Reading and writing direction effects on the aesthetic perception of photographs

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Abstract

Does the habitual reading and writing direction (RWD) affect the aesthetic appreciation of visual art? Pérez González (2012) showed that 19th century Iranian and Spanish professional photographers manifest lateral biases linked to RWD in their compositions. The present study aimed to test whether the general public shows similar biases, and under what conditions. Photographies with left-to-right (L-R) and right-to-left (R-L) directionality were selected from Pérez González's collections and presented in both the original and mirror reversed forms to Spanish (L-R readers) and Moroccan (R-L readers) participants. In Experiment 1, participants rated each picture as to how aesthetically pleasing it was. The results showed no interactions with RWD. In Experiment 2, we presented each picture and its mirror version and asked the participants to choose which one they liked better. Now, clear biases linked to RWD arose. RWD does affect aesthetic impressions of photography in the general public, but only when people are paying attention to the lateral spatial dimension of the pictures.

Keywords: aesthetics, reading and writing direction, spatial biases, left-right, photography, fluency.

Introduction

Can the aesthetic appreciation of a piece of visual art be affected by reading and writing directional habits? Many spatial dimensions are relevant to aesthetics in visual art (Gaffron, 1956), and people show clear biases on some spatial choices. A dimension which has received much empirical attention is the lateral organization of an image: its left-to-right (L-R) or (R-L) directionality. In a seminal paper, McManus and Humphrey (1973) showed that European portrait painters have more often preferred to paint the left cheek (the person turns slightly toward the left side of the viewer, what we will here call a "leftward pose") than the right cheek. Since then, it has been shown that artists, posers, and the public assign different emotional value to a leftward than a rightward pose (see McManus (2005), Suitner and McManus (2012), and Lindell, 2013, for reviews and discussions of possible mechanisms).

Different factors have been suggested as causes of lateral biases, including brain lateralization and handedness (see, e.g., Levy, 1976). One of them is reading and writing direction (RWD). As reading and writing are highly practiced skills with a very systematic directionality, it makes intuitive sense that the direction of the script should bias aesthetic lateral preferences. RWD has indeed been shown to induce lateral spatial biases that affect how people draw (Vaid, Singh, Sakhuja, & Gupta, 2002), visually explore (Abed, 1991), pay attention (Pérez, García, Valdés-Sosa, & Jaśkowski, 2011) comprehend descriptions of events (Maass & Russo, 2003) and static scenes (Román, El Fathi, & Santiago, 2013), and how they mentally represent time (Ouellet, Santiago, Israeli, & Gabay, 2010) and number (Zebian, 2005). Some studies (reviewed below) have explored RWD effects on aesthetic preferences for simple drawings and motion clips, but its effect on art creation and contemplation has not received much attention in the literature.

Most studies using simple line drawings have adopted similar strategies: one image and its mirror version are presented (either side by side or one of top of the other) and participants are asked to indicate which one they prefer. These images are presented to users of a L-R or a R-L script. Chokron and De Agostini (2000) compared drawings of objects which can move (e.g., a truck or a fish facing toward one side), static objects (e.g., a statue with an arm extended to one side), and landscapes (e.g., a beach with a salient object located on one side). They observed clear lateral preferences congruent with script direction in French and Hebrew participants, for both moving and stationary objects, but not for landscapes (see also De Agostini, Kazandjian, Cavezian, Lellouch, & Chokron, 2010, for mediating factors such as sex and handedness; Ishii, Okubo, Nicholls, & Imai, 2011, for a replication with Japanese readers; and Heath, Mahmasanni, Rouhana, & Nassif, 2005, for an exploration of spatial dimensions specific to

landscapes). Nachshon, Argaman, and Luria (1999) used only profile drawings of people (which correspond to the category of objects with potential motion) and found similar results: L-R readers preferred profiles oriented to the right, and R-L readers preferred profiles oriented leftwards. Friedrich, Harms, and Elias (2014) used drawings of objects that can move and actual clips with moving objects, and observed an overall preference for L-R directionality, which was much reduced or even null in users of R-L scripts. Movies showed stronger biases than drawings. Only one study, to our knowledge, has presented materials individually, one by one. Maass, Pagani, and Berta (2007) showed movie clips of lateral actions, and asked their participants to rate each one on three Likert scales: strength, speed, and beauty. L-R readers rated L-R actions as stronger, faster, and more beautiful than R-L actions. R-L readers showed a perfect reversal in their ratings. All in all, this literature suggests that readers of L-R and R-L scripts differ in their directional preferences when judging how aesthetically pleasing is a simple line drawing, with L-R readers showing a clear preference for drawings oriented rightwards, and R-L readers showing either a much reduced rightward bias, no bias, or the opposite leftward bias.

