\circ}$ equaling full-left and full-right profile, respectively, while 0° represented full-frontal view. The histograms in Fig. 2 show the distribution of each portrait angle (i.e. orientation) as a function of the subjects' ratings of approach/avoidance. The measurements of head orientation were made by rotating a sculpted head pivoted on a protractor with a stick pointing straight out from its nose to match the angle of each portrait as seen by the viewer. The angle was determined by reading the location of the stick from the protractor located beneath the base of the three-dimensional head; that is, the angle displayed on the protractor was used as the angle of orientation for each portrait.

As illustrated in Fig. 3, subjects reported they would rather approach Rem-

brandt's *female* portraits (-45° striped bars; $M = 2.79$; Figs 1c and 1d) and avoid his *male* portraits ($+45^\circ$ striped bars, $M = 3.22$; $t(72) = 8.97$, $p = .001$; Figs 1a and 1b). Along with Fig. 2, Fig. 3 shows that subjects were more likely to approach *left-cheeked* females ($M = 2.70$, $R = 0.10$; Fig. 1c) than *right-cheeked* females ($M = 2.88$, $R = 0.07$; Fig. 1d); ($t(72) = 7.50$, $p = .001$).

This finding is reflected in Fig. 2's linear regression, where, as portraits of females' exposed cheeks ranged from the most rightward ($+90^\circ$) to the most leftward (-90°) profile, they were rated increasingly more likely to be approached (Fig. 2, lower graphs). This is remarkable in that male portraits produced the exact opposite pattern of results. The most leftward-facing male portraits (-90° , Fig. 1a) were rated most likely to be avoided ($R = 0.23$) and became increasingly less likely to be avoided as they shifted rightward ($+90^\circ$, Fig. 1b) ($R = 0.02$) (Fig. 2, upper graphs).

The 19 portraits with 0° lateralization were excluded from this plot, allowing separate linear fits to Fig. 2's left- and right-cheek portraits. Figure 3's stippled bars report these few cases. Surprisingly, subjects reported they would prefer to avoid the female portraits that directly face the viewer, in stark contrast to preferences for approaching females when their faces were turned in either direc-

tion ($M = 3.32$, $t(72) = 10.58$, $p = .001$). Males facing forward were also judged as likely to be avoided ($M = 3.14$), although there were no statistical differences between any of the three male groups.

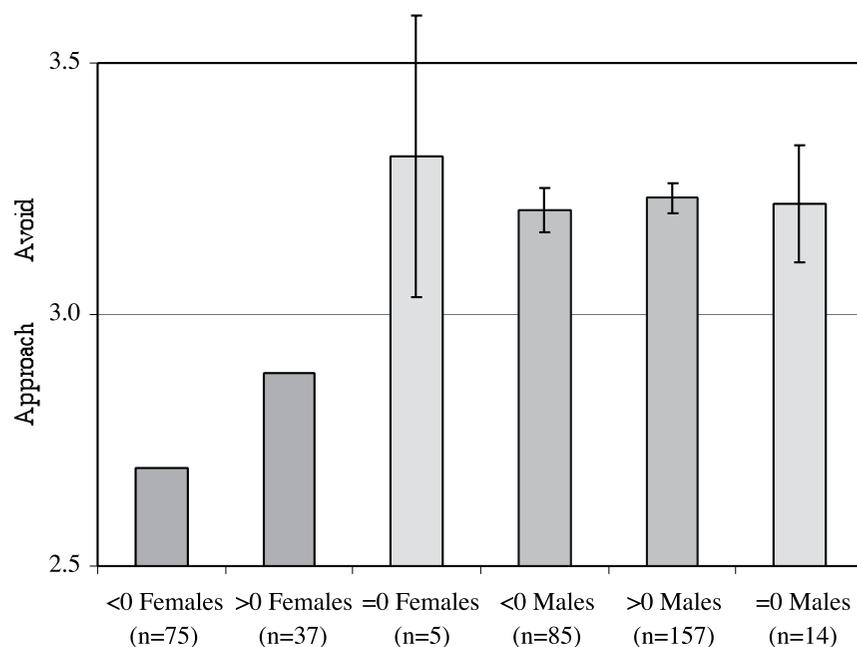
Staring directly at a person is often considered threatening (and is certainly used by animals to threaten). This might explain why females painted facing directly frontward were considered by the raters as likely to be avoided, just as were men facing frontward. It may be argued that women, when looking at a man, often look sidelong to appear demure and are often painted that way, or are painted looking away from the viewer. This is what we found in Rembrandt's portraits, for example. The eyes were turned, on average, 90° toward the viewer's left for all the portraits painted facing directly front (i.e. both male and female portraits). All the front-facing female eyes were turned up or down by only a few degrees, and only one male's eyes were turned significantly downward (by -26°). Thus, none of the front-facing individuals stared directly at the viewer. On average, for the other paintings (with turned heads), the eyes were turned 4.15° toward the viewers left and 3.47° downward. Thus, it was more likely that heads that were turned had their eyes turned to almost face the viewer (yet this did not produce the aversion one might expect).

