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Opinion Makers Section

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TWO CONCEPTIONS OF DECISION AIDING [1]

I ask you to consider the following situation. In a company or a public institution, a manager and/or a group of people are confronted with a problem that requires that they make a decision. They call on an in-house operational research service or an outside consultant or even a university research team to get help in making "the best possible" decision. I will designate as **analysts** those who are appointed to give this decision aiding and as **decision makers** those in whose name or for whom this decision aiding must be given.

In the operational research and decision aiding community to which I belong, the **decision-aiding activity** (which is meant to be scientific) is founded on three pillars:

1º- A relatively formal definition of the possible decisions, which are usually called **actions** (or alternatives).
2º- A relatively formal definition of the **consequences** that these actions could have, which allows them to be compared.
3º - One or more **preference system** models.

This last pillar needs further explanation. Based on the consequences and the individual's value system, each individual, whoever he/she may be, can state when given two possible actions "I prefer the first to the second" or vice versa, "I am indifferent between the two" or "I am unable to compare these two actions". "Preference system" refers to the result of an **implicit or explicit process** that, for each pair of actions envisioned, assigns one and only one of these three possibilities: **preference**, **indifference**, **incomparability**. Modeling a preference system means specifying a process that will provide this type of results based on a pre-established model of the action consequences. These consequences are most often complex and inadequately known. They can be modeled in quantitative or qualitative terms, in a certain or stochastic manner, with a part of arbitrariness or ill determination. I will designate as $C(a)$ the model of the consequences of action a.

Based on the pillars described above, decision aiding can be carried out according to two clearly different conceptions. One, primarily positivist, is supported by Anglo-Saxon research; the other, primarily constructivist, was born and developed mainly in Europe. In what follows, I will refer to the first as **the "Anglo-Saxon" conception** and the second as **the "European" conception**. Obviously, these designations are oversimplified. By using them, I would not like anyone to believe that every Anglo-Saxon systematically adopts the first nor that every European systematically adopts the second. I will rapidly present these two conceptions and illustrate their differences with regard to a specific point. Before doing so, I think it is important to point out that the two conceptions described hereafter do not exhaustively cover all of the conceptions that have been conceived and that are used by decision aiding professionals for scientific meaning. Still, it is often one or the other that implicitly underpins the decision aiding activity if this activity is based on the three pillars described above.

1. THE "ANGLO-SAXON" CONCEPTION

According to the "Anglo-Saxon" conception, the analyst must endeavor to reach objective truths in decision making. To do so, he/she must use an approach that aims to produce knowledge, exact or at least approximate, about the "best possible decision in the decisional context studied". This approach must be based on models designed to represent simplified versions of reality. In essence, this reality is considered to be **pre-existing data**, independent of the decision aiding process used. The process that makes up the decision maker's preference system is part of this pre-existing reality. This process, which can remain very mysterious, is assumed to be **stable**. It is supposed to lead decision makers, given two actions a and a' (whatever they may be), to state without ambiguity either their preference for one action over the other or their lack of preference or indifference, based on models $C(a)$ and $C(a')$ of the actions' consequences. In

[1] I use "decision aiding" rather than "decision support", "decision making" or "decision analysis" to escapesimplistic assimilations.

this conception, incomparability is not envisioned; it is possibly assimilated to indifference.

In the "Anglo-Saxon" conception, to discover the correct responses to the decision maker's questions, the analyst must endeavor to model the decision maker's preference system as closely as possible. In order to hope to find coherent responses, he/she must also verify that the decision maker is **rational** in a certain sense that would be too long to explain here. In fact, the decision maker's preference system must conform to this rationality requirement in order to give meaning to the notion of "best decision". To verify decision maker rationality and elaborate a model that is likely to describe the decision maker's preference system, the analyst must ask this decision maker a certain number of questions. (I cannot describe them here). The analyst must obviously assume that the decision maker correctly understands the questions and that the responses given are in fact produced by the process that makes up the decision maker's preference system.

In order to objectively produce exact or at least approximate knowledge about the best possible decision in the decisional context studied, it seems to me that the analyst following the "Anglo-Saxon" conception of decision aiding must accept the following two postulates:

Postulate of the decision maker's optimum. *In the decisional context studied, there exists at least one optimal decision, or in other words, there exists one decision for which it is possible (if sufficient time and means are available) to establish objectively that there are no strictly better decisions with respect to the decision maker's preference system.*

Postulate of the decisional context reality. The principal aspects of the reality on which the decision aiding is based (particularly the decision maker's preferences) are related to knowledge objects that can be seen as data (i.e., existing outside of the way they are modeled); these objects can also be seen as sufficiently stable over time and for the questions asked such that it is possible to refer to the exact state or the exact value (certain or stochastic) of given characteristics judged to accurately portray an aspect of that reality.

2. THE "EUROPEAN" CONCEPTION

According to the "European" conception, the analyst must seek for obtaining a coherent structured set of results. These results must be sought in order to guide the decision making process and facilitate communication about the decisions. To do so, the analyst must use an approach that aims to produce knowledge from working hypotheses that take into account the objectives and the value systems of the decisional context involved. This approach must be based on models that are, at least partially, **co-constructed through interaction with the decision maker**. This co-construction first concerns the way the actions studied are taken into account, as well as the consequences on which these actions will be judged. (Of course, this can also occur in the "Anglo-Saxon" conception.) Second, the co-construction process concerns the way that were designed certain characteristics (notably the values attributed to the different parameters) of the preference model that was judged the most appropriate given the specificities of the decisional context and the working hypotheses retained. In this conception, it is no longer necessary to assume that there exists, in the mind of the decision maker, a stable procedure capable of defining the decision maker's preference system completely, before even beginning the decision aiding process.

