The Condorcet Jury Theorem and Voter-Specific Truth

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1. Introduction

In his discussion of epistemic democracy in *Knowledge in a Social World* (1999), Alvin Goldman defends an interesting thesis about a special kind of knowledge relevant to democracy. He suggests that each voter in a democratic decision is confronted with what he calls the "core voter question".

Core voter question: "Which [candidate] would, if elected, produce a better outcome set from my point of view?" (Goldman 1999, p. 323)

Obviously, a voter's level of information and knowledge affects how reliably he or she is able to answer this question and, accordingly, whether the resulting vote will accurately reflect his or her interests or perspective. To capture this point, Goldman introduces three notions. A voter is said to have

- *core voter knowledge* if he or she believes the true answer to the core voter question;[2]
- *core voter error* if he or she believes the false answer; and
- *core voter ignorance* if he or she has no opinion (Goldman 1999, p. 324).

Goldman asserts the following:

The central thesis: "[D]emocracy is successful, in a certain sense, when the electorate has *full core knowledge*" (Goldman 1999, p. 326).

"Success" here means that the candidate whose policies are best from the perspective of the largest number of voters wins. "Full core knowledge" of the electorate means that all voters have core voter knowledge.

It is easy to see why this claim is true. If everyone believes the correct answer to his or her core voter question and votes in accordance with it, then the answer that is correct for the largest number of voters receives the most votes.

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[1] This paper goes back to a personal correspondence that one of us (Christian List) had with Alvin Goldman more than a decade ago. We jointly explored the issue further after a seminar discussion with him at the London School of Economics in 2012. We wish to express our admiration for Alvin Goldman's work and our gratitude to him for many interesting conversations, insights, and advice over the years. We are also very grateful to Franz Dietrich for helpful written comments on this paper. As we were finalizing this paper, a much earlier paper by Nicholas Miller came to our attention (Miller 1986), which addresses essentially the same problem that we discuss in this paper (though obviously not in relation to Goldman's 1999 book) and arrives at essentially the same formal results. Although there are a number of technical and expositional differences, Miller's results are clearly prior to ours, and we have added references to Miller's paper in several relevant places. We hope the present paper will also help to reinvigorate interest in Miller's very nice paper. Finally, we acknowledge our use of the open-source *matplotlib* library and thank its developers for providing this resource.

[2] In principle, one could extend this by requiring the voter *justifiably* to believe the true answer to the core voter question, but we set this aside.

Goldman's thesis is in line with a conception of democracy that involves "truth-tracking" and therefore fits the label "veritistic", though with a twist. For Goldman, unlike some classical epistemic democrats, it is not the case that there exists a *voter-independent truth* as to which candidate is best *simpliciter*. Rather, *for each voter*, there exists a *voter-specific truth* as to which candidate is best *for that voter*. The combination (*profile*) of voter-specific truths depends on the electorate in question and on the voters' interests and perspectives. Given a particular set of voters, however, the profile of voter-specific truths induces an overall, derivative truth as to which candidate is best *from the perspective of the largest number of voters*. Goldman's thesis asserts that if the electorate has full core knowledge, this "overall" truth prevails under majority rule: the candidate who is best from the perspective of the largest number of voters will attract the most votes.

The aim of this short paper is to show that Goldman's thesis can be recast as a generalization of the classical Condorcet jury theorem (e.g., Grofman, Owen, and Feld 1983; Boland 1989; List and Goodin 2001). Roughly speaking, the jury theorem in its original form states that if voters are individually better than random at making a correct judgment on a factual question and mutually independent in their judgments, then the probability of a correct majority judgment increases and approaches one as the number of voters increases.

The central move needed to recover Goldman's thesis from a generalized jury theorem is to replace Condorcet's assumption that there is a single truth to be tracked with the assumption of multiple such truths: one for each voter. The correct decision in aggregate then depends on the profile of voter-specific truths. We suggest that, once this move is properly implemented, Goldman's thesis becomes a consequence of a generalized Condorcet jury theorem. This matches a generalization of the jury theorem developed by Miller (1986).

The scope of this paper is limited. Its contribution lies not in presenting a fully developed technical result, but in exploring the conceptual relationship between Goldman's thesis and the Condorcet jury theorem. We refer readers to Miller (1986) for a more technical treatment. Further, in light of the limited scope of the present paper, we are not able to do justice to the richness of Goldman's work on democracy and social epistemology more broadly. Goldman's ideas on core voter knowledge are just one aspect of this.

