Justification and decision analysis

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Abstract

When decision sciences are applied to concrete problems, Decision Makers (DMs), concerned stakeholders, and the general public typically expect clear recommendations. But in fact any recommendations contained in the conclusions will be conditioned by norms or normative conceptions. This article explores the attitude to norms in the academic literature. We argue that these attitudes share a critical blind spot: they neglect or trivialize the task of helping the DMs to make up their minds about norms. As an alternative to these attitudes, we introduce and recommend a higher level norm on the basis of which, in a given decision situation, a decision analyst can decide, together with the DM, whether a given norm underlying a given recommendation can be adopted. The point of this higher level norm is to enable the subsequent choices to be justified by the decision analyst and the decision maker. We then identify and discuss a series of requirements that the notion of justification should embody.

Keywords: Decision Analysis, Normative Economics, Legitimacy, Morality, Ethics of Operational Research

1. Introduction

When analysts use decision sciences to tackle a given concrete problem, they are commonly expected by Decision Makers (DMs), concerned stakeholders and the general public to formulate recommendations R. Such R are inevitably conditioned by norms, normative conceptions, values or value judgments N (Funtowicz and Ravetz, 1993; Brans, 2002; Mingers, 2011).

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We understand this N in a very broad sense, and take it to refer to all the elements that analysts have to associate with factual statements in order to derive recommendations. They may include or reflect implicitely or explicitely held philosophical stances concerning objectives of decision analysis in general, professional deontology, the ethics of analysts' relationships with clients, but also norms specifying good practices in using various methods, and so on.

The importance of these normative elements N is largely acknowledged in the Operational Research (OR) literature (Churchman, 1970; Taket, 1994; Brans and Gallo, 2007; Picavet, 2009), because "OR is a human activity in which OR workers engage with other humans to improve human-activity systems" (Ormerod and Ulrich, 2013), which unavoidably raises "explicit or implicit moral issues" (Diekmann, 2013). There is a large consensus, in both OR (e.g. Williams (2009), p.285) and economics (Dwyer, 1985; Heath, 1994; Sen, 2004; Mongin, 2006; Baujard, 2013), that, due to this importance of N, objectivity and scientific neutrality, if understood in an absolute sense, are unachievable and irrelevant (Le Menestrel and Van Wassenhove, 2004; Reisach, 2016).

However, most authors also claim that OR analysts have a duty to remain neutral with respect to DMs – echoing Kant's tenet of duty ethics, translated by Reisach (2016) as a right that every human being enjoys to set her own objectives. Gass's (2009) "Oath of Prometheus" similarly starts with a reference to DM's goals. A weaker form of neutrality, encapsulated in the requirement to refrain from being *dogmatic, paternalist, proselyte, or authoritarian*, by imposing N we favor in our interaction with DMs, is hence largely accepted. However, because "most contributions to the 'ethics' of OR, well-taken as they are in drawing our attention to the value content of all OR practice, tell us (...) little about how to handle ethical conflicts" (Ormerod and Ulrich, 2013), this literature barely explores how to make sure that the N underlying recommendations do not conflict with DMs' values. The present article attempts to contribute an answer to this question.

Example 1. *Let us introduce a simple example, to be used in the entire article. We start with an abstract presentation, which we then instantiate*

in a concrete setting.

Imagine that an analyst is asked by a DM *to help him decide whether he should implement a given project P. The analyst uses cost-benefit analysis (*CBA*) (Layard and Glaiser, 1994) and ends-up formulating a recommendation R = "P should be implemented". This recommendation is not unconditional. Thanks to her analysis of the context and her computations, the analyst derives R from norms N, entrenching the relevance of using* CBA *to decide whether P should be implemented. In this case, N contains norms characterizing philosophical or ethical stances, including a version of utilitarianism stipulating that one should maximize the sum of a measure of preference inferred from willingness to pay (Meinard et al., 2016). But N also encompasses other norms, more or less clearly articulated, referring to the usual requirements for a* CBA *to be considered to be "properly" implemented, such as the claim that the preferences taken into account in the study are the relevant ones, that no important costs and benefits was ignored, that the preference elicitation methods used correctly capture preferences, etc.*

A concrete instantiation of this abstract example is given by the request, through a public procurement procedure, by the local administration in the Var Department (South-east France), in 2013, to analyze a project to restore dry grasslands in the Lachens summit, a natural mountainous area destroyed by the construction of military buildings which are now abandoned (Meinard et al., 2015). In this concrete instantiation, R refers to a recommendation to restore dry grasslands. The elements composing N refer, among other things, to the claim that the analyst properly implemented the relevant protocols, that he properly identified the whole set of relevant stakeholders to include in his survey, that he properly computed the value of the various ecosystem services that could accrue from the restored dry grasslands, etc.

In both contexts, the question that we aim to tackle is: when, as decision analysts, we apply decision sciences to solve the practical problems at issue, how should we handle the anchorage of our recommendations in norms, so as to remain neutral (in the sense given above to this term)?

We tackle this question as part of a broader research program analyzing the role of researchers in decision support, in particular in public policy, in the wake of questions initially articulated by Tsoukiàs et al. (2013). This program includes analyzes of the concepts of legitimacy (Meinard, 2017), meaning (Meinard and Gharbi, 2018), rationality (Meinard and Tsoukiàs, 2019) and argumentation (Cailloux and Meinard, 2018), and applications in environmental policy evaluations (Jeanmougin et al., 2017) and recommen-

dations (Choulak et al., 2019). The present article pursues these efforts by addressing the role of the norms underlying decision support interventions.

