Substructural Operational Semantics and Linear Destination-Passing Style (Invited Talk)

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We introduce *substructural operational semantics* (SSOS), a presentation form for the semantics of programming languages. It combines ideas from structural operational semantics and type theories based on substructural logics (such as linear logic) in order to obtain a rich, uniform, and modular framework.

We illustrate SSOS with a sequence of specifications, starting from a simple functional language presented in *linear destination-passing style* (LDPS). Next we show how to extend the first specification modularly (that is, by adding new rules for new constructs without changing earlier rules) to treat imperative and concurrent constructs. We briefly compare our means of achieving modularity with that of modular structural operational semantics [1] and contextual semantics [2].

We then discuss how structural properties of configurations (on which the operational semantics is defined) are related to structural properties of various forms of hypothetical judgments originating in the study of linear logic and type theory. Ordered, linear, affine, and unrestricted hypothetical judgments can be used to characterize and classify semantic specifications. We are currently investigating the meta-theory of SSOS, and to what extent modularity in specifications carries over to modularity in the proof of properties such as type preservation and progress.

Many SSOS specifications can be realized immediately in the *concurrent logical framework* (CLF). In fact, SSOS arose from the early specifications of Concurrent ML and the π-calculus in CLF [3].

References

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