
Framing categories – Aristotle's substance ontology as a conceptual scheme

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Lawrence Barsalou introduced frames as a general format of cognition to explain categorization behavior. Barsalou frames are interpreted as recursive attribute-value structures that comprise certain structural components such as relations, constraints, a central node and attribute value sets. A comprehensive formal model of frames that is capable of representing not only sortal concepts but also other logical concept types is currently developed (Petersen 2007, Loebner 2014). Loebner (2011) classifies four concept types according to the two features of uniqueness (U) and relationality (R). Attributes in frames are interpreted as functions assigning unique values.

The Aristotelian categories can be considered either as highest classes of entities or as kinds of predicates and therefore as possible ways that simple words can make reference to the world. Aristotle postulates a structural resemblance between the world and mental representations (Modrak 2001, p. 33). Substances are described as picking out an individual as a 'what-it-is' – e.g. Socrates as a human being because of certain essential qualities. The central node in frames is interpreted as referring to an individual of a certain kind while the other nodes describe aspects of this individual. Both uniqueness and relationality can be found in the Aristotelian scheme to distinguish categories and entities, respectively. We argue that in consequence, the Aristotelian categories have a strong resemblance to a theory of concept types and frames.

Aristotle, in addition to his ten-fold classification of categories, develops a four-fold ontological distinction resulting from the two features "being in something" and "being said of something" and their possible combinations. Particular properties (U) are "in something" while they are "not said of something". Primary substances like Socrates as an individual ($\neg R, U$) are not "in something" and not "said of something" while generic properties ($\neg U$) and substances, i.e. species ($\neg R, \neg U$), are "said of something".

Particular properties such as 'this green' may be interpreted either as an individual instance of green – e.g. 'the green of this tree' – which is individuated by virtue of inhering in an individual substance and thus cannot recur in any other tree of the same color whatsoever, or as a maximally determinate but still repeatable shade of green (Allen 1969, Corkum 2009). The same two options are available to describe the status of values in frames.

In case all referents represented by nodes in a frame are individuals (either substances or properties), it is evident that all relations in instantiated frames for individuals are one-to-one relations and, therefore, can be described as functional when abstracting from concrete instances to kinds.

If this feature of the frame model results merely from an ontological presupposition it might require further methodological justification since frames are described as a format of representation. It might seem counterintuitive at first sight why functional relations like 'mother of' are allowed as attributes in frames while non-functional relations like 'brother of' are not. Relations might be considered to have a content of their

own (e.g. two different individuals might have more than one relation such-as 'female genetic predecessor of' and 'birth-mother of' which coincide in most cases but still have to be individuated in some way). When cognitive criteria of what information is actually represented are taken into account it might be more economically to store attributes as relations rather than functions e.g. the attribute 'being a member of' might be applied more than once.

The case of the functionality constraint on the frame format showcases that it is really decisive to develop a coherent account of how frames should be conceived ontologically. If an ontology based on individuals is presupposed and the structures of representation are assimilated to the structures of reality as it is the case with the Aristotelian categorial scheme frames would be justified to describe all attributes as necessarily functional. However, this is not the case if a different ontology is assumed or the structures of representations are regarded as independent of the structures of reality. In the latter case psychological evidence for describing attributes as functional would be required. A third alternative would be not to ascribe cognitive reality to frames but to rather see them as a methodological tool of description. In this case different kinds of justification would be required e.g. like methodological economy.

This case study and comparison of frames as a model of representation to the Aristotelian categorial scheme shows that frame theory in particular and theories of representation in general should reflect their ontological presuppositions and the consequences they might have for their models and methodology.

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