Normative Uncertainty as a Voting Problem

WILLIAM MACASKILL
University of Oxford University
William.Macaskill@philosophy.ox.ac.uk

1. Introduction

Often, you are not certain about what you ought to do. You might have heard the arguments for vegetarianism, but be only partially convinced, and so be uncertain whether you ought not to eat meat. On a larger scale, the government of a country might be uncertain whether it should act solely in the interests of those it currently governs, or whether it should take into account the interests of future generations as well. Indeed, ethics is a subject that is rife with controversy: for almost any ethical view, there seems to be *something* to be said in its favour. For even moderately reflective decision-makers, therefore, normative uncertainty is the norm.

Recently, some philosophers[1] have argued that decision-makers ought to take normative uncertainty into account in their decision-making. Consider the following case.

> *Suit*
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> Jo Bloggs has £1000 to spend, and she wants to buy a nice suit. Just before buying it, however, she remembers Peter Singer's article 'Famine, Affluence and Morality'.[2] She believes that, if Singer is right, buying the suit would be as wrong as letting a child which she could have easily saved drown in front of her. But she is not that convinced by his argument: she believes with 80% certainty that she ought to buy the suit, because of the pleasure it would give her, and gives Singer's conclusion only 20% credence.

By her own lights, should Jo buy the suit, or should she donate the money? Assume, for simplicity, that these are the only two options. There are two cases in which she makes the correct decision: (1) she buys the suit, and she ought to buy the suit; (2) she donates, and she ought to donate. And there are two cases in which she makes the wrong decision: (3) she buys the suit, but she ought to donate; (4) she donates, but she ought to buy the suit.

One might think that she should act on the belief in which she has most credence, and buy the suit. But that overlooks an important asymmetry in the bad outcomes. (3) is a far, far worse outcome, morally, than (4): if (4) is true, Jo's act is only wrong insofar as she loses a small amount of aesthetic pleasure; but if (3) is true, her act is as wrong as walking past a drowning child. So, given what she believes, she should not buy the suit. To do so would be morally reckless: ignoring the small risk of grave wrongdoing.

[1] For example, Oddie 1995; Lockhart 2000; Ross 2006; Guerrero 2007; Sepielli 2009. John Broome flags the importance of this idea, though he does not state his views on it, in Broome 2010.
[2] Singer 1972.

This reasoning just imports the idea, familiar from decision theory, that decision-makers ought to take both the probability of an outcome and the magnitude of the value of that outcome into account when making their decision. If we ought to do this under empirical uncertainty, it is plausible to suggest that we should do this under normative uncertainty as well,[3] and, just as it is plausible that we should maximize expected value under empirical uncertainty, it is plausible that we should maximize expected *choice-worthiness* under normative uncertainty.

This idea is at least prima facie compelling when applied to the *Suit* case. But when we look to apply the idea more generally, two problems immediately rear their heads. First, what should you do if one of the theories you have credence in does not give sense to the idea of magnitudes of choice-worthiness? Some theories will tell you that murder is a more serious wrong than lying is, but will not give any way of determining *how much* more serious a wrong murder is than lying. But if it does not make sense to talk about magnitudes of choice-worthiness, on a particular theory, then we will not be able to take an expectation over that theory. I will call this *the problem of merely ordinal theories*.

A second problem is that, even when all theories under consideration give sense to the idea of magnitudes of choice-worthiness, we need to be able to compare these magnitudes of choice-worthiness across different theories. But it seems that we cannot always do this. A rights-based theory claims that it would be wrong to kill one person in order to save fifty; utilitarianism claims that it would be wrong not to do so. But how can we compare the seriousness of the wrongs, according to these different theories? For which theory is there more at stake? In line with the literature,[4] I will call this *the problem of intertheoretic comparisons*.

Some philosophers have suggested that these problems are fatal to the project of developing a normative account of decision-making under normative uncertainty.[5] The primary purpose of this article is to show that this is not the case. To this end, I will develop an analogy between decision-making under normative uncertainty and the problem of social choice, and then argue that the Borda Rule provides the best way of making decisions in the face of merely ordinal theories and intertheoretic incomparability.

[3] Advocates of this idea include Lockhart 2000; Ross 2006; and Sepielli 2009.

[4] E.g. Lockhart 2000; Ross 2006; Sepielli 2009.

[5] E.g. Gracely 1996; Hudson 1989; Ross 2006. In conversation, John Broome has suggested that the problem of intertheoretic comparisons is 'devastating' for accounts of decision-making under normative uncertainty; Derek Parfit has described the problem of intertheoretic comparison as 'fatal'.

Before I begin, let me introduce the framework within which I work. What I will call a *decision-situation* is a quintuple $\langle S, t, A, T, C \rangle$, where *S* is a decision-maker, *t* is a time, A is a set of options that the decision-maker has the power to bring about at that time, T is the set, assumed to be finite, of first-order normative theories considered by the decision-maker at that time, and C is a credence function representing the decision-maker's beliefs about first-order normative theories. I will now elaborate on each of the last three members of this quintuple in turn.

First, options. An *option* is a proposition, understood as a set of centred possible worlds, that the decision-maker has the power to make true at a time. A centred possible world is a triple of a world, an agent in that world, and a time in the history of that world.[6] By convention, the options in A are specified so as to be mutually exclusive and jointly exhaustive. Furthermore, all the worlds in all the options in A are centred on the same agent, S, and the same time, t. I will use the letters A, B, C etc to refer to specific options, and italicised letters *A, B, C* etc to refer to variables. I assume that the constitution of the relevant option-set is not something about which different first-order normative theories disagree.[7]

Second, normative theories. A *first-order normative theory* (or 'theory' for short) is an ordering, for all possible sets of options A, of the options in that set in terms of their choice-worthiness. I therefore assume that the theories in T are mutually exclusive and jointly exhaustive.[8] I take *choice-worthiness* to be defined as the ordering that first-order normative theories produce; put intuitively, the choice-worthiness of an option on a particular first-order normative theory is the degree to which the decision-maker ought to choose that option, according to that theory. I use '$A \succcurlyeq_i B$' to mean '*A* is at least as choice-worthy as *B*, according to T_i,' and I define '*A* is strictly more choice-worthy than

[6] An option therefore can include the action available to the decision-maker, as well as the decision-maker's intention, motive, the outcome of the action, and everything else that could be normatively relevant to the decision-maker's decision.

[7] This assumption does some real work: for example, Bergström (1971), argues that which option-set is relevant, in a given decision-situation, is in part a normative question, which may therefore vary from theory to theory. (I thank an anonymous referee for pointing out this issue.) However, while this issue is interesting and important, it is one that I will have to leave to the side for the purposes of this paper. If one endorses Bergström's view, then one should assume that I am only discussing those situations where all theories in which the decision-maker has positive credence agree on what the relevant option-set is.

[8] In defining normative theories this way I also assume that the decision-maker cannot be uncertain about what is entailed by a given normative theory. This, of course, is highly unrealistic, if we are using 'normative theory' within its usual meaning. (I thank an anonymous referee for pressing this point). However, I am using 'normative theory' in a technical sense. If a decision-maker is unsure about whether, according to Kantianism, A is more choice-worthy than B or vice-versa, then I would describe her as uncertain between two distinct normative theories: Kantianism', according to which A is more choice-worthy than B, and Kantianism'', according to which B is more choice-worthy than A. To my knowledge, nothing hangs on this.

B, according to T_i' (or '$A \succ_i B$') as $(A \succcurlyeq_i B)$ & $\neg(B \succcurlyeq_i A)$, and 'A is equally as choice-worthy as B, according to T_i' (or '$A {\sim_i} B$') as $(A \succcurlyeq_i B)$ & $(B \succcurlyeq_i A)$. Note that by 'choice-worthiness' I do not mean merely *moral* choice-worthiness, in the sense in which the moral choice-worthiness of an act might be weighed against the prudential choice-worthiness of it. I mean *all-things-considered* choice-worthiness: the normative ordering of options after all normatively relevant considerations have been taken into account (according to a particular first-order normative theory).[9] First-order normative theories' choice-worthiness orderings can be represented by a *choice-worthiness function*, which is a function from options to numbers such that $CW_i(A) \geq CW_i(B)$ iff $A \succcurlyeq_i B$, using '$CW_i(A)$' to represent the numerical value that the choice-worthiness function CW_i assigns to A.[10]

The fifth element in a decision-situation is the credence function. The credence function C is a representation of the decision-makers partial beliefs over first-order normative theories. It is a function from every theory $T_i \in T$ to a real number in the interval [0,1], such that the sum of credences across all theories in T equals 1.[11,12]

I introduce a new term, *appropriateness*, which is defined as the ordering that metanormative theories produce; put intuitively, the appropriateness of an option is the degree to which the decision-maker ought to choose that option, in the sense of 'ought' that is relevant to decision-making under normative uncertainty. I represent that A is at least as appropriate as B as $A \succcurlyeq_A B$, defining the relations 'more appropriate than' and 'equally as appropriate as' in the standard way. As long as the appropriateness relation is reflexive, transitive, and complete, it may be represented with an *appropriateness function*: a function from options to real numbers such that $AP(A) \geq AP(B)$ iff $A \succcurlyeq_A B$, where '$AP(A)$' is the numerical value that the appropriateness function assigns to A.

[9] In this article, I do not consider how to accommodate theories that involve supererogation. This is an important issue, but one that must be left for another time. So I only discuss theories according to which all permissible options are maximally choice-worthy.

[10] In a purely ordinal and non-comparable information setting, one could simply talk about orderings, rather than choice-worthiness functions, as Arrow did. However, insofar as we might wish to use the social choice analogy in order to develop metanormative theories in conditions of interval-scale measurability or intertheoretic comparability, then it is better to rely on choice-worthiness functions, which are able to accommodate this.

[11] For simplicity I assume empirical certainty, and I assume that the decision-makers' credences across theories are evidentially independent of her actions; nothing will hang on this in what follows.

[12] One might worry that, if non-cognitivism true, then one cannot make sense of credences over normative theories. There has been debate on this issue in the literature, e.g. (Smith 2002; Bykvist and Olson 2009; Sepielli 2012; Olson and Bykvist 2012). However, I wish to sidestep this debate in this article, so for the purpose of this paper I assume that cognitivism is true.

I use the technical term 'appropriateness' in order to remain neutral on the issue of whether metanormative norms are norms of practical rationality,[13] or some other sort of norms.[14] I use the term 'appropriate' rather than 'ought' because 'ought' is a non-comparative concept: it does not make sense to say that some action is more or less 'oughty' than another. But it does make sense to say that an action is more or less appropriate than another, and in this paper I will sometimes be interested in how a metanormative theory orders options that are not maximally appropriate. From an appropriateness ordering, with a little bit of extra argument, one can derive oughts: on the most natural view, if *A* is the most appropriate option, then one ought (in the sense of 'ought' that I am interested in) to do *A*. When I say that *A* is an 'appropriate' option, using the term as a monadic predicate, I mean that it is a maximally appropriate option in the decision-situation under discussion.

A *metanormative theory* is a function from decision situations to appropriateness functions that have as their domains the option sets of the decision situations in question. The central project for those working on decision-making under normative uncertainty is to find the correct metanormative theory, and this paper is a part of that project.

Now that we have a framework in place, we can turn to the main problem that this article addresses.

2. Intertheoretic Comparisons and Ordinal Theories

If you want to take an expectation over first-order normative theories, two conditions need to hold. First, each theory in which you have credence needs to provide a concept of choice-worthiness that is at least interval-scale measurable. That is, you need to be able to

[13] Where practical rationality concerns how best to achieve one's goals, whatever they are; this should not be confused with prudential rationality, which concerns how best to act in one's self-interest. If my goal is to help others, then it may be practically rational for me to donate some of my income to international development, even though if would be prudentially rational for me to spend that money on luxuries for myself.

[14] In the existing literature, Lockhart (2000), Ross (2006), and Sepielli (2009) all claim to give an account of what it is rational to do under normative uncertainty. Wedgwood (2013) gives an analysis of what I call appropriateness in terms of *enkrasia*. Michael Zimmerman (2008, 61–8) suggests that decision-making under moral uncertainty could be a sort of 'second-order' moral norm, though he does not endorse this idea. Weatherson (2014) and Harman (2014) have recently questioned whether there are any facts of the matter at all concerning what it is appropriate for one to do. I set aside such scepticism in this paper. However, it is worth noting that, whereas Lockhart, Ross and Sepielli all claim to give an account of what is *rational* to do under normative uncertainty, Weatherson and Harman attack the position that there are *moral* norms that take into account moral uncertainty. So there is an odd situation in the literature where the defenders of the importance of normative uncertainty and the critics of the view seem to be talking past one another.

make sense, on every theory in which you have credence, of the idea that the difference in choice-worthiness between *A* and *B* is equal to the difference in choice-worthiness between *C* and *D*.[15] Intuitively, you need to be able to make sense of the idea of *how much* less choice-worthy one option is than another — for example that, though lying, theft and genocide are all wrong, the difference in wrongness between genocide and theft is much greater than the difference in wrongness between theft and lying. Second, you need to be able to make comparisons of magnitudes of choice-worthiness across different moral theories. That is, you need to be able to tell whether the difference in choice-worthiness between *A* and *B*, on T_i, is greater than, smaller than, or equal to, the difference in choice-worthiness between *C* and *D*, on T_j. Moreover, you need to be able to tell, at least roughly, *how much* greater the choice-worthiness difference between *A* and *B* on T_i is than the choice-worthiness difference between *C* and *D* on T_j.

The problem for maximizing expected choice-worthiness accounts is that sometimes these conditions do not hold. First, consider the problem of merely ordinal theories. Many theories do provide interval-scale measurable choice-worthiness: in general, if a theory orders empirically uncertain prospects in terms of their choice-worthiness, such that the choice-worthiness relation satisfies the axioms of expected utility theory, then the theory provides interval-scale measurable choice-worthiness.[16] Many theories satisfy this condition. Consider, for example, decision-theoretic utilitarianism, according to which one should maximise expected wellbeing (and which therefore satisfies the axioms of expected utility theory). If, according to decision-theoretic utilitarianism, a guarantee of saving Person A is equal to a 50% chance of saving no-one and a 50% chance of saving both Persons B and C, then we would know that, according to decision-theoretic utilitarianism, the difference in choice-worthiness between saving person B and C and saving person A is the same as the difference in choice-worthiness between saving person A and saving no-one. We give meaning to the idea of 'how much' more choice-worthy one option is than another by appealing to what the theory says in cases of uncertainty.

However, this method cannot be applied to all theories, for two reasons. First, if the theory does not order empirically uncertain prospects, then the axioms of expected utility

[15] More precisely: Let $CWi_{(}A)$ represent $\succcurlyeq_i$. If T_i is interval-scale, then $CW_j(A)$ also represents $\succcurlyeq_j$ iff $CW_i(A)=aCW_j(A)+b$, where $a>0$ (Stevens 1946). If T_i is merely ordinal, then $CW_j(A)$ also represents $\succcurlyeq$I iff $CW_i(A)=f(CW_j(A))$, where f(x) is any increasing transformation. A theory might also be *ratio-scale*. Ratio-scale theories give meaning to ratios between the absolute levels of choice-worthiness of options. More precisely: Let $CW_i(A)$ represent $\succcurlyeq_i$. If T_i is ratio-scale, then $CW_j(A)$ also represents $\succcurlyeq_i$ iff $CW_i(A)=aCW_j(A)$, where $a>0$. Ratio-scale theories therefore give strictly more information than merely interval-scale measurable theories. However, *maximise expected choice-worthiness* only needs interval-scale measurability, so for this paper I put the possibility of ratio-scale measurability to the side.

[16] As shown in von Neumann et al. 2007. The application of this idea to moral theories is discussed at length in Broome 1995.

theory are inapplicable. This problem arises even for some consequentialist theories: if the theory orders options by the value of the consequences the option *actually* produces, rather than the value of the consequences it is *expected* to produce, then the theory has not given enough structure such that we can use probabilities to measure choice-worthiness on an interval scale. Second, the axioms of expected utility theory sometimes clash with common-sense intuition, such as in the Allais paradox.[17] If a theory is designed to cohere closely with common-sense intuition, as many non-consequentialist theories are, then it may violate these axioms. And if the theory does violate these axioms, then, again, we cannot use probabilities in order to make sense of cardinal choice-worthiness. In the limiting case, a theory may simply put options into two categories: right and wrong. Kant's ethics may be interpreted this way. In this case, there is no fact of the matter about *how right* or *how wrong* different options are, which means, again, that someone who has non-zero credence in this interpretation of Kant's ethics simply cannot use expected choice-worthiness maximization over all theories in which she has credence.

The second problem for maximizing expected choice-worthiness is the problem of intertheoretic comparisons. Even when theories do provide interval-scale measurable choice-worthiness, there is no guarantee that we will be able to compare magnitudes of choice-worthiness between one theory and another. Previously I gave the example of comparing the difference in choice-worthiness between killing one person to save fifty and refraining from doing so according to a rights-based moral theory and according to utilitarianism. In this case, there is no intuitive answer to the question whether the situation is higher-stakes for the rights-based theory than it is for utilitarianism or vice-versa. And in the absence of intuitions about the case, it is difficult to see how there could be any way of determining an answer.

Even worse, the problem of intertheoretic comparisons arises even for theories that seem very similar. Consider two consequentialist theories: utilitarianism and prioritarianism. Prioritarianism gives more weight to gains in wellbeing to the worse off than it does to gains in wellbeing to the better off. But does it give more weight to gains in wellbeing to the worse off than utilitarianism does? That is, is prioritarianism like utilitarianism but with additional concern for the worse-off; or is prioritarianism like utilitarianism but with *less* concern for the better off? We could represent the prioritarian's idea of favouring the worse-off over the better-off equally well either way. And there seems to be no information that could let us determine which of these two ideas is the 'correct' way to represent prioritarianism *vis-à-vis* utilitarianism.

[17] Allais 1953.

