Studying and simulating social systems including human groups and societies can be a complex problem. In order to build a model that simulates humans' actions, considering the major factors that affect human behavior is a must. Norms are one of these factors: social norms are the customary rules that govern behavior in groups and societies. Norms are everywhere around us, from the way people handshake or bow to the clothes they wear. They play a large role in determining our behaviors.

Studies on norms are much older than the age of computer science, since normative studies have been a classic topic in sociology, psychology, philosophy and law. Various theories have been put forth about the functioning of social norms. Although an extensive amount of research on norms has been performed during the recent years, there remains a significant gap between current models and models that can model real-world normative behaviors of humans. Most of the existing work on norms focuses on abstract applications, and very few realistic normative simulations of human societies can be found.

The contributions of this dissertation include the following: 1) a new hybrid technique based on agent-based modeling and Markov chain Monte-Carlo for modeling and simulation is introduced. This method is used to prepare a smoking case study for applying normative models. 2) This hybrid technique is described and demonstrated using category theory, which is a mathematical theory focusing on relations rather than objects. 3) The relationship between norm emergence in social networks and the theory of tipping points is studied. 4) A new lightweight normative architecture for studying smoking cessation trends is introduced. This architecture is then extended to a more general normative architecture that can be used to model real-world normative behaviors. The final normative architecture is designed by considering cognitive and social aspects of norm formation in human societies. Normative architectures based on only one of these two aspects exist in the literature, but a normative architecture that effectively includes both of these two is missing.

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The public is welcome to attend.