
RECOGNITION, RECALL AND IMAGERY OF FACES

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Two exploratory studies are reported on the relationship between recognition, recall and imagery of faces. The first investigated undergraduates' memory of a single well known face. The second was a correlational study testing faces in general. Both studies suggest that subjects' reported imagery ratings for faces reflect performance on face recognition tasks more strongly than performance on recall tasks. It is argued that our difficulty in recalling faces arises principally from problems of recoding rather than retrieval.

INTRODUCTION

Without doubt, the most important and most difficult practical problem for research on faces is recall. An effective system for recalling faces would not only help the police catch criminals but also allow members of the public to communicate the appearances of faces among themselves. Furthermore it would prevent some of the injustices from mis-identification which the publication of the Devlin report (1976) has done little to alleviate.

Recognizing faces is usually an easy task and from this we know that locked away in our heads we must carry substantial amounts of information about a whole gallery of faces. But all current research points to the conclusion that there is no easy way of getting this information out. Ellis, Davies and Shepherd (1976) in an apposite series of experiments on recall, using verbal descriptions and drawings as well as Photo-fit reconstructions found again and again that recall did not begin to approach the performance found with recognition.

This paper asks: why are faces difficult to recall? It is argued that the explanations offered for recall from verbal memory are inadequate for faces. Two exploratory studies are described and these are discussed with other evidence.

DATA FROM A SINGLE FACE

A study was conducted to compare performance on the recog-
dition and recall of a single well known face—Cliff Michelman. He has been appearing regularly on British television in a wide variety of programmes for the last 20 years, and is moderately well known to the British undergraduates who took part in this study. They were 45 men and 59 women who were tested in two groups: the first had 70 and the second, 34.

A printed page was prepared with a photograph of Michelman among 11 other men of similar age and appearance. The first group was told that one of the faces was well known to people living in the United Kingdom and the second group was told that one of the faces was Michelman. 87 per cent of the first group and 88 per cent of the second group identified the correct photograph, but only 57 per cent of the first group could name Michelman or say who he was. It is likely that some of the undergraduates failed the recognition test because they had never seen Michelman. However, the important point is that a large majority had no difficulty recognizing him.

20 minutes later the first group was told the identity of the target face and was asked to try to form a visual image of Michelman's face. The procedure for this is given in the Appendix, but question 2 was excluded. 89 per cent reported they could form an image, 53 per cent rated their images as 'clear' or 'very clear' and 76 per cent could change the expression of the imaged face.

The first group then had 3 minutes to write a description of Michelman which would help someone intending to meet him at a railway station. Descriptions were to be of his head and face only, and were to be as detailed as possible. The second group had the same instructions except they wrote their description while viewing the photograph of Michelman. Five subjects in the first group did not attempt a written description and so there were only 99 descriptions in all. These were typed and 99 undergraduates at an American university acted as judges. Each was given a single description and attempted to pick out the face from the same 12 faces used in the recognition test. American undergraduates are most unlikely to have heard of Michelman.

With the descriptions written from memory by the first group, 23 per cent were matched to the correct face. With the descriptions of the photograph written by the second group, 26 per cent were correctly matched. Both are significantly above the level expected by chance ($\chi^2 = 18.5$ and $14.7$, both $p < .001$) but they do not differ significantly from each other ($\chi^2 = 0.016$, $p > .5$).

86 per cent of students could recognize Michelman but only 23 per cent wrote a description which could identify him.
among the same set of photographs. This demonstrates the disparity between recognition and recall. Especially interesting is the finding that performance on recall was similar for descriptions made from a photograph and made from memory.

Ellis et al (1976) have reported a similar phenomenon with Photofit: a police method of reconstructing faces from photographs of facial features. There was no reliable difference between Photofit reconstructions made when a photograph of the target face was present and reconstructions made from memory. However, when university students were asked to sketch a face from memory their drawings were considerably worse than those made with a photograph present. These facts suggest that our difficulty in recalling faces is not simply a problem of retrieving information from memory.

