

Book Review  
**Facing the Future**  
**Agents and Choices in Our Indeterminist World**

N. Belnap, M. Perloff, M. Xu  
Oxford, OUP 2001, 501 pp.

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This is not only a rich, solid, well-written study in the logic and philosophy of action but it is, first and foremost, a rare example of how logic can be successfully applied to deliver crystal-clear clarifications of hard philosophical problems. This makes the book an extremely valuable methodological guide to any formally-minded researcher in philosophy. For this reason, I will give a somewhat unconventional touch to my review, by dedicating most of the attention to the methodological aspects of the work, trying to highlight the way followed by the authors in developing their theory.

The authors start off with an analysis of the standard resources available in natural language for the expression of action, looking for a “canonical form” able to encompass them all. This quest is carried out in Chapter 1, where action expressions such as “agent *i* does *A*”, “agent *i* brings it about that *A*” etc. are all regrouped under the same semantic class of “agentives” and are referred to by the “seeing to it that” grammatical form, the so-called “stit form”. This aims at polishing natural language action expressions, freeing it from unnecessary nuances which would mislead the later formal analysis. Such picky quest well testifies the authors’ distrust towards natural language as a guide for philosophical research. To say it with them “it is certainly a theme of stit theory that English grammar is no sure guide” (p. 117).

Once the basic grammar of action has been settled, and after having provided a brief but historically deep and instructive overview of the contributions that various logicians have given to the formal theory of action and agency (Section 1D and Chapter 3), the authors set the ground for the answer to the central question of the work: what do stit sentence mean, from a formal point of view? What is their formal semantics? Or, to use one of the several literary examples available in the book, what do we mean when we say that Don Quixote sees to it that Don Quixote attacks the windmill? (p. 259)

To follow a method means to make principled choices. The authors, in order to answer the above question, could have gone two ways. They could have either attempted an axiomatic characterization of stit sentences, by taking them as primitives and stating principles such as “if

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i stit A then [i stit [i stit A]]” in form of axioms. Otherwise, they could have proceeded by first identifying the structures on which stit sentences will have to be interpreted, that is to say, the form of the world which provides a semantics to the language of agency. The latter is the way they chose, although axiomatizations are provided at the end of the book (Chapter 16). This priority given to the logical “ontology or perhaps metaphysics or (less pretentiously) extra-linguistic portion” (p. 139) of the theory is not taken for granted in applied logic, where axiomatizations are often attempted as an always legitimate means of formal analysis. However, the authors seem to be aware of the methodological pitfalls that such a practice hides when the to-be-analyzed notions do not have a unique clear interpretation, as is the case for stit and, in general, of all notions drawn from common-sense. To say it with Tarski, “[. . .] the choice of axioms always has a rather accidental character, depending on inessential factors (such as e.g. the actual state of our knowledge). [. . .] a method of constructing a theory does not seem to be very natural [. . .] if in this method the role of primitive concepts —thus of concepts whose meaning should appear evident— is played by concepts which have led to various misunderstanding in the past” (Tarski, 1983, pag. 405-406).

So, no axioms, but rather a logical ontology providing solid grounds for a semantic analysis of the notions at issue. What kind of ontological structures are chosen by the authors, and why? The ontology of stit theory is based on two minimal and rather uncontroversial assumptions: 1) the past is settled, i.e., it cannot be changed; 2) the future is open, i.e., it can be changed by the choices the agents make. In a way, stit theory is a beautiful example of how far simple assumptions can lead you when they are taken seriously from a mathematical point of view. A theory based on such simple assumptions surely cannot make sense of all the intricacies of the philosophy of action, but it can take you a long way in explaining a number of essential features of agency. “Like geometry, it does not pretend to be that famous ‘theory of everything.’ It concerns above all the structural aspects of how the doings of agents fit into the indeterministic causal structure of our world” (p. 178).

