What can we learn about a face from a single view?

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Abstract

There are large differences between invariant recognition of familiar faces across changes in pose and lighting and poor recognition of unfamiliar faces across equivalent transformations. It's unclear whether this difference reflects that familiar faces have been seen more often (multiple exposures) or across perceptual transformations (multiple views). Two experiments examine how well a face can be learned from a single view with single or multiple exposures. In experiment 1, participants received a single exposure or multiple exposures of a photograph of each stimulus face and recognition memory was tested for the same view and across transformations of pose and lighting. The results indicated that multiple exposures significantly improved recognition but did not give rise to invariance. Experiment 2 examined the effect of a delay of 2 and 12 weeks on recognition memory, participants showed no significant decline in performance. The key factor implicated in forming an invariant representation of a familiar face looks to be the number of views seen, not the number of exposures.

Introduction

Previous research has revealed large differences in performance for the processing of unfamiliar and familiar faces.

How do faces become familiar? What allows us to become familiar with a face? Do we become familiar with a face because we have

- seen it from a large number of views?
- seen it a large number of times?

The research presented here examines the second of these 2 possibilities. Can we learn a face from a single view presented a large number of times?

Experiment 1

Does seeing a single view of a face a number of times lead to invariant recognition?

Method

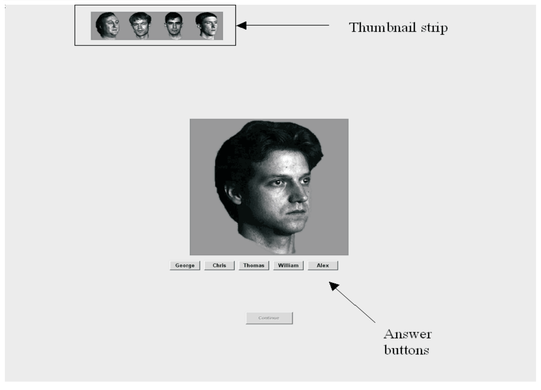
24 participants in 2 groups.

1st Phase – 12 faces seen for 5 seconds each. Name presented with it.

2nd Phase – One group received training which required participants to name the faces. The other group did not.

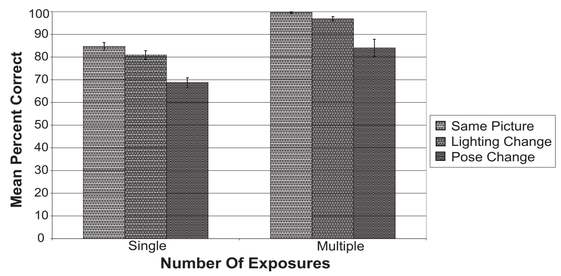
3rd Phase – Both groups completed a recognition memory task for the same image plus, a change in pose, a change in lighting direction

Figure 1



Results

Mean Percent Correct Obtained



Significant effect of number of exposures; $F(1,22) = 39.33$, $p < 0.01$.
Significant effect of transformation type; $F(2,44) = 31.413$, $p < 0.01$. No interaction ($F < 1$).

Results indicate that:

- multiple exposures lead to better recognition than a single exposure does
- for both single and multiple exposures, the same picture is recognised better than the lighting change which is recognised better than the pose change

No evidence that multiple exposures leads to invariant recognition

Experiment 2

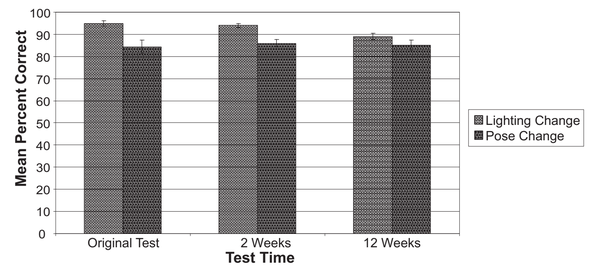
How robust is learning?

- Tested recognition memory 2 and 12 weeks after learning.
- 14 participants.
- Procedure was the same as experiment 1 except 16 faces were used[1].

[1] The initial part of training consisted of 4 blocks of 4 faces

Results

Mean Percent Correct Obtained During The Original Test And Subsequent Tests At 2 And 12 Weeks



Significant effect of transformation type; $F(1,13) = 16.71$, $p < 0.01$.
No effect of testing time; ($F(2,26) = 1.33$, $p > 0.1$).
No interaction ($F(2,26) = 1.05$, $p > 0.1$).

Results indicate that:

- learning achieved via the training procedure is robust over a period of 3 months and
- over this period the change of lighting has less of an effect on recognition than the change of pose

Conclusions

Experiment 1 demonstrated that providing the same picture a large number of times leads to better performance than a single exposure.

Both experiments suggest that this learning is limited to the particular image studied.

Overall, it would appear that for a face to become truly familiar, the number of views seen is of importance.

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