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# Mona Lisa Looks at us. And Smiles

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**Abstract**: A contrasting empirical evaluation will be provided with the aim of suggesting that the reductionist approach results in experiments that are not reproducible.

**Keywords:** reproducible; representation; meaning; anticipation

This short paper is a Reply to Horstman and Loth (2019). The authors condensed their article in the title: *The Mona Lisa Illusion—Scientists See Her Looking at Them Though She Isn't*. The following are the arguments for questioning both the so-called experiment and the conclusion:

1. The authors do not provide any proof that the perception of the original is the same or in some ways equivalent to the perception of photographs or scans of the original.

2. The authors do not provide  proof that size and/or zoom have any impact on the perception.

3. The authors do not even attempt to justify the implicit assumption that characteristics of the subjects (in particular age, culture, gender) affect the outcome. Cognitive bias is of no concern to them.

4. The authors do not distinguish between static and dynamic gaze.

5 Relevant references, in particular regarding the role of meaning are missing.

To keep the Reply short: This is yet another example of an experiment that cannot be replicated. In what follows I shall address each of these aspects. A contrasting empirical evaluation will be provided with the aim of suggesting that the reductionist approach—reduction of dynamic to

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static visual perception is only one part of the larger subject—results in experiments that are not reproducible.

*The issue of representation*

When the real (the *La Joconde* portrait in the Louvre) is replaced by a representation (photo, scanned image, a painted copy, a print, etc.), two aspects ought to be observed: 1) no representation is complete; 2) in the process of transposing the original to a substitute medium, noise is introduced, and the image itself is changed. While the authors provide details regarding the scanned image (7,479 px by 11,146 px) and the monitor used (a 35 x 26 cm computer screen), they fail to assess the way in which the scanning and display technology affected the characteristics of the image as it was transposed from oil painting to a display on a computer. They use a re-presentation of the original, never questioning the impact of the technology on the representation. It is evident that the scanned image displayed on a computer monitor (at 66 cm distance from the viewer) affords a perception different from that of the original, or at least from what generations of researchers (art historians, psychologists, vision scientists, etc.) have examined before formulating the Mona Lisa gaze effect.

To represent is to present again. Figure 1 consists of the reproduction of the original—the framed painting hanging on a wall in the Louvre—and a small subset of reproductions: books about the painting, music inspired by Mona Lisa, the original name (La Gioconda), the name under which it is displayed (*La Joconde*), the experiment, the various zoomed edited variations mentioned in the article, etc.

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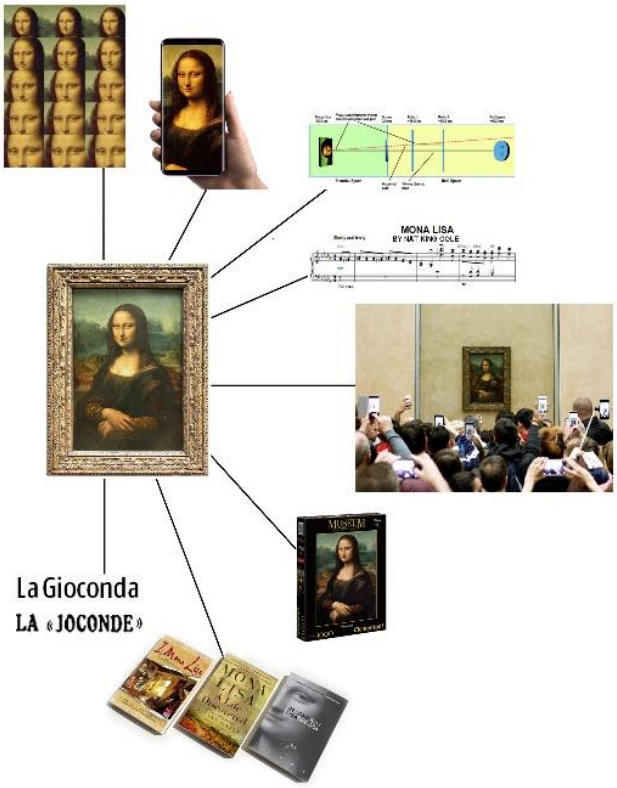


Figure 1. Possible representations of Mona Lisa—open-ended list of possibilities—including the experimental setting used in order to measure whether La Gioconda (the name is also a representation) is gazing at the viewer.

