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The Effect of Category Labels on Inference and Classification

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Although inference and classification are two of the most important functions of categories, categorization research has focused primarily on the investigation of classification. The underlying assumptions of this line of research is that classification is essentially equivalent to inference, and that the category label can be treated as just another feature of category exemplars. A number of findings, however, indicate that inference and classification are based on fundamentally different processes: People attend to within-category information for inference, but they use between-category information for classification. This difference may arise from the fact that inference and classification require different uses of categories. Inference is pertinent to the prediction of unknown attributes, and classification is essential for stimulus identification and discrimination.

In the experiment we describe, we hypothesized that the major difference between inference and classification results from distinct representational characteristics associated with category labels. In particular, we suggest that category labels are represented differently from category features, and guide subjects to focus on category information bounded within a category.

In the experiment, subjects were given a sample sheet depicting 10 members of two categories (5 for each category) and answered either classification questions or inference questions shown in a booklet. The two categories shown on the sample sheet have a family resemblance structure. The stimuli, which depicted schematic figures of bugs, consisted of five features and a category label, "monek" or "plaple."

In the classification questions, subjects predicted the category label of a stimulus given four dimensions of feature information. In the inference questions, subjects predicted a feature value of a stimulus given three dimensions of feature information and the category label. Subjects made responses based on the sample sheet, which was available to them throughout the experiment.

In general, subjects' response-patterns coincided with overall similarity between test stimuli and the exemplars of the two categories. For classification questions, 95% of responses were made consistent with a particular category if test stimuli had 4 out of 5 features in common with the prototype of the corresponding category (i.e., high-match). This percentage dropped to 76% and 25% respectively if test stimuli had 3 out of 5 features (i.e., medium-match) or 2 out of 5 features (i.e., low-match) in common with the prototype of the corresponding category. Thus, subject's classification performance reflected overall similarity between test stimuli and the exemplars of the two categories. In contrast, for inference questions, similarity information was not a good predictor if category labels contradicted feature-match information. In the condition comparable to the high-match classification questions, subjects made 89% of responses consistent with the corresponding category. This percentage decreased to 79% and 75% in the conditions comparable to the medium-match and the low-match classification questions in inference questions. These results indicate that subjects do not want to give a response that is inconsistent with the category label, even though it would agree with similarity information. In other words, category labels are differentiated from category features in representation and category labels play a guiding role in inference. We tested this idea further by modifying the characteristic associated with the two category labels.

In one condition, the instructions stated that the two labels represented the two types of bugs. In another condition, the instruction stated that the two labels represented two shapes of wings. In the third condition, we replaced the two labels with actual figures depicting a new feature — two wings. The reasoning underlying these manipulations was that if category labels have a direct impact on subjects' inference performance, subjects should exhibit different response-patterns depending on the way category labels are characterized. The results of the experiment were consistent with this prediction.

When the two labels were described as two types of bugs, 81% of responses were consistent with the feature value predicted by the two labels (thereby subjects were primarily attending to the category exemplars bounded by the category label). This percentage dropped to 69% when the two labels were described as two shapes of wings, and to 64% when the two labels were replaced with actual figures of two wings.

The results of the experiment were consistent with our hypothesis: category labels are differentiated from category features in representation and play a guiding role in inferences.

Reference

Yamauchi, T. & Markman, A. B. (in preparation) Processes underlying inference and classification using categories.