However, the question of what to do when one or more of these conditions do not hold has not been discussed in the literature. At best, it has been assumed that, in the absence of intertheoretic comparisons, the only alternative to maximizing expected choice-worthiness is the account according to which one should simply act in accordance with the theory that one thinks is most probable.[18] For that reason, it has been assumed that the lack of intertheoretic comparisons would have drastic consequences. For example, because intertheoretic incomparability entails that *maximise expected choice-worthiness* cannot be applied, Jacob Ross says:

> the denial of the possibility of intertheoretic value comparisons would imply that among most of our options there is no basis for rational choice. In other words, it would imply the near impotence of practical reason.[19]

In a similar vein, other commentators have regarded the problem of intertheoretic comparisons as fatal to the very idea of developing a normative account of decision-making under normative uncertainty. In the first modern article to discuss decision-making under normative uncertainty, James Hudson says:

> Hedging will be quite impossible for the ethically uncertain agent... Under the circumstances, the two units [of value, according to different theories] must be incomparable by the agent, and so there can be no way for her [normative] uncertainty to be taken into account in a reasonable decision procedure. Clearly this second-order hedging is impossible.[20]

Likewise, Edward Gracely argues, on the basis of intertheoretic incomparability, that:

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[18] E.g. Ross 2006, 762 fn.11. Gustafsson and Torpman (2014) defend the 'most probable theory' account. Though I am unable in this article to engage with their arguments in depth, I will note that, because they have a very fine-grained definition of a moral theory, their view has absurd consequences. For example, suppose that you are 99.9% certain in prioritarianism, and 0.1% certain in utilitarianism. You are deciding between two options: in the first option, person A has 100 units of wellbeing, and person B has 1 unit of wellbeing; in the second option, both people have 50 units of wellbeing. Everything else about the options is the same. Given your credences, it seems you should choose option B. But suppose you are not exactly sure of how concave the prioritarian function should be, and you have equal credence in 100 slightly different concave functions as the best form of prioritarianism. The degree of concavity does not make any difference in this case, but would make a difference in some very rare cases. According to Gustafsson and Torpman's view, all these slightly different forms of prioritiarianism are different theories. So in fact utilitarianism is your favourite theory. So you should choose the first, unequal, option. That, in my view, is a *reductio*.

[19] Ross 2006, p. 763. Note that Ross uses this purported impotence as a *reductio* of the idea that different theories' choice-worthiness rankings can be incomparable. However, if my argument in the preceding paragraphs is sound, then Ross's position is not tenable.

[20] Hudson 1989, p. 224.

> the proper approach to uncertainty about the rightness of ethical theories is to determine the one most likely to be right, and to act in accord with its dictates. Trying to weigh the importance attached by rival theories to a particular act is ultimately meaningless and fruitless.[21]

Similarly, Sepielli suggests that *maximise expected choice-worthiness* is 'the' correct principle for decision-making under normative uncertainty.[22] None of the above philosophers consider the idea that different criteria could apply depending on the informational situation of the agent. It is this assumption that leads to the thought that the problem of intertheoretic comparisons of value is fatal for accounts of decision-making under normative uncertainty. Against Ross and others, I will argue that decision-making in conditions of normative uncertainty and intertheoretic incomparability is not at all hopeless. But to see this, we need to recognise an analogy between decision-making under normative uncertainty and social choice.

3. Normative Uncertainty and the Social Choice Analogy

Social choice theory, in the framework developed by Amartya Sen,[23] studies how to aggregate individuals' utility functions (where each utility function is a numerical representation of that individuals' preferences) into a single 'social' utility function, which represents 'social' preferences. A *social welfare functional* is a function from sets of utility functions to 'social' utility functions. Familiar examples of social welfare functionals include: utilitarianism, according to which x has higher social utility than y iff the sum total of utility over all individuals is greater for x than for y; and maximin, according to which x has higher social utility than y iff x has more utility than y for the worst-off member of society.

Similarly, the theory of decision-making under normative uncertainty studies how to aggregate different first-order normative theories' choice-worthiness functions into a single appropriateness function. The formal analogy between these two disciplines should be clear.[24] Rather than individuals we have theories; rather than preferences we have

[21] Gracely 1996, pp. 331–2.

[22] Sepielli 2009, p. 12.

[23] Sen 1970.

[24] Note that this analogy is importantly different from other analogies between decision theory and social choice theory that have recently been drawn in the literature. Rachael Briggs's (2010) analogy is quite different from mine: in her analogy, a decision theory is like a voting theory but where the voters are the decision-maker's future selves. Samir Okasha's (2011) analogy is formally similar to mine, but his analogy is between the problem of social choice and the problem of aggregating different values within a pluralist

choice-worthiness orderings; and rather than a social welfare functional, we have a metanormative theory. And, just as social choice theorists try to work out what the correct social welfare functional is, so we are trying to work out what the correct metanormative theory is. Moreover, just as social choice theorists tend to be attracted to weighted utilitarianism ('weighted' because the weights assigned to each individual's welfare need not be equal) when information permits,[25] so decision-theorists are attracted to its analogue under normative uncertainty, *maximize expected choice-worthiness,* when information permits.

The formal structure of the two problems is very similar. But the two problems are similar on a more intuitive level as well. The problem of social choice is to find the best compromise in a situation where there are many people with competing preferences. The problem of normative uncertainty is to find the best compromise in a situation where there are many possible normative theories with competing recommendations about what to do.

What is particularly enticing about this analogy is that the literature on social choice theory is well developed, and results from social choice theory might be transferable to normative uncertainty, shedding light on that issue. In particular, since the publication of Amartya Sen's *Collective Choice and Social Welfare*,[26] social choice theory has studied how different social welfare functionals may be axiomatised under different *informational assumptions*. One can vary informational assumptions in one of two ways. First, one can vary the *measurability assumptions*, and, for example, assume that utility is merely ordinally measurable, or assume that it is interval-scale measurable. Second, one can vary the *comparability assumptions*: one can assume that we can compare differences in utility between options across different individuals; or one can assume that such comparisons are meaningless. The problem of determining how such comparisons are possible is known as the problem of interpersonal comparisons of utility. As should be clear from the discussion in the previous section, exactly the same distinctions can be made for theories: choice-worthiness can be ordinally or interval-scale measurable; and it can be intertheoretically comparable or incomparable.

Very roughly, what is called voting theory is social choice theory in the context of preferences that are non-comparable and merely ordinally measurable. Similarly, the

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epistemological theory, rather than with normative uncertainty. For further discussion of Okasha's analogy, see Morreau 2014; Morreau 2015; Stegenga 2015; Bradley 2013.

[25] See, for example, Blackorby, Donaldson, and Weymark 1984 for the reasons why, given interval-scale measurable and interpersonally comparable utility, weighted utilitarianism is regarded as the most desirable social welfare functional.

[26] Sen 1970.

problem with which I am concerned in this article is how to aggregate individual theories' choice-worthiness functions into a single appropriateness function in conditions where choice-worthiness is merely ordinally measurable. So we should explore the idea that voting theory will give us the resources to work out how to take normative uncertainty into account when the decision-maker has non-zero credence only in merely ordinal theories.

However, before we begin we should note two important disanalogies between voting theory and decision-making under normative uncertainty. First, theories, unlike individuals, do not all count for the same: theories are objects of credences. The answer to this disanalogy is obvious. We treat each theory like an individual, but we weight each theory's choice-worthiness function in proportion with the credence the decision-maker has in that the theory. So the closer analogy is with weighted voting.

The second disanalogy is that, unlike in social choice, a decision-maker under normative uncertainty will typically face varying information from different theories at one and the same time. For a typical decision-maker under normative uncertainty, some of the theories in which she has credence will be interval-scale measurable and intertheoretically comparable; others will be interval-scale measurable but intertheoretically incomparable; others again will be merely ordinally measurable.[27] In contrast, when social choice theorists study different informational set-ups, they generally assume that the same informational assumptions apply to all individuals. In this article, I will assume that all theories in which the decision-maker has credence are merely ordinal and are intertheoretically incomparable. I am thereby limiting the scope of my argument, leaving the question of how to act when faced varied informational conditions for another time. However, I will thereby show that even in what might be considered the 'worst case' scenario, informationally speaking, there is still a principled account of what one ought to do.

With these caveats, the obvious next question is: which voting system should we use?

4. Some Voting Systems

[27] There are further informational possibilities, too. Theories might be ratio-scale, as defined in fn.14. They may also be *level comparable*: one may be able to say that the choice-worthiness of A on T_i is less than (greater than, equal to) the choice-worthiness of B on T_j. Maximin, for example, requires that theories are level-comparable with each other, so that it is meaningful to say which theory is 'worst off' given the selection of a particular option; but it does not require comparability of units across theories.

With the voting analogy in hand, we can understand a couple of metanormative theories that have been suggested in the literature as voting system analogues. First, we can understand the 'My Favourite Theory'[28] account of decision-making under normative uncertainty, endorsed in the quote by Edward Gracely, as a sort of Dictatorship voting system. let us define it more precisely:

> *Most Probable Theory Dictatorship*. If T_i is the theory in which in *S* has highest credence, then: if $A \succ_i B$, then it is more appropriate for *S* to do *A* rather than *B*; and if $A \sim_i B$ then *A* and *B* are equally appropriate for *S*.

