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Habilitation of Dr. Jiří Mazurek for Associate Professor

The research monograph presented by Dr. Mazurek concerns some aspects of the analysis of preferences of decision makers and experts within the more general framework of Multi-Criteria Decision Analysis. Methods like AHP, Multi-attribute value theory, TOPSIS, PROMETHEE, and ELECTREE, have all been developed within this field of research.

Needless to say, they are prescriptive analytics tools and their range of applications—on which it is unnecessary to spend time—is extremely vast and their applications have a daily impact on our lives.

The book starts from the assumption that in real-world situations, an expert can hardly ever be fully rational when expressing his cardinal preferences on a set of alternatives and criteria. This is a fair assumption which has been embraced by some normative decision scientists too.

The book continues with an exhaustive presentation of almost all the inconsistency indices proposed in the literature. Inconsistency indices are functions which map preferences into levels of inconsistency (irrationality). The higher the value of inconsistency, the more irrational the preferences. The discussion encompasses both numerical and theoretical aspects of inconsistency indices and, in doing so, it probably offers the most extensive and updated treatment of inconsistency indices ever presented in the literature. The chapter is enriched by a discussion on “thresholds”. That is, values of inconsistency beyond which preferences should be considered too inconsistent.

Then, the book moves towards the issue of inconsistency reduction, for all the cases when inconsistency is considered excessively high. Interestingly, Dr. Mazurek took the chance to state a formal definition of “*algorithm for inconsistency reduction*” (AIR) and analyzed some properties of this family of algorithms. Albeit quite natural, this definition was missing in the literature and it is good to have a prime attempt. I am confident that this should sparkle further theoretical studies.¹

The monograph proceeds considering two types of algorithms, the automatic (which do not require any interaction with the decision maker) and the iterative ones (which need further contact with the decision maker). To my understanding, this comparative study is neat and all algorithms were considered.

¹ In fact, I consider Proposition 4.1 quite bold. A trivial AIR which always returns the unit matrix would satisfy the definition and have computational complexity $O(1)$. However, this is not bad, as it shows that there is much more to say about the idea of AIR.



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In the next chapter, some unorthodox approaches to the analysis of irrationality of preferences are presented. It must be said that these approaches are not alternative to the classic quantification of inconsistency and they can be regarded as bringing further evidence on the rationality of preferences. Given their increasing relevance in the scientific debate, I appreciate this chapter and the discussion.

Chapter 6 considers extensions of inconsistency indices to the case of incomplete preferences. This is not a marginal chapter as I am more and more convinced that incomplete preferences should not be the exception but, instead, the normality. My belief is that it is hardly ever the case that a decision maker can express his complete preferences, and this may not be desirable either.

The last chapter considers the case of violations of ordinal consistency. With ordinal consistency one considers the usual transitivity condition applied to valued preferences. This chapter is rich with original results never published before.

One of the most peculiar characteristics of this book is that it starts from a descriptive approach and ends up with a prescriptive approach: inconsistency indices are essentially descriptive tools, but the author did a very good job to make them operational and turn them into something even more useful.

Conceptually speaking, the monograph is well-organized and I perceived its flow as extremely sequential and linear. The field of investigation is growing and new proposals and formal studies are almost certainly going to appear in the next year. For this reason, I hope that Dr. Mazurek will not consider this work as a starting point, but something to be kept updated for a second edition in, maybe, ten years. I'll be reading it!

It is safe to say that, having written this monograph Dr. Mazurek is presently the most knowledgeable scholar, at an international level, when it comes to the quantification of preference inconsistency and its rectification. Or, at least, I could not come up with any better name.

Let me note that, during the years, Dr. Mazurek has worked alone and together with a number of other researchers. Publications show his capacity to work both individually and cooperatively.

Clearly, my opinion is that Dr. Mazurek has reached, by any standard, and most likely even exceeded, the maturity for the rank of Associate Professor.

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