To elaborate results likely to make things clearer for the decision maker (e.g., if…, then… results), in the "European" conception, the analyst must propose working hypotheses which allow the co-construction of preference model to play an appropriate role in the decision aiding process. The co-constructed model must be a tool for looking deeper into the subject, exploring, interpreting, debating and even arguing. To guide this process of co-construction, the analyst must also interact with the decision maker, assuming that he/she understands the questions that are asked. Nevertheless, in the "European" conception, it is not necessary to assume the responses given are produced through a stable pre-existing process, but only that these responses are made up through interaction with the decision maker's value system, which is rarely free of **ambiguity or even contradiction**. In particular, the analyst must make sure that the person who responds to the questions is able to place these questions in the concrete context studied. This analyst must admit that the novelty of these questions can bring the person thus questioned to **revise** certain pre-existing preferences momentarily and locally.

According to the "European" conception, the knowledge produced does not aim to help the decision maker discover a good approximate decision that would objectively be one of the best given his/her value system, but rather more humbly to provide the decision maker with a set of results derived from the reasoning modes and working hypotheses. The decision maker will better understand the results produced and will better appropriate them (and potentially share them) if the analyst has made sure that understanding of the underlying reasoning modes and working hypotheses is integrated into the model co-construction process.

In this "European" conception, the analyst does not need to accept either one of the two postulates presented above. He/she may see these postulates as totally unrealistic. He/she may even have good reasons for accepting the existence of incomparabilities in the preference models used.

3. ILLUSTRATION

Before concluding, I want to illustrate the difference between these two conceptions in relation to a specific aspect of the preference system modeling process. To do this, I consider the case of a family of criteria designed to evaluate and compare the actions to be studied. In the

decision maker's mind, the process that is supposed to define the preference system makes these criteria play roles that are generally not interchangeable. Some of these criteria can play "very important" roles; others play a "totally secondary" role. Whatever way the analyst models the preference system, he/she must include in the model adopted a set of parameters that characterize the specific role appropriate for each criterion. This set most often associates to each criterion a single parameter, usually called the criterion weight. This is the term I will use in this section, although the metaphor of weight (the greater the weight, the greater the importance of the criterion) can be misleading. I will look at the way the analyst has to define the parameter set to attribute a value to each parameter in the set.

According to the “Anglo-Saxon” conception, the analyst must retain a model type that is likely to reproduce, as exactly as possible, the reality of the process used to define the decision maker's preference system. The parameter set that differentiates the role of the various criteria is assumed to really exist, and consequently, each parameter must have a true value. The analyst must thus design his/her questioning protocol to find the best possible approximation of this true value. In particular, if the parameter set represents weights in the model adopted, the analyst must try to come as close as possible to the "true weight" of each criterion.

According to the “European” conception, the analyst must retain a preference model type that is appropriate to the role that the model must play in the decision aiding process. The set of parameters that differentiate the various roles attributed to various criteria is not assumed to really exist. Thus, there is no true value that must be approximated as best possible. For this reason, the analyst must design his/her questioning protocol in such a way as to attribute to these parameters the most appropriate value so that the resulting preference model constitutes a basis from which it is possible to elaborate interesting results. The analyst may decide that one type of model, whose parameters represent weights, is particularly appropriate because it can be easily understood and accepted by the decision maker. The way that the analyst interacts with the decision maker (notably during the questioning phase of the process) when attributing a weight value to each criterion is intended to make a value emerge so that the criterion will play a role that is coherent with the one that the decision maker wants it to play (notably to obtain "if…, then…" results). This role can be greatly affected by uncertainty since the decision maker's preference system was not necessarily completely defined *a priori*. It is not uncommon that the decision aiding process can contribute to make this preference system evolve. In fact, in the “European” conception, the preference model that is adopted for reasons of convenience and clarity does not pretend to reproduce the implicit process that is assumed to make up the preferences in the decision maker's mind. It follows that the way that the analyst interacts with the decision maker is also intended to help him/her to better understand the links that may exist between the weight value attributed to a criterion and the role that this criterion plays in the type of model adopted. In these conditions, the questioning protocol can lead to retaining not a single set of weights but rather several, in order to evaluate the impact that each of the weight sets can have on the results produced.

4. CONCLUSION

Continuing the oversimplified designations of the two conceptions (which do not seem to me to be fundamentally incompatible, I will conclude by schematizing the differences between them on three levels as follows:

Source of legitimization: The “Anglo-Saxon” conception situates the source of legitimization in realism and objectivity, while the “European” conception situates it in procedural rationality and communication.

Status of the preference model: In the “Anglo-Saxon” conception, it is a matter of reproducing as faithfully as possible the decision maker's preference system as it truly exists in order to get as close as possible to the best decision, while in the “European” conception, it is a matter of working with the decision maker to co-construct one or more preference models in order to study the results to which they lead.

Place of the analyst: In the “Anglo-Saxon” conception, the analyst is assumed to be neutral, or in other words, to be outside of the decision aiding process, while in the “European” conception, the analyst must admit that, as soon as he/she interacts with the decision maker to obtain information, this interaction makes him/her a co-constructor of the knowledge produced; thus, he/she cannot be seen as being outside of the decision aiding process.

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