We begin (in section 2) by exploring attitudes of decision analysts with respect to N in the economic and philosophical literature. We argue that these various attitudes share a critical blind spot: they neglect or trivialize the task to help the DM to make up her mind about N. By contrast, we argue (in section 3) that this task is pivotal, and that decision analysts should endorse a "higher level" norm $\mathscr{N}$, embodying the requirement to produce *justifications*, understood in a specific sense that we elaborate. We call $\mathscr{N}$ a "higher level" norm because $\mathscr{N}$ can be used to establish if this or that N can be used in a given application of decision sciences, but in itself $\mathscr{N}$ is too abstract for any R to be directly derived from it. We use here a comparative term ("high*er*"), because our point is simply that $\mathscr{N}$ does not play the same role as N, and places itself "upstream" N (elaborating a precise and complete typology of norms falls beyond the scope of this article). We flesh out $\mathscr{N}$ as a series of four simple rules that applications of decisions sciences should follow in order to help the DM make up her mind about the normative elements underlying the decision analysis she is provided with. Section 4 then briefly concludes.

2. Varieties of attitudes with respect to N

In this section, we review attitudes with respect to N in the economic and philosophical literature. Our approach to establish this typology is interpretative: we infer a proposal for a classification based on our knowledge of the literature in economics, philosophy and OR. Like any hermeneutic claim, our proposed typology is tentative. We distinguish four attitudes (A_O, A_E, A_I and A_J) which are reminiscent of Le Menestrel and Van Wassenhove's (2004) distinction between "ethics outside" (echoing our A_O), "inside" (echoing A_E) and "beyond the model" (of which our A_I and A_J can be seen as variants). However, our topic is broader, since we are interested here in the role that N play in a decision support process as a whole, not only in models.

2.1. Elusive economic attitudes with respect to N

2.1.1. A_O: The elusive search for "basic" N

In normative economics, a widespread approach, which we will call A_O ("O" stands for "obvious"), consists in insulating supposedly simple and clear norms. Such norms N are considered to be simple enough to let DMs decide, without the help of the analyst, if they endorse them. It is then possible to derive R from the chosen N.

Identifying such basic N however proves more difficult than one might expect. Indeed, as Sen (1967) observes, a value may appear convincing but fail to be basic, in the sense that there may exist facts whose knowledge would lead an individual, originally supporting this value, to cease to support it. Or a value may conflict with another value, and the individual may cease to support one of them upon realizing this conflict. Because this might hold even for norms such as Pareto Dominance (Sen, 1984, ch. 5 and 6), A_O appears untenable. To illustrate this idea, consider Arrow's (2012) theorem. (This illustration has been suggested to us by Ulle Endriss.) It shows that Dictatorship follows (in some formal context) from the axioms of Universal Domain, Pareto Dominance, and Independence of Irrelevant Alternatives. One can easily imagine that individuals would accept each of these axioms as capturing value judgments they endorse about what they demand from a voting rule, if the axioms were explained to them by focusing only on what each axiom demands separately, even though they would reject Dictatorship. One therefore cannot rest content with the bare fact that a norm N seems self-evident in the abstract, since one can reject a seemingly self-evident N on due reflection, once one has come to realize some of N's implications.

A_O hence flouts neutrality by surreptitiously accepting the unwarranted premise that some norms N can be found about which DMs can readily make up their mind.

2.1.2. A_E: choosing N that Decision Makers "would endorse if they could understand"

A second attitude, A_E (where "E" stands for "expert"), consists in claiming that DMs cannot systematically take the time to strive to understand N

or are not always willing or able to do so. Decision scientists holding this attitude claim that they have the collective skills to understand decision science and discuss among peers whether this or that N should be accepted. But they do not consider that DMs should take part in such discussions, because these are technical, difficult discussions. When they arrive at conclusions including recommendations R, predicated on N encapsulating axioms that decision scientists collectively deem commendable, they consider themselves entitled to jump to R without bothering to help DMs to make up their mind about N.

Attitude A_E consists, for the decision analyst, in endorsing a higher-level norm $\mathscr{N}_E$ claiming that expert discussions about norms enable them to make decisions about norms on behalf of DMs, a questionable moral stance that Estlund (2009) calls the "expert/boss fallacy". It is unlikely that many decision scientists really wholeheartedly endorse it. Besides, to the best of our knowledge, the literature does not specify what is precisely required (when adopting $\mathscr{N}_E$) for an expert to decide that "enough" discussion has taken place in the expert community and that a consensus has been reached concerning a given N. Furthermore, the fact that a norm has been considered acceptable in the abstract by the scientific community does not guarantee that it is acceptable in its use by the analyst in a concrete context.

2.1.3. A_I: informally testing whether Decision Makers endorse N

The blatant weaknesses of A_E suggest a pragmatic variant, A_I, with I standing for "informal". This is the attitude of decision analysts who reject A_E's idea that decision scientists can decide on N on behalf of DMs, and therefore make a point of informally discussing the meaning of N with DMs to verify that N appears endorsable to the DMs.