Similarly, we can interpret a proposal from Lockhart in light of this voting analogy. He suggests the following metanormative theory, which he labels 'Principle of Rationality 2':

> In situations of moral uncertainty, I (the decision-maker) should (rationally) choose some action that has the maximum probability of being morally right.[29]

Translating Lockhart's proposal into our terminology, and making a natural modification such that the principle generates an ordering of options in terms of appropriateness, we get:

> *Maximalism.* If *S* has a higher credence in *A* being maximally choice-worthy than in *B* being maximally choice-worthy, then *A* is more appropriate for *S* than B. If *S* has equal credence in *A* being maximally choice-worthy as in *B* being maximally choice-worthy, then *A* and *B* are equally appropriate for *S*.

Both of these criteria are able to operate even in the absence of intertheoretic comparability and in the presence of merely ordinal theories. So they are at least in the game of providing what we are looking for. But they suffer from pretty major problems. Here is just one.[30] Consider the following case.[31]

> *Research Funding*

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[28] This term is from Lockhart 2000, p. 42.

[29] Lockhart 2000, 26.

[30] Others are detailed, with responses, in Gustafsson and Torpman 2014.

[31] In the cases that follow, and in general when I am discussing merely ordinal theories, I will refer to a theory's choice-worthiness ordering directly, rather than its choice-worthiness function (e.g. I write $A \succ_i B \succ_i C$ rather than $CW_i(A)=3$, $CW_i(B)=2$, $CW_i(C)=1$). I do this in order to make it clear that these theories are to be understood as ordinal rather than interval-scale. However, strictly speaking the metanormative theories I discuss take choice-worthiness functions as inputs, rather than choice-worthiness orderings. Also, when it is clear which theory the choice-worthiness ordering belongs to, I leave out the subscript on the symbol '$\succ$'.

Julia works for a research funding body, and she has the final say over which of three proposals receives a major grant. The first, project A, is a blue-sky project in theoretical physics that is of very clear theoretical value but which is unlikely to have a positive impact outside of academia. The second, project B, is an applied project in medical imaging. It would have little in the way of theoretical value, but would probably result in advances that would improve the treatment of a number of medical conditions. The third, project C, is in biochemistry. This project has some theoretical value, but less so than the theoretical physics project, and it is likely to lead to advances in pharmacology that will benefit others, but it will probably have a smaller positive impact than the medical imaging project.

She has credence in three theories:

35% credence in T_1 according to which the grant should be awarded purely on the basis of theoretical value. According to this view, A≻B≻C.

31% credence in T_2, according to which the grant should be awarded purely on the basis of its real-world impact. According to this view, C≻B≻A

34% credence in T_3, according to which both theoretical value and real-world impact are important considerations. According to this view, B≻C≻A.

Most Probable Theory Dictatorship and *Maximalism* both regard A as most appropriate, because A both is most choice-worthy according to the theory in which the decision-maker has highest credence, and has the greatest probability of being right. But note that Julia thinks that there is only slightly less chance of B being right than A; and she is 100% certain that B is at least second best. It seems highly plausible that this certainty in B being at least the second best option should outweigh the slightly lower probability of B being maximally choice-worthy. So it seems, intuitively, that B is the most appropriate option: it is well supported in general by the theories in which the decision-maker has credence. But neither *Most Probable Theory Dictatorship* nor *Maximalism* can take account of that fact. Indeed, *Most Probable Theory Dictatorship* and *Maximalism* are completely insensitive to how theories rank options that are not maximally choice-worthy. But to be insensitive in this way, it seems, is simply to ignore decision-relevant information. So we should reject these metanormative theories.

If we turn to the literature on voting theory, can we do better? Within voting theory, the gold standard voting systems are *Condorcet Extensions*.[32] The idea behind such voting

[32] A brief comment on some voting systems I do not consider: I do not consider range voting because I am

systems is that we should think how candidates would perform in a round-robin head-to-head tournament. A voting system is a Condorcet extension if it satisfies the following condition: that, if, for every other option *B*, the majority of voters prefer *A* to *B*, then *A* is elected.

We can translate this idea into our terminology as follows. let us say that *A beats B* (or *B is defeated by A*) iff it is true that, in a pairwise comparison between *A* and *B*, the decision-maker thinks it more likely that *A* is more choice-worthy than *B* than that *B* is more choice-worthy than *A*. *A* is the *Condorcet winner* iff *A* beats every other option within the option-set. A metanormative theory is a *Condorcet Extension* if it elects a Condorcet winner whenever one exists. Condorcet Extensions get the right answer in *Research Funding*, because B beats both A and C.

However, often Condorcet winners do not exist. Consider the following case:

> *Hiring Decision*
>
> Jason is a manager at a large sales company. He has to make a new hire, and he has three candidates to choose from. They each have very different attributes, and he is not sure what attributes are morally relevant to his decision. In terms of qualifications for the role, applicant B is best, then applicant C, then applicant A. However, he is not certain that that is the only relevant consideration. Applicant A is a single mother, with no other options for work. Applicant B is a recent university graduate with a strong CV from a privileged background. And applicant C is a young black male from a poor background, but with other work options. Jason has credence in three competing views.
>
> 30% credence in a form of virtue theory. On this view, hiring the single mother would be the compassionate thing to do, and hiring simply on the basis of positive discrimination would be disrespectful. So, according to this view, A≻B≻C.
>
> 30% credence in a form of non-consequentialism. On this view, Jason should just choose in accordance with qualification for the role. According to this view, B≻C≻A.

considering the situation where theories give us only ordinal choice-worthiness, whereas range voting requires interval-scale choice-worthiness. I do not consider instant-runoff (or 'alternative vote'), because it violates monotonicity: that is, one can cause A to win over B by choosing to vote for B over A rather than vice-versa. This is seen to be a devastating flaw within voting theory, and I agree: none of the voting systems I consider violate this property. Instant-runoff is also not a Condorcet extension.

40% credence in a form of consequentialism. On this view, Jason should just choose so as to maximise societal benefit. According to this view, C≻A≻B.

In this case, no Condorcet winner exists: B beats C, C beats A, but A beats B. But, intuitively, C is more appropriate than A or B: A≻B≻C, B≻C≻A, and C≻A≻B are just 'rotated' versions of each other, with each option appearing in each position in the ranking exactly once. If Jason had the same credence in each theory, each option should be equally appropriate. But Jason actually has a higher credence in the consequentialist theory. It follows that C should be the most appropriate option.

Condorcet extensions therefore need some way to determine a winner even when no Condorcet winner exists. One way is given by the Simpson-Kramer method, a simple but attractive Condorcet extension. Let us say that the *magnitude* of a defeat, for some options *A* and *B*, where *B* beats *A*, is the difference between the credence the decision-maker has that *B* is more choice-worthy than *A* and the credence the decision-maker has that *A* is more choice-worthy than *B*. For example, if, for two options D and E, the decision-maker had 70% credence that E is more choice-worthy than D, 20% credence that D is more choice-worthy than E, and 10% credence that they are equally choice-worthy, then D is defeated by E with a magnitude of 50%. On the Simpson-Kramer method, we pit each option against every other option in a head-to-head comparison, looking both at which options beat which other options, and also at the size of each defeat. Options are ordered in terms of their appropriateness by how large the magnitude of their biggest loss is, where it is worse to have a larger biggest loss. Put precisely:

> *Simpson-Kramer Method*: *A* is more appropriate than *B* iff, in a round-robin tournament among all options, *A*'s biggest pairwise defeat is smaller than *B's* biggest pairwise defeat; *A* is equally as appropriate as *B* iff *A* and *B*'s biggest defeats are equal in magnitude.

In *Hiring Decision*, the magnitude of the biggest defeat for A and B is 40%, whereas the magnitude of the biggest defeat for C is only 20%. So, according to the Simpson-Kramer method, C is the most appropriate option, which seems intuitively correct in this case.

In what follows, I will use the Simpson-Kramer method as a prototypical Condorcet Extension.[33] Though Condorcet Extensions are the gold standard within voting theory,

[33] There are other Condorcet extensions that in my view are better than the Simpson-Kramer method, such as the Schulze method (Schulze 2010) and Tideman's Ranked Pairs (Tideman 1987), because they satisfy some other desirable properties that the Simpson-Kramer method fails to satisfy. However, these are considerably more complex than the Simpson-Kramer method, and fail to be satisfactory for exactly the same reasons why the Simpson-Kramer method fails to be satisfactory. So in what follows I will use the

they are not right for our purposes. The reason is that, whereas voting systems rarely have to handle an electorate of variable size, metanormative theories do: varying the size of the electorate is analogous to changing one's credences in different normative theories. It is obvious that our credences in different normative theories should often change. But Condorcet Extensions handle that fact very poorly.

Minimally, one would think that increasing one's credence in a given first-order theory should not make the appropriateness ordering worse by the lights of that normative theory. But Condorcet Extensions fail by that criterion. More precisely, let me introduce a new adequacy condition:

> *Updating Consistency*: For all decision-situations, and for all T_i, A, if A is maximally appropriate in that decision situation, and A is maximally choice-worthy according to T_i, then if the decision-maker increases her credence in T_i, keeping the ratios of her credences between all other theories the same, it is still true that A is maximally appropriate.

