

Book review of :

Niklas Luhmann, Die Wissenschaft der Gesellschaft (Frankfurt a.M.: Suhrkamp, 1990); 732 pp., DM 84. *Science, Technology, & Human Values*, 17 (1992) 248-253.

Niklas Luhmann is probably the most important living German theoretician in sociology,ⁱ and there is good reason for science studies to pay attention to a specific study from his hand which focusses on science (see also: Krohn *et al.* 1990). However, since Luhmann's general thesis is macro-sociological (Luhmann 1984), the sociology of science is only one of a number of special sociologies. Therefore the frame of reference is different from that of most other studies in our specialty. Let me first introduce the general framework, and then return to the study of the sciences from this perspective.

The author summarizes his sociological systems theory in the first hundred pages (two chapters) of the present study. The essential point is that society is constituted not of human beings, but of communications. Of course, communications are generated by human beings and have to be understood by human beings, but society is the network which is *added to* the actors as the nodes. The network differs in nature and in operation from the individual systems: individual "consciousness systems" process thoughts on the basis of perceptions; society processes communications. The two systems are structurally coupled, i.e., they presuppose each other, but the one is not an aggregate of the other. In addition to the four billion or so people who perform their own self-referential loops (e.g., "thinking"), society is also a self-referential system. These self-referential social systems are also self-reproducing and reflexive. The catchword is "autopoietic," which relates this sociological theory to modern theoretical biology (e.g., Maturana).

Scientific communications are a functionally differentiated type of communications, like market-transactions in the economy, or love in personal relations (cf. Parsons). On the one hand, the focus on communications makes the theory of symbolic generalized communication media the starting point of sociological analysis. Since communication is based on interaction, this can also be read as an attempt to bridge the gap between systems theory and symbolic interactionism as the other great tradition in American sociology (cf. Mead; see also: Luhmann 1975a). On the other hand, it makes the study of social phenomena accessible for mathematical

modelling of communication patterns (using, for example, Shannon's mathematical theory of communication). Luhmann elaborates the latter perspective only qualitatively, and with reference to evolution theory. However, the aim is explicitly "die Soziologie im Gang zu bringen" (i.e., "to get sociology going") by objectifying its subject matter. The main "restriction" of the social sciences in comparison with the natural sciences is their more pronounced and *conscious* need for reflexivity in theorizing.

The Sociology of Science

The empirical fruitfulness of the general theory has to be shown in the special sociologies. The "sociology of science" with its focus on "truth" follows in time upon studies on power in the polity (Luhmann 1975b), love in personal relations (Luhmann 1982) and the economy (Luhmann 1988). The sociology of science is more difficult than the others, since in this case the functionally differentiated relation between individual consciousness and the social system cannot be adequately understood in terms of action alone. Actually, the problem of "science and society" is complex, since it is the result of two problems, *viz.* the sociological question about the relations between individuals and society (social action and social structure), and the epistemological question about the relations between the knowing subject and the sciences as cognitive communication structures and constructs. In essence, Luhmann proposes to understand epistemology as the theory of the relation between individual and society within science, as a functionally differentiated subsystem of society.

The stratified society has gradually been replaced by a functionally differentiated society (cf. Marx, Weber, Parsons). Historically, this (highly unlikely) transition happened in the 16th and 17th centuries. However, since the transition took place at the level of society, individual awareness of it came only with hindsight. In the period after the great civil wars (1650-1750), and notably in France, gradually a semantics was formulated for communicating about social developments and their contingencies. The social order was no longer understood as a given. However, in many respects our common language and much of our thinking is still in the terms of the previous (hierarchical) model.

The reflection on modern science (later: epistemology) took a different historical route, because of its relation with theology. The transition to modernity meant here a repositioning of

the individual consciousness (also in relation to God) as the source and the ultimate foundation of all knowledge (Descartes' "ego cogitans"). The eighteenth century witnessed a debate about the empiristic ("sense-data") and the idealistic interpretation of the concept of the subject, which eventually culminated in Kant's transcendental turn in philosophy. However, the transcendental subject is *a priori* socially and culturally constituted (cf. Hegel and Marx). Within the natural sciences and the philosophy of science, this social *a priori* is reflected in the postulate of "intersubjectivity". The development of the social sciences and their reflexive self-understanding make it increasingly necessary to elaborate this philosophical tension between individual knowledge claims and their "intersubjective" justification in sociological terms. The semantics for doing so have become available after Kuhn's The Structure of Scientific Revolutions (1962), and its elaboration in empirical science studies.