Only one study so far has assessed the influence of RWD on visual art. Pérez González (2012) analyzed two corpora of 19th-century studio photographs, one from Spain (where the language is written L-R) and another from Iran (where the writing is R-L). She analyzed five kinds of compositions which directionality can be ascertained: Linear orderings (a group of more than two people, often siblings, arranged by their height), Couples (one person standing and one sitting), Chairs (a single person standing and resting an arm on a chair), Tables (a single person sitting and resting one arm on a table), and Portraits (a single person portraited with no props). Her results showed clear effects of RWD on the number of photographs with a L-R and R-L directionality in each condition. The proportions of L-R and R-L Linear orderings and Couples was perfectly predicted by RWD. Chairs, Tables, and Portraits showed clear modulation by RWD together with an overall bias toward the left. These data support that professional photographers, when designing their compositions, are sensitive to the lateral spatial dimension and are affected by biases that arise in their habitual RWD.

Photography, both professional and amateur, poses many problems for the understanding of aesthetics (McManus and Stöver, 2014), but also allows opportunities for testing hypotheses (e.g., McManus, Stöver & Kim, 2011). In this study we asked whether members of the general public show similar RWD-linked lateral biases when appreciating professionally produced photographs from different cultural backgrounds? In order to answer this question, we selected an equal number of L-R and R-L Spanish and Iranian photographs from Pérez González's digitalized collections and presented them both in their original and mirror-reversed forms to young adults from Spain (users of a L-R script) and Morocco (R-L script). Participants, who were not expert photographers, were asked to report their aesthetic impressions.

Experiment 1

In Experiment 1, the photographs were presented one by one, and the participants were asked to rate them in a Likert scale as to how aesthetically pleasing the photograph was. We expected to find opposite effects in the groups: the Spanish group should prefer photographs with L-R directionality, whereas the Moroccan group should prefer R-L directionality. In order to assure a perfect match between L-R and R-L photographs in all variables that may affect their aesthetic appreciation (beauty of the characters, image quality, and so on), we did not include in the design whether the picture was original or mirror-reversed (half L-R pictures were originals and half were mirror-reversed R-L pictures). Thus, our prediction of an interaction between the habitual RWD of the participant and the directionality of the photograph in their aesthetic rating could not be attributed to factors other than the theoretically relevant ones. Trying to avoid participants to focus only on salient aspects of the pictures, such as the physical beauty of the characters, the instructions framed the study as selecting items for an exhibition of antique photographs.

Methods

Participants. Eighty university students, 40 from Spain (16 males, 3 left-handers, mean age 23.8 years) and 40 (20 males, 2 left-handed, mean age 21.6 years) from Morocco. The Spanish participants were psychology students from the University of Granada who received course credit in return for their collaboration. The Moroccan participants volunteered to participate without compensation. Most of them were university students from the National School of Business and Management or the Abdelmalek Esaadi University, both at Tangier.

Materials. Pérez González's personal collection of digitalized 19th-century Iranian and Spanish photography was used to select the materials for this study. A total of 167 pictures were selected, belonging to different types of compositions, as described below. In each type half the stimuli had L-R and the other half had R-L directionality; half were of Iranian origin, half of Spanish origin. Some composition types were further subdivided in subgroups. We aimed to have the same number of items in each cell, although this was not always possible. Because men and women differ strongly in their stereotypical agency, and Maass and Russo (2003) reported that agency interacts with RWD, we included pictures that varied in the arrangement of the sexes in those categories where it was possible.

Photographs with four different compositions were selected (see examples in Figure 1) because a) we were able to find enough examples with L-R and R-L directionality of each origin (Spanish vs. Iranian); and b) their directionality could be clearly ascertained:

1. *Linear orderings:* A group of more than two people (most often siblings) arranged by their height.

2. *Couples:* A couple, either of the same or different sex.

3. *Sittings:* Couples where one person is sitting and the other standing, also of the same or different sex. In different sex couples, either the man or the woman could be standing.

4. *Portraits*: A single person is portrayed, either a man or a woman.

The directionality of Linear orderings was established as flowing from the location of the more active component of the scene (the tallest person in Linear orderings and Couples, the standing person in Sittings), and the direction of the face in Portraits.

