A Defence of Ambiguity Aversion in Policymaking

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Abstract

Some have argued that ambiguity aversion implies information aversion (refusing free information) and is therefore irrational (see, e.g., Al-Najjar and Weinstein 2009 and Fleurbaey 2018). However, using a simple model involving climate policy, this paper shows that such supposed information avoidance merely demonstrates a perfectly reasonable preference for time-consistency and/or cost-avoidance.

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Ambiguity aversion entails that a decision maker prefers to bet on known risks than on unknown risks (Montesano and Giovannoni 1996: 133). Objections to the rationality of ambiguity aversion have incorporated appeals to information aversion: the refusal of free information (Fleurbaey 2018: 31). However, I shall demonstrate that these arguments are misguided as they confuse information aversion with a mere desire for time-consistent and/or cost-saving preferences. I begin by outlining ambiguity-averse preferences and Nabil Al-Najjar and Jonathan Weinstein's (2009), objection to the rationality of such preferences. Following Siniscalchi (2009), I argue that this objection is misguided. The debate will be contextualised using a climate policy scenario based on Marc Fleurbaey's (2018: 30) health example, leading to a critique of Fleurbaey's neglect of cost in such scenarios. I will then remodel the scenario, incorporating the cost factor, to demonstrate why being information averse in this context is not irrational and is in fact akin to being cost averse. I conclude that information aversion cannot be employed as an objection to the rationality of ambiguity aversion in policymaking.

Imagine the ambiguity-averse decision maker is faced with an urn containing 120 balls, precisely 40 of which are black. The remaining balls are red or yellow in an unknown proportion. The decision-maker chooses bets among the options listed in Table 1.

Bet	b	r	y
f_1	10	0	0
f_2	0	10	0
f_3	10	0	10
f_4	0	10	10

Table 1. four options.

The cell values correspond to payoffs, for example, f_1 corresponds with payoff = 10 if the ball is black. An ambiguity-averse decision-maker would display the following preferences: $f_1 > f_2$ (as there are definitely 40 black balls and they prefer the bet on known risks) and $f_4 > f_3$ (as there are definitely 80 red or yellow balls). However, if the preferences expressed are based on an assignment of precise probabilities, these preferences are paradoxical: $f_1 > f_2$ implies that $P(b) > P(r)$ and $f_4 > f_3$ implies $P(r) + P(y) > P(b) + P(y)$ which simplifies to $P(r) > P(b)$. We are left with $P(b) > P(r)$ & $P(r) > P(b)$, which is a contradiction. This is known as the Ellsberg (1961: 651) paradox.

Al-Najjar and Weinstein (2009: 266) attempt to refute the rationalisation of ambiguity aversion by highlighting the undesirable implications of such preferences, one of which is information aversion. They cite a scenario, outlined in a decision tree, to illustrate their argument. I have redrawn their diagram as follows:
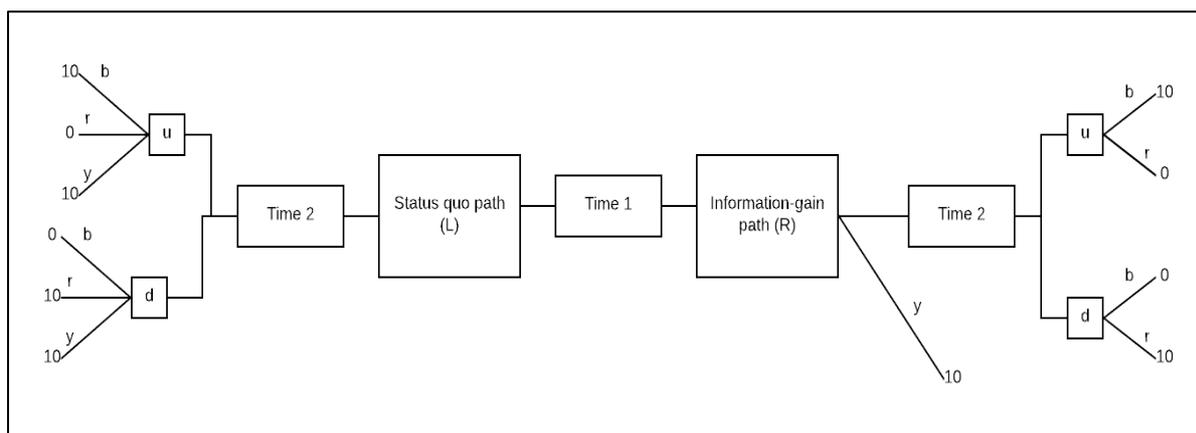

Figure1. A Decision Tree (Al-Najjar and Weinstein 2009).

Note that the payoffs on each of the left and right branches are identical at time 1 (*viz.* corresponding to f_3 and f_4 in the ambiguity-averse preferences table). At Time 1, the ambiguity-averse decision-maker has the choice to take what I will call the *status quo path* (L) or the *information gain path* (R). Taking the status quo path, they will then face a choice at Time 2 between bets *u* and *d*. Alternatively, if they take the information-gain path at Time 1, they will find out whether the ball chosen is yellow or not immediately after their Time 1 decision. If the ball is yellow, they obtain a payoff of 10 and the game is finished. If not, they progress to Time 2 and have the option to bet *u* or *d* (on the same ball first selected).

I will now break down the dynamic elements of the scenario and, following Siniscalchi (2009), explain why the implications that Al-Najjar and Weinstein draw are misguided. I will represent the choice of R at Time 1 and *u* at Time 2 as (R,*u*) and so on. I define commitment preferences to be the preferences of the ambiguity-averse decision-maker at Time 1 and the actual preferences as the preferences of this decision-maker at Time 2. Dynamic consistency occurs when commitment preferences and actual preferences coincide.

