

Model structures and automata

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Normally, model structures are based on elements of some set, and are populated with relations of various arities. Functions are treated as special relations, operations as special functions. This is a very *reist* view, in which only the elements are granted unquestioned ontological status: the rest are ‘extralogical’ and their understanding requires further postulates.

In this talk I propose to shift the division of labor more toward logic by endowing model structures with automata-theoretic structure, including *transitions*, both deterministic and nondeterministic, and perhaps *i/o* signals from a finite input and/or output alphabet. Other automata-specific particulars, such as initial, reset, and final states, will be discussed from the perspective of Clustered Moore Automata (CMA, Kornai, 2025).

I consider how to populate models with *automata*, a rather challenging undertaking given that the standard view of automata is dynamic (it involves evolution of state) whereas ordinary model structures are static, lacking in any temporal parameter. In Montague Grammar (Montague, 1973; Gallin, 1975) models are indexed by $\langle s, t \rangle$ pairs, but the treatment of time is abstract: no structure, such as \mathbb{R} or \mathbb{Z} , is imposed on the temporal index. Partee’s expository reconstructions of Montague’s intensional logic and her later work on tense/anaphora (Partee, 1976; Partee, 1984) are among the first in the MG tradition to explicitly build a temporal order into the model, typically via a partial order \leq on the set of worlds sharing the t temporal index. In subsequent work, (Kamp, 1979; Muskens, 1995) all sorts of linear orders are permitted as long as precedence is compatible with containment.

Here we will consider an even broader notion of temporal structure that is compatible with a cyclic (periodic) notion of time as well (see Ch 3:2 of Kornai, 2023) and discuss how temporality can be derived by cyclic CMA that ‘live’ in the model structures rather than being imposed externally by some temporal logic.

References

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