2. The classical Condorcet jury theorem

We begin by recapitulating Condorcet's jury theorem in its simplest form. Let there be n voters, labeled 1, 2, …, n, who are faced with a decision on a single binary question. There exists an objectively correct, albeit unknown, answer to it, which we would like the decision to track. Examples of such a question are whether a defendant in a criminal trial is guilty or innocent, whether a particular chemical is carcinogenic or not, whether policy A or B will lead to more economic growth (other things equal), or some other factual yes-no question. Which questions in political contexts have objectively correct answers and in that sense qualify as "factual" is a separate matter that we cannot address here.

Let us introduce the variable X to refer to the correct answer, which we call the *truth*. For simplicity, X can take the values 1 (e.g., "guilty", "carcinogenic", "policy A") or

0 (e.g., "innocent", "safe", "policy B").[3] For each voter i, we write V_i to denote voter i's vote, where V_i can take the values 1 or 0. Here $V_i = 1$ represents a vote for answer "1", while $V_i = 0$ represents a vote for answer "0".

The classical jury theorem rests on two assumptions. To state the first, let us write $Pr(A|B)$ for the conditional probability of event A, given event B.

Voter competence: For each voter i and each possible truth x in $\{0,1\}$, $p = Pr(V_i = x \mid X = x)$ exceeds ½ and is the same for all voters.

Informally, this assumption says that each voter is better than random at identifying the truth, and that different voters are equally reliable. Furthermore, this holds irrespective of whether the truth is $X = 1$ or $X = 0$.

Voter independence: The votes of all voters, V_1, V_2, …, V_n, are mutually independent, conditional on the truth (which can be either $X = 1$ or $X = 0$).

Informally, this says that once we hold the truth in question fixed – thereby conditionalizing either on $X = 1$ or on $X = 0$ – learning the votes of some voters does not give us any information about the votes of others.

To state Condorcet's jury theorem, let us write V to denote the outcome of a majority vote. Formally, this is defined as follows:

- $V = 1$ if there are more voters with $V_i = 1$ than with $V_i = 0$;
- $V = 0$ if there are more voters with $V_i = 0$ than with $V_i = 1$;
- $V = 1/2$ if there is a tie.

The following result holds:

Condorcet's jury theorem: For each possible truth x in $\{0,1\}$, $Pr(V = x \mid X = x)$ usually increases and converges to 1 as the total number n of voters increases.[4]

Informally, the probability of a correct majority decision grows with the size of electorate and approaches one in the limit, both when $X = 1$ and when $X = 0$. The "growth" result is called the *non-asymptotic part* of the theorem, and the "convergence" result the *asymptotic part*.

There is, of course, a vast literature on the interpretation of this theorem and its limitations. It goes without saying that both voter competence and voter independence are very demanding assumptions, which are often violated, and there are by now many proposals on how they can be weakened.[5] Since our aim is to explore the

[3] We assume that each of the two possible values of X occurs with non-zero probability.

[4] To be precise, this statement holds, separately, for all odd numbers n and all even numbers n. When we move from n to $n + 1$, where n is odd and consequently $n + 1$ is even, there are usually small decreases in the majority competence, due to the possibility of ties. The word "usually" in the statement of the theorem signals this complication as well as the fact that there is only a "weak" increase in the special case $p = 1$, where the probability of a correct decision is always one.

[5] On the relaxation of voter competence, see, among others, Grofman, Owen, and Feld (1983) and Boland (1989). On the relaxation of voter independence, see especially Ladha (1992), Dietrich and List (2004), and Dietrich and Spiekermann (2013). For simplicity, we here set these complications aside.

relationship between Goldman's thesis and the classical jury theorem, we here set these complications aside and keep in place as many elements of the classical framework as possible. Specifically, we identify the minimal modification needed in order to recover Goldman's thesis in a Condorcetian framework.

3. A generalized Condorcet jury theorem with different voter-specific truths

As before, we assume that n voters are faced with a binary decision. We label the two options 1 and 0. (Goldman's analysis is also presented in this binary format. For a generalization of the classical jury theorem to non-binary decisions, see List and Goodin 2001; in principle, a similar move is possible in relation to Goldman's analysis too.) Unlike in Condorcet's original framework, we no longer assume that there exists a single truth as to which of the two options is "correct". Instead, we assume that different options can be "correct" for different voters, which corresponds to Goldman's observation that the right answer to the "core voter question" may differ across voters. (This way of generalizing Condorcet's original framework follows the generalization offered in Miller 1986.)

