Mona Lisa's smiles in Leonardo's drawings

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INTRODUCTION

Emotions play a fundamental role in everyday life; every thought, attitude or action has an emotional counterpart. This project investigates the emotions expressed in Leonardo da Vinci’s (1503-6) work. The adherence to visual realism expressed by Renaissance and post-Renaissance artists is an asset to the study of emotional expression. Visual arts, in general, are an ideal archive where every aspect of the visual world has been represented. Artists have initiated visual illusions in their works long before scientists understood the mechanisms behind them. This is particularly true of Leonardo who was interested not only in the analysis of physical phenomena but also in our perceptions of these phenomena (Kemp, 2011). The past few years have witnessed a growing interest in the understanding of emotions through micro-expressions, which are contractions of muscles tied to underlying emotions. Interestingly, five centuries ago, Leonardo pioneered the study of micro-expressions by introducing the concepts of “muti mentalis” and “accident mentalis” which can be translated as the representation of transient, dynamic mental and emotional states. Paintings can effectively communicate emotions in a dynamic way as shown by Actis-Grosso & Zavagno (2015). The Mona Lisa (1503-6) is probably the best example of how ambiguous micro-expressions can generate a dynamic mental and emotional state in the portrayed subjects.

In her account of the Mona Lisa, Livingstone (2002) provides a basis for the ambiguous nature of the smile by pointing out that “Perhaps it is the difference in her [the Mona Lisa's] expression carried by her high and low spatial frequency ranges [sic], that produces her smile’s elusive quality” (Livingstone, 2002, p. 1359). Similarly, Kemp & Cotte (2016) noted that the emotional expression of another portrait attributed to Leonardo - La Bella Principessa (1495-6) - is also ambiguous and “subtle to an inexpressible degree” (p. 26).

The ‘uncatchable’ smile

Soranzo & Newberry (2015;2016) found that, similarly to the Mona Lisa, the Bella Principessa presents a spatial frequency dependent illusion that they termed the ‘uncatchable smile’ because when the viewer’s face is viewed from far away, the mouth is perceived as slanting upward in a smile-like fashion, but as the face is viewed from close-up, it appears to take a downward turn, making the spatial frequency, leads to an increase in the perceived level of contentment (figure 2).

The perceptual change of expression in both Mona Lisa and Bella Principessa might arise from a majority use of the sfumato technique. Sfumato can be described in terms of smoothly graded passages from one colour to another, from one tonality to another, from one brightness to another, or even the combination of the aforementioned cases. Leonardo himself defined sfumato as “without lines or borders, in the manner of smoke or beyond the focus plane” thus trying to convey the idea of visually indistinguishable passages from one colour to another. Both Mona Lisa and Bella Principessa include extensive areas of sfumato and they were both made using oil. The aim of the current project is to test the hypothesis that Leonardo included a similar illusion of direction in other artworks type, even where oil was not used, in particular in his drawings. We considered La Scapigliata (1508) and another Female Head (1470-76). These two drawings were chosen because the position of the represented head is slightly different: Side view for the Scapigliata and Front view for the Female Head. The experimental conditions intended to examine if the viewing distance affects the ratings of how happy the portrayed subjects appear.

PROCEDURE

In a mixed measure design, each participant viewed both the drawings from either 0.5 cm or from 8 meters away. The participants were asked to stand in front of the-covered drawings. Prior to the unveiling of the drawings, the participants were shown 4 magnitudes of estimation modules. These modules would represent what was meant by a rating happiness in a scale from 1 to 7. For a rating of 1 the participants were shown an unhappy face and were told that this represented that the drawing was not smiling at all and even then shown a rating of 7 which was represented by a very happy smiley face. After this the drawings were unveiled and the participants were asked to rate from 1 to 7 the level of happiness attributed to Leonardo - La Bella Principessa (1495-6). Similarly, Kemp & Cotte (2016) noted that the emotional expression of another portrait attributed to Leonardo - La Bella Principessa (1495-6) - is also ambiguous and “subtle to an inexpressible degree” (p. 26).

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dimensions: 3370.8x2384.3

text:

Figure 3: The area around the mouth is responsible for the ‘uncatchable smile’ illusion (figure 3).

It seems that the area around the Prinvesta’s mouth is the main responsible for the ‘uncatchable smile’ illusion (figure 3).

Figure 2: Increasing the level of Gaussian Blur increases the perceived level of Contentment (figure 2).

RESULTS AND DISCUSSION

A mixed two-ways ANOVA highlighted a significant difference between both Distance and View independent variables [F (1, 30) = 26.19, p < 0.001, $\eta^2 = 0.47$] and $F_{(1, 37.5)} = 53.16, p < 0.001, \eta^2 = 0.64$, respectively. The interaction between the two variables was not significant (p > 0.11). Figure 5 plots of the results. The results confirm the presence of the illusion of happiness in these Leonardo’s drawings: from far away the portrayed subjects appeared significantly happier than from close up. Furthermore, it seems that the effect is stronger in the Full Face condition. The results support the hypothesis that Leonardo trained this illusory effect before representing it in the most famous Mona Lisa and that it is present also in artworks adopting artistic techniques different from sfumato. From viewing angle positioning has a similar effect to low spatial frequencies. At the question remains whether Leonardo da Vinci intended this illusion. Either way it can be argued that the ambiguity created adds to the portrait’s allure. It is possible that the front facing Mona Lisa may have been developed from techniques whilst Leonardo da Vinci used when creating drawings.

REFERENCES


