

Memory for famous faces: Role of stimulus clutter

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Problem

How does viewing multiple faces simultaneously affect our memory for these faces?

Background



Previous research on human perception and memory of faces has focused primarily on presenting a single face in isolation, a situation rarely found in the real world.

Recent research has shown that the human brain increases activity when viewing multiple *identical* faces, but decreases activity when viewing multiple *different* faces.

Present study: What is the corresponding behavioral response, particularly short-term and long-term memory, when people view multiple versus isolated faces?



Experiment

Condition 1: 1-single



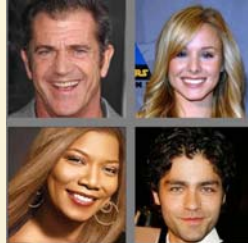
A single face presented once in the experiment, for 2 sec.

Condition 2: 4-same



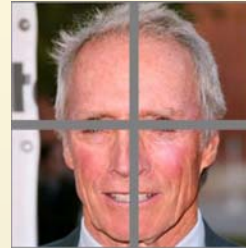
One identity is duplicated and presented simultaneously in four quadrants. The display is presented once for 2 sec.

Condition 3: 4-different



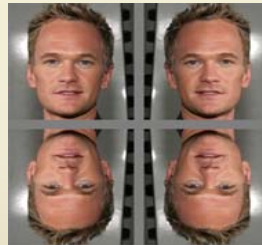
Four identities are presented simultaneously, on 4 occasions, for a total of 8 sec (2 sec per identity).

Condition 4: 1-big



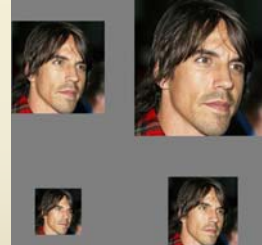
One large face is split into 4 quadrants. It is shown once for 2 sec.

Condition 5: Symmetry



One identity is flipped and/or inverted. The display is presented once for 2 sec.

Condition 6: Size-Diff

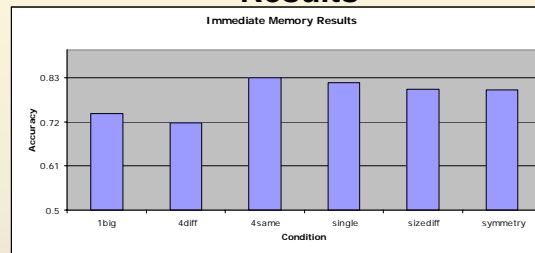


One identity is altered into four different sizes. The display is presented once for 2 sec.

Task during memory encoding: Rate how much one likes the display.

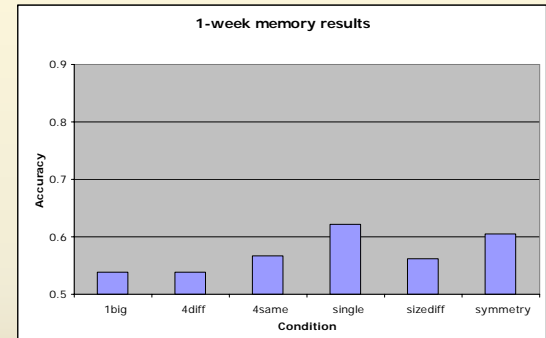
Task during memory testing: Which face (an old one and a new one) did you see before? Memory is tested immediately or after a one-week delay.

Results



Accuracy of immediate memory: 4-different < the other conditions.

➔ Different faces compete for neural representation, degrading immediate memory performance



Accuracy of long-term memory: 4-different is still lower than the other conditions, but the advantage in the 4-same condition (compared with single) is absent (or reversed).

Analysis and Conclusion

Immediate memory: Highest for 4 identical faces and lowest for 4 different faces, consistent with the brain imaging data. Presenting different faces lead to neural competition, reducing brain activity and impairing face memory.

Long-term memory: Highest for single faces and lowest for 4 different faces. More data are needed to confirm the statistical significance of these trends.

Take home message: To enhance visual perception and memory of objects (or faces), avoid presenting multiple different objects simultaneously.

Our brain is limited in its capacity in handling multiple different objects.



Acknowledgement and References

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¹ Shim, W.M., Jiang, Y. V., Kanwisher, N. (2008). Types and tokens in the ventral visual pathway: The neural representation of multiple visual objects. *Journal of Vision*, 8(6): 66, 66a.