For each voter i, we introduce the variable X_i to refer to the correct answer *for voter i*, which we call i's *voter-specific truth*. Since we have restricted our discussion to a binary format, X_i can take two values, 1 or 0, depending on which of the options is the correct one for voter i. "Core voter knowledge", in Goldman's terms, refers to a situation in which a given voter *knows* (or *believes*) his or her voter-specific truth. "Full core knowledge" of the electorate is a situation in which all voters do so.

As before, V_1, V_2, …, V_n represent the votes of the n voters. It is easy to see that, if $V_i = X_i$ for every voter i (the situation of "full core knowledge" of the electorate), then V (defined as the majority winner, as before) will indeed be the option that is "correct" for the majority of voters. Formally, full core knowledge of the electorate implies that

- $V = 1$ if there are more voters with $X_i = 1$ than with $X_i = 0$;
- $V = 0$ if there are more voters with $X_i = 0$ than with $X_i = 1$;
- $V = 1/2$ if there as many voters with $X_i = 0$ as with $X_i = 1$.

This, in formalized terms, is Goldman's original thesis about the implications of core voter knowledge. In what follows, we sketch a Condorcetian generalization of this thesis.

Moving away from *full* core voter knowledge of every voter, we introduce the following, less demanding competence assumption:

Core voter competence: For each voter i and each possible profile of voter-specific truths $\langle x_1, x_2, \ldots, x_n\rangle$ in $\{0,1\}^n$, $p = Pr(V_i = x_i \mid X_1 = x_1 \;\&\; X_2 = x_2 \;\&\; \ldots \;\&\; X_n = x_n)$ exceeds ½ and is the same for all voters.[6]

Informally, this assumption says that each voter is better than random at identifying

[6] To ensure that the conditional probabilities to which we have referred are well-defined, we must *either* assume that each possible profile of voter-specific truths, $\langle x_1, x_2, \ldots, x_n\rangle$, occurs with non-zero probability, *or* treat the relevant conditional probabilities as primitives (rather than as derived from underlying unconditional probabilities).

his or her *voter-specific* truth, and that different voters are equally reliable. Furthermore, this holds for every possible profile of voter-specific truths. We also assume that the competence parameter p does not depend on the total number of voters n. We next state a suitably modified independence assumption:

Core voter independence: The votes of all voters, V_1, V_2, …, V_n, are mutually independent, conditional on the profile of voter-specific truths (i.e., conditional on $X_1 = x_1$ & $X_2 = x_2$ & … & $X_n = x_n$, where $\langle x_1, x_2, \ldots, x_n\rangle$ is in $\{0,1\}^n$).

Informally, this says that once we hold the voter-specific truths in question fixed – thereby conditionalizing on the conjunction of all X_is – learning the votes of some voters does not give us any information about the votes of others. Note that Condorcet's original competence and independence assumptions are special cases of core voter competence and core voter independence when X_i is the same for all i.

As suggested by Goldman, let the success criterion for a collective decision be that the option that is best from the perspective of the largest number of voters wins. Goldman thereby makes the normative assumption that there is a majoritarian relationship between any given profile of voter-specific truths and the induced, derivative "truth" as to which option is correct overall. (This assumption could be further justified, for instance, by invoking (i) an axiomatic characterization of majoritarianism such as May's 1952 theorem or (ii) the observation that the majoritarian relationship minimizes the number of discrepancies between the "overall truth" and the individual voter-specific truths. We here set these issues aside. For further discussion of (i) and (ii), see List 2013, Sections 2.2 and 2.4.)

Formally, for each possible profile of voter-specific truths $\langle x_1, x_2, \ldots, x_n\rangle$ in $\{0,1\}^n$, let us define $x_{overall}$ to be the option that is correct for the largest number of voters:

- $x_{overall} = 1$ if there are more voters with $x_i = 1$ than with $x_i = 0$;
- $x_{overall} = 0$ if there are more voters with $x_i = 0$ than with $x_i = 1$;
- $x_{overall} = 1/2$ if there as many voters with $x_i = 0$ as with $x_i = 1$.

