

## Notes and Comment

### Misremembering a familiar object: Mnemonic illusion, not drawing bias

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*It was reported by Jones (1990) that the design of British coins is systematically misremembered. Although the Queen's head in fact faces right, most people draw it facing left. It is possible, however, that the origin of this phenomenon does not reside in memory but instead in a leftward drawing bias. Two experiments of the three reported here tested this hypothesis. In Experiment 1, British participants attempted to recall the direction of the Queen's head but responded verbally instead of pictorially. The results were similar to those of Jones and thus contradict the hypothesis that misremembering of the Queen's head is caused by a leftward drawing bias. In Experiment 2, Canadian participants attempted to draw a Canadian coin. Leftward misremembering was not observed in this case. Thus the hypothesized importance of a leftward drawing bias was again not supported. Instead, the results provided support for the schema explanation of the Queen's Head memory illusion proposed by Jones. The results of Experiment 3, which compared memory for British coins and stamps, further bolstered this conclusion.*

The great majority of coins currently in circulation in Britain carry the head of Queen Elizabeth II, and in all of these the Queen's head faces to the right. Yet in a study following previous work with U.S. coins by Nickerson and Adams (1979) and Rubin and Kontis (1983), Jones (1990) found that when participants were asked to draw current British coins, only a minority of the drawn heads correctly faced right. The proportions of heads that incorrectly faced left in three separate experiments were found to be 67%, 70%, and 88%. In each case, the proportion was significantly beyond even the chance level of 50%. Jones concluded, therefore, that what had been discovered was not an instance merely of poor memory but, more surprisingly, an instance of systematic misremembering. By analogy with perceptual illusions, we might term it here a mnemonic illusion. Just as the perception of a line's length is distorted in the Müller-Lyer illusion by related information present in the perceptual

field, so it was postulated by Jones that memory for the direction of a coin's head is distorted by related information present in mnemonic storage.

An alternative explanation of these results exists, however, in the shape of an elaboration of the poor-memory hypothesis. According to this, because of subjects' poor memory, the Queen's head would have been equally likely to have been drawn facing in either direction if it were not for the existence of a peripheral drawing bias. There is some evidence that the majority, right-handed population have a general tendency to draw profiles facing left (Shanon, 1979). It can therefore be argued that it is this drawing bias that is responsible for the apparent misremembering.

The drawing-bias hypothesis is simple and not a priori implausible. Furthermore, it has the virtue of being directly testable. If it is true that the apparent misremembering of the Queen's head observed by Jones (1990) resulted from a drawing bias, then removal of the drawing stage should cause the disappearance of the apparent misremembering. This prediction was tested by the following experiment.

### EXPERIMENT 1

#### Method

A total of 103 British participants were tested at Oxford University. Their ages ranged from 16 to 65 years, with a median age of 37 years; 49 were female and 54 were male. Most participants were attending an ophthalmological congress. Each participant was asked to respond in writing to the written instructions "Please form a mental picture of a penny coin. Which direction is the Queen facing?"

#### Results

The results were clear. Overall, 70 participants (68.0%) responded incorrectly with "left." This percentage was significantly different from the chance value of 50% ( $z = 3.65, p < .001$ ). The percentages for women and men were 71.4% and 64.8%, respectively, and did not differ significantly from each other [ $\chi^2(1) = 0.52$ ].

#### Discussion

From the results of this experiment, we may conclude that the phenomenon of systematic misremembering observed by Jones (1990) cannot be attributed to a drawing bias. When participants make a verbal response instead of a pictorial one, the phenomenon survives intact at approximately the same length.

What, then, is the correct explanation of the Queen's Head mnemonic illusion? We believe that the best explanation remains that advanced by Jones (1990). This ex-

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planation develops the schema model of coin memory of Rubin and Kontis (1983) and proposes that British people tend to possess only a single schema for the Queen's portrait on coins and postage stamps, even though in reality the two portraits face in opposite directions. The designs of stamps are likely to be more frequently inspected to establish their values than are those of coins, and hence it is the left-facing stamp head that dominates the content of the schema.

