Exploring the Role of Language in Two Systems for Categorization

Kayleigh Ryherd, PhD
University of Connecticut, 2019

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Blablabla said Nobody (?, ?).

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Statistical density is the method that Sloutsky and colleagues use to define categories (Sloutsky, 2010). Dense categories have multiple intercorrelated features, while sparse categories have few relevant features. Statistical density can vary between 0 and 1. Higher values (closer to 1) are dense, while lower values (closer to 0) are sparse. We calculate statistical density (D) with the following formula, where H_{within} is the entropy within the category and $H_{between}$ is the entropy between the category and contrasting categories.

$$D = 1 - \frac{H_{within}}{H_{between}}$$

To find total entropy(H), we sum entropy due to varying dimension and entropy due to varying relations among dimensions.

$$H = H^{dim} + H^{rel}$$

This equation is the same whether you are calculating within-category entropy or between-category entropy. To find entropy due to dimensions, you use the following formulas.

$$H_{within}^{dim} = \sum_{i=1}^{M} w_i [\sum_{j=0,1} within(p_j log_2 p_j)]$$

$$H_{between}^{dim} = \sum_{i=1}^{M} w_i [\sum_{j=0,1} between(p_j log_2 p_j)]$$

References

Sloutsky, V. M. (2010). From Perceptual Categories to Concepts: What Develops? *Cognitive Science*, *34*(7), 1244–1286. doi: 10.1111/j.1551-6709.2010.01129.x