Roy (1996) can be seen as a prominent supporter of A_I. Indeed, although he did not use the term "norm" to refer to elements underlying recommendations, he emphasized the need to develop interactions with the DM to ensure that, not only the recommendations, but also the building blocks of the decision support process from which they derive should be "meaningful" for the DM.

This meaningfulness requirement can be interpreted as a need to render the various elements of the decision support process intelligible for the DM. And because R are necessarily anchored in N, this intelligibility requirement unavoidably includes a requirement that the DM *endorses* N. Roy (1996) hence implicitly championed a requirement to informally test whether DMs endorse N. As another example, one can think about Raiffa's (1985) claim that, in some cases, discussions with DMs rejecting subjective expected utility theory can lead them to accept it after all.

The problem with A_I is that it combines a scientific approach to arrive at R, with an informal, loose approach to lead DMs to make up their mind about N. Like A_E, it is anchored in a higher level norm $\mathscr{N}_I$. But this higher level norm is not clearly articulated. It encapsulates the idea that decision analysts cannot make decisions about N on behalf of DMs, but does not specify precisely what they should do.

2.1.4. A_J: appealing to justifications of N

Although they do not explicitly tackle our problem, many authors in the literature, especially in ethics and methodology of OR, endorse a fourth attitude that can seem to offer a solution to our problem. This candidate solution consists in advocating that analysts should *justify* the decision support they provide, and in particular should justify the N from which their recommendations derive (or, equivalently, should produce assertions concerning these N which are all "warranted"). For example, Lahtinen et al. (2017) advocate OR practices following an "ideal path", "formed by well-*justified* choices". Similarly, Diekmann's (2013) defense of "transparency" is explicitly anchored in a justification requirement, defining transparency in terms of "open communication" and "clarification". His presentation of "integrity" explicitly refers to "justification". Beauchamp's (2009) criteria to balance principles when they conflict also explicitly refer to justification. White and Taket's (1994) call to desacralise expertise enjoin experts to justify their intervention. Jackson (1999) concurs on the importance of justification and spells out "guidelines" that justifications "must" follow to "claim to have used a management science methodology according to a particular

rationale". Ormerod (2010) even argues that a willingness to justify is a necessary condition for decision scientists to present themselves as *scientists*.

This pervasive reference to a justification requirement is, however, arguably too vague. Indeed, the term "justification" is extremely polysemous. In some contexts, one might call any argument, however spurious or ill-conceived, a "justification", and the above contributions do not elaborate on how to make sure that a given purported justification really qualifies as a "successful" or "good" justification (or as a justification *stricto sensu*) – which is difficult question, *a fortiori* when purported justifications have to do with normative elements. Jackson (1999), for example, details prototypical arguments that can be used to structure justifications, but does not explore how to ensure that an argument based on his guidelines qualifies as a justification: his "guidelines" are, in that sense, more "buiding blocks" than guidelines. A_J hence appears unsatisfactory because it takes for granted that the notion of justification is transparent and unproblematic, whereas on due reflection this notion appears ambiguous.

Example 2. *Let us simply illustrate the meaning of attitudes A_O, A_E, A_I and A_J in our hypothetical scenario of an application of* CBA.

A_O would mean, for the analyst, that she claims that it is clear and evident for DMs *to decide whether they endorse, not only preference utilitarianism, but also all the more or less clearly articulated norms specifying all the requirements for a* CBA *to be considered to be "properly" implemented.*

A_E, by contrast, acknowledges that DMs *can find it difficult to understand the meaning of this N, and might be at a loss trying to decide whether they should endorse it. An analyst adopting A_E would hence fall back upon a community of researchers endorsing N to take the decision to endorse N on behalf of* DMs.

An analyst adopting A_I would find A_E unacceptable, and would informally strive to discuss with the DM *to help him decide whether he endorses N. But to accomplish this task, the analyst will be left without a rigorous methodology. Similarly, an analyst adopting A_J would make a point to justify the N from which her recommendation derives, but for lack of a deeper analysis of what "justification" amounts to, she would find herself incapable of telling whether or not the justification she produces is a good justification.*

2.2. Philosophical explorations of higher level norms

We argued in the former subsection that the attitudes currently found in the decision science literature are unsatisfactory. A_E and A_I however suggest an interesting solution, which consists in referring to a higher level norm, and A_J goes a step further by claiming that this higher level norm might be a justification requirement. The philosophical literature contains interesting, deeper explorations of this idea, in particular in debates on "purely procedural" vs. "substantive" normative theories in political philosophy.

Substantive theories account for justice and democracy by explicitly referring to values, whereas purely procedural normative theories strive to avoid value judgments. Rawls (2005)'s normative theory of democratic legitimacy is a classical example of a purely procedural theory. Rawls did not want his theory to make any value judgment about the kind of state of affairs that should prevail in a democratic society. He therefore argued that a policy is democratically legitimate if it is based on a constitution whose justification is acceptable by all "reasonable" citizens, and he further argued that the very definition of reasonableness should be something for reasonable citizens to pick-up. He thereby attempted to eschew making any value judgments in his account of legitimacy and reasonableness. This was supposed to be a complete "flight from substance" (Estlund, 2009), in the sense that this account was supposed to eschew all forms of value judgments.