It was pointed out by Jones (1990, p. 181) that a strong test of the schema explanation could be made by studying memory for coins in Canada or Australia. Both Canada and Australia resemble Britain in having a right-facing Queen's head on their coins, but they differ from Britain in nowadays only rarely having the Queen's head on their postage stamps. Thus it was predicted that if the existence of a common coin-stamp schema is the correct explanation of the Queen's Head mnemonic illusion for British coins, the illusion should not be experienced in Canada or Australia. This prediction was tested in the following experiment conducted in Canada.

## EXPERIMENT 2

### Method

A total of 30 Canadians were tested in Vancouver. Their ages ranged from 15 to 32 years, with a median age of 18 years; there were equal numbers of females and males. Each participant was asked to draw two Canadian coins: a dollar and a quarter (25 cents).

### Results

For the dollar, 28 participants included the Queen's head in their drawings, with three of the views being full-face. Of the remaining 25, 16 (64%) correctly drew the head facing to the right. For the quarter, all 30 participants included the Queen's head in their drawings, with three full-face views. Of the remaining 27, 17 (63%) correctly drew the Queen's head facing to the right. In both cases, the deviation from the chance level of 50% does not reach significance on a binomial test.

### Discussion

The results of this experiment provide direct support for an explanation of the Queen's Head memory illusion in terms of the existence of a joint-portrait schema for British coins and stamps. In Canada, postage stamps only rarely carry the Queen's portrait, and thus the formation of such a schema is unlikely. It was therefore predicted that Canadians, unlike the British, would not systematically misremember the direction in which the Queen's head faces on a coin. This prediction was borne out by the results of the experiment, which showed that a numerical majority of participants drew the Queen's portrait facing correctly to the right. In addition, these results provide further evidence against the drawing-bias hypothesis. If a bias in drawing really caused misremembering in the British, it should presumably do so in Canadians, also. The results refute this hypothesis.

Finally, the objection could be raised that one further direct implication of the schema explanation has yet to

be verified. If British coins are systematically misremembered because of sharing a mnemonic representation with British stamps, it follows that the proportion of people who (correctly) believe that the stamp portrait faces left should be at least as high as the proportion who (incorrectly) believe that the coin portrait faces left. A further experiment was carried out to test this inference.

## EXPERIMENT 3

### Method

A total of 103 British participants were tested at Oxford University. They were all psychology undergraduates and did not overlap with the population of Experiment 1. Their ages ranged from 18 to 39 years, with a median age of 21 years; 64 were female and 39 were male. All participants were asked to draw (1) a penny and (2) a first-class stamp.

### Results

Five participants either omitted the head or drew it full-face in one or both drawings. Of the remaining 98 participants, 85 (87%) produced the same head orientation in both drawings; of these 85, 74 (87%) faced left (i.e., correct for the stamp only) and 11 (13%) faced right (i.e., correct for the coin only). Only 8 of the 98 (i.e., 8%) correctly drew the heads of both stamp (left) and coin (right); and 5 (i.e., 5%) incorrectly drew both stamp (right) and coin (left). Thus, overall the number of the 98 participants whose stamp head (correctly) faced left was 82 (84%), and the number whose coin head (incorrectly) faced left was 79 (81%).

### Discussion

The results of this experiment confirmed the prediction of the schema model that the proportion of (correct) left-facing responses for stamp portraits should be at least equal to that of (incorrect) left-facing responses for coin portraits. Furthermore, a very high proportion of individuals (87%) produced the same direction in both cases, and of these a very high proportion (again, 87%) were correct for the stamp rather than the coin. These latter two findings also accord closely with the schema explanation of the Queen's Head mnemonic illusion.

Finally, it may be noted that the present conclusions are supported by the results of further recent work (Martin & Jones, in press). On a 1-franc commemorative coin issued in France in 1988, General de Gaulle is portrayed as facing to the right. On other French coins, heads face to the left. The schema hypothesis thus predicts that French people should suffer from the mnemonic illusion that the head of General de Gaulle also faces to the left. Martin and Jones (in press) report evidence that misremembering of this kind is indeed observed, and also provide supporting evidence that this results from the formation of a consistent representation for the coinage as a whole.

## CONCLUSION

The results of both Experiments 1 and 2 disprove the hypothesis that the systematic misremembering observed

by Jones (1990) is the consequence of a general bias toward drawing left-facing profiles. Furthermore, both Experiments 2 and 3 provide direct evidence in support of the alternative hypothesis that the misremembering results from the existence of a common memory schema for British coin and stamp portraits.

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