In fact, the simple pair of assumptions of close past and open future gives rise to the mathematically well-behaved branching-time structures. These are nothing but sets of histories structured in a tree-like shape so that, given a moment  $m$  in the structure, the set of histories going through  $m$  all coincide up to  $m$ , and possibly diverge afterwards. In this setting, to have a choice in moment  $m$  means to be able to tell sets of different histories passing through  $m$  apart. When we say that Don Quixote sees to it that Don Quixote attacks the windmill, we mean that Don Quixote can force the present towards a set of histories where, in all of them, he happens to attack the windmill, while there are histories through  $m$  in which this is not the case.

This reading of stit is called deliberative stit (*dstit*) and has to be distinguished by the achievement stit (*astit*) which enjoys a different semantics (see Chapter 2 for a compact presentation of the theory): that Don Quixote *astit* Don Quixote attacks the windmill means that at the present moment, the fact that Don Quixote attacks the windmill is guaranteed by a past choice of Don Quixote which forced the future in such a way that he now attacks the windmill. Getting back to methodology, it is worth making explicit what the authors achieve



here. By starting from a relatively vague and ambiguous notion taken from common-sense (“seeing to it that”), they proceeded by disentangling two different meanings of it, making use of a specific formal ontological machinery (branching-time structures). The result is an insightful disambiguation of the notion, which is readily available for shedding light on past and future philosophical discourse concerning action. I find it instructive to quote Tarski again who, much time ago, seems to advocate the very same method when faced with problems of formal concept analysis: “[. . .] it seems to me obvious that the only rational approach to such problems (of concept analysis) would be the following: [1] We should reconcile ourselves with the fact that we are confronted, not with one concept, but with several different concepts which are denoted by one word; [2] we should try to make these concepts as clear as possible (by means of definition, or of an axiomatic procedure, or in some other way); [3] to avoid further confusions, we should agree to use different terms for different concepts; and then we may proceed to a quiet and systematic study of all concepts involved, which will exhibit their main properties and mutual relations” (Tarski, 1944, p. 355).

I have started my review by claiming stit theory to be ‘successful’. It is time to briefly show why I think it is, pointing at what I consider to be the neatest achievement of it, which is a strikingly simple and convincing analysis of the problematic concept of refraining (what does it mean to refrain from an action?). A clarification of the notion of refraining is of key importance for an appropriate analysis of deontic concepts such as, in the first instance, obligation which is typically viewed as a prohibition to refrain. The concept of refraining is problematic because it seems to refer to an action which is performed through inaction. If Don Quixote refrains from attacking the windmill, then he is doing something by not attacking the windmill. The puzzle is particularly difficult to be solved in modal action logics such as Dynamic Logic, where actions are treated as first-class citizens in the language (each modal operator corresponds to a different action-type), and where refraining is typically viewed as some sort of negation ranging over actions: “refraining from attacking the windmill” means NOT “attacking the windmill”. In such setting refraining from A means performing any action among the available ones which is not A. However, from a formal point of view, the characterization of this negation operation is far from trivial (see Broersen 2003 for a detailed overview). Stit theory offers a strikingly simple solution: Don Quixote astit [NOT Don Quixote astit [Don Quixote attacks the windmill]]. That is to say, Don Quixote sees to it that (in the achievement sense) he does not see to it that (in the achievement sense) he attacks the windmill. Stit theory can therefore render refraining by means of a simple iteration of the stit operator itself (together with classical negation), rather than by enriching a modal theory of action with a sophisticated operation of action negation. If a theory has to be judged from the ease and elegance with which it can clarify complex and controversial notions, the notion of refraining strongly advocates for stit among the formal theories of agency which are at the moment available in the literature.

Needless to say, the book provides a number of further different applications of stit theory to the analysis of deontic notions, responsibility attributions, and complex agency notions such as “could have done otherwise”. It is a rich and insightful book, and it is so for its content as



well as, and perhaps primarily, for the principled method it exemplifies in applying logic to philosophical problems.

#### REFERENCES

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