Partial Exemplar Classification: When *Seeing* Less Means *Learning* More

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Category learning takes place under a variety of circumstances, but most category learning research has relied on a single task – classification. Classification may not lead to learning some important knowledge that category learners clearly possess, such as within-category information (e.g., Markman & Ross, 2003). However, most studies of classification, including those revealing its shortcomings, are conducted under narrow conditions that may not be representative of natural classification. The goal of this study was to consider a type of learning more like real-world classification and ask: Do these learners acquire knowledge that standard classification fails to promote?

In many situations, category exemplars appear with missing attributes. Indeed, this is always the case for opaque 3D objects – the presumed target of study in much category research. Classification learners with full access to exemplars' features seek out the features diagnostic for categorization (e.g., Nosofsky, 1987), but what if these features are sometimes unavailable? Perhaps when some diagnostic information cannot be relied upon, participants distribute their attention more broadly thereby learning more about a category's features, including non-diagnostic but prototypical features (e.g., *has two eyes* is typical of cats but does not distinguish them from other animals). Surprisingly, non-diagnostic features have little, if any, influence on standard classification learners' typicality judgments (Chin-Parker & Ross, 2004). The current study asks whether this limitation is inherent to classification or merely true of some varieties of laboratory-based learning.

Experiments 1 and 2

Two groups of participants learned to classify categories of fictitious bugs. The *Full* group saw bugs with all features visible, and the *Partial* group saw bugs with four of six features. Two categories of six exemplars were generated from the prototypes 000011 and 111111 by changing one binary feature per item (e.g., 111110). Four features had 83% diagnosticity and two features were non-diagnostic.

Participants categorized learning items one at a time until they were correct nine items in a row, with a minimum of 50 trials. To generate partial exemplars, two features were randomly removed (Exp. 1) or occluded (Exp. 2) from the chosen full bug on a given trial (see Figure 1).

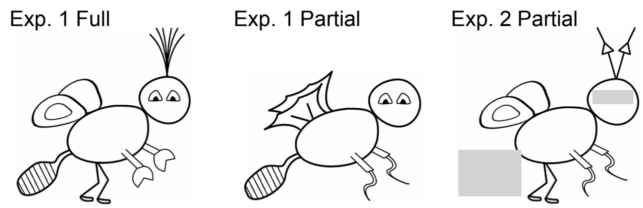

Figure 1: Sample *full* and *partial* exemplars.

Learning was assessed with typicality ratings (1-7) of new and old items from both categories. We measured a) the average impact of an additional prototypical diagnostic feature (holding non-diagnostic features constant; e.g., 011110 vs. 111110) and b) the average impact of an additional prototypical non-diagnostic feature (holding diagnostic features constant; e.g., 111100 vs. 111110). The average impact of an added diagnostic feature was large for the Full group (E1 = 0.87, E2 = 1.02) and the Partial group (E1 = 0.60, E2 = 0.97), but the groups did not differ statistically (p's > 0.10). Critically, the impact of an added non-diagnostic feature was small for the Full group (E1 = 0.06, E2 = 0.01) and significantly larger for Partial (E1 = 0.30, E2 = 0.24) in both experiments (p's < 0.05).

These results indicate that classification can, under some learning conditions, promote the learning of non-diagnostic prototypical features. It is an open question as to what other aspects of the literature and theories depend on specifics of the commonly used classification learning paradigm.

References

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