We are now in a position to describe a generalized jury theorem. We call it a "conjectured theorem" rather than a "theorem", because we are giving only an informal gloss instead of a full mathematical treatment and provide only a partial proof. An earlier variant, which establishes essentially the same conclusion, was proved by Miller (1986).

The present result makes the simplifying assumption that although the proportion of voters with different voter-specific truths is unknown, it is fixed and does not depend on the total number of voters n. Let us say that a profile of voter-specific truths $\langle x_1, x_2, \ldots, x_n\rangle$ is *proportional* to $\langle q, 1 - q\rangle$ (where $0 \leq q \leq 1$) if a proportion of q of the individuals i have $x_i = 1$ and a proportion of $1 - q$ have $x_i = 0$.

Conjectured generalized jury theorem: For each pair of proportions $\langle q, 1 - q\rangle$ (with $q \neq ½$), the probability $Pr(V = x_{overall} \mid X_1 = x_1 \,\&\, X_2 = x_2 \,\&\, \ldots \,\&\, X_n = x_n)$, where $\langle x_1, x_2, \ldots, x_n\rangle$ is a profile of voter-specific truths proportional to $\langle q, 1 - q\rangle$, usually increases and converges to 1 as the total number n of voters increases.[7]

In what follows, we give a sketch proof of the asymptotic part of this claim, while not giving a proof of the non-asymptotic part. We also offer some numerical illustrations of both parts. Less technically inclined readers should feel free to skip Section 4 and move on straight to Section 5.

4. Sketch proof of the asymptotic part

Let q and $1-q$ be some given proportions of voters i with voter-specific truths 1 and 0, respectively (where $q \neq ½$). Let $N = N_1 \cup N_0$ be the smallest electorate such that the sizes of N_1 and N_0 are proportional to q and $1-q$, where $N_1 = \{i : X_i = 1\}$ and $N_0 = \{i : X_i = 0\}$. Let n_1 and n_0 be the sizes of N_1 and N_0, respectively.

Now construct a sequence of electorates on the basis of this electorate, with the following sizes:

- 1st electorate: total size n, consisting of n_1 voters i with $X_i = 1$ and n_0 voters i with $X_i = 0$;
- 2nd electorate: total size $2n$, consisting of $2n_1$ voters i with $X_i = 1$ and $2n_0$ voters i with $X_i = 0$;
- 3rd electorate: total size $3n$, consisting of $3n_1$ voters i with $X_i = 1$ and $3n_0$ voters i with $X_i = 0$; and so on.[8]

In each of these electorates, under the assumptions of core voter competence and core voter independence, the expected proportions of votes in support of the two options are as follows:

- Expected proportion of votes in favour of option 1: $(pn_1 + (1-p)n_0)/n$,
- Expected proportion of votes in favour of option 0: $(pn_0 + (1-p)n_1)/n$,

where p is the competence parameter. Statistically, we expect the following majority decision:

- $V = 1$ if and only if $(pn_1 + (1-p)n_0)/n > (pn_0 + (1-p)n_1)/n$,
  i.e., if and only if $n_1 > n_0$;
- $V = 0$ if and only if $pn_0 + (1-p)n_1)/n > (pn_1 + (1-p)n_0)/n$,
  i.e., if and only if $n_0 > n_1$.

In each case, the simplification of the inequation works because $p > ½$. In other words, the *expected* decision is in favour of the option that is best for the largest number of voters (i.e., $V = x_{overall}$, assuming this 0 or 1).

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[7] Note that the assumption $q \neq ½$ excludes the "knife-edge" case in which $x_{overall} = ½$. The qualification "usually" is to be understood in analogy to the one in our statement of the classical jury theorem above.

[8] In this construction, the variables $V_1, V_2, V_3, \ldots$ and $X_1, X_2, X_3, \ldots$ are not assumed to be the same for all electorates in the sequence. Rather, for each new electorate in the sequence, we consider a new pair of sets of variables $V_1, V_2, \ldots, V_{kn}$ and $X_1, X_2, \ldots, X_{kn}$, where kn is the size of the electorate in question. The different electorates in the sequence have in common only the proportions q and $1-q$ of voters with voter-specific truths 1 and 0. If one wanted to make this explicit, one could index the variables by indicating the relevant electorate as a superscript, as in $V^k{}_1, V^k{}_2, \ldots, V^k{}_{kn}$ and $X^k{}_1, X^k{}_2, \ldots, X^k{}_{kn}$.

