

Do reading habits influence aesthetic preferences?

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Abstract We tested the idea that the directionality of a person's primary writing system has influences outside the domain of reading and writing, specifically influences on aesthetic preferences. The results of several previous studies suggest that people whose primary writing system goes from left to right prefer pictures of moving and static objects that face right over their mirror images that face left. People whose writing system goes from right to left, in several studies, prefer pictures that face left. We attempted to replicate these findings by testing Bahraini users of Arabic ranging from 2nd grade through 12th grade. Bahraini participants preferred right-facing pictures rather than those that faced in the direction of their writing system, and this preference was somewhat stronger in older students than in younger students. As expected, US fourth graders preferred right-facing pictures. There was no statistically significant difference between them and Bahraini fourth graders. Our results call into question the idea that the directionality of people's primary writing system influences their preferences for pictures.

Keywords Writing directionality · Reading directionality · Mirror images · Pictures · Arabic · Aesthetic preferences

Introduction

Research on reading, traditionally dominated by studies of how people read and of how they learn to read, increasingly focuses on how knowledge of reading may

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influence performance in other tasks. Researchers have examined this issue by comparing people who do and do not know how to read and people who read different types of writing systems (e.g., Kolinsky et al., 2011; Spalek & Hammad, 2005; Vaid, 2011). Here we consider the possible influences of one characteristic of a writing system—its directionality—outside the domain of language.

People who read and write in a language such as French, Russian, or English have much experience moving their eyes and hands from left to right, and people who use a writing system such as Arabic or Hebrew have much experience with the opposite direction. Several studies suggest that such experiences influence people's performance in various nonlinguistic tasks, including tasks tapping their preferences for right-facing versus left-facing pictures.

One study compared readers of French and Hebrew (Chokron & De Agostini, 2000). The stimuli of primary interest here were pictures of mobile objects, such as trucks, and static objects, such as statues. Each picture was presented in a right-facing and a left-facing version, one above the other, and participants were asked which version was more pleasing or interesting to look at. The participants were 41 French adults, 40 French third graders (approximately 8 years of age), 40 Israeli adults, and 41 Israeli third graders (approximately 8 years of age). The French adults showed a statistically significant preference for pictures with left-to-right directionality, the same directionality as their writing system. Conversely, the Israeli right-to-left readers showed a statistically significant preference for pictures with right-to-left directionality. The authors interpreted the results to suggest that experience with directionality in writing influences people's aesthetic preferences. Third graders' preferences were in the same direction as adults' from the same county but were in most cases not statistically significant. This latter result suggests that effects of writing system directionality become stronger as users gain more experience with the system.

In another study, Ishii, Okubo, Nicholls, and Imai (2011) solicited judgments about vertically-arranged pairs of pictures of mobile and static objects, both animate and inanimate, from 50 adults in each of Japan and Australia. The Australian participants, who had English as their native language, showed a statistically significant preference for pictures with left-to-right directionality. The participants from Japan, whose native language was Japanese, showed a statistically significant preference for pictures with right-to-left directionality. Japanese is traditionally written in columns of print that are read from right to left and top to bottom, and Ishii and colleagues suggested that experience with this format causes people to prefer right-to-left directionality outside the domain of writing. In modern times, however, Japanese is increasingly read and written horizontally from left to right. Given that the Japanese participants had experience with the horizontal format on signs and websites in their native language, and given that their experience with the vertical format involves right-to-left reading at the level of lines of print but not at the level of individual words, it is surprising that the Japanese participants' preference for right-to-left directionality was almost twice as strong as the Australian participants' preference for left-to-right directionality.

Nachson, Argaman, and Luria (1999) presented participants with pairs of pictures of human faces and bodies that pointed either right or left. They tested 31 adults

who had recently immigrated to Israel whose native language was Russian, 62 Israeli residents whose native language was Hebrew, and 45 Israeli residents whose native language was Arabic. Overall, the Russians showed a statistically significant preference for the right-facing pictures, and the Hebrew readers showed a statistically significant preference for the left-facing ones. The Arabic readers did not show a significant preference for left-facing pictures, as predicted by the hypothesis that the directionality of people's native writing system influences their aesthetic preferences for pictures. However, the trend for the Arabic readers was in the same direction as that for the Hebrew readers. One concern about this study is that the pairs of pictures were presented side by side; some aspects of the results differed according to whether the pictures faced one another or not.

