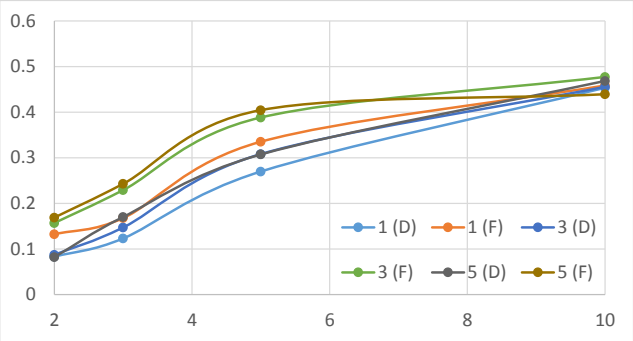

Figure 6: The average proportion of agents that prefer the final position over the opening position for non-strategic agents with lexicographic utility and 5 candidates, according to number of districts (the x axis) and various gaps. (F) marks fractional tie-breaking vs. deterministic one (D).

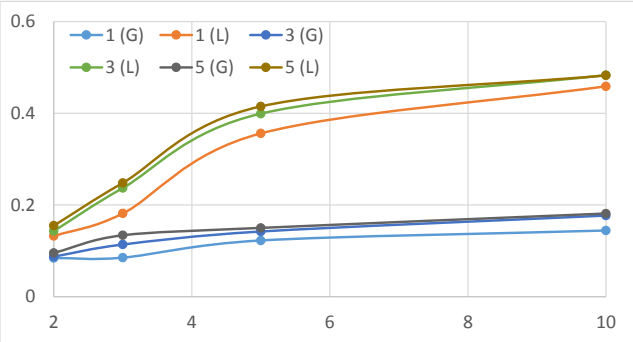

Figure 7: The average proportion of agents that prefer the final position over the opening position for strategic agents with deterministic tie-breaking and 8 candidates, according to number of districts (the x axis) and various gaps. (L) marks lexicographic preferences vs. globalist ones (G).

changing the constraints is fairly consistent across all settings. This is also true when comparing the social welfare as a function of the number of district for fractional vs. deterministic tie-breaking. As can be seen in Figure 6, the utility increase as the number of districts grows (the x-axis), and generally speaking under fractional settings, the agents tend to prefer the final state more than under deterministic tie-breaking settings.

The difference in utility between globalists and lexicographic agents is quite significant (almost 250% more), as can be seen in Figure 7, an advantage that is consistent (though with different magnitudes) when changing number of candidates, tie-breaking system, and whether agents are strategic or not. This has to do with the greater ability of lexicographic agents to be partially satisfied – several agents, with opposing views can be satisfied. However, the growth is quite dramatic. Furthermore, notice that smaller gaps produce less utility for the agents, while larger gaps presumably allow greater flexibility to the manipulating agents.

Beyond lexicographic agents' greater utility, global

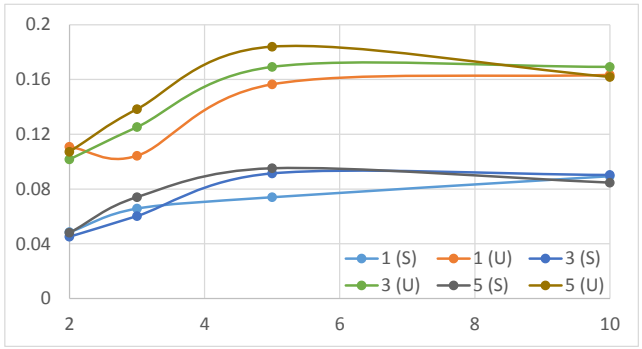

Figure 8: The average proportion of agents that prefer the final position over the opening position for non-strategic agents with deterministic tie-breaking, global utility and 5 candidates, according to number of districts (the x axis) and various gaps. (S) marks single-peaked preferences vs. uniformly random ones (U).

agents' distribution can effect their utility significantly. As can be seen in Figure 8, single-peaked agents were almost half the utility compared those whose preferences were allocated uniformly at random. Notice that, as before, in general, higher gap agents were more successful.

We should note that one of the most surprising outcomes is that strategic agents did not, ultimately, have a meaningfully better utility than non-strategic agents. In a sense, all agents could save themselves the effort, and just not bother with strategizing.

Discussion

The "reverse gerrymandering" setting, presented in this paper, may sound slightly unnatural at first blush, since people do not usually get to jump between voting districts (though (**?**) worked on such a setting). However, we believe that when viewed from the perspective of people participating in workplace committees, with their overlapping organizational influence, they do indeed strategize on where they could be more influential, and they move if they find a better position. In a more futuristic outlook, as autonomous systems become more common, the issue of these agents will need to be finding on their own where they are pivotal to help, and when will it be wrong to move. We presented here both theorems on the properties of this dynamic, and also explored it empirically (including for cases which we showed could not converge, hence an empirical examination is the main tool for analysis), discovering some key issues on the effect of changing the agent preference model, and the effect of district size on the agent. There is still much to discover – what other preference models work well with this setting; understanding better the effect of the gap constraints on social welfare; and combining various different types of agents in the same simulation, examining how their differences interact.

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