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Research report

Reading habits influence aesthetic preference

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Abstract

The aim of the present study was to determine the extent to which aesthetic preference, previously attributed to cerebral dominance, may be determined by reading habits. One hundred and sixty two normal subjects were presented pairs of images, one being the mirror-image of the other, and were asked for their aesthetic preference. Half of the subjects were left-to-right readers (French subjects) and the other half were right-to-left readers (Israeli subjects). We found a significant effect of reading habits on aesthetic preference, with left-to-right readers showing a preference for stimuli with a rightward directionality while right-to-left readers preferred stimuli with a leftward directionality. These findings raise the question of an interaction between cultural factors and cerebral dominance.

Theme: Neural basis of behavior

Topic: Cognition

Keywords: Aesthetic preference; Vision; Hemispheric specialization; Reading habit

1. Introduction

Clinical and experimental studies conclude that in the great majority of right-handers the left hemisphere is specialized for language-related functions while the right hemisphere is specialized for spatial and manipulative skills [14,16].

In the field of visual judgement, several studies have shown that either manual preference or sex may have a specific effect when looking at visual stimuli such as faces, pictures or paintings [3,10,17–19].

Similarly, Chemtob and co-workers [4,24] used a tachistoscopically presentation of simple aesthetic stimuli, to one visual field at a time, to specifically study an eventual visual field advantage for aesthetic preference. Normal subjects were found to differ in their likes and dislikes depending on whether the stimuli were seen in the right visual field (RVF) or in the left visual field (LVF). On the basis on this finding, the investigators inferred that the hemispheres differ in their aesthetic preference.

In the same way, when dextrals look at a front view of a face, they find that the half in the left visual field looks more like a person than the other half [9,13]. This asymmetry has also been related to the superiority in normals of the LVF (i.e. of the right hemisphere) in face recognition [9,15,21].

Aesthetic judgement appears thus to be one of the many aspects of cognitive and emotional processing that is influenced by asymmetric organization of the brain. Apart from the sex effect mentioned above, an effect of manual preference on aesthetic preference has also been found. Using coloured vacation slides, Levy [17] has shown that when a group of right-handers preferred one orientation of a complex picture over its mirror image the center of interest was judged by another group of right-handers to be displaced to the right. Suggesting that asymmetry of hemispheric functioning plays a role in producing such effects, orientation preference of left-handers was unrelated to asymmetry of picture content.

Using mirror-image pairs of landscape photographs and paintings, other studies have confirmed that right-handers exhibit systematic preferences for one orientation of a picture over its mirror image while left-handers on the

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contrary do not exhibit any striking preference [3,10,18,19].

This pattern of behavior has also been hypothesized to reflect aspects of observers' neural organization [2,3,17–19]. To explain the fact that right-handed subjects preferred pictures where the center of interest was displaced to the right, Levy [17] proposed that '. . . in viewing pictures, the right visuo-spatially specialized hemisphere is selectively activated producing a bias of attention toward and a psychological weighting of the left side of space. Pictures which correct for this imbalance by having their more important content or greater heaviness on the right are considered [. . .] to be more pleasing'. On the other hand, another hemispheric explanation has been proposed. Beaumont [3] suggested that the right position of the center of interest would attract the subject's gaze thus leaving most of the picture in the left visual field allowing the right hemisphere to analyse the pictorial information side.

Levy's hypothesis fits the phenomenological work of Gaffron [12] who proposed that Westerners scan paintings in a consistent fashion, starting in the lower left foreground and sweeping up and to the right in the picture space.Gaffron [12] suggested that this glance path might explain why artists and critics prefer paintings whose areas of interest are shifted to the right of center. Using the wisdom of the day, Gaffron argued that the dominance of the left hemisphere in dextrals would result in an 'overprocessing' of the right visual field. The glance curve from left-to-right 'compensates for this asymmetry [. . .] and permits the most complete, unfalsified impression of the three-dimensional space by the visual space perception'.

But, this left-to-right scanning of pictures may reflect the subject's reading habits rather than his/her neural organization. As reading habits have been shown to influence the exploration of non-linguistic stimuli [1] as well as visuo-spatial skills [5–7,20,22,23,25] we sought to determine the extent to which aesthetic preferences previously attributed to cerebral dominance, may be determined by reading habits. We think that this issue is of importance, because usually, as we have seen, perceptual asymmetries of non linguistic tasks are typically interpreted solely in terms of a cerebral lateralization framework, especially in terms of right hemisphere dominance.