VISUAL IMAGERY

The imagery ratings suggest that the majority could form clear visual images of the face. Of course, it is possible for people to exaggerate when rating the quality of their visual images but an experiment by Gordon and Hayward (1973) shows that images of faces do carry information. They found that subjects can make reliable similarity judgments between imaged pairs of well known faces. There was good agreement between judgments made in this way and judgments from pairs of photographs of the same faces.

If there is a blockage in the neural pipeline which joins recognition and recall, on which side of this blockage does imagery lie? Imagery could be regarded as a type of recall, but imaging a face appears to be much easier than drawing it, describing it in words, or making a Photofit reconstruction. One approach to this question is a correlation study. Howells (1938) presents some data to suggest that recognizing faces does not correlate with the recall of details. But would imagery ratings correlate positively with performance on either recognition or recall? Ellis et al (1976) failed to find any relationship between people's ability at using Photofit and their imagery ratings, and Forbes (1975) also found no relationship between the recognition of faces and imagery. However, both studies were using general measures of visual imagery: it is possible that a test which specifically measures images of faces would give different results.

CORRELATION STUDY

95 volunteers from university admission candidates, divided into several small groups, participated on the same day that they were interviewed and given selection tests. There
were 30 men and 65 women. The questions are described in the order they were given, which was the same for all subjects.

The first three questions required subjects to rate the strength and quality of the visual images they could form with their eyes closed. The first was the Vividness of Visual Imagery Questionnaire (Marks, 1975). The second asked subjects to image the face of a close friend or relative and then answer the Imagery for a Face Questionnaire which is described in the Appendix. The third was Gordon's (1949) Control of Imagery Questionnaire slightly modified.

The face recognition test followed about 15 minutes later when subjects had completed some unrelated tests. The test employed 30 full face photographs of white male university students without glasses, beards or other obtrusive features. Subjects were asked to remember 20 faces projected at a 3s rate. After about 30s, subjects saw a further 20 faces consisting of 10 old and 10 new items projected at a 6s rate. They were asked to write 'old' or 'new' for each picture, guessing when uncertain. The score was d'.

This was followed immediately by an unexpected request to recall the last face which had been projected. 21 multiple choice questions similar to those used by Goldstein, Harmon and Lesk (1972) were used. The test was repeated without the element of surprise using a different face. Eight judges determined the correct answers, but on some of the multiple choice questions where judges showed little agreement it was necessary to allow more than one correct answer or to not count a question at all.

On the recognition test, mean d' was 2.16. For the first recall question the mean was 8.3 and for the second it was 11.2, both out of a maximum of 18. Pearson correlation coefficients between these and the imagery scores are shown in Table I.

**TABLE I**

The correlation matrix. FRN = face recognition test; FL1,FL2 = face recall, parts 1 and 2; FIM = imagery of a face; VVI = vividness of visual imagery; COI = control of imagery. * = p<.05, ** = p<.01, one tail.

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<th>FRN</th>
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<td>COI</td>
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The only statistically significant correlation between memory performance and imagery is the coefficient of 0.24 between face recognition and face imagery. In order to check this, the same two questions were given in the reverse order to a different group of 80 undergraduates. The Pearson correlation was 0.20 which is also statistically significant (p<.05, one tailed). Although the correlation coefficients are small the replication suggests there is indeed a tendency for people who are better at face recognition to form stronger images of faces. The failure to find a similar result for recall suggests that the formation of an image of a face is more similar as a skill to recognition than to recall.

DISCUSSION

If we can visualize the position of furniture in a room we can also recall its position; for most types of information, imagery guarantees recall. But for faces this is not so. Everyday life experience, confirmed by the first study, tells us that it is much easier to visualize a face than to recall the details. The correlations found in the second study suggest imagery draws more strongly on the skills we use in recognition than those of recall.