Updating Consistency seems to me to be a necessary condition for any metanormative theory. It would be perverse if, according to some metanormative theory, increasing one's credence in a particular theory on which A is maximally choice-worthy should cause A to no longer be maximally appropriate. However, all Condorcet Extensions violate this condition. To see this, consider the following case:

> *Tactical Decisions*
>
> Jane is a military commander. She needs to take aid to a distant town, through enemy territory. She has four options available to her:
>
> A: Bomb and destroy an enemy hospital in order to distract the enemy troops in the area. In this scenario, 10 enemy civilians die as a result of the bombing, but all soldiers survive.
>
> B: Bomb and destroy an enemy ammunitions factory, restricting the scale of the inevitable skirmish. In this scenario, 10 enemy civilian engineers die as a foreseen side-effect of bombing the ammunitions factory; 10 of her soldiers and 10 enemy soldiers die.

Simpson-Kramer method as my example of a Condorcet extension.

C: Status quo: do not make any pre-emptive attacks and go through the enemy territory only moderately well-armed. In this scenario, 25 of her soldiers die and 25 enemy soldiers die.

D: Equip her soldiers with much more extensive weaponry and explosives. In this scenario, 5 of her soldiers die and 85 enemy soldiers die.

Jane has credence in four different theories:

She has 8/24 credence in T_1 (impartial consequentialism), according to which one should simply minimise the number of deaths. According to T_1, A≻B≻C≻D.

She has 3/24 credence in T_2 (partialist consequentialism), according to which one should minimise the number of deaths of home soldiers and enemy civilians and engineers, but that deaths of enemy soldiers do not matter. According to T_2, D≻A≻B≻C.

She has 6/24 credence in T_3 (mild non-consequentialism), according to which one should minimize the number of deaths of home soldiers and enemy civilians and engineers, that deaths of enemy soldiers do not matter, and that it is mildly worse to kill someone as a means to an end than it is to let someone die in battle. According to T_3, D≻A≻C≻B.

She has 7/24 credence in T_4 (moderate non-consequentialism), according to which one should minimise the number of deaths of all parties, but that there is a side-constraint against killing a civilian (but not an engineer or soldier) as a means to an end. According to T_4, B≻C≻D≻A.

Given her credences, according to the Simpson-Kramer method D is the most appropriate option.[34] The above case is highly complicated, and I have no intuitions about what the most appropriate option is for Jane, so I do not question that answer. However, what is certain is that, if Jane were to come to have positive credence in a theory according to which D is the most choice-worthy option, doing so should not cause D to become *less* appropriate than it was before, making some option other than D maximally appropriate in its place. But that is exactly what happens on the Simpson-Kramer method.

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[34] A beats B 17 to 7; A beats C 17 to 7; D beats A 16 to 8; B beats C 18 to 6; B beats D 15 to 9; C beats D 15 to 9. Each option's biggest pairwise defeats are: A – 8; B – 10; C – 12; D – 6. So according to the Simpson-Kramer method, D≻A≻B≻C.

Let us suppose that Jane finds out about a new theory, T_5, which is a form of thoroughgoing non-consequentialism. According to this theory there is a side-constraint against killing enemy civilians or engineers as a means to an end, and killing enemy civilians as a means to an end is worse than killing enemy engineers as a means to an end. Given that these side-constraints are not violated, then one should aim to minimize the number of deaths, but one should weight the deaths of domestic soldiers as three times as bad as the deaths of enemy soldiers. According to T_5, C~D≻B≻A. She finds the theory fairly compelling, and assigns it 8/32 credence (whereas it had 0 credence before), reducing her credence in the other theories such that the ratios of credences between them stays the same. Her credence distribution is therefore now as follows: 6/32 in T_1, 3/32 in T_2, 8/32 in T_3, 7/32 in T_4, and 8/32 in T_5.

After Jane has updated in favour of T_5, B becomes the most appropriate option, according to the Simpson-Kramer method.[35] But that is bizarre. On the previous appropriateness ordering D was maximally appropriate, and according to T_5 D is maximally choice-worthy. So, by T_5's lights, the outcome would have been better if Jane had *not* come to have positive credence in that theory. That just should not happen. So we should reject the Simpson-Kramer method.

In fact, it has been shown that *any* Condorcet extension will violate the equivalent of *Updating Consistency*.[36] So, rather than just a reason to reject the Simpson-Kramer method, violation of *Updating Consistency* gives us a reason to reject all Condorcet extensions as metanormative theories.

One might object to my argument as follows.[37] One might argue that we should not merely be concerned with how increasing one's credences in some theory alters which option is maximally appropriate (which is the sole concern of *Updating Consistency*). Instead, we should be concerned with how increasing one's credence in some theory affects the overall appropriateness ordering, including those options that are not maximally appropriate. If increasing one's credence in T_i means that the most appropriate option is no longer T_i's most choice-worthy option, that might be acceptable if the overall appropriateness ordering is closer to T_i's choice-worthiness ordering after one updates in favour of T_i. And, so the objection goes, that is exactly what we find in this case. On the

[35] A beats B 17 to 15; A beats C 17 to 15; D beats A 24 to 8; B beats C 18 to 14; D beats B 17 to 15; C beats D 15 to 9. Each option's biggest pairwise defeats are: A – 16; B – 2; C – 3; D – 7. So according to the Simpson-Kramer method B≻C≻D≻A. The Schulze method and Ranked Pairs (mentioned in fn.28) both give the same answers in both versions of *Tactical Decisions*, so this case is a counterexample to them too.
[36] Within voting theory this is known as the 'strong no-show' paradox. Proof of this is too complex to provide here, but can be found in Duddy 2014, which builds on work by Moulin (1988).
[37] I thank an anonymous referee for this objection.

Kemeny-Snell definition of distance between orderings[38] the appropriateness ordering that the Simpson-Kramer method gives us after Jane has updated in favour of T_5 is closer to T_5's choice-worthiness ordering than the appropriateness ordering that the Simpson-Kramer method gives us before Jane updated in favour of T_5.[39]

However, though it is true that, in *Tactical Decisions*, the new appropriateness ordering is closer on the Kemeny-Snell definition of distance to T_5's choice-worthiness ordering than the prior appropriateness ordering was, I do not think that this poses a grave problem for my argument. First, there are several plausible ways of defining 'distance' between orderings, and there seems to be no reason to privilege the Kemeny-Snell definition over any other.[40] Indeed, if we choose an alternative, the Cook-Seiford definition,[41] then the voting system that minimises mean distance between the choice-worthiness orderings and the appropriateness ordering is the Borda Rule—which is exactly the system I will go on to defend. Given this, the appeal to the notion of 'distance' between orderings should not have much weight; we soon reach a stalemate as a result of different possible views on what 'distance' should mean in this context.

Second, and more importantly, what a given metanormative theory determines as the most appropriate option is particularly significant, because a decision-maker can only choose one option, and, if she is rational, she will choose the most appropriate option.[42] A theory therefore 'loses out' much more if its most choice-worthy option ends up as 2nd most appropriate rather than 1st most appropriate than if its most choice-worthy option ends up as 3rd most appropriate rather than 2nd most appropriate. It is only of secondary importance how options other than the most appropriate option are ordered, and we should therefore be particularly concerned with what happens to the most appropriate option as the decision-maker changes her credences. In the case above, according to the Simpson-Kramer method if Jane is acting rationally then she will choose *D* before she updates in favour of T_5 and *B* afterwards. T_5 loses out in virtue of the fact that Jane has

[38] On the Kemeny-Snell definition, the distance between A and B on two theories T_i and T_j is 2 iff $A \succ_i B$ and $B \succ_j A$ or vice-versa, 1 iff $A \succ_i B$ and $A \sim_j B$ or vice-versa, and 0 iff $A \succ_i B$ and $A \succ_j B$ or vice-versa. The distance between two theories is the sum of the distance between all pairs of options.
[39] The Kemeny-Snell distance between the prior appropriateness ordering and T_5 is 7; the Kemeny-Snell distance between the posterior appropriateness ordering and T_5 is 5.
[40] See Truchon 2005 for an overview.
[41] On the Cook-Seiford definition, the distance between T_i and T_j is given by the sum of the absolute differences between the ordinal rank of every option. For example, suppose that, on T_1 $A \succ B \succ C$ and on T_2 $C \succ A \succ B$. A is different by one ordinal rank, B is different by one ordinal rank, and C is different by two ordinal ranks, so the distance between T_1 and T_2 is $1 + 1 + 2 = 4$. The definition becomes more complicated once ties are included: for this, see Truchon 2005.
[42] If one believes that 'appropriateness' is not about rational norms, but about 'second-order moral norms, then one could make the same argument *mutatis mutandis*.

increased her credence in it; the fact that the Simpson-Kramer method countenances this means we should reject the Simpson-Kramer method.

The notion of closeness between orderings might still have value as a tie-breaker. If two metanormative theories both satisfied *Updating Consistency*, then perhaps we should consider how they affect the appropriateness ordering of options that are not maximally appropriate given changes in credences over theories. But it is what a metanormative theory says about which options are maximally appropriate that is of primary importance, because it is that which will guide the actions of a rational decision-maker. For that reason, if a metanormative theory violates *Updating Consistency*, then we should reject it, even if it results in orderings that are on some definition 'closer'.