For this purpose we submitted normal left-to-right (French) and right-to-left (Israeli) readers to a visual aesthetic preference task. Subjects were presented pairs of object pictures. The pair constituted a picture of the same object but presented with a left-to-right directionality or with a right-to-left directionality. In addition, we presented pairs of landscape pictures which were located either on the left-half of the page or on the right one.

If only hemispheric factors influence the preference for one directionality over the other one, we should confirm previous results in showing that all subjects whatever their reading habits exhibit a preference for pictures with a left-to-right directionality or located in the right half of the page.

If reading habits also influence the visual aesthetic preference, then the subjects' preference should differ according their reading habits and we can expect a preference for pictures possessing the same directionality than the subjects' reading habits.

Concerning the location of the landscape pictures on the page, the same predictions can be drawn. We should observe a preference for the right location for all subjects in case of a preponderance of hemispheric factors or an opposite pattern of results depending on the subject's reading habits, in case this latter factor is at work in aesthetic preference.

2. Material and methods

2.1. Subjects

One hundred and sixty two subjects accepted to participate in this study. Half of them were French left-to-right readers ($n=81$) and the remaining half were Israeli right-to-left readers ($n=81$). Each group was constituted of half male and half female subjects (for French subjects: 41 males, 40 females; for Israeli: 40 males, 41 females). For left-to-right readers, 41 were school children in grade 3 (mean age: 8.51, from 6.11 to 9), and 40 were adults (mean age: 27, from 19 to 35). For right-to-left readers, 40 were school children in grade 3 (mean age: 8.41, from 7 years to 8.11 years), and 41 were adults (mean age: 26, from 20 to 39). All the subjects were strong right-handed [8] and monolingual and have been tested in their own country.

2.2. Procedure

Subjects were presented 30 mirror pairs of stimuli located one above the other and were asked to indicate which stimulus was more aesthetically pleasing or interesting to look at. Equivalence was not allowed. The stimulus pairs were displayed in a random order. In half of the pairs, the picture with a left-to-right directionality was on the top of the sheet and in the remaining half, it was on the bottom (see Fig. 1).

The presented pictures could represent static or mobile objects with a rightward (left-to-right) or leftward (right-to-left) directionality, and landscapes (Fig. 1). Whereas objects possessed a directionality and were centred on the sheet, the most informative part of the landscapes was positioned on the left or right half of the sheet.

2.3. Data analysis

Subjects were requested to indicate their preference for one directionality (or one location for landscapes) over the other one, by designating the corresponding picture.

