Color categorization in macaques

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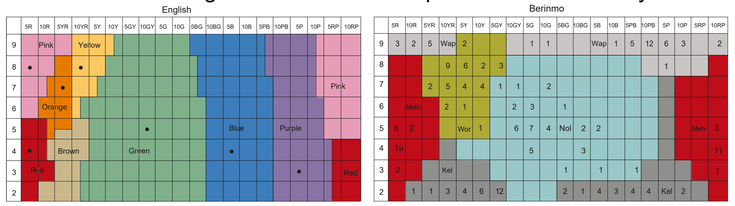
Objectives

Categorization is a hallmark of high-level cognition, studied extensively with color. How are colors categorized independent of language? We explored this question by measuring color categorization in macaques, a primate species which shares the same retinal color-encoding mechanisms as humans.

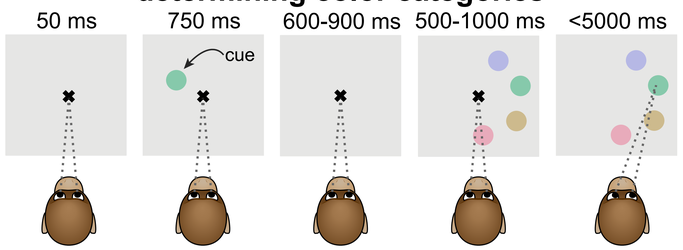
Color categorization in humans

Human categories show universal patterns and variability.



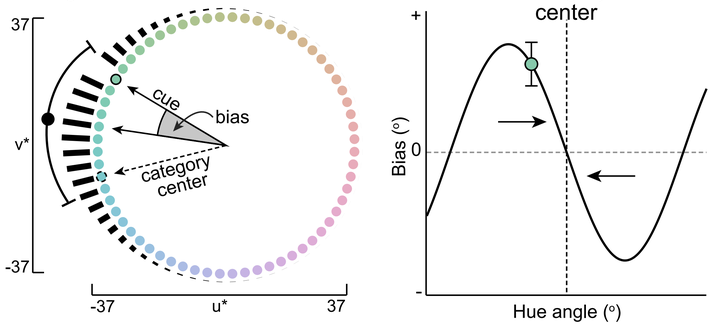
Davidoff et al. (1999)