This approach hence elaborates on the idea to produce justifications, anchors this idea in a reference to acceptability, but strives to eschew specifying criteria to distinguish acceptable justifications from non-acceptable ones.

This approach arguably fails, however, for reasons articulated by Habermas and Estlund. Estlund (2009) noticed that, if one accepts, following Rawls, that the notion of reasonableness should be selected by reasonable people themselves, then there is an "impervious" plurality of groups that could select themselves as being "reasonable". He concluded that rawlsian political philosophers have no choice but to render the concept of reasonableness more precise, by specifying the values underlying it. Habermas (1995) criticizes Rawls's presentation of his notions of "veil of ignorance"

and "overlapping consensus" as *devices* whose real-life functioning can give rise to principles of justice. According to Habermas (1995), these notions are rather rhetorical tools thanks to which Rawls exposes principles of justice that he surreptitiously deduces from various philosophical notions, such as the one of a moral person, which he (perhaps unconsciously) presupposes. Rawls's "flight from substance" hence collapses in a retreat back to the substantial inquiry into the nature and features of a moral subject. Rawls's theory therefore is anchored in a higher level norm $\mathscr{N}_R$, but this higher level norm is not thematized as such in his philosophy.

By contrast, in his debate with Rawls on the theory of justice, Habermas (1983) goes a step further by analyzing the higher level norm underlying his own theory (though he does not uses this vocabulary), by introducing a "weak" transcendental deduction of the tenets of "discourse ethics" from communicative action. Habermas (1981) argues that agents communicating with each other make validity claims of three sorts: veritative claims about truth, normative claims about values and norms, and authenticity claims about expressions concerning their inner life, feelings and consciousness. The role that norms play is therefore clearly circumscribed in Habermas's framework, it concerns one kind of validity claims among others, and Habermas would probably not claim that recommendations based on such norms can be justified. Habermas (1983) however does not locate the tenets of "discourse ethics" at this level. He rather argues that all the acts and deeds that consist in making validity claims are oriented by a strive for intercomprehension, which lies at the core of communicative action. And he identifies the tenets of discourse ethics as conditions of possibility for this intercomprehension-oriented activity.

The norms specifically constituting Habermas's discourse ethic are hence anchored in his philosophy of society, which endows them with a specific justification referring to Habermas's theory of communicative action. According to this theory, it would be pointless to expect DMs to make up their mind about these norms, because they are conditions of possibility for a very basic, all-pervasive structure of human action. Their justification is hence unassailable – or so, the argument goes.

As opposed to proponents of A_E, Habermas hence develops foundations to entrench his $\mathscr{N}_H$, and these foundations provide him with a reason to claim that a justification based on these foundations is a good justification, which permit to go beyond attitude A_J. These foundations are, however, derived from his very specific understanding of communication and its importance in the functioning of human societies, which has been extensively criticized in the literature (Heath, 2001; Honneth, 1985; Benhabib, 1992).

3. The recommended approach

In this section, our aim is to elaborate on the idea outlined by A_J and (according to our argument) unsatisfactorily elaborated by Rawls and Habermas, according to which a convenient higher level norm $\mathscr{N}$ should embody a justification requirement.

We begin with the notion of justification in general: at this level of generality, a justification requirement is innocuous. We then progressively clarify and flesh out this idea so as to articulate a concrete notion of justification. Such a concrete notion should no longer be ambiguous, and should enable us to identify a satisfactory $\mathscr{N}$. To that end, our approach will be similar to the one typically used in ordinary language philosophy (Soames, 2003): we will draw on everyday intuitions about the meaning of the term "justification", and strive to progressively sharpen a specific definition that the term should take in order to play the role that we want it to play, in the very specific context in which we want to use it. To do so, we will take advantage of the arguments developed above against the various attitudes presented in the former section to sharpen our understanding of the idea of a *satisfactory justification* in our context.

In the two subsections below, using this approach, we identify a series of requirements that the notion of justification should embody (these subsections draw on provisional ideas introduced by Meinard (2013, 2017)). The third subsection then presents a set of practical rules that materialize these requirements and participate in fleshing them out. These practical rules specify the attitude that a decision analyst should have, if he sets himself the task to produce *satisfactory justifications* for the N grounding his R.

3.1. Three requirements

Any notion of justification should be specified by criteria. But what criteria should one use? Here we introduce three requirements encapsulating the criteria that, we argue, are relevant to capture the notion of justification that we need.

3.1.1. Incrementalism

As we have seen, $\mathscr{N}_E$ encapsulates a criterion: N should be considered consensual among decision science experts. $\mathscr{N}_E$ presupposes that this criterion is clear and determined. However, one cannot find, in the literature, any elaboration of how this criterion is supposed to be checked. This blind spot obfuscates the idea that such a consensus, if it existed, would certainly evolve as decision science knowledge improves. A more satisfactory version of $\mathscr{N}_E$ would hence clarify the meaning of this criterion, and would thereby in particular highlight that the content of the criterion is liable to change as knowledge improves, incrementally. The same idea applies to $\mathscr{N}_R$ and $\mathscr{N}_H$. We have seen that the former is anchored in an implicit philosophy of the moral subject, and the latter in a theory of society. But both theories can be questioned, and more satisfactory versions of $\mathscr{N}_R$ and $\mathscr{N}_H$ should accept and openly display their provisional status (Habermas (1983) does emphasize this point – discussing whether this claim is coherent with the larger habermassian framework falls beyond the scope of this article).

