How portraits turned their eyes upon us: Visual preferences and demographic change in cultural evolution

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ARTICLE INFO
Article history:
Initial receipt 12 November 2012
Final revision received 31 January 2013

Keywords:
Direct eye-gaze
Art history
Renaissance
Cultural selection
Cognitive attraction

ABSTRACT
It has often been suggested that innate features of the human mind could make some cultural forms more successful than others. This paper presents a case study consistent with this “cognitive attraction” hypothesis. Numerous studies show that direct eye-gaze catches the attention of adults and newborns. Adults find it more attractive. We explore one possible cultural consequence of this cognitive appeal. Among XVIIth century European portraits, direct-gaze paintings are more likely to be featured in today’s art books. In Renaissance Europe, the proportion of paintings that stare at the viewer grows gradually, strongly, and remains prevalent for centuries. A demographic analysis of this shift shows that it was due to the arrival of new generations of painters. Those artists show a preference for direct-gaze portraits as soon as they start painting, suggesting that they acquired the new style in the years of their apprenticeship. The preferences of those painters and of contemporary art critics seem consistent with the innate attentional bias that favours direct-gaze faces. The structure of the “Renaissance gaze shift” bears evidence for the importance of demographic turn-over in cultural change.

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1. Introduction

You probably have in your wallet, or on your hard disk, a representation of a human face that seems to be looking out of the picture into your eyes. This visual illusion is so common we hardly notice it. Yet its effects on our mind are far from trivial (Wollaston, 1824). As compared to a slightly averted gaze, direct eye-gaze in pictures facilitates identification and gender assignment (Macrae, Hood, Milne, Rowe, & Mason, 2002; Vuilleumier, George, Lister, Armony, & Driver, 2005). Direct eye-gaze is attention-grabbing as well. Staring faces make more potent distractors than averted-gaze faces (Conty, Gimmig, Belletier, George, & Huguet, 2010; Senju & Hasegawa, 2005). Direct-gaze faces are more arousing, as evidenced by physiological measures such as galvanic skin response (Nichols & Champness, 1971). Direct-gaze pictures of faces (even neutral faces) are rated by subjects as more “likable” or “attractive” (Conway, Jones, DeBruine, & Little, 2008; Ewing, Rhodes, & Pellicano, 2010) – but see Hietanen, Leppänen, Peltola, Linna-Aho, and Ruuhiala, (2008). Some of these effects of direct eye-gaze are probably due to innate features of our visual system. Children as young as three days old preferentially look at direct-gaze pictures of still faces (Farroni, Csibra, Simion, & Johnson, 2002). Direct eye-gaze facilitates identification in 4 months-old as it does in adults (Farroni, Massaccesi, Menon, & Johnson, 2007).

Several authors have suggested that open eyes facing the viewer were ubiquitous in various artistic traditions, given their psychological impact (Cross, 2003; Eibl-Eibesfeldt, 1988). Yet for all their cognitive appeal, direct-gaze depictions of the human face are not a universal standard, far from it. Identity documents are overwhelmingly directly-gazing (indeed that is often a legal requirement). So were Greek and Egyptian funerary portraits. Yet, in many other traditions (Indian and Japanese portraits, for instance) direct eye-gaze is hardly ever present. Most portrait traditions are constrained by rigorous (and possibly arbitrary) norms concerning the sitter’s pose. In many cases, these artistic standards can mesh with local norms governing gaze behaviour. Many cultures implicitly forbid staring in some contexts. Those norms may have an incidence on portraits, especially when they are painted for ritual purposes. Korean official portraits, for instance, came from a court society where etiquette frowned upon gazing. Asked to check that the King’s portrait was faithful, some officials remarked that they could not know: they had often been in the King’s presence, but never looked at his face (Sŏng-mi, 2008 p. 120). Thus, there is no denying that gaze direction in portrait traditions varies a lot. This paper contends, however, that in traditions where gaze direction is left free to vary, so that we find both averted and direct-gaze portraits, the latter style should enjoy more success and, over time, become the default option.

