Schneeweiss, Christoph, Hierarchies in Distributed Decision Making, Springer Verlag, Berlin et. al. 1999, 341 pp., hc., DM 120,00.

The author considers organizations and systems that have been decomposed into a set of subsystems each of which is charged with making certain (partial) decisions. He refers to this as “distributed decision making”. Whether or not this is identical with decentralized decision making I cannot tell. In any event, the author is especially interested in hierarchical arrangements between the subsystems.

He considers these for two-level hierarchies (consisting of just one “top level” and one “base level”). He distinguishes “constructional hierarchies” where both levels have access to identical (“symmetric”) information and “organizational hierarchies” where this is not the case. The latter get classified further into “decision time hierarchies” and “leadership hierarchies”. “Principal-agent hierarchies” show up as a third classification characterized by “antagonistic conflict” between levels. These concepts of hierarchy are so broad that they include not only relationships between organizational and planning levels (e.g. strategic, tactical, and operational) but also between the stages of sequential decision processes and logical orderings that are not normally considered as hierarchical.

The author postulates a number of general interactions between levels. The top level can issue “instructions” to the base level, can “anticipate” the base level’s reaction, and the base level can feed back an actual “reaction” to the top. Several cycles of the process may be required to produce a final instruction for implementation. Both levels have decision variables and objective functions whose parameters include available information and instructions that were previously given. The whole mechanism is based on optimization principles: optimization at the top level produces a decision. Based on this decision an instruction is issued which enters into the objective function of the base level. The resulting relationship between instruction from the top and optimal decision at the bottom level is called the “anticipation function”. The whole mechanism is formulated by a set of “coupling equations” (p. 39). These, according to the author, are the basis for all further developments in the book.

Since both the concept of hierarchy and the coupling equations are extremely broad and general it is not surprising that the author is able to subsume a large number of well-known planning and computational approaches to the general structure of his coupling equations, e.g. *Dantzig/Wolfe* decomposition, relaxation, two-stage linear programming, and hierarchical production planning. Surprisingly, there is very little reference to dynamic programming. This is surprising because the author’s “anticipation functions” are essentially the same as *Bellman*’s decision functions in multi-stage decision processes – with one important difference: *Bellman*’s optimizations take into account that decisions at later stages will depend on *actual* (not estimated) information. Hence the author’s approach to optimization may in some cases be questionable.

The author adapts his concepts for application to many different types of behavior in hierarchies, among others to the principal-agent situation. He also attempts to include qualitative concepts.

The book is not easy reading. The English text leaves something to be desired. All in all, the author has been successful in exposing a common underlying structure of a large variety of (sometimes rather artificial) hierarchic arrangements. However, both his approach and the mathematical relationships resulting from it are mostly conceptual, abstract and theoretical – not empirically founded. Hence the book will appeal most to theoreticians interested in highly abstract conceptualizations.

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