Before moving on to a voting system that does better in the context of decision-making under normative uncertainty, I will highlight one additional reason that is often advanced in favour of Condorcet extensions. This is that Condorcet extensions are particularly immune to strategic voting: that is, if a Condorcet extension voting system is used, there are not many situations in which a voter can lie about her preferences in order to bring about a more desirable outcome than if she had been honest about her preferences.

It should be clear that this consideration should bear no weight in the context of decision-making under normative uncertainty. We have no need to worry about theories 'lying' about their choice-worthiness ordering (whatever that would mean). The decision-maker knows what theories she has credence in, and she knows their choice-worthiness orderings. So, unlike in the case of voting, there is no gap between an individual's stated preferences and an individual's true preferences.

5. The Borda Rule

We have surveyed some metanormative theories that fail. Let us now look at a voting system that does better: the Borda Rule. To see both the Borda Rule's similarity to, and difference from, Condorcet extensions, again we should imagine that all options compete against each other in a round-robin head-to-head tournament. Like the Simpson-Kramer method, the magnitudes of the victories and defeats in these pairwise comparisons matter. However, rather than focusing on the size of the biggest pairwise defeat, as the Simpson-Kramer method does, the Borda Rule regards the success of an option as equal to the sum of the magnitudes of its pairwise victories against all other options minus the sum of the magnitudes of its pairwise losses against all other options. The most appropriate option is the option whose sum total of magnitudes of victories minus magnitudes of losses is greatest. To see the difference, imagine a round-robin tennis tournament, with players A-Z. A beats all other players, but in every case wins during a tiebreaker in the final set. B loses by only two points to A, but beats all other players in straight sets. Condorcet extensions care first and foremost about whether a player beats everyone else, and would regard A as the winner of the tournament. The Borda Rule cares about how many points a player wins in total, and would regard B as the winner of the tournament. In this case, it is not obvious to me which view is correct: the arguments for choosing A or B both have something going for them. But the fact that it is not obvious shows that we should not reject outright any metanormative theory that isn't a Condorcet extension.

Now that we have an intuitive understanding of the Borda Rule, let us define it more precisely:

> An option A's *Borda Score*, for any theory T_i, is equal to the number of options within the option-set that are less choice-worthy than A according to T_i, minus the number of options within the option-set that are more choice-worthy than A according to T_i.[43]
>
> An option A's *Credence-Weighted Borda Score* is the sum, for all theories T_i, of the Borda Score of A according to theory T_i multiplied by the credence that the decision-maker has in theory T_i.

These definitions allow us to state the Borda Rule:

> *Borda Rule*. An option A is more appropriate than an option B iff A has a higher Credence-Weighted Borda Score than B; A is equally as appropriate as B iff A and B have an equal Credence-Weighted Borda Score.

We can argue for the Borda Rule in two ways. First, we can appeal to cases. Consider again the *Research Funding* case. We criticised *Most Probable Theory Dictatorship* and *Maximalism* for not being sensitive to the entirety of the decision-maker's credence distribution, and for not being sensitive to the entire range of each theory's choice-

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[43] The reader familiar with the Borda Rule might previously have seen an option's Borda Score defined as equal simply to the number of options below it. The addition of 'minus the number of options that rank higher' clause is to account for tied options. A technical explanation of why the Borda Rule has to accommodate ties in this way is given in Saari 1990, p. 299. Briefly: We want the sum total of Borda Scores over all options to be the same for each theory, whether or not that theory claims there are tied options; if we did not do this we would be giving some normative theories greater voting power on arbitrary grounds; only on my definition does this happen. The reader may also have seen a Borda Score defined such that an option ranked ith receives n-i points plus 0.5 for every option with which it is tied, where n is the total number of options in the option-set. This definition is equivalent to mine; however, mine will prove easier to use when it comes to extending the account in the next section.

worthiness ordering. The Borda Rule does not make the same error. In *Research Funding*, the Borda Rule ranks B as most appropriate, then C, then A.[44] This seemed to me to be the intuitively correct result: favouring an option that is generally well-supported rather than an option that is most choice-worthy according to one theory but least choice-worthy according to all others. In *Hiring Decision*, according to the Borda Rule C is the most appropriate candidate, then A then B.[45] Again, this seems to me to be obviously the correct answer.

Finally, consider the *Tactical Decisions* case. In this case, according to the Borda Rule, before updating the most appropriate option for Jane is A, followed by B, then D, then C.[46] As I said before, I do not have any intuitions in this case about which option is most appropriate. But I do know that Jane increasing her credence in T_5 (according to which $C \sim D \succ B \succ A$) should not make the most appropriate option worse by T_5's lights. Indeed, given that it seems unclear which option is most appropriate, I would expect that a substantial increase in her credence in T_5 to improve the appropriateness ranking by T_5's lights. And that is what we find. After updating in favour of T_5, according to the Borda Rule the appropriateness ranking is D, followed by C, then B, then A.[47]

However, appeal to cases is limited in its value because we cannot know whether the cases we have come up with are representative, or whether there exist other cases that are highly damaging for our favoured proposal that we simply have not thought of. A better method is to appeal to general desirable properties. One such property is *Updating Consistency*. In the context of voting theory, it has been shown that only *scoring rules* satisfy the equivalent property, where a scoring rule is a rule that gives a score to an option based on its position in an individuals' preference ranking, and claims you should maximize the sum of that score across individuals.[48] The Borda Rule is an example of a scoring rule, as is *Maximalism*, whereas *Most Probable Theory Dictatorship* and *Simpson-Kramer Method* are not. But we rejected *Maximalism* on the grounds that it was not sensitive to the entirety of theories' choice-worthiness orderings. So we could add in another condition that the score of each option in *i*th position has to be strictly greater than the score given

[44] Because it does not affect the ranking when there are no ties, when providing the calculations of options' Borda scores I will use a simpler definition of a Borda score: that an option's Borda Score, for some theory *i*, is equal to the number of options below it on theory *i's* choice-worthiness ranking. Given this, definition, A receives a score of 35*2 + 0 + 0 = 70; B receives a score of 35 + 34*2 + 31 = 134; C receives a score of 0 + 34 + 31*2 = 96.

[45] A receives a score of 30*2 + 0 + 40*1 = 100. B receives a score of 30*1 + 30*2 + 0 = 90. C receives a score of 0 + 30*1 + 40*2 = 110.

[46] A's score is 42/24; B's score is 40/24. C's score is 28/24. D's score is 34/24. So $A \succ B \succ D \succ C$ according to the Borda Rule.

[47] A's score is 42/32. B's score is 48/32. C's score is 48/32. D's score is 54/32. So $D \succ B \sim C \succ A$ according to the Borda Rule.

[48] See Moulin 1988.

to an option in $i+1$th position. This restricts the class of voting systems to *positional voting methods*.

It turns out that the Borda Rule enjoys a privileged position among positional voting methods: it minimizes the number of undesirable properties and maximizes the number of desirable properties.[49] One way in which this is the case is how it relates to the Condorcet criterion. For example, let us define an option *A* as a *Condorcet Loser* if it is defeated in a head-to-head competition by every other option *B* from the option set. The Borda Rule is the only positional voting method that satisfies the property that a Condorcet Loser is never the most appropriate option. Similarly, the Borda Rule is the only positional voting method that ensures that a Condorcet Winner is never the least appropriate option; and the Borda Rule is the only positional voting method that always ensures that a Condorcet Loser is never more appropriate than a Condorcet Winner.

Another advantage of the Borda Rule is that it correctly interprets the cases in which two options should be tied. For example, suppose that in a given decision situation no option beats any other option: in every head-to-head comparison between every two options *A* and *B*, the decision-maker thinks it equally likely that *A* is more choice-worthy than *B* as that *B* is more choice-worthy than *A*. In this case, we would expect there to be no single option that is strictly more appropriate than all other options. The Borda Rule is the only positional voting method that ensures this.

The satisfaction of these conditions, among others,[50] means that if we endorse *Updating Consistency* then we should endorse the Borda Rule.

6. Objections and Extensions

6.1 Incomplete Theories

In developing the voting analogy, one aim of mine has been to enable decision-making under normative uncertainty to accommodate a broader range of theories than it usually is able to. But many theories posit some degree of incomparability between options, and

[49] 'The Borda method is the unique positional voting method to minimize the kinds and number of paradoxes that can occur' (Saari 1990, p. 280); 'Borda's procedure occupies a unique place among all positional scoring procedures by being less susceptible than all other procedures to many unsettling possibilities and paradoxes.' (Brams and Fishburn 2002). The following results (and more) can be found in Saari 1990.

[50] The Borda Rule is also the only positional voting system that satisfies a weakened form of Arrow's Independence of Irrelevant Alternatives. See Saari 1990 for an extensive list of the Borda Rule's virtues.

therefore the choice-worthiness ordering is often incomplete: that is, it is neither the case that *A* is more choice-worthy than *B*, nor are they equally choice-worthy. As stated, the Borda Rule is simply not applicable to them.[51]

However, a virtue of my account is that it can naturally be extended to accommodate incomplete choice-worthiness rankings. Let a *completion* of an incomplete choice-worthiness ranking be any way of adding new choice-worthiness relations between options such that the incomplete choice-worthiness ranking becomes a complete ordering. For example, suppose that A≻B, but that C is incomparable with both A and B. We would have the following completions: C≻A≻B; A≻C≻B; A≻B≻C; A~C≻B; A≻B~C.