The law of large numbers implies that, with probability one, the *actual* proportions of votes for the two options will approximate the *expected* ones as the size of the electorate kn increases (along the sequence of electorates we have constructed). By implication, $Pr(V = x_{overall} \mid X_1 = x_1 \;\&\; X_2 = x_2 \;\&\; \ldots \;\&\; X_n = x_{kn})$, where $\langle x_1, x_2, \ldots, x_{kn}\rangle$ is a profile of voter-specific truths for the k^{th} electorate along the constructed sequence, converges to one as k (and thereby kn) increases.[9]

As in the case of the classical jury theorem, when we move from an odd-sized electorate to a slightly larger even-sized one, there can be small decreases in the majority competence, due to the possibility of ties. The qualification "usually" in the statement of the result signals this complication as well as the fact that, in the limiting case $p = 1$, the majority competence is constantly one and hence we can only speak of a "weak" increase. This completes our sketch proof.

5. Numerical illustrations of the generalized jury theorem

We now provide some numerical examples to illustrate the implications of the generalized jury theorem. In each example, we begin with an initial electorate of size $n = n_1 + n_0$, where n_1 and n_0 are the numbers of voters with voter-specific truths 1 and 0, respectively. We scale up this electorate by doubling, tripling, quadrupling its size, and so on, using scaling factors $k = 1, 2, 3, 4, \ldots$, thereby generating electorates of sizes $1n$, $2n$, $3n$, $4n$, … For each k, we calculate the probability of success $Pr(V = x_{overall} \mid X_1 = x_1 \;\&\; X_2 = x_2 \;\&\; \ldots \;\&\; X_{kn} = x_{kn})$, understood as the probability that the option that is correct for most voters wins. For small electorates, this probability can be calculated analytically, applying a modified version of the well-known standard binomial cumulative distribution function to calculate group competence in a Condorcet jury setting. For larger electorates, analytical calculations are computationally too demanding, and approximations provide reliable estimates instead. We omit the technical details.

The first example begins with an initial electorate of size $n = n_1 + n_0$, where $n_1 = 2$ and $n_0 = 1$. Figure 1 shows the probability of a majority vote for option 1, the option that is "correct" for most voters, for different multipliers of the electorate $k = 1, 2, \ldots, 100$ and three different values of the individual competence parameter p. The little triangles indicate the results for odd values of kn, the lozenges for even values of kn. The probability of success increases in kn (for both odd and even values) and does so faster for higher values of p. Since even-sized electorates experience more majority ties, the probability of success tends to be lower for them than for comparable odd-sized electorates, but this difference vanishes as the electorate grows bigger.

[9] Note that we have excluded the "knife-edge" case $n_1 = n_0$.

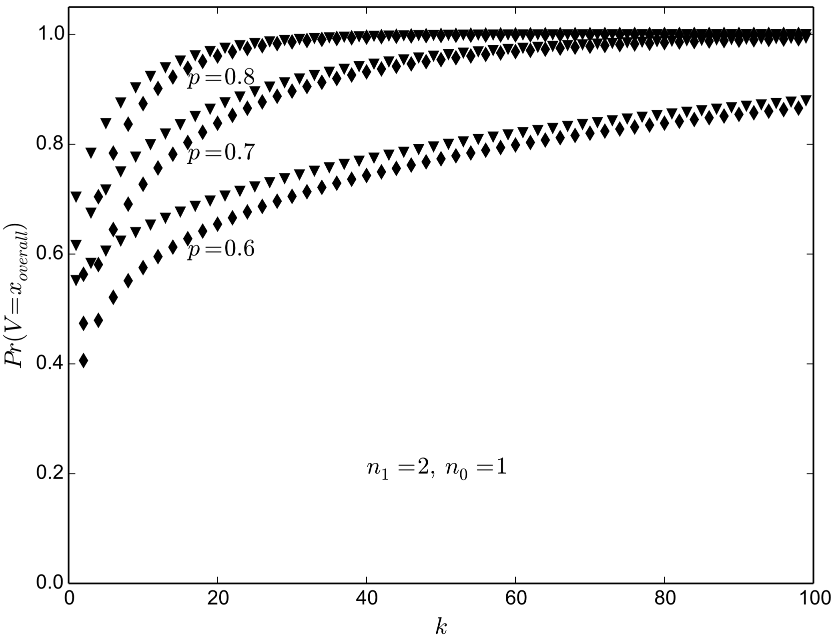

Figure 1

The second example begins with an initial electorate of size $n = n_1 + n_0$, where $n_1 = 3$ and $n_0 = 2$. As the ratio $n_1 : n_0$ is now lower (3 : 2 rather than 2 : 1), the increase in the overall probability of success is a little slower, as shown in Figure 2.