This first analysis of part of the shortcomings of $\mathscr{N}_E$, $\mathscr{N}_R$ and $\mathscr{N}_H$ hence suggests the need to integrate, in our notion of justification, an *incrementalism* requirement, holding that it is illusory to claim to be able to capture a definitive list of criteria defining what is a satisfactory justification. According to "incrementalism", one had better work incrementally, to improve step by step one's understanding of the relevant criteria. "Incrementalism" reflects the idea that even experts have limited capacities to identify definitive solutions to the problems they are entrusted to tackle, and therefore their conclusions cannot be considered to be definitive solutions.

3.1.2. Anchorage in real-life acceptability

Another problematic feature that our exploration of A_E illustrated is that it conceives the elaboration and application of $\mathscr{N}_E$ as tasks for decision scientists alone to tackle. By contrast, Rawls and Habermas wanted their theories not to grant the philosopher the right to preempt discussions concerning N – an idea also supported by attitude A_I. Rawls introduced this idea thanks to his notion of "reasonableness", which Estlund rearticulated at a more general level as an acceptability requirement. We have seen that, at least according to Habermas and Estlund, Rawls's argument is flawed. But a core underlying idea remains, in our view, pivotal to elaborate a relevant notion of justification: whether a justification is satisfactory should depend on how people in the flesh receive and react to purported justifications. If we want to identify criteria distinguishing acceptable from unacceptable justifications, instead of searching for such criteria through theoretical reflection, we should take the stance that consists in putting justifications to the test in real-life situations, so as to improve gradually our blunt understanding of what it means for a justification to be acceptable.

3.1.3. Interventionism

The latter requirement might suggest the following approach, inspired by the sociological literature on "orders of justification" (Boltanski and Thévenot, 2006). According to this literature, various groups in various situations typically refer to different and largely irreconcilable "orders of justifications", which can (according to some authors at least) be formalized as sets of normative axioms accepted by some groups but rejected by others.

Drawing on this literature, one could set out to use sociological surveys determining in which groups the people concerned by a given application of decision sciences fall, and produce recommendations justified by the axioms endorsed by those people in the situation at issue. Such an approach can be seen as a refinement of A_O: it accounts for cases where different people find different norms self-evident, but it still requires that people judge by themselves whether they consider a given norm to be self-evident. In particular, it might be that people accept some norms only because they have

not realized all their implications.

In order to integrate such reactions, we need a notion of justification that does not reduce the acceptability of justifications to the bare acceptance of discourses. This requirement obviously echoes Habermas's and Estlund's criticism of Rawls's notion of "reasonable": if it is to make sense, Rawls's theory cannot be about justifications that real people usually accept or will accept, it must be about justifications that citizens *would* accept, if they were reasonable. Habermas (1992) forcefully emphasizes this counterfactual aspect in his theory of legitimacy, but this leaves his approach vulnerable to the criticism that he talks about counterfactual worlds in outer space. In our view, the important idea that Habermas's reasoning conceals is that the notion of acceptability is only convincing if one accepts that the philosopher or the decision scientist, trying to capture what people can find acceptable, allows himself to interact with those people, and thereby goes beyond the approach championed by authors like Boltanski and Thévenot (2006).

3.2. Unfolding practical rules

The former subsections allowed us to clarify important requirements that the notion of justification should fulfill, in order to play the role we want it to play in applications of decision sciences. We are now in a position to clarify the contours of a practice of justifying that would fulfill those requirements. This practice is materialized by a practical procedure, whose steps are presented below. (The tenets constituting our practical procedure bear a resemblance with Diekmann's (2013) "mid-level" moral principles, but they aim to be more general – not being limited to a specific activity such as modeling – and are not derived from moral theories, but rather from our higher level norm $\mathscr{N}$, which is designed to be more fundamental.)

Meinard (2017) attempted to elaborate a practical procedure of that sort in an exploration of the concept of legitimacy. Here we will translate some elements of this approach to our context, and also address what we take to be weaknesses, so as to unfold a more satisfactory account. Our proposed practical procedure will be articulated in four points.

A first requirement is designed to capture the idea that, as application

of "Anchorage in real-life acceptability", in a context where an analyst offers a recommendation R to a DM, the fact that the analyst endorses $\mathscr{N}$ should first and foremost take the form of his actually articulating justifications in such a way that the DM understands them and is convinced by them.

In this setting, our first requirement (clause i) can be articulated as follows: *Systematically display arguments in favor of the N from which our recommendations derive.*

We emphasize that this task is more difficult than one might think at first sight. Clarifying the N that the analysts endorses, often implicitly, requires hermeneutic, communicative and interactive explorations which are no less complex than those involved in clarifying the goals of the various people involved in a decision process (Reisach, 2016). Besides, as Cronin et al. (2014) point out, "Often participants may not even be aware of the preconceptions, or assumptions, that they are taking for granted" and interactions with DMs "are inevitably subject to various constraints some of which arise pre-consciously as a result of historically acquired competences and predispositions to operate in particular ways" (Brocklesby, 2009). Unfolding clause i is therefore a challenging task. Making the effort to tackle it can prove useful for the analyst himself to clarify his own assumptions. But one should remain prudent and cannot assume that the exercise will always be entirely successful.