Luhmann and empirical science studies

Luhmann's critique of the social-constructivist tradition in empirical science studies takes various forms. (Throughout the study he has inserted footnotes and cross-references to studies in this tradition in order to illustrate his points.) Essential in his critique is the lack of reflection in modern science studies on the epistemological consequences for the sciences of the sociological knowledge that they have nowadays to be understood in terms of constructions. What is the reflexive value of constructivism for science and its philosophy? The social-constructivist tradition takes a position external to the process of knowledge production and control, and eventually reflects only on itself.

Note the shift in the system of reference: neither science nor the sociological reflection on it is to be analyzed as an attribute of knowing subjects, but in terms of the cognitive communication structures which are gradually constructed by the operation of this system. If the sociology of science is itself understood as a part of science, and if science is understood as a functionally differentiated subsystem of society, the lack of reintegration through epistemological reflection can be cured. However, this calls for a sociological analysis of the specific functional equivalent of the relation between individual and society within the science system, as it was made the subject of epistemology.

However, the analysis of this relation (between the conscious scientific observer and the

scientific communication system) by analogy with the general relation between individuals and society, i.e., in terms of "action," has been unfortunate. Scientific interest is in the first place guided by experience and not by action. Of course, experience is conditioned by various forms of actions (e.g., instrumentation), and experience implies communication as a subsequent action. However, one may not skip over the receptive momentum in the constitution of knowledge, since then one loses the possibility of studying the "cognitive structure" which remains necessarily "virtual" in the action (e.g., Giddens 1979). In order to understand what it means epistemologically that science (as a structure) is constructed, the semantic link between "interest" and "action," as it has come to be accepted in the socio-constructivist tradition in science studies, must be broken.

In a sense this is a traditional picture, echoing Kant's classical distinction between "pure" and "practical" reason. However, if the distinction is dropped, epistemology is at risk of becoming over-politicized. This was, for example, extensively discussed in (notably French) neo-marxism with reference to the Lysenko-debate (Lecourt 1976). It is therefore not incidental that the issue returned in Amsterdamska's (1990) critique of Latour's (1987) Science in Action, in which he positioned science exclusively in the context of action. The very conceptualization blocks a sophisticated understanding of "cognitive structure" as that which is acted upon.

However, Luhmann adds to this traditional picture the idea that "cognitive structure" is a sociological theme which can be operationalized in empirical terms with the help of a theory of communication. This is also elaborated in his book with notions from systems theory and evolution theory. However, the analysis remains on the heuristic side, and, in my opinion, it will need another round of interpretation before the empirical possibilities can be seen in other than metaphorical terms.

Evaluation

The strong points of this study are that (i) the sociological model is there, and it is clearer than in the 1984 study; (ii) the priority of the sociology of science for the epistemological understanding of the sciences as cognitive constructions is specified; and (iii) the sociology of science is itself elaborated as a reflection on science and its relations to society.

Partly, however, these contributions are hidden behind neologisms, and phrases which are formulated in opposition to the German tradition.

Although Luhmann explicitly denounces the teleological idea of a unifying "synthesis" in dialectical reasoning, he accepts its logic of a "movement of thoughts" which is presumed necessary in order to reach the analytical results. In my opinion, this makes the study unnecessarily complex.ⁱⁱ One does not have to walk the road to Rome in order to arrive there; there are many roads to Rome! The road taken here was the path of the tradition, and although this adds a richness of connotations, it also hinders, particularly if there are good alternatives available. For example, I wonder whether Luhmann's term "Limitationalität" denotes more than the simple necessity of specifying dimensions if one wishes to do (social) research. To understand what Luhmann wants to say is one thing; to understand how it builds on and modifies the oeuvres of other thinkers is another.