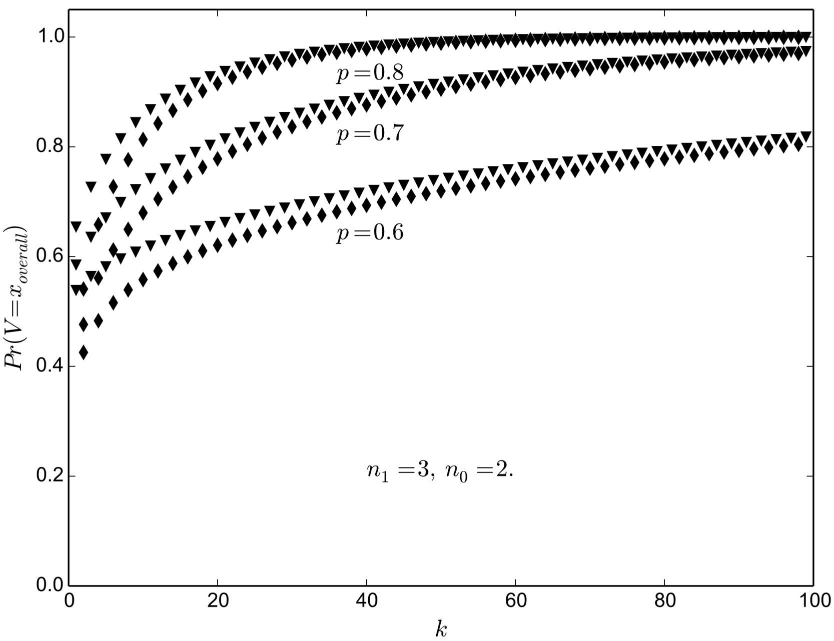

Figure 2

To illustrate that the convergence result holds even when n_1 and n_0 are almost of the same size (so that that there is only a narrow majority of voter-specific truths on one side) and even when individual competence is barely better than random, we finally present results for $n_1 = 10$ and $n_0 = 9$ with lower levels of p. Figure 3 shows the relevant numerical approximations.

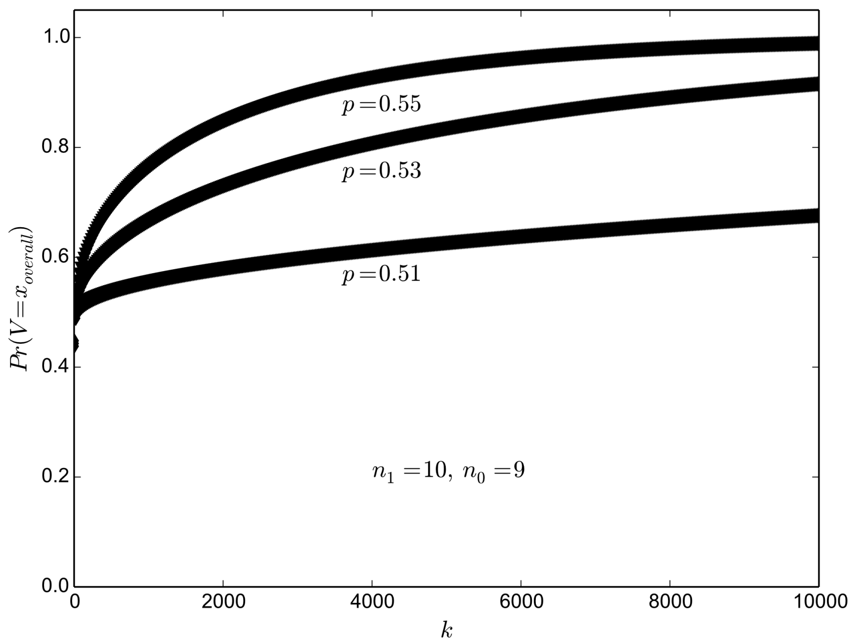

Figure 3

6. What happens if individual competence depends on the voter-specific truth?

So far, we have made the simplifying assumption that each voter's competence does not depend on his or her voter-specific truth. Specifically, we have assumed that, for each profile of voter-specific truths, all voters have the same probability of believing their own voter-specific truth, irrespective of whether that truth is 1 or 0. What happens if we lift that assumption? It may be harder, for example, to identify one's voter-specific truth if it is 1 than if it is 0, or vice versa. It may be harder for people who have a true interest in social reform, for instance, to recognize their voter-specific truth than it is for people who have an interest in preserving the *status quo*. (As an aside, it is often said that there are a significant number of voters in the United States who vote for the Republicans even though this is arguably against their economic interests.)