From the original 167 photographs, a second set was derived by mirror reversing them horizontally. Two lists were created containing only one version of each picture, such that one half of the list was in original form and the other half was mirror-reversed. Half the participants saw one list and half saw the other. All pictures were adjusted to have the same vertical size (500 pixels), while the horizontal size varied freely. They were presented centered on a 16 inches computer monitor with a grey background.

Procedure. Each group was tested in their own country by the same experimenter (S.Ch.) and using the same laptop computer. All interactions with the experimenter took place in the local native language (Spanish in Spain, and Darija, the local Arabic dialect, in Morocco).

Figure 1: Examples of photographs used in the experiments. All of them are in their original version. Upper row: Iranian pictures. Lower row: Spanish pictures. Columns from left to right: Linear orderings, Couples, Sittings, and Portraits. Specific coding of each example (from left to right and top to bottom): 1) Iran, Linear ordering, L-R; 2) Iran, Couple, R-L, Different sex; 3) Iran, Sitting, R-L, Different sex, Woman standing; 4) Iran, Portrait, L-R, Man; 5) Spain, Linear ordering, R-L; 6) Spain, Couple, L-R, Same sex, 7) Spain, Sitting, R-L, Same sex, Women; 8) Spain, Portrait, R-L, Woman.

The experiment was programmed and run using E-prime. In each session, the participant received the following oral instructions in their native language:

"Thank you for taking part in this study. Next, we will show you a series of antique photographs of people. We are preparing an exhibition about 19th-century Spanish and Iranian photographers, and we want to ask your help to select the most attractive works. There are many factors that make a photograph to be beautiful as a photograph, and while the person in the picture is part of them, the composition, organization, context, and technical aspects, all help to give some pictures a special quality that makes them particularly attractive. Remember that they are all antique pictures so please do not take too much into account the quality of the image. Follow your intuition and evaluate each picture in a scale that goes from 1 (horrible picture, I would never select it) until 9 (very beautiful, I would select it for sure). Try to use all values in the scale".

After clarifying any questions, the 167 pictures were presented, one by one in random order. In each trial, a fixation point was presented first during 500 ms, followed by the picture, and then the participant gave his or her aesthetic judgement by pronouncing aloud a number from 1 to 9. The experimenter sat behind the participant out of sight and entered the responses by means of the computer keyboard. Both the use of oral instructions as well as the response collection procedure were meant to avoid the presentation of any visual stimulus with left-right directional characteristics (such as text or numbers).

After the experimental block was finished, participants answered the Edinburgh Handedness Inventory and a final debriefing sheet which included questions about the hypotheses of the study as well as an evaluation of how much they liked and practiced photography in a 4 points scale (from 1, not aficionado at all, to 4, expert).

Design. Photograph ratings were analyzed by means of a factorial ANOVA with Country of the picture (Spain, Iran), Type of composition (Linear ordering, Couple, Sitting, Portraits), and Directionality (L-R, R-L) as within-participant factors, and RWD of the participant (L-R Spanish, R-L Arabic) as between-participant factor.

Results

As handedness may affect lateral biases in aesthetic experience (De Agostini et al., 2010), only data from right-handed participants were analyzed (which left 37 Spaniards and 38 Moroccans). Their self-rated level of expertise in photography was 1.13 (SD = 0.79, range 0-3, with only 6 participants rating themselves with a 3, and 11 with a 2). Spaniards and Moroccans did not differ on this variable ($F<1$).

The analysis revealed differences in the aesthetic ratings given to different kinds of compositions ($F(3,219)=79.78$, $p<.001$): photographs of Linear orderings were the most appreciated, followed in descending order by Couples, Sittings, and Profiles. Additionally, Spanish photographs

were preferred over Iranian photographs ($F(1,73)=149.12$, $p<.001$). There were no other main effects nor interactions (all $p>.24$). Therefore, the directionality of the photograph, the habitual RWD of the participant, and their interaction, all failed to have any influence on aesthetic ratings.

Discussion

Experiment 1 showed very clear results: RWD did not interact with photograph directionality on the aesthetic appreciation of photographs. This occurred even when the instructions emphasized that participants should pay attention to all aspects of the photograph which make it aesthetically pleasing, including its composition.

However, before concluding that RWD affects only the decisions made by professional photographers but it fails to be appreciated by the general public, we decided to test our hypothesis under conditions that facilitate paying attention to the spatial aspects of the composition, while matching the influence of any other factors: in Experiment 2 participants were asked to directly compare each photograph and its mirror-reversed version and choose which one they liked better.

