

## Why crystal barrels are faster than whiskey spoons – A frame-theoretic remark to psycholinguistic studies of compounding

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The underlying mechanisms that enable subjects to understand noun-noun compounds apparently without an effort have been widely debated in semantic research. Hypotheses tested in psycholinguistic studies are usually built either on the relation-set approach or the schema approach. The relation-set approach (see among others Levi, 1978; Gagne & Shoben, 1997; Gagne, 2002) assumes that the interpretation of compounds is based on a set of abstract relations that are deduced from existing compounds and stored in the lexicon. When interpreting a compound, the most appropriate relation is chosen. Representatives of the schema approach (see among others Cohen & Murphy 1984, Wisniewski, 1997), however, assume that interpretations of compounds are the result of a spontaneous matching process of schemata, understood as knowledge representations activated by the compound constituents. The schemata, in this context, offer open slots such that interpreting compounds is considered as a special case of slot filling.

In our talk, we will argue that both models lack explanatory value in explaining the interpretation of compounds. We will demonstrate that frames in the sense of Barsalou (1992) offer an instrument to capture the advantages of both approaches without inheriting their weaknesses. To verify our notion, we investigated the cognitive processes underlying the interpretation of certain types of compounds in an experimental study.

According to Barsalou (1992), human knowledge is represented in recursive attribute-value structures, called frames. Attributes in frames describe general properties of the entity represented in the frame, while values are specifications of these attributes. Building on Petersen (2007), we represent frames as directed graphs where the arcs correspond to attributes and the values correspond to nodes, exemplified in Figure 1 for the frame of the concept ›car‹. Which values an attribute can take is restricted by so-called type hierarchies in so far as possible values of a given attribute are subtypes of an upper-type concept, that is, in turn, determined by the attribute (cf. Petersen 2007).

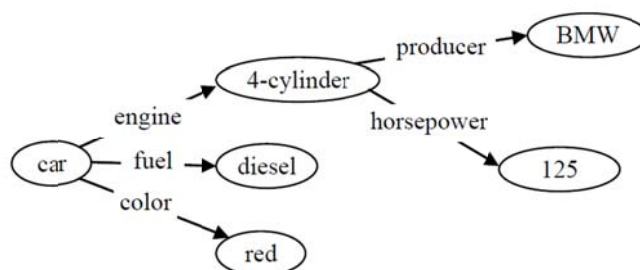


Figure 1: frame of the concept ›car‹

In our talk, we will argue that the interpretation of compounds makes use of both strategies: a relational and a matching interpretation. The relational interpretation is based on abstract relations that are deduced from existing compounds in the sense of the relation-set approach, while the matching interpretation consists in combining the frames activated by the compound constituents similar to the schema approach.

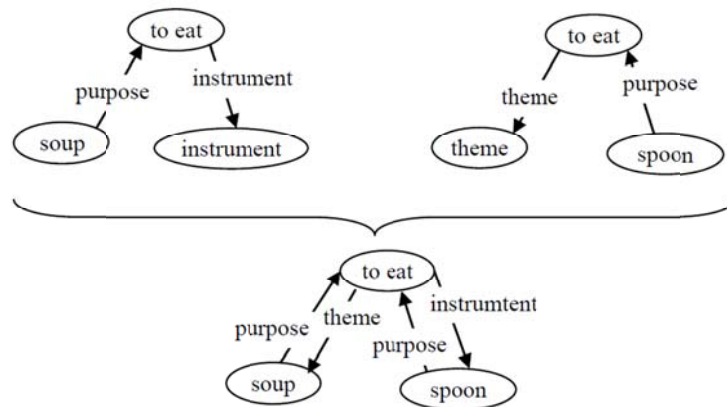


Figure 2: matching interpretation of *soup spoon*

These types of interpretation may interact: Figure 2 shows the stepwise matching interpretation of the compound *soup spoon* “spoon for eating soup”. The result of this processes can be abstracted by substituting each value by the corresponding upper-type concept (see Figure 3). Then, the new frame can be used as a template to interpret compounds that are built with semantically similar nouns; e. g. *hedge shear* “shear for cutting hedges”. This kind of interpretation is thus relational.

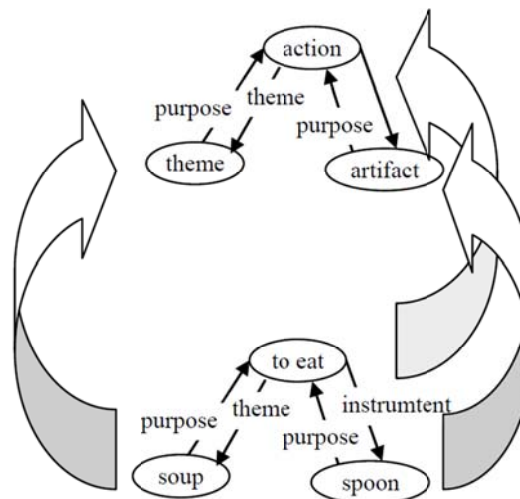


Figure 3: abstracting relations

In our experiment, we investigated German compounds of different semantic structures:

- (a) MATERIAL-OBJECT  
example: *Eisenlöffel*, lit. *Eisen* ‘iron’ *Löffel* ‘spoon’ “spoon made of iron”
- (b) THEME-action-INSTRUMENT  
example: *Suppenlöffel*, lit. *Suppe* ‘soup’ *Löffel* ‘spoon’ “spoon for eating soup”

Note, that in (b) the action element is not represented on the linguistic surface and has to be reconstructed from the frames of the compound constituents as in Figure 2. In contrast to the compounds in (a), the interpretation of the compounds in (b) should, thus, be more complex resulting in a longer processing time. To test our hypotheses we separated each category in two subcategories: (a1) and (b1) with common compounds and (a2) and (b2) with uncommon compounds. During the experiment, representatives of all categories were presented visually, together with one plausible and one implau-

sible paraphrase. The subjects had to decide which paraphrase is more plausible by pressing a corresponding button. The data show that representatives of (a1) required a similar reaction time as that of (b1), while the representatives of (a2) yielded a significantly longer reaction time than that of (b2). We explain these effects as a result of different interpretation processes: common compounds are interpreted relationally, while uncommon compounds require matching interpretations. The different reaction times of (a2) and (b2) may therefore follow from the fact that in matching processes, frames have to be activated recursively in case of (b2), but not in case of (a2). The similar reaction times of (a1) and (b1) on the contrary follow from the fact that in relational interpretations the obligatory frames are activated simultaneously.

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