Title: Granular DeGroot Dynamics – a Model for Robust Naive Learning in Social Networks

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Abstract: We study a model of opinion exchange in social networks where a state of the world is realized and every agent receives a zero-mean noisy signal of the realized state. It is known from Golub and Jackson that under DeGroot dynamics agents reach a consensus that is close to the state of the world when the network is large. The DeGroot dynamics, however, is highly non-robust and the presence of a single "stubborn agent" that does not adhere to the updating rule can sway the public consensus to any other value. We introduce a variant of DeGroot dynamics that we call 1/m-DeGroot.

1/m-DeGroot dynamics approximates standard DeGroot dynamics to the nearest rational number with m as its denominator and like the DeGroot dynamics it is Markovian and stationary. We show that in contrast to standard DeGroot dynamics, 1/m-DeGroot dynamics is highly robust both to the presence of stubborn agents and to certain types of misspecifications.

Joint work with Gideon Amir Itai Arieli and Ron Peretz