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A Gentle Introduction to Template Games and Linear Logic

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Game semantics is the art of interpreting formulas (or types) as games and proofs (or programs) as strategies. In order to reflect the interactive behavior of programs, strategies are required to follow specific scheduling policies. Typically, in the case of a sequential programming language, the program (Player) and its environment (Opponent) play one after the other, in a strictly alternating way. On the other hand, in the case of a concurrent language, the Player and the Opponent are allowed to play several moves in a row, in a non-alternating way. In the two cases, the scheduling policy is designed very carefully in order to ensure that the strategies synchronize properly and compose well when plugged together. A longstanding conceptual problem has been to understand when and why a given scheduling policy works and is compositional in that sense. In this talk, I will introduce the notion of a template game and exhibit a number of simple and fundamental combinatorial properties which ensure that a given scheduling policy defines (indeed) a monoidal closed bicategory of games, strategies, and simulations. The notion of a template game will be illustrated by constructing two game models of linear logic with different flavors (alternating and asynchronous) using the same categorical combinatorics, performed in the category of small 2-categories.

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