Experiment 2

In this study, the same set of materials was presented, but each participant saw both the original and the mirror-reversed version of each photograph and chose the one that he or she preferred. However, we wanted to avoid presenting both pictures side by side or on top of each other. Firstly, because this may bring about rather artificial viewing conditions; and secondly, because it may induce configurational effects (such as a preference for pictures which are inward-looking versus outward-looking, pictures on upper versus lower locations, and so on) that may increase noise in the data. Therefore, we opted for presenting individually each version of each photograph, but letting the participant to switch between them at will (a technique used in a previous study of photography; McManus et al, 2012). After viewing each one of them as many times as desired, the participant would press a key to indicate his or her preference for the currently displayed picture and move on to the next pair.

If RWD interacts with the directionality of the photograph, we expected that Spanish participants would prefer the original version of L-R pictures, and the mirror-reversed version of R-L pictures, whereas Moroccan participants would show the opposite preferences.

Methods

Participants. Two new groups were drawn from the same populations as in Experiment 1: there were 40 Spanish participants (10 males, 6 left-handed, mean age 20.0 years) and 39 Moroccan participants (21 males, 5 left-handed, mean age 24.9 years). Spaniards were compensated with credit course, and Moroccans participated without compensation.

Materials. The same set of materials as in Experiment 1 was used. Each participant saw all photographs, both original and mirror-reversed.

Procedure. As in Experiment 1, Spanish participants were tested in Spain in Spanish, and Moroccan participants were tested in Morocco in Darija, using the same laptop computer (but not the same experimenter: A.F. tested Spaniards and S.Ch. tested Moroccans).

The pictures were presented in pairs formed by the original and the mirror-reversed version. Each trial started with the presentation of a single picture on the screen. The participant could then press the down-arrow key to move to the next member of the pair, and then she could press the up-arrow to return to the prior member. There were no restrictions on the number of times that the participant could switch between pictures nor any time pressure to decide. Once she felt that she knew which one was the preferred picture, and having that picture on the screen, she pressed a key (the "l" key) that was covered with a yellow sticker. The program then started the next trial.

Half the participants saw first the original version of half of the pictures and the mirror-reversed version of the other half. The remaining participants saw first the mirror-reversed version of the former set of pictures, and the original version of the latter set of pictures. The order of presentation of the pairs was randomized for each participant.

The instructions were given orally in the participant's native and local language. They informed the participant that two mirror versions of each picture would be presented, and that her task was just to choose the one she liked best. They also explained how to switch between pictures and make her choice, and remarked that there was no time pressure at all.

Design. The proportion of choice of the L-R version of each photograph (be it either original or mirror-reversed) was computed and averaged over the items in each composition category. Those proportions were submitted to an ANOVA including Country of the picture (Spain, Iran), Type of composition (Linear ordering, Couple, Sitting, Portraits), and Picture Directionality (L-R, R-L) as within-participant factors, and RWD of the participant (L-R Spanish, R-L Arabic) as between-participant factor.

Results

As in the previous study, data were only analysed from right-handed participants, of whom 34 were Spanish and 34 Moroccan. s. The main result of the ANOVA was a main effect of RWD: there was a clear difference in the proportion of L-R choices between Spaniards and Moroccans ($F(1,66)=9.61$, $p<.01$; see fig. 2). Spaniards chose the L-R version of the experimental photographs in 58.4% of cases, which was significantly above the 50% chance level ($t(33)=2.81$, $p<.01$). Moroccans chose the L-R

version on 44.1% of cases, which was not significantly below chance ($t(33)=-1.67$, $p=.10$).

RWD only interacted with Picture Directionality ($F(1,66)=4.08$, $p<.05$): Spaniards chose the L-R version of the originally L-R photographs in 3.4% more cases than the originally R-L photographs, whereas Moroccans chose the former in 3% less cases than the latter. In other words, the original directionality of the pictures modulated, slightly but significantly, the opposite directional preferences of Spaniards and Moroccans. RWD-induced lateral biases did not interact with Type of composition or Country of the picture (all $p>.11$).

The only other significant result was the interaction between Country of the picture, Picture Directionality, and Type of composition ($F(3,198)=3.19$, $p<.05$). This interaction was due to a clearer preference for the original version of L-R Iranian Linear orderings and Couples over their mirror-reversed R-L versions. Some additional effects and interactions approached reliability: the main effect of picture Directionality ($F(1,66)=2.96$, $p=.09$), and the interaction between Country and Picture Directionality ($F(1,66)=3.05$, $p=.09$). All of them were independent from the RWD of the participants, and therefore, are of no relevance to the present hypotheses.