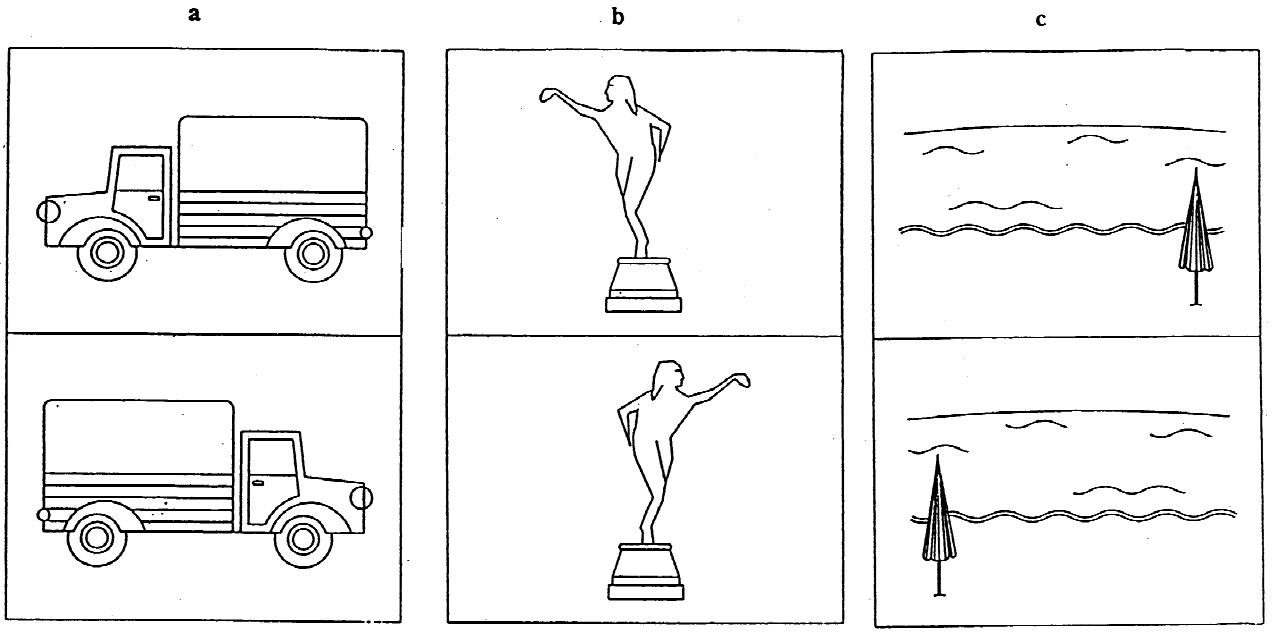

Fig. 1. Samples of aesthetic preference items. The subjects were presented pictures from three categories: ten pictures representing moving objects (a), ten pictures representing static objects (b), and ten pictures representing landscapes (c). None of the 30 pictures represented an object that could be handled.

While the answer 'right' corresponds to a preference for a picture with a left-to-right directionality or positioned in the right half of the page for landscapes, the answer 'left' corresponds to a preference for a picture with a right-to-left directionality or positioned in the left half of the page for landscapes. We have recorded the total number of answers 'right' for each category. Since each category (static objects, mobile objects, landscapes) contains ten pairs of pictures, a total of five answers 'right' means no preference for a specific category, a total superior to five a preference for pictures possessing a right-to-left directionality and a total inferior to five a preference for pictures possessing a left-to-right directionality. From the subject's responses, we also derived a preference score by substracting the number of answers 'right' to the number of answers 'left' (Fig. 2). In this way, a negative score corresponds to a larger number of answers 'right' and corresponds to a preference for pictures having a left-to-right directionality or positioned in the left half page. On the contrary, a positive score indicates a larger number of answers 'left' and corresponds to a preference for pictures having a right-to-left directionality or positioned in the

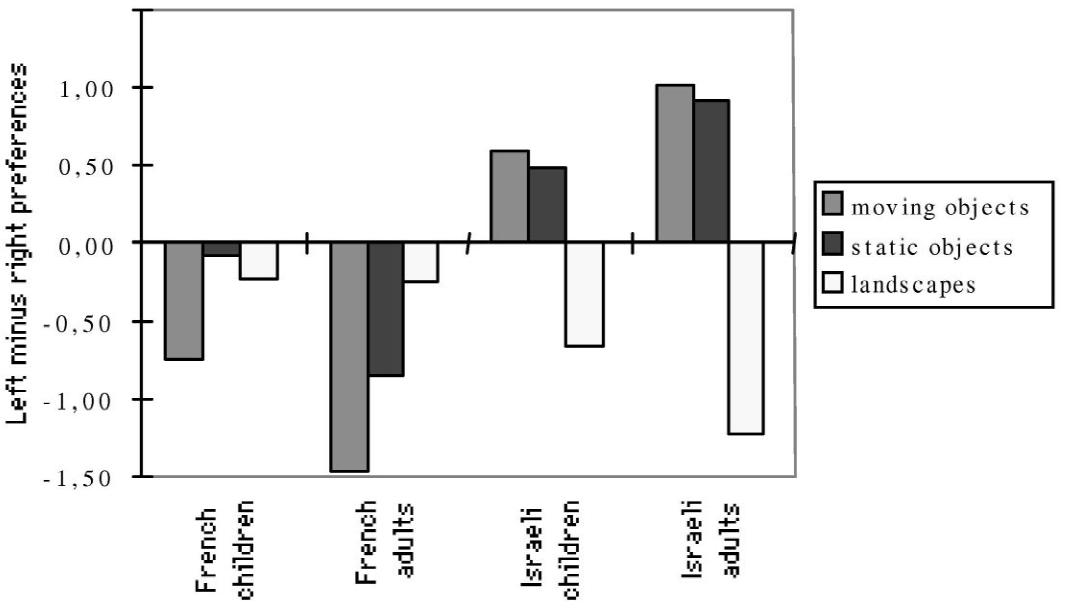

Fig. 2. Average number of left minus right preferences (possible range from −10 to 10) for moving objects, static objects and landscapes.

right half page. A nil score would correspond to an absence of preference for one directionality over the other one.