The studies we have reviewed provide some evidence that people's experiences with directionality in reading and writing carry over to a very different domain: visual perception and preferences. As we have pointed out, however, some aspects of the findings are puzzling or inconclusive. Moreover, two of the studies did not find statistically significant differences between left-to-right and right-to-left readers for pictures of landscapes in which the most informative or weightiest part is to the right or to the left of center (Chokron & De Agostini, 2000; Ishii et al., 2011). It is not clear why writing system directionality would influence performance with pictures of mobile and static objects but not pictures of landscapes.

Given the foregoing questions, some of which were also raised by Vaid (2011), and given the increasing call for replication in psychology and other fields (Ritchie, Wiseman, & French, 2012), we tested students in Bahrain whose primary language was Arabic. If the nonsignificant results reported by Nachson et al. (1999) for people whose primary writing system is Arabic reflect the relatively small size of their Arabic sample, then we should find a significant preference for left-facing pictures with a large sample of Bahraini students. To determine whether this preference becomes stronger with increasing experience of writing system directionality (cf., Chokron & De Agostini, 2000), we tested Bahraini students in grades 2, 3, 4, 6, 8, 10, and 12. We also tested US fourth graders, anticipating on the basis of previous results that they would prefer right-facing pictures.

Method

Participants saw pairs of stimuli and were asked to pick the item in each pair that looked more appealing. To avoid the problems that can occur when pictures are placed side by side (Nachson et al., 1999), the pictures in each pair were arrayed vertically. The 15 experimental pairs consisted of mirror-image drawings and photographs of static or mobile objects, such as a statue facing to the right or the left or a penguin facing to the right or the left. The items included people, animals, statues, and vehicles. There were also 33 filler pairs of varied nature: photographs and drawings of people, animals, statues, vehicles, and houses, geometric designs, numerals, and single Arabic and Latin letters. For example, one filler pair consisted of photographs of two different types of cars, both facing left, another pair had two right-facing cars, and another had frontal views of different types of houses. The

filler pairs were included to reduce the chance that participants would guess that our main interest was in the mirror-image pairs and would develop special strategies for this reason. All items were black on white. Sixteen pairs were arranged on each of three sheets of letter size paper, four rows per sheet. Each pair was placed in a separate 5.1 cm by 4.1 cm box. There were four forms that differed in which item was at the top of each pair and in the order of the pairs. Approximately one quarter of the participants were assigned to each form.

Students were tested in groups in their classrooms by a native speaker of their language. The instructions were presented both orally and in writing. The instructions directed the participants to look at the pairs of pictures carefully. Within each pair, they were asked to decide which picture was more appealing and to draw a circle around it. They were told that we were interested in their opinions and that there were no correct or incorrect answers. Participants were requested not to skip any items.

There were 736 Bahraini (359 boys) students from public schools. They included 86 second graders (approximately 7 years old), 104 third graders (approximately 8 years old), 116 fourth graders (approximately 9 years old), 122 sixth graders (approximately 11 years old), 122 eighth graders (approximately 13 years old), 122 tenth graders (approximately 15 years old), and 64 twelfth graders (approximately 17 years old). These students speak and read Arabic as their primary language, and reading instruction in Arabic begins in first grade. All instruction in Bahraini public schools is carried out in Arabic, with the exception that, at the time of data collection, English was taught as a foreign language beginning in grade 3. The third graders in our study had two 50-min English classes per week. The fourth, sixth, and eighth graders had five such classes per week. In 10th and 12th grades, students took between two to four English classes of 40–50 min each per week. For comparison, 68 US fourth graders (30 boys) from Texas were tested. These students, who were approximately 9–10 years old, were taught in English, although some spoke and read Spanish as well. Whereas some previous studies have obtained information on handedness from participants, we did not do so because left-handedness is considered negative for some activities in many Arab countries (Fagard & Dahmen, 2004).