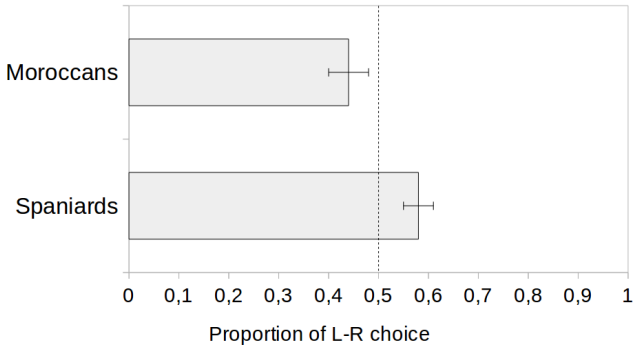

Figure 2: Average proportion of choice of the L-R version of the photographs in the groups of Spaniards (L-R readers) and Moroccans (R-L readers). Chance level (50%) is indicated by the dotted line. Error bars show Standard Error of the Mean.

Discussion

Experiment 2 asked participants to directly compare the original and mirror-reversed versions of the same photograph, and thereby forced them to pay attention to the only difference between them: their composition along the left-right axis. Under these conditions, clear directional preferences linked to RWD arose: Spaniards chose more L-R versions of the photographs than Moroccans. The L-R preference of Spaniards was significantly above the chance level, showing a proper L-R bias, whereas the Moroccans numerical preference for R-L photographs was not significantly different from 50% and should be characterized as the absence of a directional bias.

General Discussion

Do members of the general public have lateral biases in their appreciation of photography which are linked to their habitual RWD? The present study provides a positive, but qualified, answer to this question. Spanish readers do show an aesthetic preference for studio photographs which flow from left to right over those that flow from right to left. Arabic readers differ from Spanish readers in showing a statistically null lateral bias. This pattern of findings was the same for different types of compositions. The finding of L-R biases in L-R readers and null or smaller R-L biases in R-L readers is consistent with some prior studies (Friedrich et al., 2014).

However, these RWD-linked lateral biases only occurred when participants directly compared the original and mirror-reversed version of each photograph, thereby focusing their attention on this particular aspect of the composition. When they were assessing how aesthetically pleasing a single photograph is, the lateral dimension was shadowed by the many other dimensions which are relevant to the aesthetic appreciation of a piece of visual art. It is also important that although the effect was statistically significant it was also not particularly large. That suggests that participants had not merely guessed at the purposes of the experiment and thence merely choosing a particular directionality on an automatic basis. The judgements were indeed aesthetic, and depended on the individual photographs.

This null finding when photographs were individually rated contrasts with prior results by Maass et al. (2007) for movies with lateral motion, which also were individually rated and still showed effects of RWD. A possible way to reconcile them is suggested by Friedrich et al.'s (2014) study. They compared drawings of objects with potential motion and movie clips that actually showed motion, and observed that movies generated stronger effects. As motion automatically captures attention (Jonides, 1981), it makes sense that clips with sideways motion are very effective stimuli at attracting attention to the directionality of that motion, and thereby, opening the door to influences of habitual RWD on the appreciation of the stimulus. In contrast, the lateral directionality of the static compositions studied here must be much less salient. This account also explains why the professional photographers that generated the materials of Pérez González (2012) were biased by their RWD: both their expertise and the fact that they had to take decisions about what would be the most beautiful arrangement of the elements in the composition made them to pay close attention to the lateral dimension.

Why should RWD affect aesthetic preferences? A possible mechanism is fluency (Reber, Schwarz, & Winkielman, 2004). Several studies have shown that the feeling of cognitive fluency (the easiness at performing a cognitive task) is associated with an enhanced preference for the materials and contents of the task (see review in Reber et al., 2004; see also Forster, Leder, & Ansorge, 2013, for recent evidence). When attention is paid to the lateral dimension of space, this dimension is more fluently processed when it

affords actions, scanning patterns, and configurations which are congruent with highly practiced habits arising from the experience of reading and writing.

To conclude, members of the general public show an influence of their habitual RWD when aesthetically appreciating visual art. However, this effect depends on the deployment of attention to the lateral spatial dimension. The present study thus emphasizes the importance of studying how attention modulates the influence of factors that affect the aesthetic experience.

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