Introduction:
The classic psychological finding of Miller (1956) demonstrates a limitation on unidimensional absolute identification performance occurring around seven "plus or minus two" exemplars (Shiffrin & Nosofsky, 1994). Is this limitation present in neural adaptive indexes of perceptual similarity? To approach this question, we investigated the effects of gamut and dimensionality on the ERP response to non-face objects (Op de Beeck, Wagemans & Vogels, 2001).

Stimuli: One and 2 Dimensions; Five and Nine Exemplars

- 968 trials (nine-stimulus conditions), 864 trials (five-stimulus condition)
- Counterbalanced de Bruijn sequences (stimulus order & ISI; Aguirre 2011)
- Orientation of linear space & condition order was varied across subject.
- Subjects responded via button-press to target shape (every 5.5 - 6 trials).

Sensor Selection & Component Identification:

- Orthogonal comparison (targets versus non-targets) used to identify object-responsive sensors-of-interest (in red).
- Center of target response was used to define object-selective component-of-interest. Mean amplitudes were calculated for a 100 ms window (grey).

Experiment: Carry-over ERP design

- Single Five
- 1000 ms
- 235-335 ms
- Target Image
- Time
- Nine Stimuli
- Five Stimuli

Main Effect: F(4,52) = 2.63, p = 0.045

Main Effect: F(1.2, 16) = 3.36, p = 0.033 (two-tailed).

Post-hoc t-tests suggest a trending reduction in linear adaptation for the nine stimulus linear space; (five > nine); t(13) = 2.04, p = 0.062 (two-tailed), that is altered for the nine stimulus circular space; (pol > nine); t(13) = 2.38, p = 0.033 (two-tailed).

Conclusions:
We find that changes in stimulus gamut and dimensionality cause identical stimulus transitions to evince different neural responses. The attenuation of neural dissimilarity for stimulus changes within the 9 space may be the basis of Miller’s limit on absolute identification. While we interpret these findings as sensory representations (Kahn, Harris, Wolk & Aguirre, 2010), additional work is needed to characterize the perceptual correlates of these ERP components.

Contact:
dakahn@mail.med.upenn.edu
aguirreg@mail.med.upenn.edu

Acknowledgements:
Robert T. Schultz 2
David A. Wolk 1

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