So, let us now assume that voters with different voter-specific truths can have different levels of competence. Formally:

Asymmetric core voter competence: For each voter i and each possible profile of voter-specific truths $\langle x_1, x_2, \ldots, x_n \rangle$ in $\{0,1\}^n$, $Pr(V_i = x_i \mid X_1 = x_1 \;\&\; X_2 = x_2 \;\&\; \ldots \;\&\; X_n = x_n)$ exceeds ½ and equals p_1 whenever i's voter-specific truth is 1 and p_0 whenever i's voter-specific truth is 0, where p_1 and p_0 need not be the same.

Here p_1 and p_0 are the competence parameters for voters with voter-specific truths 1 and 0, respectively. As before, we assume that p_1 and p_0 do not depend on the size of the electorate.

Consider again an electorate of size $n = n_1 + n_0$, where n_1 and n_0 are the numbers of voters with voter-specific truths 1 and 0. If we continue to assume core voter independence, the expected proportions of votes for the two options are the following:

- Expected proportion of votes in favour of option 1: $(p_1n_1 + (1 - p_0)n_0)/n$,
- Expected proportion of votes in favour of option 0: $(p_0n_0 + (1 - p_1)n_1)/n$.

Accordingly, we expect the following majority decision in the limit:

- $V = 1$ if and only if $(p_1n_1 + (1 - p_0)n_0)/n > (p_0n_0 + (1 - p_1)n_1)/n$;
- $V = 0$ if and only if $(p_0n_0 + (1 - p_1)n_1)/n > (p_1n_1 + (1 - p_0)n_0)/n$.

Simplifying, we get:

- $V = 1$ if and only if $(p_1 - ½) / (p_0 - ½) > n_0 / n_1$;[10]
- $V = 0$ if and only if $(p_1 - ½) / (p_0 - ½) < n_0 / n_1$.

So, in the case of asymmetric voter competence, whether we expect a decision for option 1 or for option 0 in the limit depends on whether the ratio of the differences between each of the two competence parameters (p_1 and p_0) and ½ is greater or smaller than the ratio between n_0 and n_1. Again, we refer readers to Miller (1986) for similar and additional results. (Note that we do not expect stable convergence of the decision to either 1 or 0 when $(p_1 - ½) / (p_0 - ½) = n_0 / n_1$.)

For example, let option 1 be the progressive option, and let option 0 be the conservative option. Suppose that p_1 is 0.6, while p_0 is 0.8. Here, it is easier for people with a conservative interest to identify their voter-specific truth than it is for people with a progressive interest. The ratio of the differences between each of the two competence parameters and ½ is (0.6 – ½) / (0.8 – ½) = 1/3. In this example, we would expect a progressive decision in the limit only if $1/3 > n_0/n_1$, i.e., only if there are more than three times as many people with progressive interests as there are people with conservative interests. By contrast, we would expect a conservative decision in the limit as soon as the number of people with conservative interests exceeds a third of the number of people with progressive interests.

Therefore, it is no longer generally true that the option that is correct for the largest number of voters will prevail in a large electorate. In fact, under the present assumptions about asymmetric core voter competence, when there are more people for whom the progressive option is correct than people for whom the conservative option is correct but not more than three times as many, the contrary is the case: the option that is wrong for the largest number of voters will prevail.

