
On the ability to discriminate original from mirror-image reproductions of works of art

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Abstract. Subjects were shown pairs of slides; one member of each pair represented a painting in its correct left-right orientation and the other a mirror image of the same painting. For each pair, subjects were asked (a) to choose which they preferred, (b) to choose which they thought was the original, and (c) to rate their confidence that they had seen the picture before. Subjects were only able to discriminate between originals and mirror images for those paintings they were highly confident of having seen before.

1 Introduction

Of considerable interest to students of aesthetics is the contention that the original of a painting is aesthetically more satisfactory than a mirror image of the painting (see e.g., Wölfflin 1941; Keller 1942; Oppe 1944; Gaffron 1950a; Fröhlich 1964; Martin 1965; Uhrbrock 1973). Gaffron (1950a) proposed that this was a function of the 'glance-curve', her hypothesis being that when we look at a picture our view starts in the left foreground, penetrates into the depth of the picture on the same side, and then swings across to the right side. Objects therefore achieve a different prominence according to their placement in the picture space relative to this curve.

One may expect from our knowledge of the perceptual differences between left and right visual fields (Adair and Bartley 1958; Nelson and MacDonald 1971; Gilbert and Bakan 1973) and of the unequal distributions of asymmetrical pictures (McManus and Humphrey 1973) that subjects should be able to correctly distinguish a mirror-image picture from the original version. Experimental analyses of this topic are, however, confused. Gaffron (1950b) showed people original versions and mirror images of Rembrandt engravings and claimed on the basis of her results that the engravings should be viewed as they were etched rather than as printed. Ross (1966) showed subjects either the original version of a picture or a mirror image and asked them to decide which ones were the right ones: of 600 judgments 292 (48.6%) were correct ($\chi^2 = 0.37$, 1 d.f., not significantly different from chance). In this study the pictures were exposed for only 4 seconds, which is perhaps a little short.

Swartz and Hewitt (1970) carried out a larger study in which they showed the original and mirror-image versions simultaneously and asked subjects which of the two versions they preferred: of 8320 judgments 4299 (51.7%) were correct ($\chi^2 = 9.5$, 1 d.f., $p < 0.01$). Gordon and Gardner (1974) presented either the mirror image or the original version and asked the subjects to identify the original version: of 1020 judgments 543 (53%) were correct ($\chi^2 = 4.13$, 1 d.f., $p < 0.05$).

There would appear to be three methodological problems associated with previous studies. Firstly, it is necessary to distinguish between preferences for the original versions and an attempt to choose the original version: these two activities are not necessarily highly correlated and therefore ought to be studied separately. Secondly, the role of memory has been inadequately studied, as it is clearly trivial to be able to identify the original version of a picture one has seen before. Standing et al (1970) have demonstrated that subjects are remarkably good at remembering the left-right orientation of a photograph seen once for only 10 seconds within a sequence of 2560 photographs. Gordon and Carpenter (1974) found a significant correlation of 0.38 between success at identifying the original version and having seen the picture before. Thirdly, it is important to show both the original and mirror-image versions simultaneously and to ask for a decision. It is very difficult to rotate an image laterally in one's mind, and to expect a subject first to do this and then to compare the composition with the image displayed in front of him is perhaps asking too much, so that a negative result would not be convincing. This study has been designed to exclude these methodological deficiencies.

2 Method

One hundred undergraduates of the University of Reading (fifty male, fifty female), all of whom were unpaid volunteers, served as subjects in this experiment. Testing was carried out in groups of fifteen to twenty. The test stimuli consisted of fifty pictures, all of which were obtained from the National Gallery, National Portrait Gallery, Tate Gallery, and British Museum, London. Half of the pictures were portraits (either of individuals or groups) whilst the rest were landscapes or still lifes. Pictures were selected so that they did not contain any obvious clues as to orientation, e.g., writing, medals on the left breast, several obviously right-handed people, etc. The original version and the mirror image were projected side-by-side in a darkened room by means of two slide projectors, the side on which the original version was shown being randomized. The subjects were asked to indicate, for each picture, which they thought was the original version (on a six-point rating scale: strong, medium, weak for each version), which version they preferred (on the same rating scale), and whether they had seen the picture before (on a four-point rating scale: never, possibly, probably, or definitely). Each pair of slides was projected for 30 seconds with a 30 second interval between successive stimuli. Each experimental session lasted about an hour. It was emphasised to the subjects that they were free to indicate different versions for choice of original and preference, since in many cases artists were constrained by mechanical factors to produce the mirror image of their original composition, and thus the finished product might not represent the artist's true intentions.

