Working the Form

Call for Papers

The mathematical formulation of scientific ideas has a number of advantages. It places each term used in the context of other terms. It is not bound to the sequence of words in a text, but can represent the structure of a subject almost simultaneously. It provides rules for converting forms into other forms. In the case of measurable variables, it enables the quantifiable representation of facts. And it can be understood internationally without the difficulties of linguistic translation.

Sociological systems theory, however, has rarely engaged in the formulation of its assumptions and concepts in the medium of mathematics. Often unspokenly, the impression prevails that natural language is more powerful in structure because it is more recursive and reflexive than any mathematics available to date. Prominent attempts to formulate systemic relationships as interdependent sequences of equilibrium states disturbed by residuals (Pareto, 1916: 1442ff.) or as relations between actions that satisfy functional requirements (Parsons, 1937: 77ff.) have not been successful, nor have suggestions from general systems theory to describe the dynamics of systems in differential equations (von Bertalanffy, 1968: 55f.), to formulate the relations between system elements in terms of set theory (Mesarović/Takahara, 1975; Bunge, 1983; Ropohl, 2012), to depict functional dependencies of form formation in terms of category theory (e.g., with the help of sheafs, which allow local and global states to be entangled) (Goguen, 1991, 1999), or to model system-theoretical questions socionically (Kron, 2002) and to open up their dual fuzzy logic to the empiricism of hybrids (Kron, 2015).

The reception of George Spencer-Brown's *Laws of Form* (1969) cannot change much in this state of affairs. At least, Niklas Luhmann derived from it the suggestion of a form analysis that starts with three assumptions (Luhmann, 2013): 1. the system is a difference

between system (i.e., itself) and environment; 2. each system is realized by only one type of operation; and 3. the system realizes its self-reference and self-organization by a re-entry of its form into the form. Possibly, according to Luhmann, with these assumptions system theory reaches a higher degree of generality, which makes the system/environment distinction one case among other cases of a "theory of two-sided forms that can only be used one-sidedly" (ibid.). The critics react skeptically and point out that Luhmann does not work with Spencer-Brown's entire calculus, but only with its first two and last two chapters (Hennig, 2000). In international reception, the recourse of sociological systems theory to Spencer-Brown's calculus of indications (CI) is considered a dead end (Fararo, 2001a: 306f., 2001b; White, 2008: 353).

However, