■ *Discussant's Comments*

Comment on the Paper by van der Smagt

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Ton van der Smagt's paper is about the social construction of shared realities and models of the same. According to social constructivism, collective cognition is conceived as a social process by which such creation and representation take place.

The paper to be discussed here hinges on a crucial distinction—constitution versus causation. Causation, as the operation of causes, refers to 'cause-effect' relationships between events, objects, variables or states of affairs. Constitution as used here is the collective definition of what something is, that is the intersubjective agreement upon the rules that lay down 'what counts as ...' (according to an earlier version of van der Smagt's paper).

The main claim in this paper is that System Dynamics (SD) models 'are of limited use when studying social phenomena'. The drawback referred to here is a consequence of one major strength of SD models—their causal logic. Van der Smagt asserts that, while causal models can explain transitional states adequately, they cannot account for constitutional change. Constitution in social contexts is characterized as 'inherently unstable and constantly subject to change'. In addition, causal models are said to be inherently liable to 'seduce us' into ignoring constitutional change.

It would be unwise to object to the main claim above, the opposite of 'limited' being 'unlimited'. Who would claim that any model was of unlimited usefulness? Therefore van der Smagt's claim will go undisputed, while a more profound examination of his subsidiary arguments is definitely worthwhile. I shall limit myself to four aspects.

First of all, the author addresses a limitation of SD-modelling. He is concerned with the dominance of causal thinking in modelling paired with a 'neglect of constitutional issues and the threat of invalid outcomes'. With regard to Group Model Building, for example insufficient involvement of clients and a focus on representing rather than constructing reality is criticized. Also, reference is made to modellers who often focus their efforts from the start 'on properties and relationships between properties' without paying 'explicit and systematic attention' to 'the constitution of the underlying social objects' (earlier version of paper).

Here, the critique may be drawing our attention to a discrepancy between the conceptual-theoretical state-of-the art and day-to-day practice. In turning to advanced handbooks on the craft of SDs, one sees that they consider the articulation of the model's purpose, the conceptualization of the issue under study and the selection of the system boundary to be essential components of the modelling process (cf. Sterman, 2000: 87ff.). However, it may well be that the practice of SD modelling in many instances still has been very much focussed on building

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causal models, while not giving enough attention to issues of constitution.

Second, the author advocates a dual focus—upon the *constitution* of a social object and the study of *causal relationships*. One can assume that the former should always precede the latter, given the fundamental nature of the constitutive component. This assumption is also backed by van der Smagt's emphasis that 'constitutive theories are essential for obtaining a deeper understanding of the causal relations ...'. Therefore, a certain sequence to be followed in any model-building exercise is clearly prescribed: Before undertaking causal modelling, one should frame a constitutional discourse about 'what happens', in other words, one should conceptualize the issues at hand.

Even though many seasoned system dynamicists proceed that way, the SD community may be reminded here of an important contribution which can deliver valuable lessons: Checkland's *Soft Systems Methodology*. There it is proposed that a *root definition* constitutes the beginning of every problem-solving venture and in particular every modelling process (Checkland, 1981). This definition lays out 'what the system is' for different observers or stakeholders—or, more exactly, tries to define in more detail exactly how the various stakeholders or perspectives involved regard the nature of the system under study. From there, a fertile process of 'constitution', to use the author's term—in other words, a conceptualization dialogue—can evolve.

Third, Ton van der Smagt argues 'that causal models require modelled phenomena to be stable and determinate'. He infers that these descriptions become 'irrelevant and senseless' once the constitution changes, and correctly postulates: 'Regular revision will be necessary'. Indeed, the need to revise models whenever basic conditions change should be a constant preoccupation of a system dynamicist. Admittedly, this aspect has not been much discussed in the literature. But it has at least been mentioned (e.g. Meadows et al., 1982: 158). To my knowledge no systematic evidence has been gathered which would reveal how widely the practice of changing models when new situations arise has been adopted in

the field. One certainly cannot object to van der Smagt's argument that outdated models are in principle irrelevant. They may even be harmful. One must reasonably assume that many outdated models remain available out there. Just as reasonably, however, one may surmise that normally these stay out of use.

But this third aspect of the critique goes further: Van der Smagt addresses a principal incompatibility between intrinsically indeterminate 'social kinds' and a causal-model approach that requires static *relata*. This incompatibility is inexorable if a model is considered as a definite representation of the world. However, models—as advanced system dynamicists should understand them—are to be taken as hypothetical constructs, valid only for a limited time, as van der Smagt reminds us. These deliver an image to be reflected upon and discussed. In this sense, a model is a vehicle to keep the organizational discourse going, and also the catalyst for a joint learning process.

Fourth, in extension of his critique of the static nature of causal models, van der Smagt adverts that the validity of causal knowledge inherent in a model is lost when the underlying constitutional arrangements change. This is a warning against (a) a lack of conceptual reflection before causal connections are inferred, and (b) an insufficient awareness of what the author calls 'constitutional change'.

To be sure, whenever constitutional arrangements are taken for granted and are not subject to reflection, they become a problem: If causal modellers proceed without having clarified the concepts used in their models, the issues under study will remain 'messy', the conclusions may be spurious and the proposals for interventions misleading.

In social systems, referents are collectively constructed all the time. This implies that they shift, and keep shifting. Consequently, the revisions already invoked above are of fundamental importance. Ideally, the process of revision is one of continual learning and evolution, supported by a model without rigidly adhering to it. In this process both the mental models of the participants and the formal models which they use evolve. In

terms of (social) constructivism, both kinds of models become integral components of a process by which a (new) reality is collectively constructed. In this dynamic context of collective sense-making both causal thinking and causal modelling retain their roles as crucial cognitive devices. They are needed by any subject if it is to organize the world and take its place within that universe, to paraphrase the cognitive scientist Piaget (1998). This applies not only to individual subjects, but also to groups and organizations. Abandoning causal logic altogether would fundamentally impair the learning processes in organizations.

To summarize, Ton van der Smagt advocates a well-defined distinction between constitution and causation in modelling. But the two are not only distinctive; they are also complementary. If we mix them up, 'we lose specific insights from each one of them' (to quote a remark from an earlier version of his paper). Also, if we splinter either one, the necessary and fundamental interplay of the pair is lost.

The lesson of this paper for modelling with SD is twofold: On the one hand it points to the

necessity of getting the constitutional foundations right, in order to substantiate causal modelling. On the other hand, the paper addresses the problematic relationship between the constancy of inferred causalities and the shifting nature of fundamental constructs. Therewith it makes readers aware of the need for a modelling concept and practice along the lines of the constructivist tradition. This is a lesson of great importance for the methodology and evolution of SD modelling.

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