Non-verbal paradigm for determining color categories

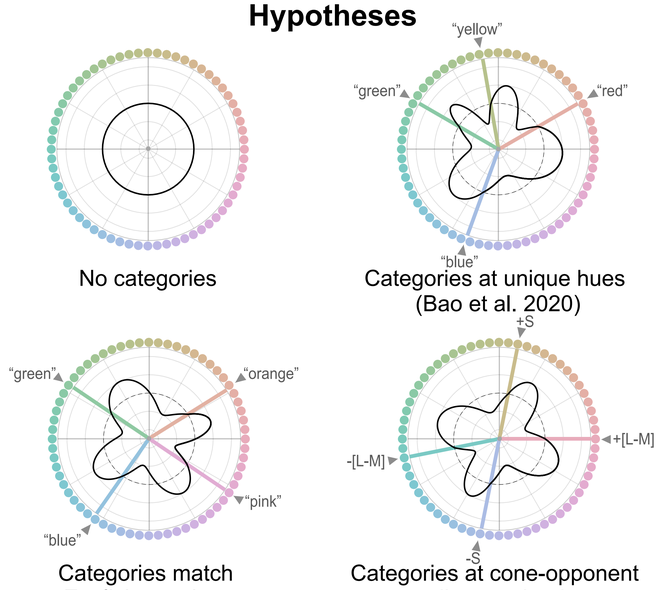


Bias as a measure of categorization

Histogram of selections on incorrect trials

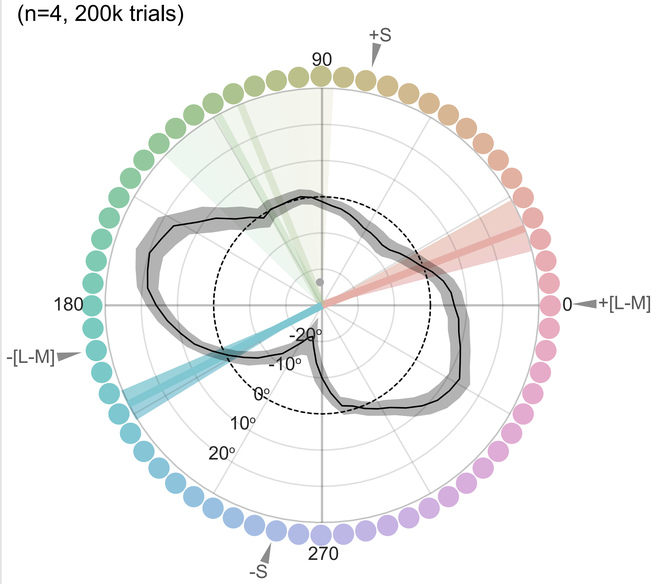


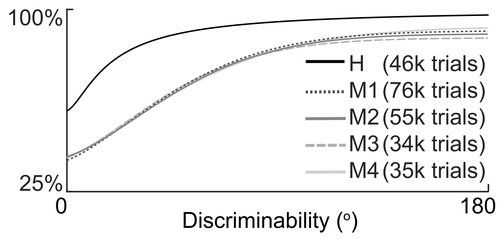
Hypotheses



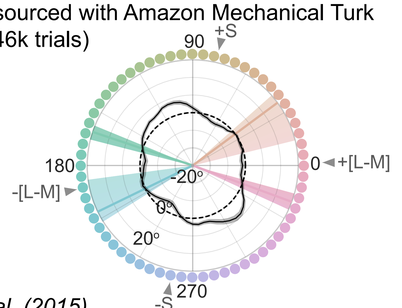
Macaques share two color categories with humans

Macaques
(n=4, 200k trials)

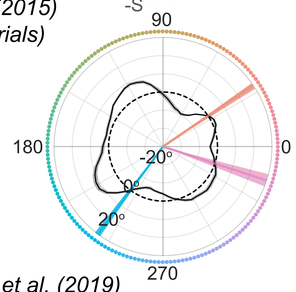




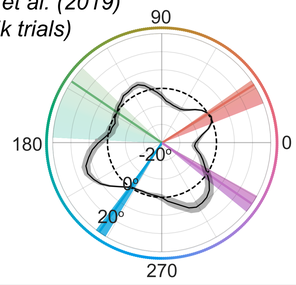
Crowd sourced with Amazon Mechanical Turk
(n=72, 46k trials)



Bae et al. (2015)
(n=3, 11k trials)

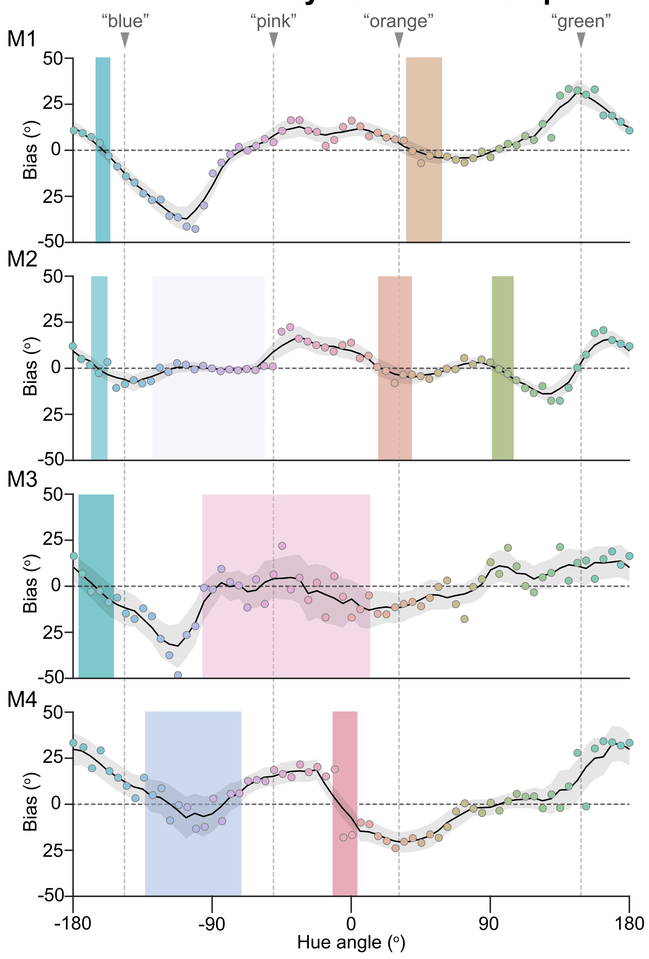


Panichello et al. (2019)
(n=106, 17k trials)

