

Measuring out the relation between truth-conditional and conceptual semantics

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Introduction In this paper, we approach the relation between conceptual structures and truth-conditional semantics in a framework of the semantic analysis of morphologically complex words (e.g. Roßdeutscher [2012], Roßdeutscher and Kamp [2010]) in pervasive syntax approaches such as Distributed Morphology (DM, Halle and Marantz [1993]), where (a) the same syntactic principles are assumed to be at work below and above the 'word level'; (b) words are formed from 'roots'; atomic, non-decomposable and category-neutral elements associated with encyclopedic knowledge and which combine with features to build larger linguistic elements; (c) the 'lexical' semantics of words (argument structure, aspect, selection restrictions) is derived along the same principles that govern the derivation of meaning at the sentence level, i.e. compositionality of truth-conditions and coherence of conceptual structures. In a pervasive approach to the syntax-semantics interface, the difference between truth-conditional semantics and conceptual structures can not reside in the lexical vs. sentence distinction, because the opposition between 'word' on the one hand and 'sentence' on the other is not present in the analysis. Instead, when both words and sentences carry similar complex functional structure, the relation between truth-conditional semantics and conceptual structures turns out to be a continuum along a spectrum of different emphasis on truth-conditions and conceptual structure, with expressions emphasizing truth-conditions at one end and expressions emphasizing conceptual structure at the other, and a fine graduation of emphasis on truth-conditions and conceptual structure in between. Logical forms employed in truth-conditional semantics are insensitive to conceptual coherence in that any well-formed logical form has an interpretation but not any interpretation of a well-formed logical form is conceptually coherent. In a pervasive approach to the syntax-semantics interface the continuum of relations between truth-conditions and conceptual structure can be measured out in terms of conceptual restrictivity on possible fillers of argument slots of a logical form: the more conceptual restrictions are imposed on the fillers of argument slots of logical forms, the more emphasis is put on conceptual structures in the meaning of an expression.

Contribution Capturing the relation between truth-conditional semantics and conceptual structures in terms of conceptual restrictivity realized as additional constraints on truth-conditions derived at the sublexical syntax-semantics interface renders possible to approach the relation between truth-conditional semantics and conceptual structures as a genuinely linguistic phenomenon. The focus on linguistic evidence distinguishes our approach from previous proposals building on the lexical-sentence distinction, where the relation between truth-conditional semantics and conceptual structures has been dealt e.g. with cognitively motivated 'semantic forms' (Bierwisch [2007]), ontologically motivated dot-types (Asher [2011]) or psychologically motivated reasoning procedures (Hamm et al. [2006]). All of these approaches share that the constraints on the formation and evaluation of conceptual structures are captured in the form of language-independent principles of cognition, ontology or psychology, which sets them methodologically apart from truth-conditional semantics because truth-conditions are derived by linguistic principles of the syntactic combination of denotations.

Sublexical semantics In this paper, we illustrate our approach of the relation between truth-conditions and conceptual structures in an account of the sublexical semantics of German spatial expressions, i.e. denominal spatial prefix-verbs such as *überdachen* (to over.pfx.roof), *#unterdachen* (to under.pfx.roof) and *unterstützen* (to under.pfx.pillar) and prepositions such as *in* (in), which in this abstract we present in an informal manner (but see e.g. (Roßdeutscher [2013]) for formal details). *über* (over), *unter* (under) and *in* are spatial expressions and so

are prefix-verbs formed with *über* and *unter*. In our analysis, we distinguish two aspects of the compositional semantic structure of spatial expressions determined with respect to (a) an abstract geometrical model of space which derives truth-conditions of spatial expressions with respect to a formal theory of observer-centered vector space (in the spirit of Zwarts [2005], Kamp and Roßdeutscher [2005]); (b) an interpretation of geometrical objects and relations *as* concepts standing in conceptual relations such as 'application' or 'support'. Geometrically, in *einen Parkplatz überdachen* (to over.pfx.roof a parking lot) the root $\sqrt{\text{über}}$ denotes a set of directed vectors attached to a reference object, $\sqrt{\text{dach}}$ denotes its Eigenspace (Wunderlich [1991]) and *Parkplatz* denotes a region (a set of bounded directed vectors). The compositional derivation of the geometrical configuration expressed by the combination of prefix and nominal root yields an abstract picture of the geometrical 'truth-conditions' expressed by the phrase consisting of the prefix-verb and its direct object, i.e. that the Eigenspace of $\sqrt{\text{dach}}$ is contained in the above region denoted by the reference object *Parkplatz*. But roofs and parking lots are not just geometrical objects, as the interpretation of a geometrical object *as* a house or roof imposes additional conceptual restrictions on how the object can be conceptually related to other objects. One basic conceptual requirement on the relation between the nominal root $\sqrt{\text{dach}}$ and the direct object *Parkplatz* is that as the result of *einen Parkplatz überdachen*, the parking lot x ends up with a having roof y , i.e. that the application of the roof to the parking lot results in a state $s : HAVE(x, y)$. But not any objects will afford the conceptual constraints expressed by the applicative *HAVE*-relation. Conceptually, a roof is "a protective covering that covers or forms the top of a building" (Wordnet) and a parking lot is "a parcel of land having fixed boundaries where cars are parked" (Wordnet). We encode such knowledge as verb-internal selection restrictions on the combination of concepts associated with the prefix and the nominal root. The root $\sqrt{\text{dach}}$ satisfies the constraint contributed by $\sqrt{\text{über}}$ in its being conceptualized as a cover or top which can be located in the above region of the direct object. But the geometry of $\sqrt{\text{dach}}$ can not be conceptualized as a roof if it is located in the below region of an object. That is, although *#unterdachen* has a well-formed geometry in that it doesn't violate the axioms of vector geometry, it is conceptually incoherent. Conceptual constraints on geometry also have a verb-external effect: *überdachen* selects for direct objects which afford an above region (thus *einen Parkplatz überdachen* is a coherent phrase but *#ein Kilogramm überdachen* (to over.pfx.roof a kilogram is incoherent) and for instrumental *mit* (with)-phrases which introduce the right kind of protective material, which is why *einen Parkplatz mit Dachpappe überdachen* (to over.pfx.roof a parking lot with roofing felt) is coherent whereas *#einen Parkplatz mit Wasser überdachen* (to over.pfx.roof a parking lot with water) is incoherent.

Conceptual restrictivity as a measure If in spatial expressions, conceptual structures manifest linguistically in verb-internal and verb-external restrictivity on the conceptual interpretation of geometrical structures, and if both geometrical and conceptual structure are part of the linguistic structure of spatial expressions, the relation between geometry (i.e. truth-conditions) and conceptual structure can be measured out in terms of restrictivity. On the one hand, spatial expressions such as *in* are insensitive to conceptual structure in that the sublexical semantics of *in* does not conceptually restrict its possible arguments but only requires the geometry of its arguments to stand in the appropriate set-theoretic inclusion relation. On the other hand, for the semantics of spatial expressions such as *unterstützen*, the *SUPPORT* relation between the nominal root $\sqrt{\text{stütz}}$ and the direct object encoded by *unterstützen* is rather insensitive to the geometrical relation of contact but imposes fine-grained conceptual restrictions on its possible arguments, because support is not a geometrical but a conceptual relation between objects. The sublexical analysis of spatial expressions supports a hypothesis according to which the continuum of relations between truth-conditional semantics and conceptual structures manifests

empirically in the distribution of possible fillers of argument slots over logical forms of spatial expressions derived at the syntax-semantics interface which in this paper we spell out in more detail.

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