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@BevilConway

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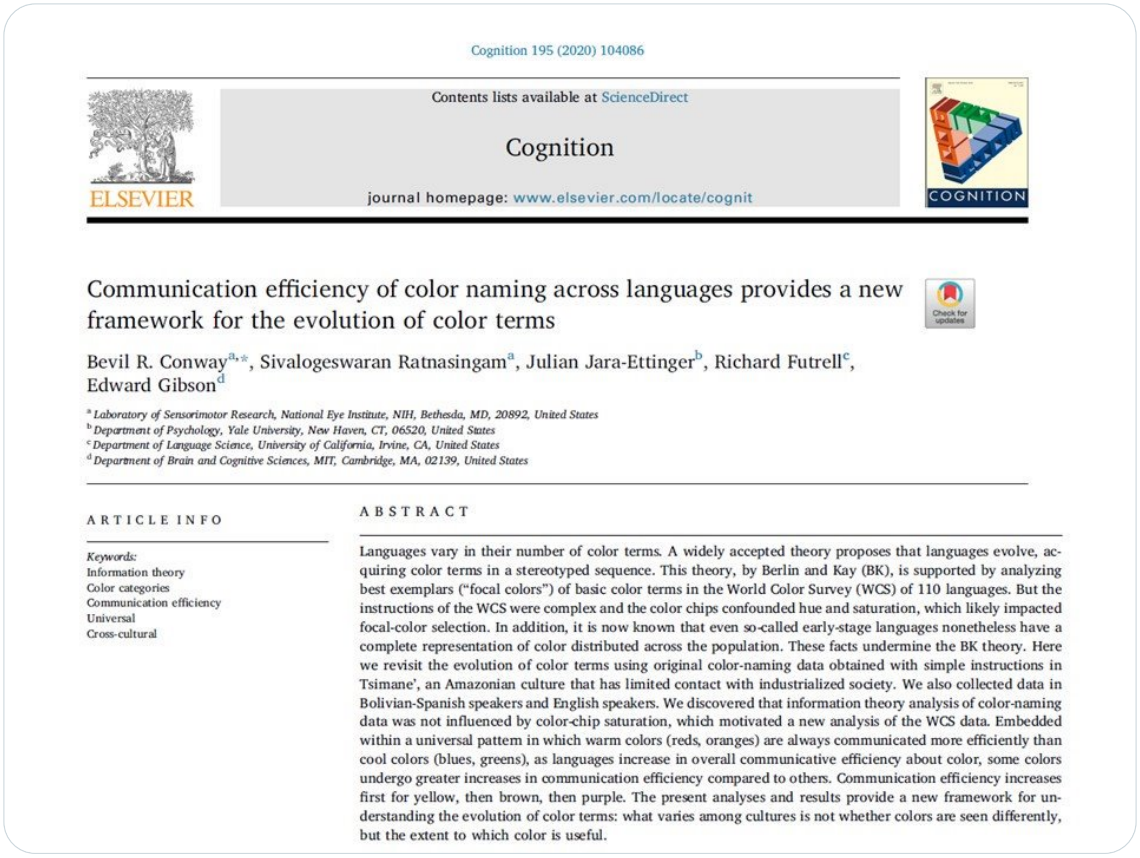

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Communication efficiency of color naming across languages provides a new framework for the evolution of color terms

Bevil R. Conway[a,*], Sivalogeswaran Ratnasingam[a], Julian Jara-Ettinger[b], Richard Futrell[c], Edward Gibson[d]

[a] Laboratory of Sensorimotor Research, National Eye Institute, NIH, Bethesda, MD, 20892, United States
[b] Department of Psychology, Yale University, New Haven, CT, 06520, United States
[c] Department of Language Science, University of California, Irvine, CA, United States
[d] Department of Brain and Cognitive Sciences, MIT, Cambridge, MA, 02139, United States

