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**PSYC03 Final Project Description**

Previous studies with applications of metric MDS show evidence that human faces can be assessed across numerous psychological relevant properties or patterns (Nestor et al, 2016). The result leads to an intriguing topic of the visual cortex: what is the relationship between cognitive face similarities and psychological relevant properties?

My goal is to investigate the neural mechanisms underlying the recognition of distinct individual faces in the human ventral cortex. The present case study will analyze how individuals differentiate faces based on age and attractiveness to support a better understanding of the topic. The metric MDS statistical technique will be used to visualize the differences between faces using a q-dimensional map based on eigen-decomposition for the study.

Programming is required to systematically showcase pairs of faces, record participants' responses, and statistically analyze responses for the study. The experimental script helps minimize possible observer biases and research budgets/costs. It, furthermore, makes the process convenient when switching to other face stimuli. The analysis script, on the other hand, efficiently and accurately helps us analyze the obtained data. However, the scripts have limitations: the sets of faces are not randomized, meaning one face will be compared to other faces in a serial order. The repetitiveness could influence participants’ responses.

The responses will be recorded into a distance matrix. At the end of the experiment, a matrix with responses below the diagonal line is obtained (see example matrix below).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Face 1 | Face 2 | Face 3 | … | Face 120 |
| Face 1 | 0 | 0 | 0 | … | 0 |
| Face 2 | R | 0 | 0 | … | 0 |
| Face 3 | R | R | 0 | … | 0 |
| … |  |  |  |  | 0 |
| Face 120 | R | R | R | … | 0 |
| \*R indicates responses | | | | | |

The two matrices (age & attractiveness) will then be modified to symmetrical and analyzed by metric MDS script to apply eigen-decomposition, assisting us to visualize pairs of psychological dimensions and how faces from the study are different in the psychological space of each case. By obtaining distances based on age and attractiveness, we are confident to conclude that the q eigenvalues dimensional map will be constructed mainly related to these two dimensions. The result is believed to provide insight into how faces differ based on attractiveness and age in human psychological space.

# References

Nestor, A., Plaut, D. C., & Behrmann, M. (2016). Feature-based face representations and image reconstruction from behavioral and neural data. Proceedings of the National Academy of Sciences - PNAS, 113(2), 416–421. https://doi.org/10.1073/pnas.1514551112