Review of Testing Epistemic Democracy's Majority Rule Result (Revision 1)

The paper has been revised substantially and it is overall clearer and reads better. However, I still have concerns about a number of issues, and I still have some doubts about whether the formal results hold up to scrutiny.

The Problem With Interaction

Imagine the following scenarios. All voters care about two issues, the environment and economic growth, and all voters care more about the environment than economic growth. The voters would ideally like to vote for a candidate that does well on both dimensions. Unfortunately, success on the two dimensions is perfectly negatively correlated, i.e. doing well on the environment dimension always means doing poorly on the economics dimension. Because the voters care more about the environment, they systematically vote against candidates that would perform well on the economics dimension.

This is the central problem in the multi-dimensional setup presented in this paper. The authors are aware of the problem, but there is very little discussion of this issue in the main text, and it is hidden behind technical assumptions in the appendix. The crucial assumption is the independence assumption, I think (Assumption 3 in the main text; (3) and (4) in the Appendix). If the votes are statistically independent conditional on which candidate is superior *on the dimension in question* (here: economics) then we assume that there are no other common influences that correlate the votes. In particular, we assume away problems like the one just sketched because we simply stipulate that voters are not influenced by another quality dimension. In effect, the conditional independence assumption implies that the quality of candidates on different dimensions cannot be (negatively) correlated.

I think the authors try to fix this issue in the appendix when they propose to also conditionalize on "conditioning facts" (22), which they denote $\tilde{a}$. While that accounts for the issue, it does not really solve it. If we conditionalize in the example as discussed above, then (as far as I can see) we only reach the much weaker result that *conditional on environmental performance* candidates with stronger economic performance are preferred. But that just ducks the central problem; the result is then much weaker, and clearly weaker than advertised in the main text.

What Can We Learn from Sociotropic Learning?

Sociotropic voting theory looks at competitions between incumbents and challengers. I think the authors should say more clearly that that is not the same as voting between two new candidates. In particular, the voters know much more about the incumbent than about the challenger. I think this needs to be addressed much more clearly in the paper.

A Problem with the Proof

The proof in appendix 6.1 does not look quite correct. Consider this counter-example. Assume that the two subsets of conditions 1 and 2 do not overlap. To make this very simple, assume that the strict inequality in proposition 1 holds only for voter 1 and the strict inequality in condition 2 holds only for voter 2. For all other voters, the respective equalities hold. If so, voter 1 is responsive to his beliefs in his votes, while voter 2 is responsive in his beliefs to the relevant quality facts (the "truth"). However, note that no voter meets both conditions 1 and 2, i.e. no voter is responsive to facts in their beliefs *and* then tends to vote accordingly. If so, the result (stated with a strict inequality) does not obtain (because no voter is responsive in both ways, and that is needed to increase the likelihood of voting correctly on the dimension).

The easiest way to fix this seems to be to ensure that the intersection of the subsets mentioned in conditions 1 and 2 is non-empty. But there might be further catches here that I don't quite anticipate. Note that there must be an error in the proof as provided. I think it is in the sentence "(2) follows immediately". If I am correct, it does not.

The Link Between Appendix and Main Text The appendix is not linked up properly with the main text. I don't see why the numbering of assumptions differs, for example. And the assumptions stated in the main text ("each voter") are much stronger than the assumptions in the appendix. More generally speaking, I find the appendix a little "clunky". I would strongly urge the authors to seek help from a mathematician or economist to tidy this up a little.

The Assumptions and Propositions in the Main Text

In the main text (6-7), the authors first state assumptions 1 and 2. Then it is claimed that Proposition 1 follows. But Proposition 1 does not follow, for the reasons related to possible interaction, as explained above. Then the authors introduce conditional independence as assumption 3, and reach proposition 2. I don't really understand this. First, Proposition 1 does not appear to follow from assumptions 1 and 2, as just mentioned. But I also don't understand what precisely the difference is between Propositions 1 and 2. This distinction is also not reflected in the more technical account in the appendix. Unless I'm overlooking something obvious, I believe that one should simply state all three assumptions and then say that they lead to Proposition 2. I also think that the importance of the independence assumption needs to be explained here (as discussed above, in my remark on interaction.)

Smaller Points

- 1: The claim about eight presidential elections that could have been changed is in the abstract, but the methodology behind this claim is hidden in a footnote, and seems to be based on some fairly arbitrary choices. It might be advisable to tone down this claim a little, especially in the abstract. It will also be important to have

an accessible online appendix to clarify (the link provided currengtly only leads to a .rdm file)

- 4, line 5: "leaving that facts to be contested" Typo?

- 14: The discussion of minority preferences seem (to me) rather far-fetched. Perhaps omit or move to a footnote?

- 16: "uninformed" not "uniformed"