A basic-level disadvantage for speeded category-verification

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Introduction

People are generally faster and more accurate to name or categorize objects at an intermediate (“basic”) level of specificity such as “bird,” relative to more general (“animal”) or specific (“kingfisher”) levels. The robustness of the basic-level advantage might suggest a dual-process account of knowledge retrieval in which objects first activate basic-level categories directly, and later engage more general or specific categories through the spread of activation in a processing hierarchy. This standard account is challenged, however, by data from patients with semantic dementia (SD), a progressive disorder that erodes semantic memory. Such patients can frequently categorize at the general- but not the basic-level. In this project, we seek to reconcile these seemingly contradictory pieces of data, using insights from a connectionist model of semantic knowledge.

Results: Healthy Ss

- Healthy Ss showed the standard basic-level advantage, responding most quickly and most accurately for basic-level names.
- There was no significant difference in reaction time or accuracy between specific and general name conditions.

Experiment 1

- Word (1 s) Match or Nonmatch
- Ss viewed a word followed by a matching or non-matching picture.
- Words were specific, basic-level, or general category names.
- Normal Ss, age-matched to the patients, indicated match or nonmatch as quickly and accurately as possible.
- Ss patients with SD made the same judgment without time pressure.

Results: Patients with SD

- SD patients were classified as Mild, Moderate or Severe on the basis of word-picture matching scores (Mild: > 75% correct; Moderate: 50-75% correct; Severe: < 50% correct).
- Patients showed increasingly severe impairments for more specific category names, but no impairment at the general level.
- The basic-level advantage is observed in the mildest patients, but basic-level performance is reliably worse than general-level performance in the most severe patients.

Explanation (Rogers & McClelland, 2004)

- Semantic representations are used to map between perceptual, motor, and language representations in different modalities.
- Accurate (prop. correct)
- RT (ms)

- Basic-level effects reveal the influence of this similarity structure on name-learning. Learning to call a canary a “bird” generalizes to all other birds and benefits name acquisition. In fact, naming specific names suffers from close-item interference and is more vulnerable to categories that have less, but still somewhat, similar patterns.

Results & conclusion

- If general names span a broader region of the representation space, they should begin to activate earlier, when the settling representation is in the right general neighborhood but not yet in the basic-level cluster.
- Once the representation is close enough to the basic-level cluster, basic-level names activate more rapidly than general-level names, so basic-level names are the first to cross threshold.
- Prediction: If participants are forced to respond faster than usual, the basic-over-general advantage should be reversed.

- The same healthy Ss from experiment 1 participated in a deadline-matching version of the same experiment with the same materials.
- After reading the word, sjs heard four regularly paced tones. They were instructed to time their responses exactly with the last tone.
- The time between the onset of the picture and the deadline was manipulated, so that Ss responded i) with their previous basic-level RT, ii) 250 ms faster and iii) 400 ms faster.