We can extend the Borda rule to account for incomplete choice-worthiness rankings as follows. For any two options *A* and *B*, *A* is more appropriate than *B* if, on all completions of all theories in which the decision-maker has credence, *A* has a credence-weighted Borda score that is at least as great as *B*'s, and on at least some possible completions all theories, *A* has a strictly greater credence-weighted Borda score than *B*. If A has a greater Borda score than *B* given some completions of all theories, but a smaller Borda score given some other completions of all theories, then *A* is neither more appropriate than *B*, nor less appropriate than *B*, nor equally as appropriate as *B*.[52]

6.2 Cyclical Theories

In the previous section we saw that the Borda Rule can be extended to handle incomplete choice-worthiness orderings. But we still do not have the resources to accommodate all theories, because some theories posit cyclical choice-worthiness, according to which *A*≻*B*, *B*≻*C* and *C*≻*A*. For example, Larry Temkin[53] suggests the view that it might be more choice-worthy to prevent ten people from losing their legs than to prevent one person from death, that it might be more choice-worthy to prevent one thousand people from broken arms than to prevent ten people from losing their legs, yet it be more choice-

[51] I thank an anonymous referee for pressing this objection.

[52] We could also use a very similar account in order to accommodate decision-makers with imprecise or 'fuzzy' credences in normative theories. We would say that a *sharpening* of a decision-maker's credences is any way of making the credences precise that is compatible with the original fuzzy credences. We would then say that, for any two options *A* and *B*, *A* is more appropriate than *B* if, on all sharpenings of the decision-makers' credences, and all completions of all theories in which the decision-maker has credence, *A* has a credence-weighted Borda score that is at least as great as *B*'s, and on at least some possible sharpening of the decision-makers credences or some possible completion of all theories, *A* has a strictly greater credence-weighted Borda score than *B*.

[53] Temkin 1996.

worthy to prevent one person from death than to prevent one thousand people from broken arms.

Again, however, the Borda Rule account can handle choice-worthiness cycles quite naturally. In fact, we can simply apply the definition of the Borda Rule directly to choice-worthiness cycles: each option receives a score equal to the number of options that it is more choice-worthy than, minus the number of options it is less choice-worthy than. So if a theory faces three options and claims that $A \succ B$, $B \succ C$, but $C \succ A$, then A, B and C each receive the same Borda score (of 0) on that theory. This is what I would expect — it is difficult to see what a choice-worthiness cycle could contribute other than that all options within the cycle contribute equally to the appropriateness ranking. I take the ease with which the Borda rule can handle cyclical rankings to be an additional point in its favour.

6.3 Option-individuation

One objection to the Borda rule is that it is extremely sensitive to how one individuates options.[54] Consider the following case:

> *Trolley Problems*
>
> Sophie is watching as an out-of-control train hurtles towards five people working on the train track. If she flicks a switch, she will redirect the train, killing one person working on a different track. Alternatively, she could push a large man onto the track, killing him but stopping the train. Or she could do nothing. So she has three options available to her.
>
> A: Do nothing.
>
> B: Flick the switch.
>
> C: Push the large man.
>
> She has credence in three normative theories.
>
> 40% in utilitarianism, according to which: $B \succ C \succ A$

[54] This problem is analogous to the problem of 'clone-dependence' in voting theory, which itself is a generalization of the idea of vote-splitting. For discussion of clone-dependence, see Tideman 1987. I thank Graham Oddie and an anonymous referee for pressing this criticism of the Borda Rule. The example is Oddie's.

30% in simple Kantianism, according to which: A≻B∼C

30% in sophisticated Kantianism, according to which: A≻B≻C

In this case, according to the Borda Rule, B is the most appropriate option, followed by A and then C.[55] But now let us suppose that there are actually two Switching options:

A: Do nothing.

B’: Flick the switch to the left.

B”: Flick the switch to the right.

C: Push the large man over the railing to stop the track

Sophie has the same credences in normative theories as before. Their recommendations are as follows:

Utilitarianism: B’∼B”≻C≻A

Simple Kantianism: A≻B’∼B”∼C

Sophisticated Kantianism: A≻B’∼B”≻C

Given this new decision-situation, then according to the Borda Rule A is the most appropriate option, then B’ and B” equally, then C.[56] So, according to the Borda Rule, it makes a crucial difference to Sophie whether she has just one way of flicking the switch or whether she has two: and if she has two ways of flicking the switch, it is of crucial importance to her to know whether that only counts as one option or not. But that seems bizarre.

Indeed, if this objection were successful, then it would be devastating, in my view. But there is a principled and satisfying response: what this objection shows is that we need to have a *measure* over possibility space, and that we were neglectful when we did not initially include a measure in our definition of the Borda Rule.[57] A measure is a function from

[55] Now that some theories posit tied options, I return to using my ‘official’ definition of a Borda score in my working. Option A receives a score of 0 + 30*2 + 30*2 – (40*2 + 0 + 0) = 40. B’s score is 40*2 + 0 + 30*1 – (0 + 30*1 + 30*1) = 50. C’s score is 40*1 + 0 + 0 – (40*1 + 30*1 + 30*2) = –90.
[56] A’s score is 0 + 30*3 + 30*3 – (40*3 + 0 + 0) = 60. *B’* and *B’* each receive a score of 40*2 + 0 + 30*1 – (0 + 30*1 + 30*1) = 50. C’s score is 40*1 + 0 + 0 – (40*2 + 30*1 + 30*3) = −160.
[57] I thank Owen Cotton-Barratt for this suggestion.

regions of some space to non-negative real numbers, with the following property: that, if A is a region that divides exactly into B and C, where B and C are non-overlapping, the measure of A is equal to the measure of B plus the measure of C. If a region D is empty, then it receives measure 0. When a measure is a *probability measure*, the measure of the domain of the function (that is, the whole space), is equal to 1. Though I talked about 'regions' in the preceding sentences, measures are often defined over sets, where the crucial property is that if set A is the union of the disjoint sets B and C, then the measure of A equals the sum of the measures of B and C.

Intuitively, the measure of a region is supposed to represent the *size* of that region. Geographical area defined over regions of land is an example of a measure: if region A consists of region B and region C, and region B and C are non-overlapping, then the area of region A is equal to the area of region B plus the area of region C. It is clear that we have an intuitive notion of the 'size' of possibility space: that there is a clear sense in which the proposition *that Tim picks up a cup* carves out a larger portion of possibility space than the proposition *that Tim picks up a whisky-filled cup at 2am on the 25th December 2013*. We might instinctively want to explain this by saying that the latter proposition excludes a greater number of possible worlds than the former proposition. But when we are dealing with an infinite number of possible worlds that explanation is not available to us, and we have to bring in the notion of a measure.

In order to adequately define the Borda Rule, we need to have a measure defined over possibility space (that is, the set of all possible options) that represents the size of each option. Plausibly, the measure over the set of all possible options should be 1, so the measure is a probability measure. But I leave it open what exact choice of measure to use. First, it would simply take too long for this article — providing a convincing arguing for one measure over possibility space being the correct one would take volumes of argumentation. Second, having a theoretical grounding for the choice of measure is not that important for practical purposes. We have an intuitive grasp of the relative 'size' of an option, and the choice of measure is simply a way to make precise that intuitive grasp. So, even if we do not know the theoretical underpinning, we can still use that intuitive understanding in the context of a voting system.

With the concept of a measure on board, we can reformulate the definition of an option's Borda score as follows: that an option's *Borda Score* is equal to the sum of the measures of the options below it minus the sum of the measures of the options above it. Once we have defined a Borda Score in this way, then we can use all the other definitions as stated. Nothing will change in terms of its recommendations in the cases we have previously discussed. But it resolves the option-individuation problem.

To see how this resolves the option-individuation problem, consider again the case given above. Let us suppose that the measure of each option, A, B and C, is 1/3.[58] If so, then, as before, according to the Borda Rule, B is the most appropriate option, followed by A and then C.[59] Now, however, when we split the option B into options B' and B'', we have to also split the measure: let us suppose that the measure splits equally, so that B' and B'' each have measure 1/6.[60] If so, then according to the Borda Rule, B is still the most appropriate option, followed by A and then C.[61] In general, the addition of a measure means that we can make sense of a 'size' of an option, and will therefore avoid the option-individuation problem.

6.4 Infinite Number of Options

A different objection to the use of the Borda Rule is that it cannot deal with decision situations in which the decision-maker faces an infinite number of options. In such a case, then the Credence-Weighted Borda Score of any option would be undefined.[62]

My first response is that it seems to me that a situation where a decision-maker faces an infinite number of options is impossible. There are only so many things I can possibly do at any given time. However, for those who dispute this, there is a second response. Once we have defined a measure over possibility space and redefined the Borda Score, as I do in response to the previous objection, then the problem goes away because one can have an infinite number of options with a measure that sums to some finite number. For example, suppose that below option *A* there are an infinite number of options, with measure ¼, 1/8, 1/16, 1/32… In this case, even though there are an infinite number of options there is a fact about the sum of the measure of options below *A*: namely, ½. Indeed, because the measure of the set of all possible options is 1, then the measure of options above or below any particular action will always be finite. So the Borda score of

[58] Note that there would be no difference to my argument if the measure were split unequally among options A, B and C.

