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# Synchronising the emergence of institutions and value systems: a model of opinion dynamics mediated by proportional representation

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## Abstract

Individuals increasingly participate in online platforms where they copy, share and form their opinions. Social interactions in these platforms are mediated by digital institutions, which dictate algorithms that in turn affect how users form and evolve their opinions. In this work, we examine the conditions under which convergence on shared opinions can be obtained in a social network where connected agents repeatedly update their normalised cardinal preferences (i.e. value systems) under the influence of a non-constant reflexive signal (i.e. institution) that aggregates populations' information using a proportional representation rule. We analyse the impact of institutions that aggregate (i) expressed opinions (i.e. opinion-aggregation institutions), and (ii) cardinal preferences (i.e. value-aggregation institutions). We find that, in certain regions of the parameter space, moderate institutional influence can lead to moderate consensus and strong institutional influence can lead to polarisation. In our randomised network, local coordination alone in the total absence of institutions does not lead to convergence on shared opinions, but very low levels of institutional influence are sufficient to generate a feedback loop that favours global conventions. We also show that opinion-aggregation may act as a catalyst for value change and convergence. When applied to digital institutions, we show that the best mechanism to avoid extremism is to increase the initial diversity of the value systems in the population.