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ABSTRACT

Languages vary in their number of color terms. A widely accepted theory proposes that languages evolve, acquiring color terms in a stereotyped sequence. This theory, by Berlin and Kay (BK), is supported by analyzing best exemplars ("focal colors") of basic color terms in the World Color Survey (WCS) of 110 languages. But the instructions of the WCS were complex and the color chips confounded hue and saturation, which likely impacted focal-color selection. In addition, it is now known that even so-called early-stage languages nonetheless have a complete representation of color distributed across the population. These facts undermine the BK theory. Here we revisit the evolution of color terms using original color-naming data obtained with simple instructions in Tsimane', an Amazonian culture that has limited contact with industrialized society. We also collected data in Bolivian-Spanish speakers and English speakers. We discovered that information theory analysis of color-naming data was not influenced by color-chip saturation, which motivated a new analysis of the WCS data. Embedded within a universal pattern in which warm colors (reds, oranges) are always communicated more efficiently than cool colors (blues, greens), as languages increase in overall communicative efficiency about color, some colors undergo greater increases in communication efficiency compared to others. Communication efficiency increases first for yellow, then brown, then purple. The present analyses and results provide a new framework for understanding the evolution of color terms: what varies among cultures is not whether colors are seen differently, but the extent to which color is useful.

Ted Gibson, Language Lab MIT and 3 others

2:30 PM · Nov 12, 2019

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The famous theory by Berlin and Kay for how color terms are thought to evolve has seven stages:

The theory is based on what colors people select as "best exemplars" (i.e. focal colors). A key piece of evidence is the universality of these selections.

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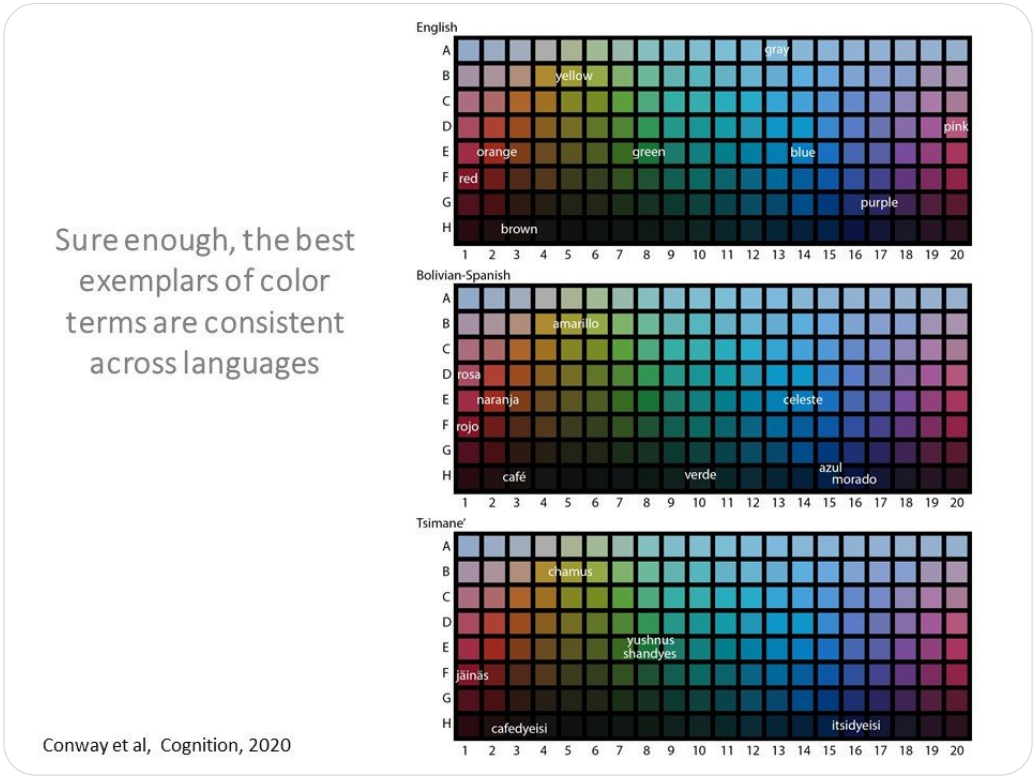

