

**Title:** Dialogue Dynamics Modeling in the Simple Theory of Types

**- Location:** LORIA, Nancy, France Université de Lorraine ---- INRIA Nancy Grand Est research center

**- team:** Sémagramme

**- Scientific Context:**

Montague semantics [6,7], in its traditional form, assigns truth conditions to simple declarative utterances. It is therefore concerned with the meaning of single sentences, and does not take into account the way such single sentences are possibly assembled in order to form a discourse. As a consequence, Montague semantics does not allow for the various dynamic phenomena that participate to the interpretation of a discourse (context updating, anaphora and co-reference resolution, presupposition projection and accommodation...). In order to make up for this lack, new formalisms have been defined. Among these, the most well-known are Kamp's discourse representation theory (DRT) and its variants [4,9].

Most of these formalisms are based, in one way or another, on a notion of state change that is used to model the dynamic phenomena. As a consequence, it is difficult to use standard tools of mathematical logic at the level of the discourse interpretation. In particular, the simplicity of a syntax/semantics interface based on the Curry-Howard isomorphism is lost. In order to avoid this defect, we have proposed a type-theoretic way of rebuilding DRT and dynamic logic [2,5]. This proposal, which is based on Church's simple theory of type [1], takes advantage of the notion of continuation in order to allow quantifiers to dynamically extend their scopes.

Central to our proposal is a notion of context that has been left underspecified in order to keep our approach as generic as possible. This, in principle, should allow the users of our dynamic framework to devise their own notion of context together with appropriate accessing and updating operations. Consequently, our dynamic framework is not committed to a given theory of discourse dynamics, but may be instantiated with one or another. In particular, it could be adapted to the dynamics of dialogue, the semantics and pragmatics of which [3] are even more intricate than the ones of monologic discourses.

**- Missions:**

The goal of this thesis is to formalize dialogue models in higher-order logic, by exploiting and adapting the dynamic logic introduced in [2] and developed in [5]. To this end, the candidate will first review the state of the art in dialogue modeling, by studying the relevant literature. She will then synthesize notions of dialogic models for the case of cooperative dialogues. Next, she will adapt her models to the case of non-cooperative dialogues. Finally, she will apply her models to study a corpus of pathological dialogues between patients and their psychiatrists [8].

**- Bibliography:**

- [1] Church, A. (1940). A formulation of the simple theory of types. *Journal of Symbolic Logic*, 5:56--68.
- [2] de Groote, P. (2006). Towards a Montagovian account of dynamics. In M. Gibson and J. Howell, editors, *Proceedings of Semantics and Linguistic Theory XVI*. Cornell University, Ithaca, NY.
- [3] Ginzburg, J. (2016). Semantics of dialogue. In M. Aloni & P. Dekker (Eds.), *The Cambridge Handbook of Formal Semantics*. Cambridge University Press.
- [4] Kamp, H. and U. Reyle (1993). *From Discourse to Logic*. Kluwer Academic Publishers, Dordrecht.
- [5] E. Lebedeva (2012). *Expression de la dynamique du discours à l'aide de continuations*. Thèse de doctorat, Université de Lorraine.
- [6] Montague, R. (1973). The proper treatment of quantification in ordinary English. In J. Hintikka, J. Moravcsik, and P. Suppes (eds.), *Approaches to natural language: proceedings of the 1970 Stanford workshop on Grammar and Semantics*. Reidel, Dordrecht. Reprinted: [8, pp. 247-270].
- [7] Montague, R. (1974). *Formal Philosophy: selected papers of Richard Montague, edited and with an introduction by Richmond Thomason*. Yale University Press.
- [8] Rebuschi, M, M. Amblard, and M. Musiol (2013). Using SDRT to analyze pathological conversations. In G. Heinzmann et al. (eds.), *Dialogue, Rationality, Formalisms*. Springer, Dordrecht.
- [9] van Eijck, J. and H. Kamp (1997). Representing Discourse in Context. In J. van Benthem and A. ter Meulen (eds.), *Handbook of Logic and Language*. Elsevier.

**- Skills and profile:**

Required qualification: Master in Computer Science, Cognitive Science, or equivalent.

Desired skill: Elementary knowledge of lambda-calculus and type theory. Training in computational linguistics.

**- Additional information:**

Supervision and contact:

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Duration: 3 years

Starting date: Oct. 1st 2017