One explanation for the difficulty in recalling a face in words is that our vocabulary for describing faces is very limited. The limitations of other methods of recalling faces can also be explained by production difficulties, for example, poor drawing skill when sketching a face, or interference problems with Photofit. However, the fact is that despite the motivation of a pressing practical problem no one has devised an adequate procedure for recalling faces, and this might suggest that the difficulty is not from a number of separate production difficulties, but from a more general cause arising from the way the brain codes faces.

Presumably when we look at a face we generate an internal code which can be stored in order to remember it. Phillips (1977, 1978) has suggested that the code loses nearly all of the spatial information about a face. A code rather like a car registration number would explain the disparity between recognition and recall. If the only thing we could remember about a car was its number, we would be unable to describe its shape, size or colour, but nevertheless if we saw it again we could be quite confident it was the same car; in other words, we could recognize it but not recall it. But this analogy breaks down when we introduce imagery. A registration number does not enable us to visualize a car, but the internal code we generate of faces does give us imagery.

This suggests that we code faces in a way which loses
spatial information but is still meaningful because it gives us facial expression. But this is still not quite right. When people describe images of faces they report that some spatial details can be seen in addition to the facial expression: it is not a case of 'a grin without a cat'. Perhaps the act of visualising a face involves two operations: loading into immediate memory a code which holds information about facial expression but little or no spatial information and simultaneously loading a stereotyped face which gives the spatial relationships between eyes, nose and mouth which are common to all faces. When these two are combined, we might have the paradoxical experience of a vivid mental image but nevertheless one from which it is difficult to extract specific details.

If this view is correct, our difficulty in recalling faces is principally a problem of recoding information. Retrieval factors may also play a part but it is the translation of a highly abstracted code which forms the biggest obstacle. If the same code is used for both memory and perception it is clear why under certain circumstances recall should be of similar difficulty with a face present or absent.

While the brain excels at recognizing faces it lets us down when we need to recall them. We need to recognize so much more frequently than we need to recall that the evolution of memory for faces must have been governed almost entirely by the demands of recognition. There is probably no simple solution to the practical problem of recalling faces. It is possible that an effective system of recall can only be achieved by a programme of training as part of school education. If this is so, it is a necessary price to pay for living in an urban society: in the country most faces are familiar, but in cities we are unequipped to cope with such enormous numbers of people.

ACKNOWLEDGEMENTS

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REFERENCES

Final report to SSRC project HR 3123/1.


APPENDIX

'Imagery for a Face' Questionnaire

Subjects are asked to close their eyes and to try to form a clear image of the face. After 30s these instructions are read slowly, pausing between sentences.

"I expect most of you have been able to form some sort of image by now. Don't open your eyes yet. Can you see whether your image is coloured, or is it just gray, rather like a black and white photograph? For example, are you able to see the colour of the eyes? Now, still keeping your eyes shut, I want to know whether you can change the expression on the face. For example, if it is a smiling face, can you change the expression to 'thoughtful' or to 'angry'? Can you try this now? Please open your eyes now, turn over the page and answer the four questions as accurately as you can."

The questionnaire is reproduced below. It is scored simply by numbering the answers from left to right, and adding up the total. For example, someone who answered, "clear", "clearly coloured", "yes, easily" and "the image disappeared . . .", would score $4 + 3 + 3 + 2 = 12$. Anyone who answers "unable to form an image" to question 1 is given a score of 4, regardless of their other answers. Pearson correlation
coefficients between the four questions are shown in Table II.

For each question, circle the best answer.

1. How vivid was your image of the face?

Unable to form Very Rather Clear Very
an image faint faint clear clear

2. Was your image coloured?

Not Faintly Clearly Clearly coloured
coloured coloured coloured including colour of eyes

3. Were you able to change the expression on the face?

Unable to Yes, with Yes, easily
do this difficulty

4. Were you able to maintain the image of the face, or did it frequently disappear?

The image frequently The image disappeared The image was
disappeared and was but could easily be easy to main-
difficult to bring tain and
back brought back rarely dis-

TABLE II

Pearson correlation coefficients between the four questions (N = 280).

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Fig. 1 The 12 faces used in the first study. Michelmore is number 65.