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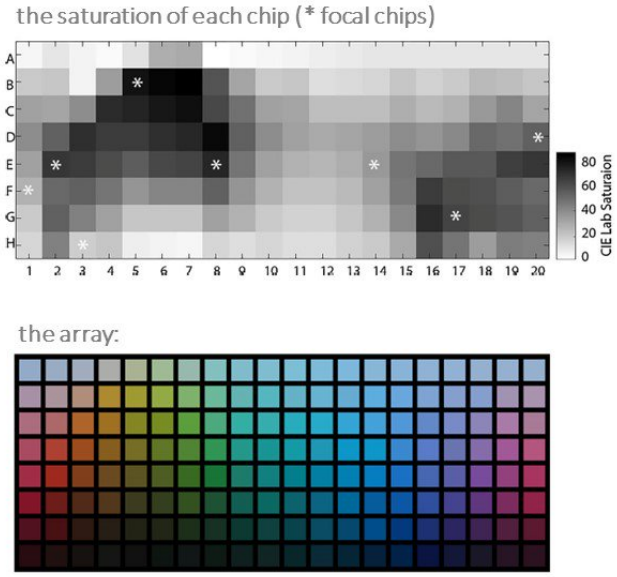
Here's the problem:

The chips in the standard array vary in both color and saturation. And chips selected as focal are the saturtation ones.

Are color chips picked because of hue or saturation (or a combo)?



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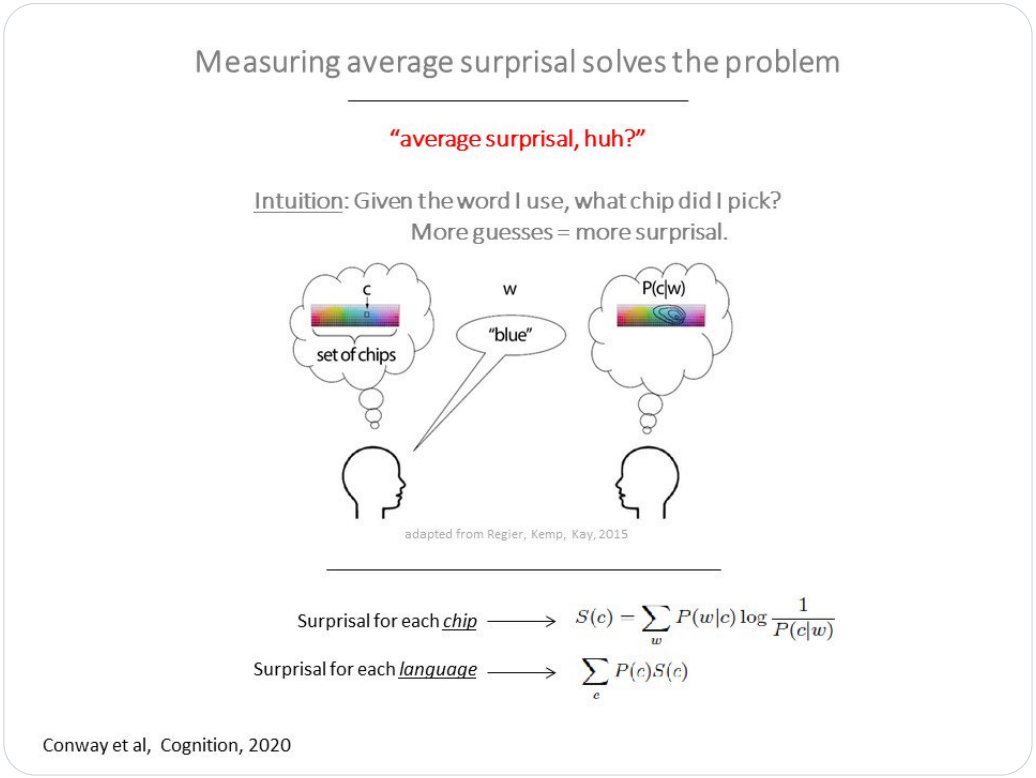

