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Validating the Micro-Dynamic Rule in Opinion Dynamics Models

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Abstract : Opinion dynamics is dedicated to modeling the dynamic evolution of people's opinions. Models in this field are based on a micro-dynamic rule, which determines how people update their opinion when interacting. Despite the high number of new models (many of them based on new rules), little research has been dedicated to experimentally validate the rule. A few studies started bridging this literature gap by experimentally testing the rule. However, in these studies, participants are forced to express their opinion as a number instead of using natural language. Furthermore, some of these studies average data from experimental questions, without testing if differences existed between them. Indeed, it is possible that different topics could show different dynamics. For example, people may be more prone to accepting someone's else opinion regarding less polarized topics. In this work, we collected data from 200 participants on 5 unpolarized topics. Participants expressed their opinions using natural language ('agree' or 'disagree') and the certainty of their answer, expressed as a number between 1 and 10. To keep the interaction based on natural language, certainty was not shown to other participants. We then showed to the participant someone else's opinion on the same topic and, after a distraction task, we repeated the measurement. To produce data compatible with standard opinion dynamics models, we multiplied the opinion (encoded as agree=1 and disagree=-1) with the certainty to obtain a single 'continuous opinion' ranging from -10 to 10. By analyzing the topics independently, we observed that each one shows a different initial distribution. However, the dynamics (i.e., the properties of the opinion change) appear to be similar between all topics. This suggested that the same micro-dynamic rule could be applied to unpolarized topics. Another important result is that participants that change opinion tend to maintain similar levels of certainty. This is in contrast with typical micro-dynamics rules, where agents move to an average point instead of directly jumping to the opposite continuous opinion. As expected, in the data, we also observed the effect of social influence. This means that exposing someone with 'agree' or 'disagree' influenced participants to respectively higher or lower values of the continuous opinion. However, we also observed random variations whose effect was stronger than the social influence's one. We even observed cases of people that changed from 'agree' to 'disagree,' even if they were exposed to 'agree.' This phenomenon is surprising, as, in the standard literature, the strength of the noise is usually smaller than the strength of social influence. Finally, we also built an opinion dynamics model from the data. The model was able to explain more than 80% of the data variance. Furthermore, by iterating the model, we were able to produce polarized states even starting from an unpolarized population. This experimental approach offers a way to test the micro-dynamic rule. This also allows us to build models which are directly grounded on experimental results.

Keywords : experimental validation, micro-dynamic rule, opinion dynamics, update rule
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