7. Concluding remarks

Let us conclude by situating Goldman's thesis in the broader debate on epistemic and procedural conceptions of democracy. According to an epistemic conception of democracy, there exists a decision-procedure-independent truth as to which option is the correct one in any given decision; the goal of a good democratic decision is to

[10] To see this, note the equivalence between (i) $p_1n_1 + (1 - p_0)n_0 > p_0n_0 + (1 - p_1)n_1$; (ii) $p_1n_1 - (1 - p_1)n_1 > p_0n_0 - (1 - p_0)n_0$; (iii) $(2p_1 - 1)n_1 > (2p_0 - 1)n_0$; and (iv) $(p_1 - ½) / (p_0 - ½) > n_0 / n_1$.

track that truth. If all goes well, the outcome of a democratic procedure – say, majority voting – is *indicative* of the truth in question. According to a procedural conception of democracy, by contrast, there exists no such procedure-independent truth. Rather, the "correctness" of any decision depends on its having been made by the appropriate procedure. Here, the outcome of a democratic procedure, if it has the right procedural virtues, is *constitutive* of what counts as the right decision.[11]

The classical Condorcet jury theorem rests not only on an epistemic conception of democracy, but on a particularly demanding one. The truth as to which option is correct is assumed to be independent not just of the relevant decision procedure, but also of the identity of the individual voters. In a criminal jury, this is plausible. Whether or not the defendant is truly guilty has nothing to do with who the jurors are. Indeed, in a good criminal-justice system, we hope that we will end up with the same verdict in a given trial, irrespective of the composition of the jury. Even more importantly, the *fact* about which verdict is substantively just does not change when the composition of the jury changes.

Alvin Goldman suggests an interesting departure from this picture in democratic contexts (which is consistent with Miller's generalization of Condorcet's framework). While, in effect, he retains the assumption that there is a procedure-independent criterion as to what the "correct" decision is, he allows this criterion to depend on the identity of the voters. Fundamentally, for Goldman, it is each individual voter for whom there exists a procedure-independent answer as to what the "correct" or "best" outcome would be. There is no exogenous answer that is true across all voters, independently of who they are. This, however, does not mean that Goldman adopts a procedural, non-epistemic conception of democracy.

In Goldman's picture, there is still an indirect, derivative sense in which there exists an "overall" truth about the correct outcome for the electorate in aggregate. This "overall" truth is determined, of course, by the profile of voter-specific truths and therefore depends on the identity of the electorate. Formally, each profile of voter-specific truths induces – via an appropriate normative criterion (for Goldman, the majority) – a corresponding electorate-dependent truth about the correct outcome in aggregate. But this electorate-dependent truth is still independent of the voting procedure used. For this reason, Goldman's conception of democracy qualifies as "epistemic".

Crucially, for Goldman, unlike for Condorcet, individual votes need not express judgments on what is "correct" or "best" for the electorate as a whole. Rather, each vote expresses a judgment on what is "correct" or "best" for the individual who casts it. Votes are thus answers to the core voter question, not answers to a question about the correct outcome in aggregate. Yet, as we have seen, under the idealized assumptions of core voter competence and core voter independence, democracy can still end up tracking the induced overall truth.

Of course, given the demandingness of this result's assumptions, some caution is needed. Things can easily go wrong when different voter-specific truths lead to different levels of competence (the asymmetric case we have considered). And as

[11] For a discussion, see, e.g., List and Goodin (2001). For early contributions to the debate, see, in particular, Coleman and Ferejohn (1986) and Cohen (1986).

discussed in the existing literature on the Condorcet jury theorem, matters can become worse when the conditions of competence or independence are violated more significantly.

Goldman's thesis makes salient an important ambiguity in existing democratic balloting procedures (see also Wolff 1994). Voters are usually given a ballot paper that merely asks them to tick a box next to one of the candidates' or parties' names. They are not usually told which question they are supposed to answer. Should they answer the question:

(1) "Which candidate or party would be best *from my own perspective*?"

Or should they answer the question:

(2) "Which candidate or party would be best *from the perspective of society as a whole*, allowing for the fact that this perspective may differ from my own?"

In the first case, voters would be asked to answer what Goldman calls the "core voter question". Different people's votes would express answers to different questions: the core voter questions for different people. In the second case, voters would be asked to answer a single, voter-independent question. Here, different votes would express different answers to the same question. (Needless to say, (1) and (2) do not exhaust the possibilities; we focus on these two only because they help us illustrate the difference between Condorcet's and Goldman's assumptions.)

Goldman's thesis, as well as its Condorcetian generalization in line with Miller's analysis, assumes case (1). Condorcet's original jury theorem, as exemplified by a criminal-jury or expert-panel setting, assumes case (2). Each approach is internally consistent and appropriate for a different set of decision problems, but we must not conflate or mix the two. If we wish to benefit from the lessons of either approach, we must keep this point in mind and disambiguate balloting procedures appropriately.

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