

A Dynamic Interpretation of Structural Causal Models

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Structural causal models (Pearl 2000) offer a popular, compact framework in which to model causal relations, and have recently been applied to a range of linguistic data, from conditionals (Schulz 2011, Kaufmann 2013, Ciardelli, Zhang, and Champollion 2018, Santorio 2019, Copley 2023) to causatives (Nadathur and Lauer 2020, Baglini and Siegal 2020, Nadathur 2023, Glass 2023).

The widespread use of structural causal models raises the question: What, *in the world*, is a structural causal model? What does it mean in general for a structural causal model to be a true representation of a scenario? I seek to offer an interpretation of structural causal models, in the same sense in which we have interpretations of probability (Bayesian, frequentist) and interpretations of quantum mechanics (e.g. Copenhagen, many worlds): an attempt to explain how the formalism corresponds to experience.

I propose that structural causal models are *abstractions of dynamical systems*. A structural causal model specifies how some parts of the world can and cannot change through time. I argue that this interpretation is more satisfactory than previous proposals based on agency (Gasking 1955, Cook and Campbell 1979, Menzies and Price 1993) and mechanisms (Pearl 2000, Halpern and Pearl 2005). A further benefit of this interpretation is that it allows us to directly compare structural causal models with notion of circumstantial modality familiar to semanticists, such as Kratzer's (1977) analysis.

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