Displacement Logic for Grammar

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Lecture 5

Comparisons
The Alternatives 1: Structural postulates

This is the methodology of MMTLG (Moortgat 1997[5]; Oehrle 2011[9]): multiple residuated base logics + structural postulates of inclusion between their modes. Instances are the underlyingly non-associative logics of scope NL_{\lambda/CL} (Barker and Shan 2014[1]) and Lambek-Grishin calculus (Moortgat 2009[6]).

- This is as well for as far as it goes, for many years it has been mainstream, and $D$ can, as we have seen, be considered a MMTLG, but the structural postulates increase derivation lengths and widen the proof/derivation search space. However as we have also seen, in $hD$ the structural postulates are fully *absorbed* in the sequent syntax so that there are only logical rules, making derivations shorter and narrowing the proof/derivation search space.

- They deal with only scope whereas $D$ addresses also e.g. discontinuous functors, parentheticals, cross-serial dependencies, comparative subdeletion, gapping, ...
It could be argued that the structural postulates of NL$_{\lambda/\text{CL}}$ and Lambek-Grishin calculus might also be absorbed, but that would be for their proponents to show.

The calculus of D is conceived from an algebraic semantics akin to language models whereas NL$_{\lambda/\text{CL}}$ and Lambek-Grishin calculus have only post-hoc frame semantics. It could be argued that the structural postulates of NL$_{\lambda/\text{CL}}$ and Lambek-Grishin calculus might also have algebraic semantics, but that would be for their proponents to show.
The Alternatives 2: Lambda syntax

This is the methodology of including linear lambda abstraction for word order (Oehrle 1994[10]; ACG: de Groote 2001[2]; \(\lambda\)-Grammar: Muskens 2001[8]; HTLG: Kubota and Levine 2012[4]).

- In ACG and \(\lambda\)-Grammar, there is the KLM (Kubota, Levine, Moot) problem with non-directional linear types \(B \prec A\) that as a higher-order argument, there is no discrimination between continuous and discontinuous dependents \(\prec A\); consequently there is overgeneration of readings of right-node raising, and even of transitive verb coordination.
HTLG *fibres* (Gabbay 1999[3]) non-directional linear implication over the Lambek connectives and largely circumvents the KLM problem. However there is a remnant problem that in a higher order argument \((C \leftarrow B) \leftarrow A\) the left-to-right orders of the two discontinuous dependents \(B\) and \(A\) are not distinguished; consequently there is overgeneration of e.g. determiner gapping (Y. Kubota, p.c.):

(1) *Most\(_i\) dogs like\(_j\) Whiskas and I \(e\(_j\) e\(_i\) cats.*

\(D\) has no such problems (Morrill and Valentín to appear[7]).


Michael Moortgat.  
Categorial Type Logics.  

Michael Moortgat.  
Symmetric Categorial Grammar.  
*Journal of Philosophical Logic*, 38(6), 2009.

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A reply to Kubota and Levine on gapping.  

Reinhard Muskens.  
Lambda Grammars and the Syntax-Semantics Interface.
R. T. Oehrle.
Multi-Modal Type-Logical Grammar.

Richard T. Oehrle.
Term-labeled categorial type systems.
Thank you!