A second point should prevent our using justifications that happen to be accepted, as a matter of fact, at the moment when we articulate them, but whose weaknesses are concealed. This point embodies "incrementalism" and "interventionism", by claiming that, once we have found arguments in favor of something, we should try to look for ways through which they could be discarded. Real-life examples of decision-aiding practices that flout this clause are given in Meinard (2017), which lead him to introduce a requirement to be ready to defend one's recommendations against criticisms, even when none are formulated. This requirement is insufficient, however. Indeed, an account associating it with clause i would be impaired by a worrying weakness, which can readily be identified by referring to the literature on epistemic injustice (Fricker, 2007) (this problem is not addressed by

Meinard (2017), and is also left aside by Mingers (2011), who mentions this issue without exploring it when acknowledging a limit to his own framework under the heading "Engagement and inclusion"). Some people and groups have access to knowledge, others have not. The former are in a position to articulate criticisms, the latter are not. By imposing that decision analysts should be ready to defend their recommendations, the above approach exposes applications of decision science only to part of the spectrum from which criticisms can come. What if many criticisms could have been addressed at us, but none were, because of epistemic injustices? In such a case, we cannot confidently claim that our approach materializes satisfactory justifications. There is therefore something amiss in the above account.

One might suggest that the problem could be fixed by identifying a specific group of people that should be the source of criticisms, or even a procedure that should be used to encourage the formulation of such criticisms. But this would mean presuming that we have the kind of perfect knowledge needed to identify *the* ultimate procedure once and for all.

The logic underlying "anchorage in real-life acceptability" offers a solution to this problem. We cannot identify once and for all a perfectly relevant group of people or a perfect procedure. What we can do is identify an attitude that will be conducive to more satisfactory justifications, and this attitude is a requirement to actively elicit criticisms. In some situations, this can imply enlarging the circle of people, groups or institutions involved in the decision process, for example as members of a steering committee. This inclusion of other people can by itself bring in new insights or information.

This requirement, Actively elicit criticisms (*ii*), is the missing element in our account; it can fix its first weakness.

We now need a third clause to allow clauses *i* and *ii* to fully embody the requirement to put justifications to the test in real-life, instead of confining them to theoretical criteria: Actively defend our recommendations against all criticisms (*iii*). Obviously enough, just like clause *i*, clause *iii* only makes sense as an application of "anchorage in real-life acceptability" because the "defense" at issue consists in articulating arguments that the

DM understands and that convince her.

Clauses *i* to *iii* spell out the attitude of experts who would enact a willingness to justify themselves by displaying arguments in favor of the norms underlying their stances, and by actively being willing to face dissident stances. But this account, although completed to fix the weaknesses mentioned above, has another worrying weakness, which can be captured by raising the question: when can one claim that one has produced *enough* justifications? (This weakness was also ignored by Meinard (2017).) Indeed, in practice, whatever the effort one makes to address all the criticisms that one can think about, there is bound to remain infinitely numerous other possible criticisms – criticisms that one failed to think about, or even criticisms that are not conceivable today, but that will emerge in the future, as knowledge increases. Demanding that decision analysts abide by this apparently infinite justificatory task might seem unrealistic.

This problem can be solved by applying "incrementalism" to the justifiability of the decision analysis process. Incrementalism means that one can never claim that one knows what the right criterion is to sort out acceptable justifications from unacceptable ones: proposed identifications of "the right" criterion are always provisional. As a consequence, when implementing clauses *i* to *iii*, the decision analyst must develop a provisional account of the justifiability of the decision analysis she provides. The decision analyst can claim that her decision analysis is more justifiable thanks to specific actions taken while implementing clauses *i* to *iii*, but not that the decision analysis is justified in an absolute and definitive sense. This adds a fourth clause to our account: Understand our own justifiability as unavoidably provisional (*iv*).

The importance of this clause will be most evident in situations in which the DM simply rejects the analyst's attempts to discuss the relevance of N, or ill-intentioned people willing to sabotage the decision process stubbornly reject any defense of N or any alternative to N. In such cases, the analyst will have to surrender at some point. But this surrender is not a failure of his justification attempts. He will have failed if an alternative decision process is launched whereby another decision analyst manages to develop a more

successful justification. In the absence of such a more successful alternative, the first decision process should be considered provisionally justified.

To sum up, the approach that we recommend is that, as decision analysts implementing decision science in concrete situations so as to provide recommendations, we should:

i. Systematically display arguments in favor of the N from which our recommendations derive;
ii. Actively elicit criticisms;
iii. Actively defend our recommendations against all criticisms;
iv. Understand our own justifiability as unavoidably provisional.

