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Copredication and Complexity Revisited: A Reply to Löhr and Michel

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Abstract

Human language affords the ability to attribute semantically distinct concepts to a single nominal, a process now commonly termed 'copredication'. If we describe a lunch as being delayed but also filling , senses of distinct semantic categories (event, physical object) are simultaneously being accessed. Copredication is relevant to major debates in cognitive science, since it cuts to the core of how the lexicon is formatted, and how distinct lexico-semantic representations relate to each other. The apparent scope and limits of copredication licensing can be explored via acceptability judgment and processing experiments, exposing certain replicable and generalizable patterns that apply across lexical types, syntactic structures, and different languages (Murphy 2021a, 2021b). As such, laying out the psycholinguistic terrain in which to address this phenomenon is crucial – and accounts that lack a valid psycholinguistic and empirical basis should be highlighted as problematic if they are to be accommodated and refined. Löhr and Michel (2022) claim that copredication acceptability is determined by a "set of expectations that are influenced by higher-order priors associated with discourse context and world knowledge". I will show that their model encounters a number of obstacles, and ends up unintentionally supporting an alternative model in Murphy (2019, 2021a, 2021b, 2021c), which they attempt to critique.

Keywords: Copredication; Polysemy; Complexity; Semantics; Prediction

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Human language affords the ability to attribute semantically distinct concepts to a single nominal, a process now commonly termed "copredication." If we describe a lunch as being *delayed* but also *filling*, senses of distinct semantic categories (EVENT, PHYSICAL OBJECT) are simultaneously being accessed. Copredication is relevant to major debates in cognitive science, since it cuts to the core of how the lexicon is formatted, and how distinct lexico-semantic representations relate to each other. The apparent scope and limits of copredication licensing can be explored via acceptability judgment and processing experiments, exposing certain replicable and generalizable patterns that apply across lexical types, syntactic structures, and different languages (Murphy, 2021a, 2021b). As such, laying out the psycholinguistic terrain in which to address this phenomenon is crucial—and accounts that lack a valid psycholinguistic and empirical basis should be highlighted as problematic if they are to be accommodated and refined.

Löhr and Michel (2022) claim that copredication acceptability is determined by a "set of expectations that are influenced by higher-order priors associated with discourse context and world knowledge." I will show that their model encounters a number of obstacles, and ends up unintentionally supporting an alternative model in Murphy (2019, 2021a, 2021b, 2021c), which they attempt to critique.

1. Methodological issues

The major methodological issues with the proposal in Löhr and Michel (2022) are as follows: (1) a lack of grounding in specific psycholinguistic variables, such as lexical frequency; (2) by ignoring these variables, the authors make predictions that already face a range of opposing empirical evidence; and (3) it can be shown that predictability bears no statistically significant relation with copredication acceptability, thus undermining the core architecture of the model proposed by Löhr and Michel (2022).

While Murphy (2019, 2021a) documented the frequency profiles of nominal senses in copredications, the authors declare without evidence that CITY "is connected to child nodes like" GOVERNMENT, POPULATION, and GEOGRAPHY, with a "high conditional probability" being that the "jump" will land on GOVERNMENT. The author's model concerns prediction, but what is missing is a discussion of lower-level statistics pertaining to lexicality, such as frequency, which is known to intimately relate to linguistic predictions and language processing more generally (Huizeling, Arana, Hagoort, & Schoffelen, 2022), and their new apparatus of sense node "jumping" is not anchored around any clear psycholinguistic architecture.

The authors assume that in neutral contexts *the expectations between senses are balanced*. But encountering BOOK in a neutral context will still be influenced by sense frequency and complexity (factors inherent not just to lexical items, but lexical senses that compose into polysemous words); given this, there is no obvious place for notions, such as balanced expectations in a cognitively plausible account.

The sense frequency profiles reported in Murphy (2021a) reveal that the expectations/frequencies for BOOK and CITY are not equally balanced between senses, and that *frequency has no statistically significant relationship with predicate order acceptability*

(e.g., there is no Dominant–Subordinate sense ordering preference). There is empirical evidence that persistence conditions of institutional entities in copredication are not significantly determined by sense frequency, but rather sense complexity (Murphy, 2021c). These findings are problematic for Löhr and Michel's model, since sense predictability most directly stems from a nominal's sense frequency profile.

The authors disagree with empirically documented acceptability dynamics (Murphy, 2021a), but to reconsider empirical findings, we require either reanalysis or further data. If one consults the Appendix in Murphy (2021a), there are a number of discrete acceptability judgments that one may personally disagree with, but that is not relevant to generalizable dynamics.

