▸ SAM VAN GOOL, *Monadic second order logic as a model companion.*
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We present a connection between monadic second order logic and first order model theory, which is emerging in our ongoing joint work with Silvio Ghilardi [1, 2].

Monadic second order (MSO) logic, when interpreted in discrete structures, is closely related to certain formal models of computation. For example, the MSO-definable sets of colored finite linear orders (*words*) are exactly the regular languages from automata theory. MSO logic and its connection to automata has been studied on many more structures, including colorings of ω and of trees.

A fundamental insight due to Robinson was that the theory of algebraically closed fields can be generalized to a purely logical notion of *existentially closed model*. The syntactic counterpart of this notion is called the *model companion* of a first order theory. We prove that MSO logic, both on ω-words [1] and on binary trees [2], can be viewed as the model companion of a finitely axiomatized universal first order theory. In each case, this universal theory is closely connected to well-known modal fix-point logics.

Finally, we will point to our ongoing and future work on trees, in which we aim to obtain a similar result for full MSO on trees, whereas our previous results on trees only covered MSO on binary trees and bisimulation-invariant MSO on arbitrary trees.

[1] S. Ghilardi and S. J. van Gool, *A model-theoretic characterization of monadic second-order logic on infinite words*, ***Journal of Symbolic Logic***, vol. 82 (2017), no. 1, pp. 62-76.

[2] S. Ghilardi and S. J. van Gool, *Monadic second order logic as the model companion of temporal logic*, ***Proceedings of the 31st Annual ACM-IEEE Symposium on Logic in Computer Science (LICS 2016)*** (New York City, USA), N. Shankar, editor, Association for Computing Machinery, 2016, pp. 417-426.