

Exploring meaning in grammar

★ Language is understood not just through the words of a speaker, but the grammatical structures they use, as different types of information are imparted through different forms of expressions.
 ★ We spoke to **Professor Thomas Ede Zimmermann** about his work in a DFG-project which brings together researchers from several different disciplines to analyse the propositionalist thesis.

The meaning of a sentence is defined not just by the words out of which it is made up, but also its grammatical structure. In order to understand a spoken sentence for example, the listener needs to not only understand what the words mean, but also how their meanings interact. "This interaction between the meaning of words is central to the meaning of a sentence," says Thomas Ede Zimmermann, Professor of Linguistics at Goethe University Frankfurt. As the Principal Investigator of a new DFG-funded research project, Professor Zimmermann is probing deeper into the semantic structure of language, using methods derived from mathematical logic. "We can use grammatical structure to understand what the subject and the object are in a sentence, but this doesn't tell us how the meanings of these components interact," he explains. "This is where logical semantics comes in. With methods from formal logic, we can describe the interaction of word meanings."

Linguistic semantics

This approach only entered linguistic semantics around the 1970's, and a lot of progress has been made over a comparatively short time. However, Professor Zimmermann

says that certain suppositions or ideological preferences have entered the field. "One of them is the idea of propositionalism," he outlines. This can be thought of as a fairly general approach to linguistic semantics that is used by a majority of researchers in the field. However, over the last 10-15 years or so its foundations have been increasingly called into question. "People have started producing evidence against propositionalism,

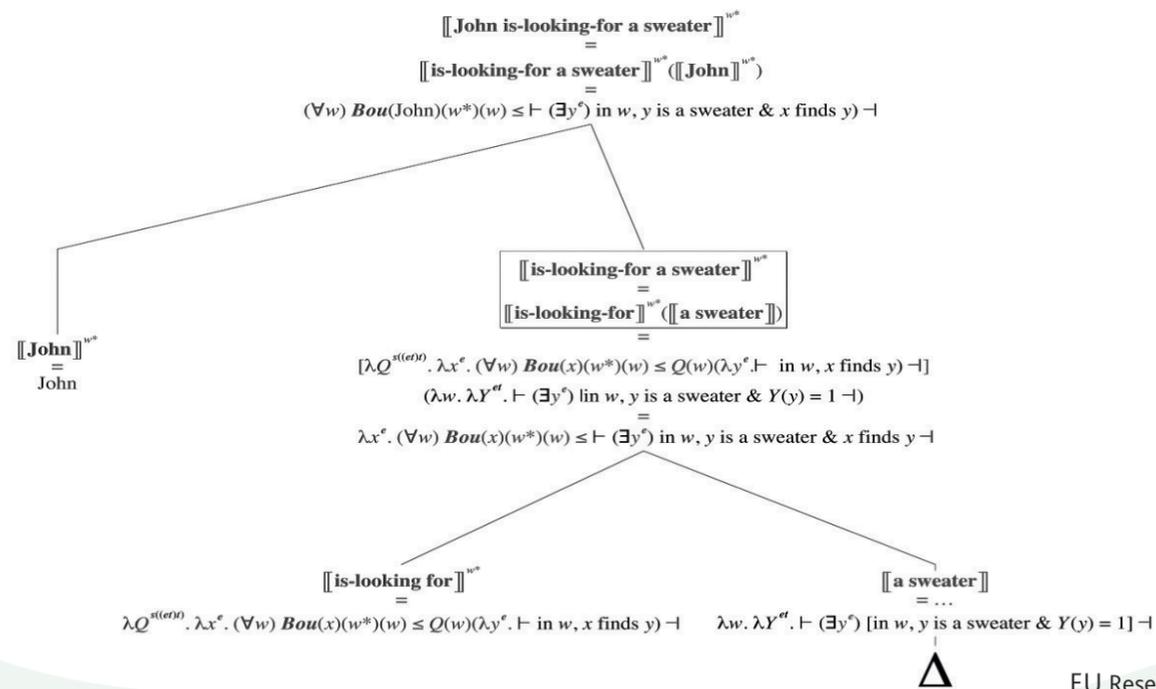
We can use **grammatical structure** to understand what the subject and the object are in a sentence, but this doesn't tell us how the **meanings of these components interact**. This is where **logical semantics** comes in.

an anti-propositionalist thesis - this was mainly in philosophy of language, not so much in linguistic semantics," continues Professor Zimmermann. "One thing that philosophers of language have not really considered enough, to my mind, is that it's highly non-trivial to give this general strategy of propositionalism a precise definition."

The divide between extensional and intensional grammatical constructions is central to understanding propositionalism.

The simplest grammatical constructions are known as extensional, usually identified by what's called a substitution test. "Take the sentence 'John kissed Mary', and let's suppose that Mary is Harry's mother. The name 'Mary' and the description 'Harry's mother' are co-referential - that means they refer to the same person," outlines Professor Zimmermann. Since the constructions are extensional, they can be substituted for

each other without affecting the truth value of the sentence, which is not the case with intensional constructions. "Intensional constructions often relate to what people think or mean. The most common example is what's called an attitude report - a sentence where a clause gets embedded or becomes the object of a verb, as in; 'Jane thinks that John kissed Mary,'" explains Professor Zimmermann. "In this context, replacing the name 'Mary' by the co-referential description



$$= \lambda Q^{s(et)t}. \lambda x^e. [\lambda p^{st}. \lambda z^e. \vdash (\forall w) \text{Bou}(z)(w^*)(w) \leq p(w) \rightarrow] (\lambda w. Q(w) (\lambda y^e. \vdash \text{in } w, x \text{ finds } y \rightarrow)) (x)$$

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'Harry's mother' may turn a true report into a false one: Jane need not know that Mary is Harry's mother."