3 Results

Of the 4990 judgments made of the original version, 2648 (53.2%) were correct ($\chi^2 = 18.6$, 1 d.f., $p < 0.001$); and of the 4990 preferences made, 2640 (52.9%) were for original versions ($\chi^2 = 16.9$, 1 d.f., $p < 0.001$). Figure 1a shows the ratio of original to mirror-image orientation decisions as a function of the strength of decision made, and it can be seen that only 'strong' decisions are significantly different from chance. Figure 1b shows the ratios of original to mirror-image decisions as a function of having seen the picture before, and it is clear that the task was possible only if the subject had 'probably' or 'definitely' seen the picture before. The correlation of preference judgments with judgments of the original version was 0.91 ($n = 4990$), and it is thus valid to consider the two types of decision as equivalent for the purposes of this experiment.

It might be objected that although the overall results are random in cases where the subject had never seen the picture before, this may be due to half of the subjects performing significantly better than chance, whilst the other half perform significantly worse than chance. Figure 2a shows the results for individual subjects on those pictures which they had never seen before: there is no evidence for two population subgroups. Alternatively one might reason that half of the pictures are chosen significantly better than chance, and half are chosen significantly worse than chance. However, if we look at judgments for individual pictures in cases where the picture had never been seen before (figure 2b), then it is clear that in this case also there is no evidence for two population subgroups. We may therefore conclude that undergraduate subjects are only able to detect the original version of a picture from its mirror image if they have seen the picture before.

In view of the known preponderance of portraits showing the left cheek as opposed to the right one (McManus and Humphrey 1973), it is of interest to ask whether perhaps this is due to a simple preference for the left cheek. Of the pictures used, six were portraits of single individuals showing the left cheek, and seven were

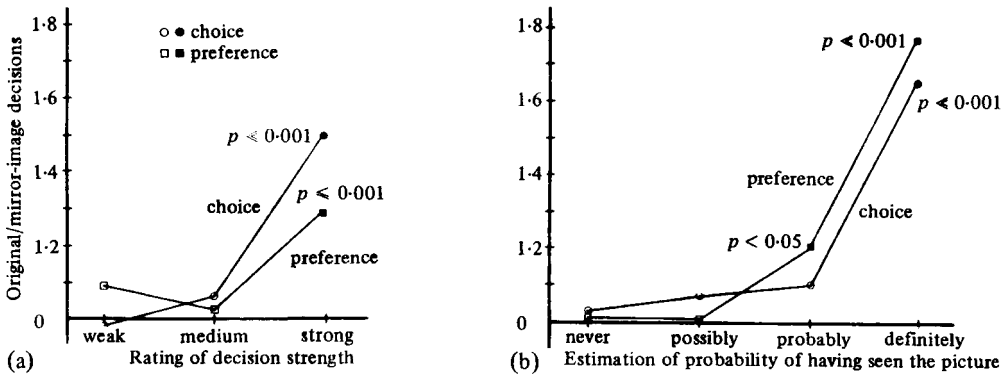


Figure 1. Detection of original from mirror-image versions of paintings and subjects' preferences as functions of (a) subjects' certainty of correctness of their choices, and (b) subjects' estimation of probability of having seen the picture before. Open symbols denote results not significantly different from chance expectation; solid symbols are better than chance with a probability of less than 0.05 (χ^2 test on a 2×1 matrix, 1 d.f.).

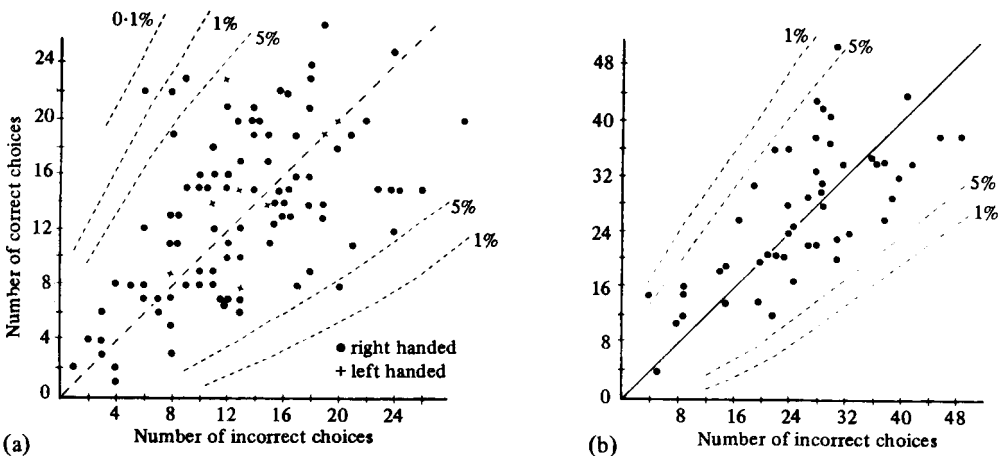


Figure 2. Scattergrams of results for (a) 100 individual subjects and (b) 50 individual pictures on decisions of choice of original in those cases in which the subjects had never seen the pictures before. Lines of probability are based upon a 2×1 cell, two-tailed χ^2 test with 1 d.f.