This is an open-ended selection, never to be complete, as no representation can ever fully reproduce whatever it represents. Each representation is pragmatically defined: the purpose pursued informs the choice.

*The sample*

The gaze-metric—cleverly referenced by a simple carpenter's rule—of an image on a computer monitor might be independent of the cognitive profile of the 24 participants, but it does not afford any insight into dynamic perception. The perceptual characteristics of the 24 subjects, never mind their cultural profiles, are left out. The authors have not proven that this sample is relevant or that the characteristics of the subjects are relevant. As I learned, they expect the reader to carry this research out for them.

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The authors wanted to test the gaze in order to prove a point. It is obvious from their test setting that they worked with a reductionist model of gaze perception (see Garner & Hecht, 2007). Elements specific to the problem at hand are left out, in particular the head position of the viewers and their vision characteristics. It is because of this failure to ground the problem subjected to their experiment that the authors do not understand that viewing an image on a computer screen from a distance of 66 cm is different from the perception of a painting hanging in a museum. Viewers get closer in order to discern details, or seek distance (of an individually based action) in order to realize the holistic nature of the image they examine. No one has ever claimed that reproductions of Mona Lisa look at us. The fact that the experiment left out "non-perceptual information including beliefs" is a reduction within the mechanistic view they adopted. Direction of gaze and artificially defined line of gaze are not the same.

Among the missing representations are quite a number of attempts to explain why the Mona Lisa's eyes follow you (e.g., David Munger's entry from March 2005 in the Cognitive Daily). The references to those who have dealt with the subject are incomplete (Reibe, DiPaola, Enns, 2009; Quiroga & Pedreira, 2011). Missing are the attempts of art historians to explain gaze--in particular to define the characteristics of linear perspective--and the aesthetic considerations. Within information aesthetics (as limiting as it was), attempts were made at quantifying a variety of characteristics of aesthetic artifacts (Nadin, 2009; Nake, 2012).

*Empirical findings using an interactive setting*

On David Munger's closed blogsite (2005), an academic reference of anecdotal significance, Madison G. (2009; cf. Munger, 2005) came up with an idea that I decided to pursue: Mona Lisa as a high-resolution screen saver. One hundred subjects, from ages 14 to 86, of course with

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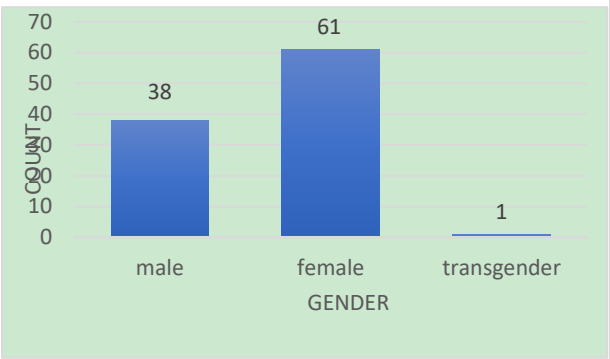
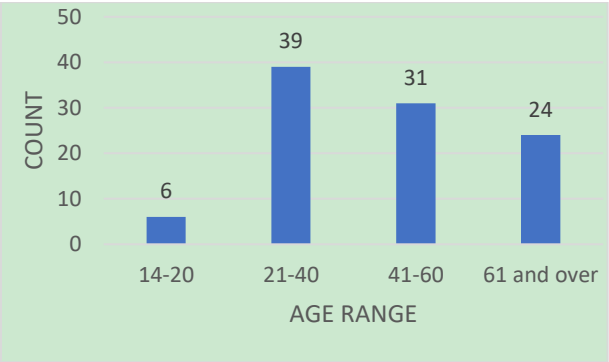
variable vision characteristics (from 20/20 vision to corrected vision) looked at the Mona Lisa scaled-down image.