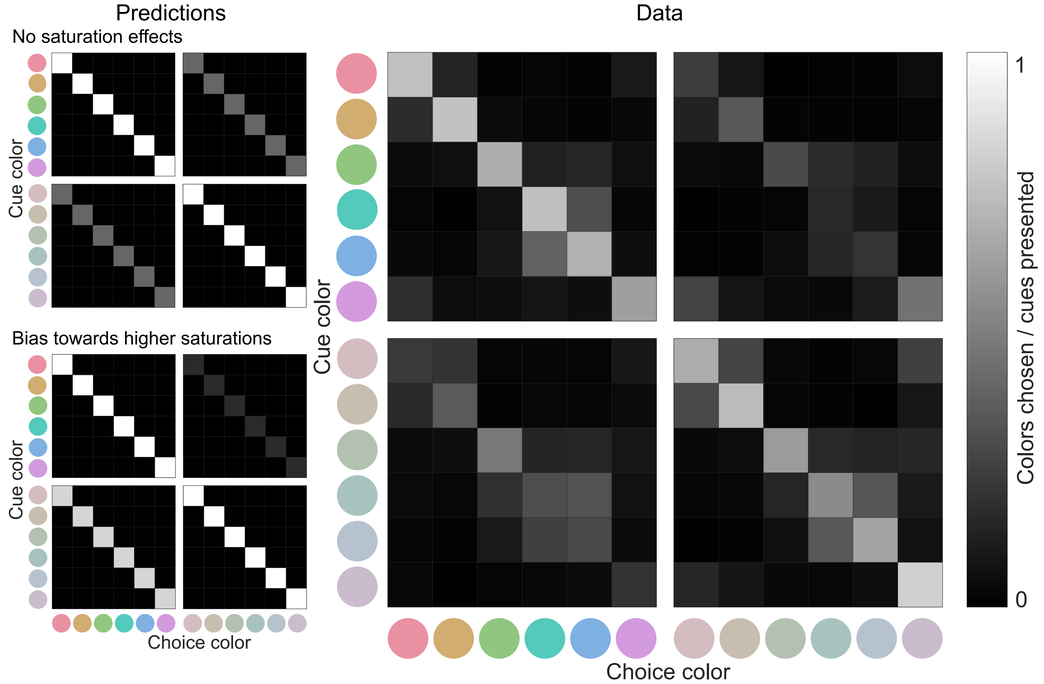


Macaques show consistently **two color categories**, which align with the primitive "**warm-cool**" categories evident in all human cultures.

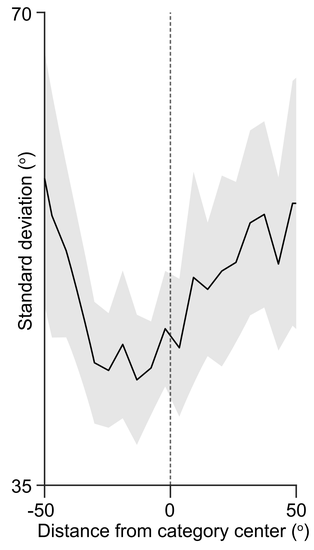
Individual variability between macaques



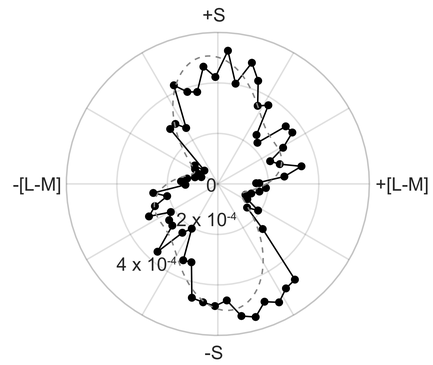
Macaques show no bias for higher saturations



Low behavioral variability at category centers



Learning rate is higher along S-axis



References

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