Next, we read that "Murphy focuses on aggregate statistics. We are here interested in a mechanistic cognitive account that can also accommodate [individual] differences." It is unclear to me how we can model individual differences without first establishing a theory of general dynamics, parsing biases, representational properties, and so forth. It is also unclear to me why Murphy's (2021a) priming model cannot accommodate individual differences (the authors do not explain why, either).

The authors incorrectly note that their (3a) and (3b) sentences "involve the same coactivation packages." They do not distinguish *types* (a) from individual *tokens* (b). The latter refers to an individual newspaper, not multiple copies of a given type; (a) could involve different copies of either the same day (Friday's newspaper), or different days. By not exploring this, the authors are led into the implication that the physical sense always "coactivates" both type/token senses. Meanwhile, their explanation for why (3a) is acceptable constitutes a reiteration of coherence relations. Their "expectation hierarchy" provides no definition of what comprehenders are to be expecting. The authors arbitrarily order senses based on what they consider felicitous copredications, introducing circularity.

2. Conceptual issues

The major conceptual issues with the proposal in Löhr and Michel (2022) are as follows: (1) a lack of novelty in the theoretical framing of copredication, with the central architecture being identical to an existing, influential model ("underspecification"); (2) the authors pose questions about semantic complexity and copredication that have already been empirically addressed in literature they cite; and (3) the authors make claims about semantic complexity that can be shown to be inconsistent with basic properties of polysemous senses widely discussed in the literature.

The authors propose that copredication parsing "involves the selection of one single and sufficiently abstract representation that is compatible with both predicates." This directly mirrors the existing "underspecification" account (Frisson, 2015). Murphy (2021a) presents empirical support for a complexity-based underspecification One Representation Hypothesis account, based on a priming mechanism between polysemous senses—a more specific and testable account than expectations about senses.

The authors claim that "it is still an open empirical question whether complexity is a causal-explanatory variable" with respect to copredication felicitousness, and note that "an interesting question is *why* the parser should prefer a simple-complex ordering." These issues are addressed in Murphy (2021a) (Chapter 6), where complexity was directly manipulated in one of the experimental reports, with additional experimental evidence being given for the role of coherence relations in acceptability. In an attempt to rebut Murphy, the authors note: "However, abstraction and complexity are plausibly often correlated." However, this is precisely what is argued in Murphy (2021a) (Chapter 4), motivating the specific experimental design therein.

The authors disagree with Murphy (2021a, 2021b) that the BUILDING sense of SCHOOL is less complex than INSTITUTION. Murphy presents a formal complexity hierarchy supported by a range of empirical and theoretical literature, illustrating how BUILDING (a physical artifact) is a less semantically complex *sense* than INSTITUTION, with the latter relying on Telic and Agentive thematic notions of means to a common end, intentional action, social cognition, and still more abstract features. With the SCHOOL example, the building is indeed a "school building" (as the authors note), but it could also turn into a library. INSTITUTION is also more abstract in that it does not even need a building (a school can be organized outdoors), being less temporally and physically delimited than BUILDING.

The authors object to another of Murphy's (2021a) claims about defining semantic complexity. The following is meant to constitute an argument against Murphy's empirically documented Complex-Simple acceptability costs: "[I]t has been suggested that children can quickly grasp more abstract features and generalizations before more specific exemplars are presented […] and that perception of complex object/scenes often involves first grasping the overall gist before concrete details." This assumes that stages of cognitive development need to map on to online sentence comprehension of analogous concepts. This is similar to arguing that English-speaking children, acquiring an SVO language, need to learn complex event semantics (V) before understanding objecthood (O). What is the principled connection between infants getting the "overall gist" of something and their copredication parsing preferences? Although the authors aim to solicit "cognitive developmental data [that] could be used to test our view," they do not cite evidence from child language development (Murphy, 2017) that already showed that there is no relation between age of acquisition of copredication senses and online processing dynamics. As such, the authors are reinforcing a conclusion reached in Murphy (2017, 2021a) while simultaneously trying to deploy this as a strong counter-argument to Murphy.

In summary, while the authors attempt to propose *a model of copredication anchored around predictability* in an effort to trump *an existing model grounded in complexity*, they provide inaccurate statements about the former and ultimately present arguments that inadvertently support the latter.

Conflict of interest

The author declares no conflict of interest.

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