Clearly enough, applying clauses *i* to *iv* is unlikely to ensure that we will be able to identify *the* ultimate justification for our recommendations. For that, we would need to have access to all the possible arguments, all the possibly relevant information, and we would need a perfect definitive definition of what a satisfactory justification is. The more modest ambition of the present account is to provide a practical answer to the core question of our inquiry: *as practitioners applying decision sciences to the resolution of concrete problems, how can we make sure that the normative aspects of the decision analysis that we provide do not lead us to take liberties with our scientific neutrality by being dogmatic, paternalist, proselyte, or authoritarian?* The answer that we propose is: *we can make sure that we remain scientifically neutral by applying clauses i to iv.*

Example 3. *To illustrate the concrete meaning of our reasoning, let us see how it applies to our example of a decision analyst using* CBA *to help a* DM *to decide whether he should implement a given project P.*

To apply clause i, instead of simply using the chosen method without further discussion, the analyst should take upon herself to clarify the norms N underlying her usage of this method, and explain to the DM *why she deems it relevant to accept N in the case at hand. An analyst who would miss this step, for example because using* CBA *was part of the requirements of the public procurement procedure through which she was chosen and she assumes that she has nothing to say about the relevance of this requirement, would fail to abide by clause i. To apply clauses ii and iii, the analyst should set the discussions with the* DM *in such a way as to foster reactions and elicit*

criticisms when it comes to the relevance of N. For example, if the decision analysis task is monitored by a steering committee, the analyst should take advantage of the meetings with the committee to highlight possible reasons either to accept or to reject N. If, thanks to her understanding of the local context, the analyst suspects that the structure of the steering committee is biased against a given group of stakeholders, she should suggest to the DM *to enlarge the committee to include those groups or external experts, and thereby facilitate the emergence of possible criticisms. In the same vein, she should do her best to take advantage of the scientific literature to identify relevant arguments.*

Let us now illustrate these ideas using our concrete example of the restoration of dry grasslands on the Lachens summit (the account below is stylized to some extent, in particular in that it focuses on exchange of arguments between the analyst and the DM*, and leaves aside the contributions of other people, which are not directly relevant to our argument here). In its analysis of the restoration project, the consultancy argued that using* CBA *was inappropriate in this case, for two main reasons. First, they argued that, because of knowledge gaps in the literature on restoration of the kind of natural habitats at issue, it was impossible to compute the risks involved in the project. Second, they argued that some of the likely consequences were such that using* CBA *was ill-advised. Among these risks are possible impacts on populations of rare species, in particular* Leucanthemum burnatii *Briq. & Cav., a rare plant species (see the discussion of this issue by Meinard et al. (2016)). The main recognized value of this species lies in its scarcity. Although it does not provide any major ecosystem service and has no market value, botanists around Europe consider that it has an intrinsic value as a rare species. A prominent method used in the context of* CBA *to capture this kind of value is the travel cost method, which, in its application in this case, would compute the money that botanists are prepared to pay to make the trip to the Lachens summit to see the species. A major problem for this method is that it does not take account of the value that botanists who do not have the money to make the trip bestow on the species. An important part of the value of the species would hence be ignored if this method were used. Prominent alternatives to this method are provided by stated-preferences methods. But here again the consultancy argued that applying it would not give completely satisfactory results, because the applicability of this method to biodiversity is debated in the literature. Part of these arguments can be found in the technical report produced by the consultancy (Meinard et al., 2015), but many were voiced in meetings. In the end, although the initial demand was to implement a complete* CBA*, the consultants did not do it, because they had reasons that*

they could articulate in discussions with the DM, the reasons being that they believed they lacked the data and technologies needed to properly implement this method. This means neither that the DM's problem was unsolvable, nor that other consultants could not have found a way to solve it using CBA. But as it stands, the consultants who tried to solve the problem using CBA did not find a satisfactory way to do it, and produced arguments which convinced the DM that doing it was (possibly provisionally) impossible. Accordingly, this endeavor to provide decision aid was justified, in the sense articulated above.

The practical rules spelled out above echo Lahtinen et al.'s (2017) "path approach" to OR activities, and their promotion of an "ideal path", which they describe as a "path formed by well-justified choices". Our own practical rules aim at spelling out in more concrete terms the requirements that Lahtinen et al. (2017) refer to using terms such as "well-justified", "essential characteristics", "reflective". Similarly, our clause *i* echoes Funtowicz and Ravetz's (1993) claim that in post-normal science "values are not presupposed but made explicit", and our clause *ii* is reminiscent of Funtowicz and Ravetz's "extended peer community". However, in our view Funtowicz and Ravetz neglect the difficulties involved in implementing clauses *i* and *ii*, which prompted us to introduce clauses *iii* and *iv* and, as opposed to Funtowicz and Ravetz, we argue that the clauses *i* to *iv* should be deployed in all decision support processes, not only in situations characterized by high decision stakes and systems uncertainties. Our proposed practical rule should therefore be seen as complementary to the above contributions, which they contribute to strengthen by clarifying a preliminary crucial step that they tend to neglect. A similar relation exists with Mingers (2011), who delineates applications of Habermas' discourse ethics to OR practice, but refers to the idea of "justifiability" without defining it and advocates that what is important is "that every effort is made to involve and engage all the relevant stakeholders in a genuine and continuing dialogue" without specifying how to ensure that the dialog is "genuine". Although, at this stage, we do not explore in concrete behavioral terms the interaction between analysts and DMs, our approach also interestingly echoes Hämäläinen et al. (2013) who emphasize, in their review of the importance of taking behavioral aspects in OR, "the phenomenon that people are less influenced by decision problem

framing, that is, by the way in which the information is presented, if they are asked to give written reasons for their decision". Our approach suggests a path to implement this requirement in practice.