At Time 1, the decision-maker's commitment preferences are (L,*d*) = (R,*d*) > (L,*u*) = (R,*u*). If the status quo path is taken, the actual preferences at Time 2 map to the commitment preferences, as the payoffs are the same: (10, 0, 10) for (L, *u*) and (0, 10, 10) for (L, *d*). Therefore, in the status quo case, dynamic consistency is maintained. However, for the information-gain path the case is not so simple. At Time 2, (after learning that the ball is not yellow), the payoffs for *u* and *d* respectively are (10, 0, *) and (0, 10, *). The decision-maker will now strictly prefer *u* (as black balls are guaranteed to be in the urn). Thus, we face the following situation: their initial commitment preferences are (R,*d*) > (R,*u*), however, their actual preferences at Time 2 are *u* > *d*: dynamic consistency is violated. Because the sophisticated ambiguity-averse decision-maker is aware of their future actual preferences, they know that if they choose R, it is as if they were to choose (R, *u*). Given that their commitment preferences are (L, *d*) > (R, *u*), they rationally choose the status-quo path (L, *d*) to which they can commit.

Al-Najjar and Weinstein argue that because the decision-maker strictly prefers the status quo path, they can be said to be information averse as they knowingly take the path which does not grant them extra information. The authors conclude that this is irrational, since "a statistician who finds himself choosing not to look at all available data should feel rather embarrassed" (Al-Najjar and Weinstein 2009: 266). The crux of the problem with their argument is that, whilst they infer that the scenario signals information-averse tendencies, the scenario in fact signals a trade-off between information aversion and an inability to commit to preferences and simply signals the decision-maker's desire for commitment over information. As Siniscalchi (2009: 345) argues, the scenario says little about the decision-maker's attitude to information. By choosing the status quo path, they can be certain that they will act with dynamically consistent. We should not take this as evidence of information aversion – they simply consider commitment to be of higher importance than information gain.

To further my objection to Al-Najjar and Weinstein, I will contextualise the debate with a climate policy problem, similar to Fleurbaey's (2018: 30) application of their argument to health policy. I will then criticise Fleurbaey's approach to ambiguity aversion in such policy problems. In my proposed scenario, there is a climate crisis. Green technologies are being developed and it must be decided whether they are worth the risk of investing in. A new technology has been developed that harnesses the sun for electricity. It is cheaper than existing technology, thus more homes and businesses would have access to it. A policymaker working for a climate charity must decide between donating to the use of the new or the existing technology. They do not yet know whether the use would take place in country A or B, which have different climates. The key variables for the decision-maker are: (a) the chance of the technology being a success or not; and (b) cost. The chance of the existing technology being successful is known and constant across countries. By contrast, the chance of the new technology being a success is ambiguous and depends on the country in the manner displayed in Table 2.

	Country A	Country B
Existing technology	50%	50%
New technology	p	100% - p

Table 2. Chance of success of two technologies, with 0 < p < 100%.

The decision maker can choose to discover the assigned country or not. Suppose they opt not to find out the country and that the likelihood of the project taking place in country A or B is equal. Thus, the expected chance of success under the new technology is 0.5p + 0.5

(100% - p) = 50%. Since the new technology is cheaper than the existing one, it is the preferred option under such ignorance.

Suppose, by contrast, that they opt to find out the country. If the country is revealed to be A, the chance of success of the new technology is ambiguous, ranging from 0 to 100%. (The same is true if the country is revealed to be B.) An ambiguity-averse policymaker may then choose the existing technology despite the higher cost. If faced with the decision whether to find out the country or not, the policymaker will likely choose not to test for it, and simply choose the new technology, as they would not then have to change their choice to a costlier option after discovering the country assigned.

Fleurbaey (2018: 31) argues that this "refusal of free and useful information" is difficult to justify when the information introduces no disadvantage. However, drawing on my prior argument, it may be justified by the fact that this choice to refuse to discover the country does not mean that the policy-maker is information averse, but rather that they rank time-consistent preferences over the information gain as they know that they cannot commit to their initial cheaper preference (of investing in the new technology) if they choose to discover the country.

A critic may object to the argument that the preference for commitment can dominate that of information, questioning why commitment is inherently valuable. In response, I would claim that information is also not inherently valuable: in this policy scenario, choosing the information-gain path (*viz.* finding out the assigned country) actually carries a cost. The reason why commitment is valuable is because it guarantees the avoidance of this cost. Fleurbaey (2018: 31) argues that the information induces "no strategic disadvantage", yet there are few examples of disadvantage more explicit than a direct cost being induced. If we assume that taking the cheapest option according to a cost-benefit analysis is rational, then it is rational to choose the status quo path and refuse the extra information. The preferences expressed here are not concerned with avoiding information but with avoiding *cost.* This is of particular importance in the climate policy scenario as the extra money could be invested in other technologies.

In sum, my abstract and applied scenarios demonstrate that we cannot take the ambiguity-averse decision-maker's choices as evidence of information aversion, but rather as a preference for commitment and/or cost aversion. Thus, Al-Najjar and Weinstein and Fleurbaey's claims do *not* amount to rejecting the rationality of ambiguity aversion in policymaking – if it is to be rejected, a different appeal must be made. Their assumption that information is always valuable is false: it may carry a cost which must be accounted for in decision modelling. These costs are especially important for policymaking scenarios where some resources could be better distributed elsewhere without sacrificing policy effectiveness.

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