This substitution resistance is indicative of intensional constructions. "In general, in an intensional construction, co-referential expressions or sentences with the same truth values cannot replace each other without affecting the truth value of the entire report," says Professor Zimmermann. Researchers in Professor Zimmermann's group are also looking at a number of intensional constructions including intensional transitive verbs, which allow for so-called non-specific readings of their objects. "A classic example is the sentence 'John is looking for a cheap restaurant'. Let's imagine that cheap restaurants are specifically Italian restaurants, but John might not be looking for an Italian restaurant, maybe he dislikes Italian food," Professor Zimmermann continues. "So, although John is looking for a cheap restaurant, it doesn't necessarily follow that John is looking for an Italian restaurant. In this respect, the intensional verb 'look for' differs from an ordinary transitive verb like 'enter': in the circumstances indicated, the truth of 'John enters a cheap restaurant' guarantees the truth of 'John enters an Italian restaurant'."

The propositionalist thesis

The distinction between extensional and intensional constructions is central to developing a precise and systematic account of grammatical meaning, a topic central to Professor Zimmermann's research. The overall aim of the project is to develop a critical analysis of the propositionalist thesis, namely that intensionality only occurs when a clause is embedded. "In the first example of an intensional construction - 'Jane thinks that John kissed Mary' - we have a clausal embedding. With 'John is looking for a cheap restaurant', we don't seem to have a clausal embedding," says Professor Zimmermann. This latter example could however be reformulated in such a way that a clause is embedded, viz. by 'John is making efforts to the effect that he find a cheap restaurant'. "The advocates of the propositionalist thesis suggest that as it's an intensional construction, there will be some clausal embedding," explains Professor Zimmermann.

A key question thus is whether there is always a way to paraphrase or analyse an intensional construction in terms of clausal embedding. As part of their work in scrutinising the propositionalist thesis, Professor Zimmermann and his colleagues are investigating potential counter-examples to this thesis. "We've

identified grammatical constructions that might turn out to be intensional, without being reducible to clausal embedding," he outlines. One prominent counter-example involves the verb 'fear'. "It has been argued that 'fear' is intensional" continues Professor Zimmermann. "For example, take the sentences 'Lex Luthor fears Superman' and 'Lex Luthor fears Clark Kent'. It seems that the first is true and the second is false, even though Superman and Clark Kent are the same person. This looks like a substitution failure, so the construction should be intensional. However, people have argued that it would be difficult to come up with a clausal embedding analysis of this structure."

This reasoning has been questioned on the basis of the observation that it runs the risk of trivialisation, another issue that Professor Zimmermann and his colleagues are exploring in the project. David Kaplan's 1975 paper *How to Russell a Frege-Church*, holds clear relevance in this respect. "Kaplan showed that Bertrand Russell's arguably propositionalist picture is far less restrictive than it would appear," says Professor Zimmermann. If propositionalism means what Kaplan took Russell to have meant, then the thesis of anti-propositionalism collapses; Professor Zimmermann and his colleagues will try to make an important contribution to this debate. "Part of the project is about developing a stable and precise definition of what's behind propositionalism, and the thesis of anti-propositionalism," he explains.

One longer-term aim is find alternatives to propositionalism, yet researchers in the project are also pursuing more immediate objectives. One area in which Professor Zimmermann hopes to make tangible progress within the scope of the project is in the mathematical aspects of semantic theory. As a case in point, logical paraphrases are usually formulated in terms of a family of under-explored algebraic techniques known as type-shifting [aka 'type-coercion']. "I hope that we will elaborate some proposals and theories in the area of type-shifting," says Professor Zimmermann. Over the longer term, Professor Zimmermann plans to devote a lot of his attention to the logical foundations of semantic analysis of natural language, and the role of propositionalism in particular. "Once we have a stable, viable definition of propositionalism which we can show is non-trivial, then we can proceed with potential counter-examples and look towards empirical questions. Can the account that we give be shown to be propositionalist? Under what circumstances will it be shown to be anti-propositionalist?"

PROPOSITIONALISM IN LINGUISTIC SEMANTICS

Propositionalism in Linguistic Semantics

Project Objectives

How do humans understand linguistic content? Techniques from formal semantics allow researchers to investigate the role played by grammar in imparting meaning, a topic central to Professor Zimmermann's research.

The aim in the project is to investigate the underlying theoretical principles by means of a critical analysis of what is known as the 'propositionalist hypothesis'. This assumes that any reference to linguistic content is ultimately based on clausal embedding in grammar.

The competing intensionalist approaches are more liberal and build on the assumption that information content in principle corresponds to all types of expression. The ultimate aim in research is to find alternatives to propositionalism.

Project Funding

Funding through the Reinhart Koselleck Projects (DFG)

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