In the contemporary philosophy of mind and language, the naturalization of the notion of meaning or intentionality is one of the core issues. The analytical philosophy of the 20th century took up many questions concerning the basic semantic notion of meaning. The notion appears more or less explicitly in every discipline of the humanities. It can be acknowledged that synonymy is (like the notion of truth related to it) one of the deepest concepts permeating the philosophical discourse and human knowledge in general. The idea reappeared constantly in recent decades until being recognized by some philosophers as basically feasible, in particular with reference to the notion of biological function, which is the core of various teleosemantic approaches to naturalizing intentionality.

The objective of the current project is to develop an account of classical semantic properties of structural representations, as underpinned by representational mechanisms in neural systems.

To address this issue, the current project will provide an account of such features as synonymy, meaning identity under substitution, and compositionality, which are crucial in understanding how semantics of complex structural representations may be implemented in the neural systems as well as in artificial cognitive systems. Structural representations are of a kind with pictures: Their vehicles are structurally similar to what they are supposed to represent and they play causal roles within representational mechanisms. Until now, most studies have focused on denotative capacities of simple structural representations, whose contents could play not only descriptive but also directive roles, but the crucial question is whether they could provide meaning properties that could underlie intensional phenomena, which can lead to well-known semantic phenomena as, for example, referential opacity. In other words, representations may depict their targets as having certain properties—and having one representation, one could not re-identify the same entity that is available through another.

At the same time, the project will focus on the simplest semantical components, relations, and operations, to understand how complex representational contents and operations could be studied in the biologically evolved neural systems. By bringing together insights from natural language engineering and computational cognitive neuroscience, the project aims to make conditions for the emergence of complex, structural representational contents explicit. The issue of how contents can be combined from multiple representations has not been tackled in a biologically plausible fashion yet.

For example, to understand how vision works, one may appeal to picture-like, or structural representations. However, these cannot be all simple because we can merge together a plethora of facets and visual features of a given entity in a visual scene. Moreover, we may not only see a bird but hear it singing.

How do complex structural representations such as multimodal representations of perceptual objects attain their satisfaction conditions? This question is all the more important because multimodal representations may rely on unimodal structural representations that have to become bound to a single target in some way. How do complex representations function so as to lead to referential opacity?

This doctoral project is of fundamental importance for further development of structural accounts of representational capacities, which are the lynchpin of our best scientific accounts of representational conceptions of the mind and brain.