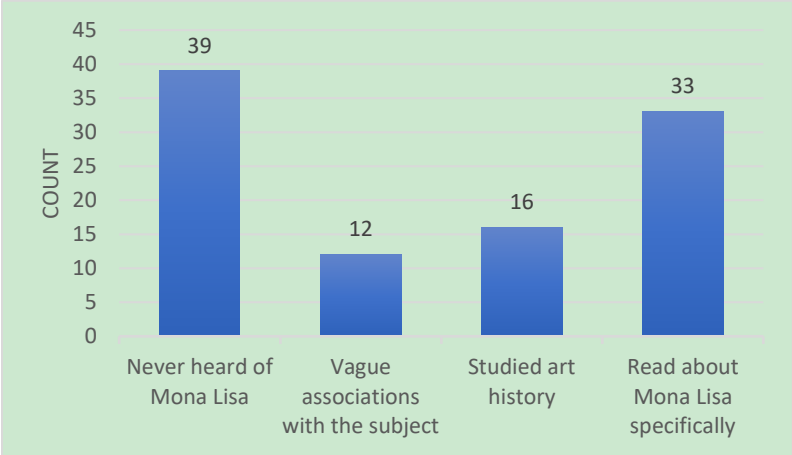




Table 1, 2, 3: Profile of subjects in the empirical study

The distance was between inches and an arm length. The question was: What strikes you while examining this image on the iPhone? Without any exception, the subjects noticed a) her smile; b) that her eyes followed them. Of course, this is empirical observation, not an experiment subject to replication. And, of course, it only proves that the image reproduced on the small monitor looks at whoever looks at her. Exactly what Leonardo tried to achieve.

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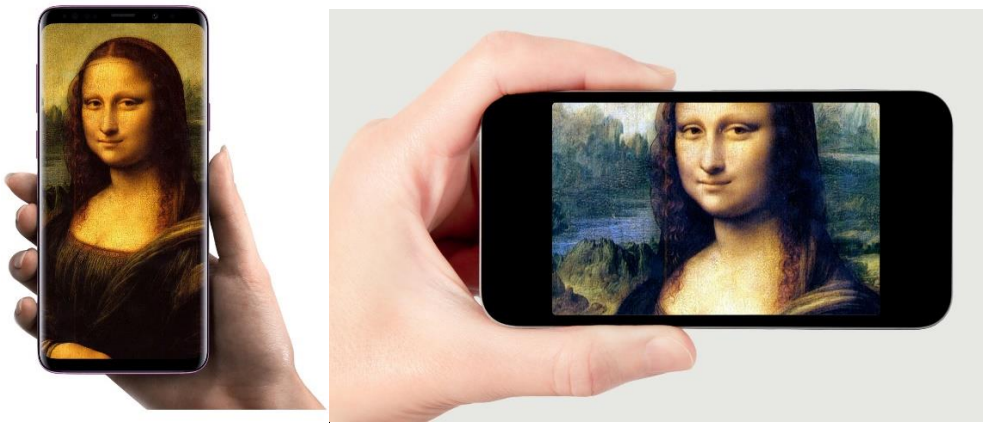

Figure 2. Mona Lisa on an iPhone. Her smile and her gaze noticed by all subjects.

*The nature of the experiment*

In this short discussion of a confusing experiment (to which I contrasted empirical findings), I left out more systematic notes on what an experiment is and what the limitations of experiments are (for details, see Nadin, 2018). Perception is a subject by necessity associated with the living. If artificial perception (as in vision systems, for example) is the object, experiments that replicate can be carried out, provided that the phase space describing the machine supposed to perform the function is well defined. You can prove (like in mathematics or physics) some hypothesis. For living processes, the phase space changes as the perception is influenced by the response (for example, motoric expression—moving closer to the image, squinting, etc.). Since the subject under discussion is visual perception within the knowledge domain of aesthetics, let us provide some details.