[59] Option A receives a score of 0 + 30*(2/3) + 30*(2/3) – (40*(2/3) + 0 + 0) = 13 1/3. B's score is 40*(2/3) + 0 + 30*(1/3) – (0 + 30*(1/3) + 30*(1/3)) = 16 2/3. C's score is 40*(1/3) + 0 + 0 – (40*(1/3) + 30*(1/3) + 30*(2/3)) = –30.

[60] Note that there would be no difference to my argument if the measure did not divide evenly between B' and B''.

[61] A's score of 0 + 30*(2/3) + 30*(2/3) – (40*(2/3) + 0 + 0) = 13 1/3. B' and B'' each receive a score of 40*(2/3) + 0 + 30*(1/3) – (0 + 30*(1/3) + 30*(1/3)) = 16 2/3. C's score is 40*(1/3) + 0 + 0 – (40*(1/3) + 30*(1/3) + 30*(2/3)) = –30. That is, the scores are just the same as they were prior to the more fine-grained individuation of option B.

[62] I thank an anonymous referee for pressing this objection.

an option will always be well defined, even when there are an infinite number of options available to the decision-maker.

6.5 Arrow's Impossibility Theorem

Given the voting analogy, an obvious issue is how to respond to Arrow's impossibility result. Here I discuss the implications of Arrow's result for my account.

Arrow's impossibility theorem can be formulated in many ways. The strongest, in my view, is as follows: in conditions of ordinal preferences and interpersonal incomparability, there is no social welfare functional that satisfies *Pareto, Non-Dictatorship, Unlimited Domain* and a formulation of *Contraction Consistency*.[63] The condition that the Borda Rule violates is Contraction Consistency. Within the context of decision-making under normative uncertainty, we may define this condition as follows:

> *Contraction Consistency*: Let C be the option-set, M be the set of maximally appropriate options given the option-set C, and S be a subset of C that contains all the members of M. The set $M*$ of the maximally appropriate options given the option-set S has all and only the same members as M.

To see that the Borda Rule violates Contraction Consistency, consider *Hiring Decision* again. In that case, C was the uniquely most appropriate option. Now, however, suppose that it was no longer possible to hire candidate A. In which case the credence distribution looks as follows:

> 30% credence in virtue theory, according to which B≻C.
>
> 30% credence in non-consequentialism, according to which B≻C.
>
> 40% credence in consequentialism, according to which C≻B.

[63] The reader might be more familiar with Arrow's final condition being Independence of Irrelevant Alternatives (IIA), which states that how candidate *x* fares against candidate *y* should be independent of the voters' views on *X* vis-à-vis any third candidate, *z*. However, though IIA is what Arrow uses in his proof, when he justifies the condition he gives an argument in favour of Contraction Consistency, apparently confusing the two conditions: see Bordes and Tideman 1991 for discussion of this. Contraction consistency is a more plausible condition than IIA, in my view (IIA, for example, rules out the Borda Rule almost by fiat), and can be used in place of IIA to get the impossibility result, and so I use Contraction Consistency instead of IIA. A proof of Arrow's theorem using Contraction Consistency can be found in Tideman 2006, 123–42.

In this new decision-situation, B is now the uniquely most appropriate option. Similarly, if the option-set were {A, B}, A would be most appropriate, and if the option-set were {A, C}, C would be most appropriate. The appropriateness of options is highly sensitive to which other options are within the option-set. According to the objection, Contraction Consistency is a requirement on any metanormative theory. So my account cannot be correct.

Before responding to this objection, I will note what it cannot do. The objection cannot use Contraction Consistency violation as an argument against the Borda Rule and in favour of some other voting system. Though Contraction Consistency is plausible, the other conditions listed are essential. All voting systems endorsed in the voting theory literature satisfy the other conditions but violate Contraction Consistency. Instead, therefore, the objection must be an objection to the very idea of using some voting system as a way to aggregate the one's credences in merely ordinal theories.

Even more importantly, the violation of Contraction Consistency is not as bad as one might think, for two reasons.

First, a reason why Contraction Consistency is thought desirable in the voting context is that violating it leads to susceptibility to tactical voting. Again, consider *Hiring Decision*. If virtue theory could pretend that its preference ordering was B≻A≻C rather than A≻B≻C, then it could guarantee that its second-favoured option 'won', rather than its least-favoured option. And, indeed, the Borda Rule is often dismissed for being extremely susceptible to tactical voting. However, as I have noted, while tactical voting is a real problem when it comes to aggregating the stated preferences of people, it is no problem at all in the context of decision-making under normative uncertainty. Theories are not agents, and so there is no way that they can conceal their choice-worthiness ordering. If a decision-maker were to pretend that one theory's choice-worthiness ordering were different than it is, she would only be deceiving herself.

Second, we have reasons for positively expecting violations of Contraction Consistency in this context. To see this, I will introduce an analogy with aggregating the competing claims of individuals. A fairly common view within first-order ethics is that small benefits to many cannot outweigh a sufficiently large benefit to one person, but some other trade-offs are acceptable.[64] So, perhaps, one should choose to cure a huge number of headaches over a merely large number of people with broken arms, in the choice between those two options; and one should choose to cure a large number of broken arms over curing one person of AIDS. Nonetheless, according to the view I am considering, in the case of a

[64] E.g. Brink 1993; Scanlon 1998, pp. 238–41.

choice between curing one person of AIDS or a huge number of headaches, one should cure the one person of AIDS. This view, as I understand it, violates Contraction Consistency. When all three options are available, on this view, one should cure the broken arms, because it is better to cure the many broken arms than to cure the one person of AIDs, and the claim of those suffering from headaches has no legitimate force when the option of curing someone of AIDS is available. However, when the option of curing the person of AIDS is removed, then one should cure the headaches, because the claims of those suffering from headaches do have legitimate force against the claims of those suffering from broken arms. One potential explanation for this phenomenon is that one *disrespects* the person with AIDS by curing the headaches, but one would not disrespect them by curing broken arms. The reason why contraction consistency is violated is that whether or not one shows disrespect by choosing a particular option depends on what other options are available.

Now, one might not find the above view plausible. But, whether or not that view is plausible in that context, we can use a very similar analysis to understand our voting situation. Consider again our problematic case:

> 30% credence in virtue theory, according to which A≻B≻C.
>
> 30% credence in consequentialism, according to which B≻C≻A.
>
> 40% credence in non-consequentialism, according to which C≻A≻B.

In this case, there is no reasonable complaint against choosing C. Virtue theory and consequentialism could 'complain' that B is preferred by a majority to C, so B should be chosen over C. But non-consequentialism could legitimately respond by noting that the exact same argument would apply to choosing A over B. There is a deadlock of majority opinion, so the option that has the largest majority opinion behind it, namely option C, should win. In the two-option case, however, when A is dropped from the option-set, this response from non-consequentialism is not possible. The majority prefers B to C, but there is no corresponding reason against choosing C. So virtue theory and consequentialism have a stronger claim to B being the winning option, and non-consequentialism has no good response.

If we understand decision-making under normative uncertainty as adjudicating among competing claims of different normative theories, violations of Contraction Consistency are to be expected, because the claims that different theories have depend crucially on the other options that are available in this option-set.[65] So we should not take violation of Contraction Consistency to be a reason to reject the Borda Rule as a way of taking normative uncertainty across merely ordinal theories.

7. Conclusion

Traditionally, the way moral philosophers have responded to normative uncertainty has been to try to find conclusive reasons in favour of one side of the debate. However, for many of the most important moral questions we face, this ambition seems quixotic. Despite thousands of years of thought, we are little closer to knowing what constitutes a good life than when we started. Indeed, progress in moral philosophy seems to have found more problems (such as in population ethics and animal ethics) than it has solved. It may even be that, given the difficulty of the subject matter, we should *never* become certain in one particular normative view—our normative evidence and experiences will always be limited, always be open to many reasonable interpretations, and there will always be judgment calls involved in weighing different epistemic virtues.[66]

Normative uncertainty is a fact of human life—one that we will have to learn to live with. It is therefore highly attractive to develop an account of how one ought to act in the face of normative uncertainty. However, any such account faces the problem of intertheoretic incomparability, and it is often asserted that if theories are intertheoretically incomparable then all accounts of decision-making under normative uncertainty are doomed—we should just go back to ignoring normative uncertainty, and assuming our favourite theory to be true when deciding what to do.

This paper has shown the above assertion to be false. Even in conditions of intertheoretic incomparability, and even when all theories claim that choice-worthiness is merely ordinally measurable, there is still a plausible criterion for appropriate action, namely the Borda Rule. We therefore have a principled metanormative theory that is far more general than simply maximizing expected choice-worthiness. Even despite the problems of intertheoretic incomparability and merely ordinal theories, we can and should factor normative uncertainty into our decisions.

[65] This is argued convincingly, and at length, in Sugden 1985; McClennen 1990, ch. 2; Sen 1993; Rawling 1997; Weirich 2007, ch. 4.

[66] Cf. Rawls 1993, pp. 54–58 on the 'burdens of judgment.'

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