

APPROXIMATE OBJECTS ARE PRECISE IN SOME CONTEXTS

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Abstract

Concepts that are ill-defined in general can be precise in limited contexts. We propose applications for this idea in AI and in philosophy.

Two previous papers (McCarthy 1993) (extended by (McCarthy and Buvač 1997)) and (McCarthy 2000) respectively discussed the idea of context as a formal object and the idea of an approximate entity without an if-and-only-if definition. The present paper combines these ideas. An entity without an if-and-only-if definition in general may admit such a definition in a suitably specialized context.

One example is the concept of a person owning an object, e.g. a house or a loaf of bread. In general owning is complicated, and many of these complications appear in case of a house. On the other hand, buying and hence owning a loaf of bread is ordinarily quite simple. The relation between owning in simple specialized contexts and owning in more general contexts is formalized in this paper.

1 Introduction—Informal examples

What's a lemon? It's a fruit of a particular kind. As far as I know, the DNA of lemons has not been sequenced yet, but biologists can tell us a lot about them. Lemon growers can tell us still more, only partly overlapping what the biologists tell us.

Now consider a five year old child in a supermarket. In that context, the child need only be told, "a lemon is a small yellow fruit with a skin like an orange but smaller." We don't want the child to bring us a grapefruit, referring to it as a big lemon.

The quoted phrase provides an if-and-only-if definition of lemon in context of the particular visit to the supermarket.

Here's another example.

A child first treats "mother" as a proper name for its own mother. Then it learns that other children have mothers so the word become the name of a kind. A common error at this stage is to refer to a man's wife as his mother. A bit later the child learns that "mother" designates a relationship. At some point the child learns that animals often have mothers and still later the fact that all animal have mothers, visible or not.

A child learns about stepmothers, about adopted children and about the biological role of mothers and fathers.

(McCarthy 1993) discusses contexts that are specializations of pre-existing context and gives examples of lifting formulas (bridge formulas) that relate assertions true in the inner and outer contexts. We can use specializations, but it seems likely that human usage, with adults as well as children, often starts with specialized contexts and the moves outwards. One goes from a context with clear if-and-only-if definitions to outer contexts in which these definitions don't apply. Both ordinary people and philosophers seek new if-and-only-if criteria. (McCarthy 2000) makes the point, not entirely explicitly, that this search is sometimes necessarily unsuccessful.

2 Action contexts with the actor unmentioned

References

McCarthy, J. 1993. Notes on Formalizing Context¹. In *IJCAI93*.

McCarthy, J. 2000. Approximate objects and approximate theories². In A. G. Cohn, F. Giunchiglia, and B. Selman (Eds.), *KR2000: Principles of Knowledge Representation and Reasoning, Proceedings of the Seventh International conference*, 519–526. Morgan-Kaufman.

McCarthy, J., and S. Buvač. 1997. Formalizing context (expanded notes). In A. Aliseda, R. v. Glabbeek, and D. Westerståhl (Eds.), *Computing Natural Language*. Center for the Study of Language and Information, Stanford University.

¹<http://www-formal.stanford.edu/jmc/context.html>

²<http://www-formal.stanford.edu/jmc/approximate.html>