A growing body of work shows that a “cognitive attraction” drives many cases of cultural evolution (Sperber & Hirschfeld, 2004). Widespread cognitive biases appear to constrain the evolution of cultural forms, from folk tales (Norenzayan, Atran, Faulkner, &
Schaller, 2006) and urban legends (Heath, Bell, & Sternberg, 2001) to
table manners (Nichols, 2002) and religious beliefs (Boyer & Ramble,
painters exaggerate “neotenic” features in their portraits: traits like
big eyes or round faces, which make faces seem more attractive to
viewers across many cultures and from the youngest age.

If cognitive attraction played a role in the evolution of paintings, it
should contribute more to the fame of direct-gaze portraits. It
should favour, over time, a gradual replacement of averted-gaze
portraits with direct-gaze portraits. We should also be able to
identify the drivers of this evolution, and identify the kind of
mechanism that explains the change (e.g., individual learning or
demographic change). Each one of these questions asks how
cultural evolution and cognitive attraction, two phenomena that
are often studied separately, may influence one another. To answer
these questions, we used a quantitative analysis of Renaissance
portraits (Mcmamus & Humphrey, 1973; Tyler, 1998). Three studies
looked at the effect of cognitive attraction on the evolution of
direct eye-gaze from different angles. Study 1 shows that direct-
gaze portraits are cognitively attractive with today’s critics: they
are more likely to be featured in art books. Study 2 shows a
sustained shift in the Renaissance portrait traditions, favouring
direct-gaze portraits. Study 3 shows that the shift was due to the
arrival of new generations of painters, not to a change in the way
sitters posed, to a change in the style of individual painters, or to a
preservation bias.

2. Study 1: Did direct-gaze portraits become more famous
than others?

European portraiture was chosen because (unlike most portrait
traditions) it produced both averted-gaze and direct-gaze portraits. (A
similar tradition, Korean portraiture, was studied as well with similar
results. See Electronic Supplementary Materials, 1, available on the
journal’s Web site at www.ehbonline.org, and our conclusion). Our
investigation focuses on the XVth century (a period that is as well
studied as the XVth century and was much more productive).
European portraiture is a fairly recent tradition by global standards.
Single-piece (“autonomous”) portraits were rare before the XVth
century. Yet those earliest autonomous portraits also show a near
absence of direct eye-gaze. It seems that we are dealing with a
tradition where direct-gaze portraits were, at first, unknown or
excluded by the artistic standards of the time.

2.1. Material selection and coding

The portraits included in this study were single original paintings
where the painter tried to depict one other human individual’s real
appearance. This definition and the exclusion criteria it implies are
detailed in the Electronic Supplementary Materials, 2 (available on
the journal’s Web site at www.ehbonline.org). Two big Internet
databases were searched for European portraits: the JOCONDE database,
which gathers paintings from most French public museums, and the
WEB GALLERY OF ART database, which gathers paintings from the
inventories of the most important museums in the world. 671
paintings were found.

Information was collected on the sitter’s sex and notoriety. Sitters
were classified between Identified sitters, who were either named or
identified in some other way (e.g. “The artist’s mother”), and
Unidentified sitters. Identified sitters were classified into Famous
and non-Famous. Sitters possessing an entry in one of five versions of
Wikipedia (Italian, German, French, Dutch, Spanish, English) were
Famous. Sitters who had an entry devoted to their portrait, not to their
person, were not coded as Famous. (Only one sitter, Mona Lisa, could
be said to have gotten into Wikipedia only because of her portrait). For
each portrait, the national “school” of the artist (“Italy”, “France”,
“Germany”, “Netherlands”, “Spain”) was recorded.

All portraits were double-coded for gaze direction. As a first step,
the author and a second coder coded all the paintings independently
(Cohen’s Kappa = 0.896, S.E. = 0.018). Most disagreements were
solved by discussion. Persistent disagreement caused the discarding
of 15 paintings (leaving 656 paintings).

Inclusion in an illustrated art book was used as an indication of a
portrait’s current fame. Such books typically present themselves as
providing a selection of the best and most famous paintings from a
given period. Most authors provide a reproduction of at least some of
the most famous paintings of a given age (for instance, the Mona Lisa,
Raphael’s Balthazar Castiglione and Bellini’s Leonardo Loredano were
all reproduced in the majority of books). Are direct-gaze portraits in
our two corpora more likely to be reproduced in art books because
of this?