Results

Eight of the 804 participants failed to make a choice for all 15 experimental pairs. These students were eliminated from the analyses, leaving 796 participants. For these 796 participants, the mean proportion of cases in which no choice was made was very low, .025. It was extremely uncommon, as well, for a participant to select only items at the top or only items at the bottom of each pair.

We calculated the mean proportion of right-facing choices out of the total number of right-facing and left-facing choices for experimental pairs. The mean proportion of right-facing choices was .573 for the Bahraini students, significantly above the level of .500 that would be expected on the basis of random guessing according to a two-tailed *t* test by subjects, $t(728) = 9.24, p < .001$. An analysis of

variance on the proportion of right-facing choices for the Bahraini students using the variables of grade and sex showed one statistically significant but small effect, that for grade, $F(6,715) = 2.33$, $p = .031$, $\eta^2 = .014$. The proportion of right-facing choices was somewhat lower on average for Bahraini students in grades 2 and 3 ($M = .534$) than for Bahraini students in grade 4 and higher ($M = .586$). However, the proportion of right-facing choices was significantly greater than .500 for the second and third graders, $t(189) = 2.47$, $p = .014$, as it was for the students in grades 4 and up, $t(538) = 9.19$, $p < .001$. The mean proportion of right-facing choices was .592 for the US fourth graders and .588 for the Bahraini fourth graders, and an analysis of variance using the factors of country and sex showed no statistically significant effects. The proportion of right-facing choices was significantly above .500 for fourth grade students in each country ($p < .001$ for both). A t test using items as the unit of analysis and including data from all participants showed that the proportion of right-facing choices significantly exceeded the chance level of .500, $t(14) = 7.95$, $p < .001$. Indeed, the proportion of right-facing choices was greater than .500 for all 15 experimental pairs.

Discussion

In the present study, which included many more participants than previous studies of aesthetic preferences and writing system directionality (Chokron & De Agostini, 2000; Ishii et al., 2011; Nachson et al., 1999), people whose primary language is read and written from right to left showed the same aesthetic preferences as people whose primary language is read and written from left to right. Both groups showed a small but statistically significant preference for pictures of moving and static objects that faced right over pictures that faced left. The preference appeared to be somewhat stronger in children aged 10 and up than in children aged 8 and 9, but even the younger children showed a statistically significant preference.

It is not clear why we found no significant differences in aesthetic preferences for pictures of mobile and static objects as a function of writing system directionality whereas several previous studies found some differences (Chokron & De Agostini, 2000; Ishii et al., 2011; Nachson et al., 1999). Note, however, that Nachson et al. (1999) did not find a statistically significant preference for pictures of human faces and bodies that faced left among readers of Arabic and that two previous studies did not find significant differences as a function of writing system directionality for pictures of landscapes with the feature of interest on the right versus the left (Chokron & De Agostini, 2000; Ishii et al., 2011). There were some procedural differences between our study and previous studies, most notably the fact that we included filler items that were not mirror-image pairs whereas previous studies did not. If the effects of writing system directionality on aesthetic preferences were robust, such changes should not have influenced the outcome. Although English is widely used in Bahrain, Arabic was the native language of our participants and the language that they primarily used at home and at school, both in speaking and in reading and writing. The younger children in our study, in particular, knew little or no English. If the directionality of one's native language writing system influences

aesthetic preferences for pictures, then we should have seen a preference for left-facing pictures among the Arabic readers in our study.

Additional work will be needed to shed light on why both populations in our study showed a preference for right-facing pictures. One possibility is that this preference reflects aspects of hemispheric brain specialization that are independent of language and culture (Beaumont, 1985; Levy, 1976). Research with people who have learned to read in different directions is critical for disentangling effects of brain organization from effects of cognitive skills and culture (e.g., Chokron, 2002; Nicholls & Roberts, 2002), and it will need to include a variety of tasks and methods.

Years of experience with moving one's eyes and hands in a particular direction when reading and writing do appear to have some effects outside the domain of reading and writing (e.g., Newman, Lamb, & Civil, 1986; Spalek & Hammad, 2005; Vaid, 2011). However, our findings lead us to question the idea that these effects extend into the realm of visual aesthetic preferences.

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