

The measurement mechanism: The role of scale structure in implicature computation

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Two bodies of literature tackle the role of scales in adjective interpretation: measurement scales in semantics and Horn scales/scalar implicature in pragmatics. To date, there has been little research into the interplay of the two kinds of scales (but see Gotzner et al., 2018). We postulate that scale structure may be crucial to implicature computation. That is, for some Horn scales, the measurement scale underlying the semantics of different triggers can be informative as to whether an implicature should be derived or not. We formalize this as an alternative mechanism for computing (scalar) implicatures, which involves reasoning about positions on a measurement scale (rather than reasoning about lexical alternatives).

We present an experimental study on scalar terms of relative and absolute adjectives differing in scalar strength, polarity and presence of negation (8 conditions for each adjective type). Participants had to read 8 simple predication statements (one per condition) in a rating scenario that made distinctions between different interpretations relevant via an action-based task (inspired by Tessler & Franke, 2018; Benz & Gotzner, 2018), and that introduced a fine granularity level. The judgments were made on a 1-5 point Likert scale with the endpoints representing the strong scale-mates (e.g., 1: *tiny* and 5: *gigantic*).

The results of our study show that participants use distinct portions of the scale when interpreting predication statements with weak and strong (positive/negative) scale-mates of relative (e.g., *large* vs. *gigantic*) or absolute adjectives (e.g., *clean* vs. *pristine*), indicating that they perceive the difference in strength between expressions. These distinctions are less pronounced when the same terms appear under negation. We find that under negation, middling interpretations (‘neither large nor small’) favor relative adjectives (*not small/tiny/gigantic*), while a polarity asymmetry due to negative strengthening (inference to the antonym) arises for weak relative terms (*not large* vs. *not small*), and possibly for strong absolute terms (*not pristine* vs. *not filthy*), if at all. Weak absolute terms are typically interpreted semantically (*not clean* \Rightarrow ‘dirty’, *not dirty* \Rightarrow ‘not clean’), while granularity interacts with minimum/maximum standard semantics triggering additional inferences: middling (‘neither clean nor dirty’) and inference to the antonym.

Overall, our findings show that measurement scales underly the semantics of gradable adjectives and that different properties of such scales—scale structure, polarity, granularity—are responsible for the derivation of different (pragmatic) inferences (see also Gotzner et al., 2018). This constitutes the core of the so-called *measurement mechanism* of inference computation of gradable adjectives.

Our proposal makes several novel predictions for the acquisition and processing of implicatures, which we will investigate in future research. Since children at age

4 already know a lot about the scale structure underlying the semantics of gradable adjectives (e.g., Syrett, 2009), we assume that the measurement mechanism develops in tandem with the semantics of gradable adjectives. The implicature literature has shown that 4-to 5-year-olds struggle computing scalar implicatures with quantifiers, as these require spontaneously accessing alternatives from the mental lexicon (e.g., Barner et al., 2011). We hypothesize that scale structure gives a cue to implicature derivation. If children and adults can reason about positions on an underlying measurement, we predict that (i) children will learn to compute implicatures with certain adjectival scales at earlier stages of acquisition compared to quantifiers and that (ii), the lexical alternatives of these Horn scales will be differentially activated during processing.