4. Conclusions

In this article, we have introduced an account of how, as decision analysts applying decision sciences to concrete situations, we should cope with the normative aspects of our endeavor. Several aspects of this account echo ideas developed by American pragmatist philosophers (Ormerod, 2006). In particular, our approach to "justification" is anchored in an analysis of the usages of the term, we propose to unfold the requirement to produce justification as a practical procedure and, even more fundamentally, our original research question only makes sense against the pragmatic background idea that norms play a key role even in activities that other approaches would categorize as entirely concerned with pure facts. However, beyond these fundamental ideas, our reasoning is not tightly anchored in any specific philosophical framework developed by authors in this school of thought. We therefore do not place this contribution under the aegis of American pragmatism.

To ponder on our proposed practical procedure, it is useful to mention three prominent objections that one might want to raise against our approach. A first objection might come from decision scientists who would reduce our argument to a simple call for decision analysts to justify their recommendations, which, they might argue, is what decision analysts already do. This would miss an important aspect of our reasoning. Indeed, our rationale emphasizes that recommendations necessarily rest on norms, and stresses that decision analysts cannot eschew the need to help DMs to make up their mind about those norms. Current practices address this issue informally, if at all. By contrast, we argue that it is necessary to anchor this important part of applied decision theory in a rigorous methodology – an objective to which this article attempts to contribute. To that end, we have proposed practical rules that decision analysts should follow in order to obtain justified recommendations. If followed, these practical rules will modify

current practices. Cailloux and Meinard (2018) provide a first instantiation of this account in a formal framework.

A second objection might come from decision analysts who would claim that justification requirements command respect, but are impossible to implement in practice. Such critics would claim that, in practice, decision scientists have no choice but to pick up some norms N to derive recommendations, and that any serious attempt to justify these norms would be impractical. Justification requirements would be impractical indeed, if they meant that any recommendation should be anchored in an "ultimate" justification. However, our reasoning is based on an incremental and provisional approach to justifications: the justifications that we are interested in are not "ultimate" in any sense, they are tentative and open to improvements. Identifying such provisional justifications is far more practical than pretending to capture "ultimate justifications", and we argue that it can be done in practice by following our proposed practical rules.

A third objection is a radicalized version of the second one. It would claim that, in practice, justification is irrelevant: the only relevant point is that decision analysis should "work". This idea is *prima facie* convincing, but what does it mean for decision analysis to "work" or to be "value-adding"? To a large extent, the successfulness of decision analysis hinges upon the analyst's capacity to justify it. In that sense, this would-be objection does not seem to be a real objection after all. At the very least, the burden of proof lies on critics who should be able to articulate it using a clear explanation of what it means for decision analysis to work.

We see our contribution as an attempt to articulate (relatively) precise requirements that applications of decision sciences should follow, with concrete, practical implications. We emphasize that the precision of those requirements is limited in many respects. It provide neither a metric nor generally applicable mechanical means to compare any two applications of decision sciences without discussions (Cailloux and Meinard (2018) introduce the rudiments of a procedure liable to fulfill this more ambitious agenda).

Besides, our work in this article is focused on relatively simple situations where the recommendations elaborated by the analyst are offered to a single,

well-identified DM. We thereby leave aside difficulties associated with group decisions (Jackson and Keys, 1984), stakeholder identification (Wang et al., 2015) and with boundary judgments involving the integration of several individuals in a collective DM (Midgley, 2000) – not for lack of interest, but because they are too complex to be tackled in the limited space of this article. One might want to criticize our approach by claiming that this restriction in effect confines our analysis to highly stylized decision processes never exemplified in real-life decision analysis. We rather see our contribution as an exploration of a fundamental aspect shared by all decision support processes, which is, in our view, insufficiently analyzed in the literature addressing decision processes in their full concrete complexity. In our view, the analysis of these more complex issues can benefit from our exploration, in the sense that the difficulties involved in aiding a single DM to make up his mind about the relevance of accepting a given norm are exacerbated in these more complex, pluri-actor settings. Similarly, although the requirement to justify can participate in unveiling, and thereby denouncing, power relations which could otherwise have distorted discussions and decisions, we cannot claim at this stage that our framework addresses all the problems liable to be generated by the pervasiveness of power relations in decision processes (Cronin et al., 2014). Another important aspect of decision processes that our framework does not explicitly addresses is the idea that OR might fail to serve the interest of the public or of those who cannot afford it (Rosenhead and Mitchell, 1986), which suggests a need for more critical and socially responsible OR practices (Jackson, 2000; Ulrich, 2003). This is reinforced by the context of environmental crisis, already stressed by Churchman (1970).

A prominent avenue for future research is therefore to explore how our framework can contribute to criticize and improve frameworks devoted to tackle these complex issues, such as "system of systems methodology" (Jackson and Keys, 1984), "critical heuristics" (Ulrich, 1987), "critical rationalism" (Ormerod, 2014), "systems thinking" (Mingers and White, 2010), "problem structuring methods" (Hector et al., 2009), "cognitive mapping" (Eden, 2004), "community operational research" (Johnson et al., 2018) or "stakeholder-oriented multi-criteria decision analysis" (De Brucker et al.,

2013). Another important avenue for future works is to explore how decision analysts can adjust their selection of methods (or their combination of parts of methods) in such a was as to reflect their difficulty to justify certain N with some DMs (Mingers, 1997).

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