Computational Construction Grammar and its Potential Impact on Linguistics and Language Technologies
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Leading scientific disciplines such as physics and biology have become almost entirely computational, allowing researchers to run major experiments on vast amounts of data and to run simulations in silico (on silicon chips of a computer) on much greater scale than is possible in vitro (inside a test tube). Linguistics, however, remains largely dismissive of the need for computation, leaving issues of natural language processing largely to the fields of computational linguistics, psychology and neuroscience. One important reason for this skeptical attitude is that there is no consensus on how linguistic knowledge should be formalized, let alone what would constitute a plausible model of language processing.

Fortunately, there have been exciting developments in linguistics that have crystallized the properties that an adequate formalism should have, which have been expressed most explicitly in usage-based, constructional approaches to language (Diessel 2015; Fillmore 1988). More specifically, an adequate formalism needs to:
(a) have sufficient expressive power to handle the syntax-lexicon continuum;
(b) be compatible with what is known about language usage and cognition;
(c) be encompassed in a language processing and learning model.

In this presentation, I will give a brief overview of the many efforts that have recently been made to operationalize these demands through computational resources and computational platforms. I will focus particularly on research that has been conducted using Fluid Construction Grammar (FCG; www.fcg-net.org; Steels 2011), one of the most advanced computational platforms available for the development of constructional models of language processing and learning.

The presentation is divided into three parts. The first part shows how a computational model can help to substantiate particular linguistic analyses through an operationalization of a Goldbergian approach to argument structure constructions (Goldberg 1995; van Trijp 2015). The formalization effort not only shows the full consequences of a particular analyses, it also debunks several of the criticisms of the constructional approach. Next, the presentation provides examples of in silico experiments on language evolution (Steels, 2012) and change (van Trijp, 2013). These new computational tools may have a transformative impact on the field because they allow linguistics to go beyond descriptive adequacy and to achieve mechanistic models of language usage and development. Finally, the presentation will also discuss how computational construction grammar may have an impact on the future of language technologies.

References