Thus, Rembrandt's extreme left-facing portraits provide the best cue of females to approach (Fig. 1c) and males to avoid (Fig. 1a), providing strong supporting evidence that the right hemisphere (innervating the left side of the face) evokes more intense human emotions, and more importantly is a sexually selective attribute. These findings may account for why a comprehensive survey of 1,474 portraits (of both genders) painted in Western Europe from the 16th to the 20th century revealed that $\sim 60\%$ were posed with their left cheeks facing the viewer. More importantly, within this collection $\sim 68\%$ of the women were painted with their left cheeks (their approachable sides) exposed, while only $\sim 56\%$ of the men exposed their left cheeks (their avoidable side) [15].

Our findings dovetail nicely with those of Nicholls et al. [16], who argue that the overrepresentation of exposed left-cheek portraits is determined by the sitters' intention to display their left cheek, because it is controlled by the more emotive right cerebral hemisphere. The fact that portraits of male Royal Society scientists show no leftward bias [17] suggests a motivation to conceal negative emotions, while our data goes further to imply they may have desired to ensure that they displayed more neutral emotional states (e.g. in Fig. 3, 3.0 is neutral).

Other theories for a left-cheek bias (especially in females) include cultural norms, maternal imprinting resulting from a baby's tendency to see a mother's left cheek, as mothers typically hold their babies in their left arm, and the right-handedness of most artists, making left cheeks easier to paint (when painting the left cheek with one's right hand, the hand does not cover prominent facial features) [18]. Our findings suggest that hemispheric emotional lateralization is represented in the human facial musculature, and that these features differ along the stereotypic gender roles of approaching females for sex, nurturance and friendship and avoiding aggression in males. This difference may provide a rationale for why Rembrandt lateralized his portraits by gender. As an artist, Rembrandt perhaps instinctively saw these differences in the facial musculature, although he certainly did not know about hemispheric asymmetry. This theory agrees with a related argument by Humphrey and McManus [19] that Rembrandt's pictures of kin are more likely to show the right cheek (e.g. Fig. 1b is a self-portrait), irrespective of whether they are male or female kin. However, we claim that this asymmetry also reflects

Fig. 3. Approach/avoid ratings for 373 Rembrandt portraits separated by orientation of the cheek facing the viewer, where $< 0^\circ$ and $> 0^\circ$ indicate the degree to which the poser's left or right cheek is exposed, respectively, while $= 0^\circ$ represents the poser facing straight ahead. (© James A. Schirillo) -45° and $+45^\circ$ striped bars indicate females and males, respectively, while stippled bars are used for both genders. A rating of 2 indicates a rating of "mildly approach," 3 indicates "neutral," and 4 indicates "mildly avoid." Error bars represent Standard Error of the Mean (SEM), and n = the number of paintings in each category.



males' preferable (i.e. approachable) side, which is their nonaggressive side, and females' less preferable (and also less sexual) side.

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