3. Results

Left-to-right readers differ dramatically from right-to-left readers when asked to indicate their preference between an object picture or its mirror-image. While left-to-right readers clearly prefer pictures with a left-to-right directionality ($m=4.39$, S.D.$=2.21$), right-to-left readers prefer pictures with a right-to-left directionality directionality ($m=5.18$, S.D.$=2.16$).

This effect of reading habits on aesthetic preference for objects possessing a directionality occurred both for static ($F(1,158)=15.04$, $P<0.001$) and mobile objects ($F(1,158)=20.42$; $P<0.0001$). Concerning landscapes, the effect of reading habits on the aesthetic preference was not significant ($F(1,158)=3.41$, $P<0.07$).

Post-hoc analysis revealed that French children demonstrated a significant preference for a left-to-right directionality only for pictures representing moving objects ($m=4.90$; $t(40)=-2.38$, $P<0.02$), while French adults demonstrated a significant preference for a left-to-right directionality both for pictures representing moving ($m=4.15$; $t(39)=-2.94$, $P<0.005$), and static objects ($m=3.53$; $t(39)=-2.57$, $P<0.01$) (Table 1). Concerning pictures representing a landscape, French children and adults show a preference for a right location of the picture on the page that does not reach significance (Table 1).

Concerning Israeli subjects, no significant preference for a specific directionality appears in children, while adults exhibited a significant preference for a right-to-left directionality for both pictures representing moving ($m=5.90$; $t(40)=2.26$, $P<0.05$), and static objects ($m=6.02$; $t(40)=3.24$, $P<0.002$). For pictures representing landscapes Israeli adults significantly preferred pictures located in the right-half of the page ($m=3.78$; $t(40)=3.22$, $P<0.002$), while this preference did not reach significance in children (Table 1)

Table 1
Average number of responses (max=ten per category) where the object with a right-to-left directionality (or landscape on the left-half of the sheet) was preferred by French and Israeli children and adults[a]

	Means (S.D.)		
	Moving objects	Static objects	Landscapes
French children ($n=41$)	4.90 (1.83)	4.24 (2.03)	4.76 (2.18)
French adults ($n=40$)	4.15 (2.09)	3.53 (3.17)	4.75 (2.59)
Israeli children ($n=40$)	5.47 (1.81)	5.57 (2.48)	4.33 (2.40)
Israeli adults ($n=41$)	5.90 (1.79)	6.02 (2.90)	3.78 (2.42)

[a] An average >5 means more right-to-left preference, <5 more left-to-right preference.

4. Discussion

The main finding of the present experiment is an effect of reading habits on aesthetic preference, with subjects preferring the pictures possessing the same directionality as their reading habits.

Previous findings have shown that right-handers prefer pictures with a left-to-right directionality balance [2,3,17–19] but the present results clearly indicate that this is only true for left-to-right readers, while the right-to-left readers exhibit a preference for the opposite direction. Aesthetic preference has been mostly interpreted in terms of cerebral lateralization, especially in terms of hemispheric balance [3,17]. The present study brings evidence for an effect of reading habits on this kind of judgement. There is neither experimental nor clinical argument for a reverse pattern of cerebral lateralization in subjects with opposite reading habits. For example, whatever their reading habits, subjects were found to demonstrate the same left hemisphere advantage for language functions. Along the same lines, there is no evidence for a given neuropsychological deficit which would occur after a lesion in one hemisphere for left-to-right readers but in the other one for right-to-left readers. The present study thus underlines the need for caution in drawing inferences about hemispheric specialization from studies obtaining asymmetries in non-linguistic tasks with left-to-right readers only.

However, it is interesting to note that if reading habits seem to determine the preference for one directionality over the other, all the subjects whatever their reading habits demonstrated a preference for landscapes positioned in the right hemispace, this preference reaching statistical significance only for Israeli adults. Taken together these results are in favor of an interaction between cultural and hemispheric factors. While subjects would prefer object pictures possessing the same directionality than their reading habits, the preference for a landscape picture without any directionality in the right hemispace could be related both to the neural organization and to cultural factors.

Recently Frith [11] discussing the possibility of an influence of culture on brain anatomy asked the following question: ‘Is it possible that learning to read has an effect on processes underlying visual perception and thinking?’

The present experiment permits us to answer positively to this question. Far from confirming the prevalence of hemispheric specialization upon cultural factors, the present findings bring evidence that reading habits are able to determine our visual preferences and may also influence the way we direct our attention in the extracorporeal space or the way we mentally represent the world.

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