

# Analogies in the Wild: Generated Analogies as Assertions of Categorization

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## Analogies in the wild

The research described here is an attempt to understand analogies that are spontaneously generated by students in science classrooms and in science discussions. Most analogy research and associated models of involve the *interpretation* or *application* and not the *generation* of analogies. Analysis of student discourse presented in this poster shows that analogies generated “in the wild” have features that are neither elicited nor explained by research on analogy interpretation. It is the main thesis of this poster that generated analogies are best understood as assertions of categorization in which the base is a prototypical member of an (often) ad hoc category. Categorization research, perhaps because of its focus on the categories that participants and cultures generate, can account for the following phenomena present in generated analogies: multiple analogies, the choice of base, and the variable representation of the base. Furthermore, the ontology of mind implied by a categorization model is consistent with other findings from cognitive science, linguistics and education research.

## Features of generated analogies

Far from what transfer studies would suggest, analogies are frequent in discussions about physical phenomena in science classrooms. In one fifth grade class, when discussing whether or not water will spill from a falling cup, students generate multiple analogies: it is like swinging a toy in a basket, throwing a bucket of water, an astronaut in a space shuttle, or tossing a container of dice. I argue that these analogies serve to assert and negotiate a category, and that this assertion is strengthened by multiple analogies.

The choice of the base in these analogies is consistent with categorization as well. While students may have experiences whose features and structure are similar to the topic at hand, the choice of base is often structurally similar and perceptually dissimilar. If one assumes that analogies are assertions of categorization, then these findings may be accounted for by arguing that the choice of base is the category prototype. In categories, prototypes are the first category members to be elicited; they are used to reason about the category as a whole, and are artifacts of cognitive models. Discourse analysis of analogies finds features of prototypes to be features of the base of generated analogies.

The representation of the base is generally taken for granted in models of analogy. However, there is evidence in generated analogies that the representation of the base is variable and can shift depending on the cognitive model a student applies. When reasoning about the relationship

between light and heat, students draw an analogy between light and money. This base changes representation during the discussion from one of wealth (in which \$1.00 can unproblematically change to  $4 \times \$0.25$ ) to one of currency (in which a dollar never “turns into” four quarters). Consistent with categorization research (Lakoff, 1987), this shift in representation is indicative of the change in cognitive model that is applied.

## Ontology of mind

Concepts have long been treated as mental representations that are accessed and acted on by computational processes. This assumption of concepts as stable representations and its implications on the ontology of concepts in the mind has been called into question in several fields, including psycholinguistics, categorization, and education. Despite these concerns, the most widely accepted and used models of analogy ascribe representations to concepts and treat these as fixed— perhaps an artifact of the nature of the analogy studies. A categorization model of analogies, in particular the relationship between categories and cognitive models, addresses these concerns and accounts for analogies using a manifold ontology of mind.

## Past research

The claim of analogies as assertions of categorization is not new to the conversation. However, past studies on analogy as categorization have been in vitro studies on the interpretation of analogies. Such scenarios limit the ability to observe variability in analogical reasoning, providing an incomplete picture of the nature of analogy. When viewing analogies that are created by students, the similarities between analogies and categorization become apparent.

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