However, for those readers interested in continental and even mediaeval philosophy, the book also provides an interesting confrontation. The author has a fabulous knowledge of scholarly traditions from the 17th and 18th centuries, and of the theological backgrounds of certain ideas. The detailed discussion of the origins of their formulation clarifies why they were contingent upon the problems of their time, and how we may sometimes still be caught in the same semantics, which we might wish to abandon in favour of new formulations and conceptual schemes (see also: Luhmann 1980, 1981, and 1989). As noted, the new models refer to empirical research and mathematics, without, however, an obvious link to this further operationalization.

In summary, while parts of this study are more transparent than others, the discussion of the main issue is comprehensive. This is not just a study of another model for approaching the sciences as empirical phenomena, but raises the additional question of what it means for society at large to allow for the "free" development of this functionally differentiated system, and how this has led to new relations of dependency within society. Horkheimer and Adorno have erroneously analyzed the Enlightenment as containing a dialectics, because what it contains is not a dialectics, but a paradox: the blind flight of society is made *more uncertain* by scientific knowledge (see also: Luhmann 1986). Constructions are increasingly visible as constructions; and as such they contain the information, i.e., the uncertainty, about their

possible further developments. This study mainly seeks to provide the necessary distinctions (the semantics!) for a positive analysis of these constructions. In the final chapters, the consequences are reflected at the macro-sociological level, and "the Enlightenment celebrates its triumph."

Loet Leydesdorff

Department of Science Dynamics

Nieuwe Achtergracht 166

1018 WV AMSTERDAM

References

- Amsterdamska, O. 1990. Surely You Are Joking, Monsieur Latour! Science, Technology and Human Values, 15: 495-504.
- Giddens, A. 1979. Central Problems in Social Theory. London, etc.: Macmillan.
- Krohn, W., G. Küppers and H. Nowotny (eds.). 1990. Selforganization. Portrait of a Scientific Revolution. Sociology of the Sciences Yearbook 1990. Dordrecht, etc.: Kluwer.
- Kuhn, T. S. 1962. The Structure of Scientific Revolutions. Chicago: Chicago University Press.
- Latour, B. Science in Action, Milton Keynes: Open University.
- Lecourt, D. 1976. Lyssenko. Histoire réelle d'une "science prolétarienne". Paris: Maspero.
- Luhmann, N. 1975a. Einführende Bemerkungen zu einer Theorie symbolisch generalisierter Kommunikationsmedien. In Soziologische Aufklärung, Vol. 2. Opladen: Westdeutscher Verlag. pp. 170-92.
- Luhmann, N. 1975b. Macht. Stuttgart: Ferdinand Enke.
- Luhmann, N. 1980. Gesellschaftsstruktur und Semantik. Studien zur Wissenssoziologie der modernen Gesellschaft. Bd. 1. Frankfurt a.M.: Suhrkamp.
- Luhmann, N. 1981. Gesellschaftsstruktur und Semantik. Studien zur Wissenssoziologie der modernen Gesellschaft. Bd. 2. Frankfurt a.M.: Suhrkamp.
- Luhmann, N. 1982. Liebe als Passion. Zur Codierung von Intimität. Frankfurt a.M.: Suhrkamp.
- Luhmann, N. 1984. Soziale Systeme. Grundriss einer allgemeinen Theorie.

Luhmann, N. 1986. Oekologische Kommunikation: kann die moderne Gesellschaft sich auf ökologische Gefährdungen einstellen? Opladen: Westdeutsche Verlag.

Luhmann, N. 1988. Die Wirtschaft der Gesellschaft, Frankfurt a.M.: Suhrkamp.

Luhmann, N. 1989. Gesellschaftsstruktur und Semantik. Studien zur Wissenssoziologie der modernen Gesellschaft. Bd. 3. Frankfurt a.M.: Suhrkamp.

Notes:

- i. Niklas Luhmann is Professor of Sociology at the University of Bielefeld, Germany.
- ii. Just to give one example: at p. 613, Luhmann states that the present is the paradox of time, i.e. the unity of the differentiation between past and future (...) In my opinion, this does not add information to the statement that the present is defined in relation to the difference between past and future. I do not need dialectical expressions like "the unity of the differentiation" to understand this.