# Religious affiliation: Phase transitions in a simple contagion model

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In this work we discuss a simple model to describe the dynamics of religious affiliation. The model is based on an artificial population composed by three distinct subpopulations, namely religious committed individuals, religious noncommitted individuals and not religious affiliated individuals [1]. The transitions among the compartments are governed by probabilities, modeling social interactions among the groups and also spontaneous transitions among the compartments. Considering a fully-connected population, we write a set of ordinary differential equations to study the evolution of the mentioned subpopulations. Our analytical and numerical results show that there is an absorbing state in the model where only one of the subpopulations survive in the long-time limit. There are also regions of parameters where two or three subpopulations coexist. We also verified the occurrence of two distinct critical points. Comparison of the models' results with data for religious affiliation in Northern Ireland shows a good qualitative agreement. In addition, we also present Monte Carlo simulations of the model on two-dimensional square lattices, in order to analyze the impact of the presence of a lattice structure on the critical behavior of the model.

## References

[1] N. Crokidakis, *Nonequilibrium phase transitions and absorbing states in a model for the dynamics of religious affiliation*, Physica A 643, 129820 (2024).

## Type

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