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Editorial

In the past decade there has been an explosion of interest in the use of computational, mathematical, and logical models (formalization techniques) for theory development and testing in the social and organizational sciences. Increasingly, non-social scientists are exploring social and organizational issues using such techniques. There is an acknowledged need for the members of this multi-disciplinary community to gain greater awareness of each other, to increasingly build on each other's work, to share tools and techniques, and to develop a shared understanding of how to present and evaluate models.

This journal, *Computational and Mathematical Organization Theory* (CMOT), will be an international forum in which researchers from multiple disciplines can engage in theory building and testing using such formal techniques. As part of this process we expect that the journal will be part of the arena in which researchers share not only theoretical developments, but tools and techniques for developing and analyzing such procedural, symbolic, or numeric models and theories, review advances in the field, and engage in discussions about appropriate and inappropriate evaluation criteria.

Formalization techniques will play an increasingly important role in the development of organizational theory. This will be particularly true as our understanding of social and organizational processes expands to include the complex, dynamic, adaptive features of the ecologies of entities (people, groups, technologies, information systems, etc.) and the relationships among them that comprise organizations, their environments, and society. The range of models and techniques needed to address social and organizational issues will be vast both in scope and in complexity. This journal will be a forum in which a wide range of models can be discussed and evaluated and in which the relative merits of different types of models and the techniques for their analysis can be discussed.

We anticipate that a common theme throughout the research papers submitted to CMOT will be the construction, application, or analysis of a model or the presentation or critique of a modeling technique. A model is an abstract representation of reality. A model can be either a formalization of a theory (in which case there can be several models associated with a given theory) or the model can be, in and of itself, a theory (in which case the model operationalizes the task it seeks to explain).

In the world of organizations, principles or explanatory relationships are tentative, and hypotheses are advanced to be verified by facts. Since we are addressing theoretical concerns, the models should be abstractions: of theoretical principles from science, of processes observed in the real world, or of real or hypothetical experiences as described or postulated by individuals or groups. Furthermore, the models should be in a form that will permit manipulation in a logical fashion by machine or human intellect. Hence, models may be based on either, or both, numeric and symbolic manipulations. The central theme will be theory construction and testing. Consequently, the central focus will be on models that have fidelity, parsimony, veridicality, and robustness (see John D.C. Little, On Model Building, Ethics in Modeling, W.A. Wallace (ed.), Oxford, GB: Pergamon 1994). At issue will

be the model's: power in providing a large number of nontrivial insights; ability to provide insights not readily perceived by direct observation; sufficiency for representing or explaining a key aspect of the process or entity being examined; internal and prossesual accuracy; elegance or simplicity; and ability to be processed efficiently by human or machine intellect. Models may, though need not, be: directly relevant to decision makers; useful in terms of their ability to provide specific answers or solutions in a particular context that can be implemented in the immediate future; and cost-effective in providing improvements to an existing situation that exceeds in value the cost of developing and implementing the model.

In presenting a model, potential authors must provide its scientific context. This may be done in a theoretical, empirical, historical, or comparative fashion. That is, what social or organizational theories does this model draw on, add to, or call into question? What empirical findings in the social and organizational sciences were used to tune this model, or can be used to test it, or are being described by it? Or, what model is being tested by what new data? How does the proposed model relate to existing models in the field in terms of technique, internal processes, predictions, or fit with empirical data. It is critically important to the development of this field that new research be strongly tied to previous work employing computational, mathematical, or logical models to explore the same topic. Similarly, it is critically important that papers employing computational, mathematical, or logical models of social or organizational phenomena be strongly tied to research in this area that does not employ these formalization techniques. These ties need to move byond a superficial citation alluding to the related importance of the work being cited to a more grounded understanding of the similarities, differences, relative limitations, etc. of the new research and the work being cited. To provide the scientific context the researcher need not present a global and exhaustive review but should identify critical and grounded ties between the proposed model and the existing literature.

In presenting a model, potential authors should provide its philosophic basis: is it normative in the sense that it seeks to provide insights on what the world would look like if it was as it ought to be; does it address what and how things are; is it a mechanism for determining the consistency of a set of propositions or the completeness of an extant verbal theory; or does it attempt to reinterpret or mimic a behavioral, physical, and/or social process?

Within the social and organizational sciences we have a relatively rich tradition of presenting and assessing normative and descriptive models, since they are based on deductive and inductive logics respectively. A deductive formalization works from a prior means and has as its ends, prediction or prescription. An inferential method of inquiry uses experimentation or posterior observations as a means of achieving its descriptive ends. However, many of the most useful formalisms, such as those used in computational models, rely on a type of tacit inference. These models may employ deductive and inductive logics but also recognize and attempt to replicate the prelogical, intentional, affectual, and intangible inferences of an individual, group or organization.

Whatever the formalization technique employed, the presentation of the model must delineate its structure, which includes as appropriate: components, its constituent elements, entites or modules; internal processes or functional relationships with their variables, parameters (and concomitant estimators), and constants; inputs and/or initial conditions; outputs; boundary conditions and scope information delimiting the region of applicability; and an

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explicit statement of the objectives or goals of the model. The result should be a comprehensive description of the key mechanisms. We expect that in presenting the model's structure the assumptions used in its construction will be made explicit.

As noted, CMOT's central focus is theory development using formalization techniques. To support this endeavor, CMOT will be a forum in which somewhat non-traditional papers can be published. For example, we would like to encourage the submission of papers that perform a didactic service describing how to develop a certain type of model or run a particular type of analysis. Such papers are important to the education of future researchers in this field. Furthermore, these papers will help researchers in this field address key methodological concerns. In addition, we would like to encourage the submission of papers that describe specific tasks. Noticeable advances in physics, cognitive science, artificial intelligence, and psychology were made possible by multiple researchers focusing on a set of core tasks with distinct and important properties; e.g., the bouncing ball, the tower of hanoi, and chess. To facilitate this type of development clear descriptions of simple organizational tasks are needed. Such descriptions should provide information about the scientific context, task components, and common variations.

We expect the growth in the area of computational and mathematical organization theory to continue. This continued growth will be facilitated by the development of a shared language and set of representations for describing social and organizational entities and processes. We expect that such a language and representation schemes will be developed over time. Initially, however, it is important to develop an ongoing dialogue among researchers in the component disciplines, to tie the models to existing literature and empirical findings, to develop educational tools, and to develop a detailed shared understanding of how to present and evaluate models and their results.

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