2.2. Selection of art books

Since mainstream, commercial books were needed, Web sites
amazon.fr and amazon.com were searched exhaustively for books
featuring a selection of portraits from our two traditions (see
Electronic Supplementary Materials, 3, available on the journal’s
Web site at www.ehbonline.org, for the full lists of inclusion criteria
and books). 11 books were found that fit our criteria. Many can be
described as “coffee-table books”, i.e. they were sold for their
aesthetic value at least as much as for their scientific value. The
books came from five different countries. No book provided more
than 25% of the reproductions, and most books provided more than
8%. As expected, there was a good deal of overlap between the
books: 48% of reproduced paintings were reproduced in more than
one book.

2.3. Analysis and results

A logistic regression was run using a portrait’s presence in one of
the art books as the dependent variable. Independent variables were
the painting’s date (measured in decades), the sitter’s status, the
portrait’s current fame. Such books typically present themselves as
portraying the artist’s work to the public, i.e. the audience (Mcmanus &
Humphrey, 1973; Tyler, 1998). Three studies looked at the effect of
cognitive attraction on the evolution of
direct eye-gaze from different angles. Study 1 shows that direct-
gaze portraits are cognitively attractive with today’s critics: they
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sitters posed, to a change in the style of individual painters, or to a
preservation bias.

Table 1 displays the results. The art books selection of portraits is
oriented in non-random ways. The prototype of the famous portrait is,
so to speak, a Mona Lisa: a well-identi
cated Italian woman (typically a
daughter of a powerful family or the wife of some important
bourgeois), painted in the first decades of the XVIth century. Like

<table>
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<th>Variable</th>
<th>B</th>
<th>S.E.</th>
<th>Wald d.f.</th>
<th>Sig.</th>
<th>Exp(B)</th>
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<tbody>
<tr>
<td>Gaze (direct)</td>
<td>.650</td>
<td>.239</td>
<td>7.387 1</td>
<td>.007</td>
<td>1.916</td>
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<tr>
<td>Date (in decades)</td>
<td>-.239</td>
<td>.051</td>
<td>21.774 1</td>
<td>.000</td>
<td>0.788</td>
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<tr>
<td>Notoriety</td>
<td>33.368</td>
<td>2</td>
<td>.000</td>
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<td></td>
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<tr>
<td>Identified</td>
<td>1.290</td>
<td>.247</td>
<td>27.304 1</td>
<td>.000</td>
<td>3.631</td>
</tr>
<tr>
<td>Famous</td>
<td>1.687</td>
<td>.389</td>
<td>18.788 1</td>
<td>.000</td>
<td>5.403</td>
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<tr>
<td>Area (reference: Italy)</td>
<td>7.321</td>
<td>5</td>
<td>.008</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>-.728</td>
<td>.304</td>
<td>5.720 1</td>
<td>.017</td>
<td>.483</td>
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<tr>
<td>France</td>
<td>-1.663</td>
<td>.511</td>
<td>10.579 1</td>
<td>.001</td>
<td>.190</td>
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<tr>
<td>Netherlands</td>
<td>-.673</td>
<td>.340</td>
<td>3.932 1</td>
<td>.047</td>
<td>.510</td>
</tr>
<tr>
<td>Spain</td>
<td>-.202</td>
<td>.098</td>
<td>.083 1</td>
<td>.773</td>
<td>.817</td>
</tr>
<tr>
<td>England</td>
<td>-.053</td>
<td>1.202</td>
<td>.295 1</td>
<td>.587</td>
<td>.530</td>
</tr>
<tr>
<td>Sex (woman = 1)</td>
<td>.074</td>
<td>.237</td>
<td>9.718 1</td>
<td>.002</td>
<td>2.092</td>
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<tr>
<td>Constant</td>
<td>-.044</td>
<td>.376</td>
<td>.921 1</td>
<td>.337</td>
<td>.697</td>
</tr>
</tbody>
</table>

| Omnibus model test | χ² = 78.015 | 10 | .000 |
| Hosmer–Lemeshow test | not significant (p = 0.574) | | |

Nagelkerke’s R² = 18.2%, percentage correct = 82.5%
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