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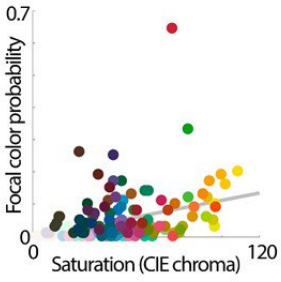
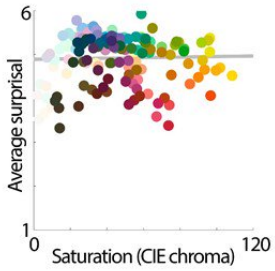
So you want to understand color-naming patterns?
Use average surprisal not focal-color status

Focal-color probability is confounded by saturation



Rho = 0.36 ($p=3x10^{-6}$)

Average surprisal is not confounded by saturation



Rho = 0.027 (p=0.73)

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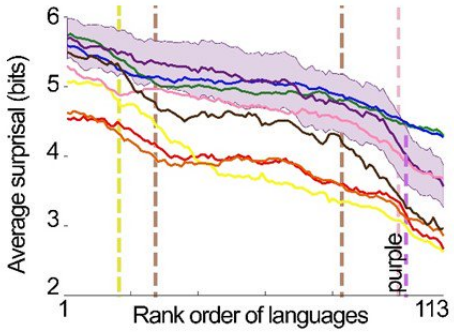
And the hot discovery:

Average surprisal uncovers a new framework for color-term evolution

- Data from 113 languages are rank-ordered by overall high communication about color.
- Colored lines show the average surprisal for focal colors. 95% CI for purple shown.
- As languages increase in overall communication efficiency (left to right), some colors undergo greater relative increases.



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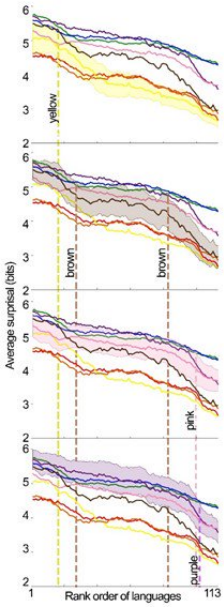
And the hot discovery:

Average surprisal uncovers a new framework for color-term evolution

Warm colors (red, orange) are always communicated with high efficiency

Cool colors (blue, green) are always communicated with low efficiency.

Relatively greater increases are found for yellow, then brown, then pink & purple.



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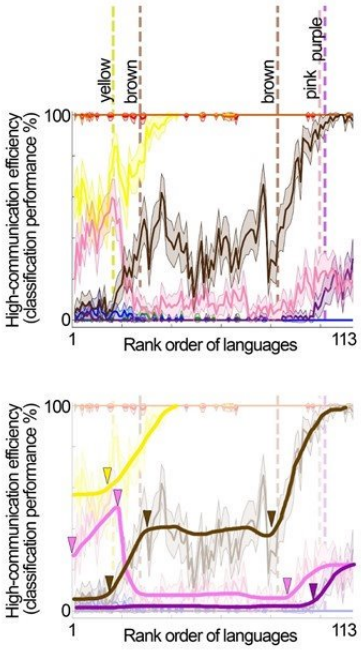
Oh yeah? Quantify it!

Binary classification of surprisal values for focal-color chips from 113 languages (95 % CI in shading).

Warm colors (red, orange) are always communicated with high efficiency

Cool colors (blue, green) are always communicated with low efficiency.

Relatively greater increases are found for yellow, then brown, then pink & purple.



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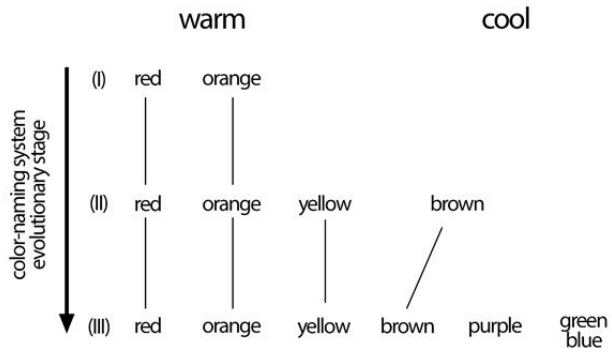
The new framework for color-term evolution uncovered by evaluating communication efficiency of color naming



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