Mutual Exclusivity across Word Classes and Languages

As children are exposed to a novel word it is often the case they must identify the correct referent among multiple potential ones. When a new word is uttered in the same context of a known and an unknown object, research provides unanimous evidence: children map the novel word onto the novel rather than the familiar object. This phenomenon is mostly referred to as Mutual Exclusivity (ME) and described as an important mechanism driving word learning (Markman & Wachtel, 1988). However, there are different accounts as to what is the nature of the processes behind ME (Lewis et al., 2020): Lexical constrained accounts, which describe ME as a 1-to-1 lexical bias leading children to think an object can only have one label, are often tested against social pragmatic accounts, which attribute ME to inferential reasoning about the speaker's intention, logical inferences accounts, which attribute ME to logical reasoning, and probabilistic computational accounts, which attribute ME to probabilistic associative mechanisms. All these theories predict the same outcome, and therefore tend to be hardly falsifiable, despite the great variability in the paradigms employed in the literature.

While extensively studied for nouns, little is known about novel verb disambiguation in an ME paradigm. Actions can, to some extent, be described with one basic-level label (the most efficient way to convey "eating" is <eat>, not <devour>) (Győri, 2019; Zhuang & Lingnau, 2022). This should lead children to reject second labels for already labelled actions. Research reports 2- to 4-year-olds being able to map novel verbs onto novel actions successfully, but with accuracy decreasing with age (Merriman et al., 1993, 1996). The authors justify this finding referring to an increased experience with label overlap for actions (e.g., "running" can also be <jog>), which would lead them to accept second labels for familiar actions.

No ME studies, moreover, were conducted on adjectives. The main function of adjectives is to discriminate between different versions of the same entity, making its use heavily dependent on the context (Tribushinina et al., 2013). In fact, an object can be described with multiple adjectives (a ball can be <round> and <blue> and <cold>), if no context is taken into consideration. However, if one would refer to a specific object using an adjective, they would likely do so a) because alternatives are present in the context; b) referring to the feature of the target object that differentiates it from the non-target one. Inferences about the speaker's intention are therefore necessary to interpret adjectives, making their disambiguation more dependent on context and inferential reasoning about the speakers' potential alternative utterances and intention, rather than on 1-to-1 mapping between feature and label (a still necessary but not sufficient piece of information).

Furthermore, no study has compared performance in nouns, adjectives and verbs in an ME paradigm, and none of the above-mentioned accounts makes differential predictions. Thus, this pre-registered study investigates how children's performance is modulated by word classes differently bound to basic-level labels and 1-to-1 mappings, and by the referent being an object, feature or action, with the goal to disentangle the influence of lexical and inferential processes in the classical ME paradigm. Additionally, we test the same predictions in a language with a less clear noun bias (Gözütok, 2024), Turkish.

Firstly, we predicted the ME-effect would be stronger for nouns than for adjectives and verbs: The noun condition represents a simpler condition, as nouns are more often referred to with basic-level labels, and words from basic-level categories are strongly mutually exclusive (Au & Glusman, 1990). Secondly, we predicted adjectives would be easier than verbs for two reasons: Adjectives lend themselves, as per their function, to a more contrastive, contextual and inferential interpretation in comparison to verbs; Verbs describe actions, which are dynamic in nature, decomposable in other sub-actions, and therefore more complex.

On each experimental trial, children see a character and three pictures, always consisting of two familiar objects (noun condition), features (adjective condition), or actions (verb condition), and one novel object, feature, or action (respectively). In experimental trials, the character asks the child to click on a picture using an unknown word, hence the target is always the novel picture; In filler trials, a familiar word is used to refer to one of the two familiar pictures. Each child completes 6 items per condition plus 12 filler trials.

Results on 99 German children (mean age= 5.13; range: 3.05-6.85) show that children get better with age (β= 0.67, 95%CrI [0.20, 1.13]), a greater accuracy for nouns compared to adjectives (β= -1.19, [-2.23, -0.12]) and verbs (β= -2.31, [-3.37, -1.27]), and a greater accuracy for adjectives in comparison to verbs (β= -1.12, [-2.16, -0.09]); On an individual level, there were moderate correlations between adjective and noun (r= .34, p<.001), noun and verb (r= .32, p= .001) and a weak correlation between adjective and verb (r= .22, p= .032) accuracies.

Preliminary results on 56 Turkish children (preregistered sample= 100; mean age= 4.54; range: 3.20-6.29) also show better performance with age (β= 1.61, [0.91, 2.37]), a greater accuracy for nouns compared to adjectives (β= -1.24, [-2.36, -0.17]) and verbs (β= -2.35, [-3.48, -1.21]), and a greater accuracy for adjectives in comparison to verbs (β= -1.11, [-2.27, -0.03]);

Performance above chance in all three conditions in German, the higher accuracy on adjectives in comparison to verbs and the age effect show that: Children succeeded in conditions when 1-to-1 mapping was not possible or not informative; They performed better in a condition where inferential reasoning was embedded in the word class function; Preschoolers' accuracy

increased even with increased label overlap experience. In sum, our findings support the interpretation of ME as a flexible mechanism, strongly driven by inferential processes and modulated by the inherent lexical characteristics of the word category. Final results on Turkish and theoretical implications for accounts of ME and word learning will be discussed.

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