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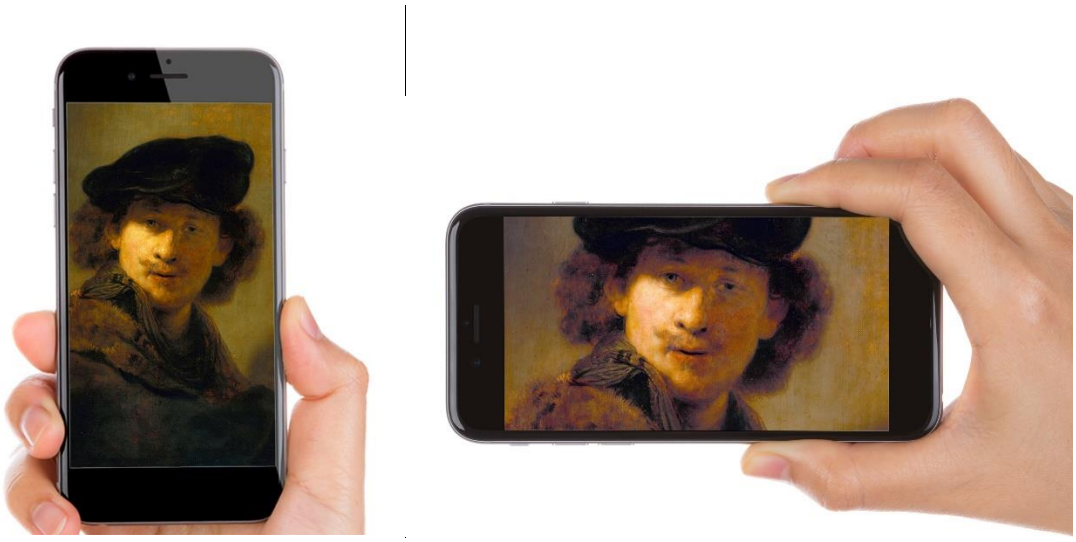

Figure 3. Viewer gaze is informed by various levels of detail. It is the outcome of an aesthetics based on a sophisticated understanding of perspective as dynamic and not static.

The phase space describing visual perception can be reduced, as the authors did in their experiment—the gaze is reduced from its 3D space (the gazing cone) to a 2D situation, but only at the price of losing meaning, which is the definitory aesthetic characteristic. Gaze and gaze direction are two different things. Figure 3 exemplifies the understanding of perspective as a dynamic expression (Rembrandt's *Self-Portrait in a Cap and Fur-trimmed Cloak***).** Mona Lisa's portrait is an expression of the same. The experiment considered is marginally appropriate for describing the syntactic level—data from the reading of the carpenter's rule that references the deviation from the line of gaze—but entirely misses the semantic aspect of dynamic visual perception. Not to mention the pragmatics: why *should* Mona Lisa's gaze follow us? What counts is the meaning. The phase space of the variables involved in the gaze perception changes continuously in perception in the museum. A variety of interactions among viewers (including dialogs or listening to a guide) contributes to this dynamic.

*The reason to write this Letter*

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The empirical case does not demonstrate more than the so-called experiment that Mona Lisa is gazing at us. But it recovers the most important aspect: the interactive nature of aesthetic artifacts. It shows that the reductionist approach—reduce everything to the data of measurement of physical characteristics—is scientifically questionable. The aesthetic domain, scientifically defined by Baumgarten (1750) is that of meaning. Aesthetic artifacts are perceived through interactive experiences. Meaning is complementary to quantitative assessments of aesthetic expression (and of life in general).

The reason to write this Letter is twofold: to bring to the attention of the scientific community the obligation to define experiments that preserve the coherence of the perspective; to avoid placing in the public domain false conclusions. After the publication of the so-called *Mona Lisa Illusion,* the media rushed to tell the public that it was wrong seeing that she was gazing at us, instead of saying that a scan of the painting seen on a computer monitor from 66 cm distance was not confirming the expectation. In the spirit of Popper's legacy (1983), we falsified the experiment in a simple empirical setting. When science disseminates questionable results (think about the major subjects of the day: evolution, climate change, etc.), and, even worse, uninformed conclusions (in disregard of aesthetics) it does a disservice to society and to its own credibility.

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aspects of anticipatory expression. Without Dr. Asma Naz's cooperation, the preparation of this short text would have been close to impossible.

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