similar portraits but showing the right cheek. When we consider the detection and preference of these portraits (figure 3) we find that pictures showing the left cheek were detected significantly worse than by chance alone ($N = 325$, $\chi^2 = 3.97$, 1 d.f., $p < 0.05$) if we consider the preference judgments in the case in which the picture had never been seen before. When we look at the thirteen portraits in terms of just the cheek shown, irrespective of the correct version, then of 705 preferences shown, 386 (54.8%) were for the right cheek version ($\chi^2 = 6.15$, 1 d.f., $p < 0.02$). For judgments of the original version a similar right cheek bias may be found. A similar result has been found elsewhere (Blount 1975, unpublished). It may thus be considered that the predominance of left cheeks in portraits is unlikely to be due to a simple preference for left cheeks.

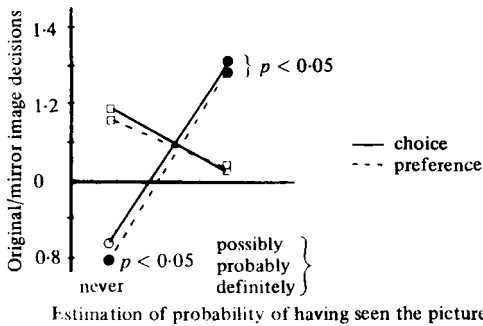


Figure 3. Detection of original from mirror-image and subjects' preferences for portraits of single individuals. ● left cheek shown in original ($n = 6$); □ right cheek shown in original ($n = 7$). Indication of statistical significance as in figure 1.

4 Discussion

It is perhaps worth discussing the limitations of this study. It does not as such demonstrate that the views of Wölfflin and others are wrong. It is quite feasible that subjects with a heightened aesthetic sensitivity may be able to carry out the task successfully, although we have found in a subsequent study that students studying art are no more successful than ordinary students (Blount 1975, unpublished). Neither does the study necessarily imply that for all aesthetic purposes mirror-image stimuli may be regarded as equivalent. It is possible that with a more sensitive index, for instance the semantic differential, differences would be found in the perception of mirror-image forms: this is being investigated at present. Alternatively mirror-image differences may be of importance, but primarily to the artist himself (Humphrey and McManus 1973), and thus this sort of experiment would not find significant differences. Finally, the fact that the subjects' preference judgments were related to their familiarity with particular pictures is reminiscent of the results obtained by Zajonc on preference as a function of familiarity (see e.g. Zajonc et al 1974).

References

- Adair H, Bartley SH, 1958 "Nearness as a function of lateral orientation in pictures" *Perceptual and Motor Skills* 8 135-141
- Fröhlich F, 1964 "The function of perceptual asymmetry in picture space" *British Journal of Aesthetics* 4 291-297.
- Gaffron M, 1950a "Right and left in pictures" *Art Quarterly* 13 312-331
- Gaffron M, 1950b "Die Radierungen Rembrandts, Original und Drucke" (Mainz: Kupferberg Verlag)
- Gilbert C, Bakan P, 1973 "Visual asymmetry in perception of faces" *Neuropsychologia* 11 355-362

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- Gordon I E, Gardner C, 1974 "Response to altered pictures" *British Journal of Psychology* **65** 243-251
- Humphrey N K, McManus I C, 1973 "Status and the left cheek" *New Scientist* **59** 437-439
- Keller R, 1942 "The right-left problem in art" *Ciba Symposia* **3** 1139-1142
- Martin F D, 1965 "Spiritual asymmetry in portraiture" *British Journal of Aesthetics* **5** 6-13
- McManus I C, Humphrey N K, 1973 "Turning the left cheek" *Nature* **243** 271-272
- Nelson T M, MacDonald G A, 1971 "Lateral organisation, perceived depth, and title preference in pictures" *Perceptual and Motor Skills* **33** 983-986
- Oppe P, 1944 "Right and left in Raphael's cartoons" *Journal of the Warburg and Courtauld Institute* **7** 82-94
- Ross B M, 1966 "Minimal familiarity and left/right judgment of paintings" *Perceptual and Motor Skills* **22** 105-106
- Standing L, Conezio J, Haber N, 1970 "Perception and memory for pictures: Single-trial learning of 2560 visual stimuli" *Psychonomic Science* **19** 73-74
- Swartz P, Hewitt D, 1970 "Lateral organization in pictures and aesthetic preferences" *Perceptual and Motor Skills* **30** 991-1007
- Uhrbrock R S, 1973 "Laterality in art" *Journal of Aesthetics and Art Criticism* **32** 27-35
- Wölfflin H, 1941 "Über das Rechts und Links im Bilde" in *Gedanken zur Kunstgeschichte* (Basel) p 82 (referred to by Gaffron, 1950a).
- Zajonc R B, Markus H, Wilson W R, 1974 "Exposure effects and associative learning" *Journal of Experimental Social Psychology* **10** 248-263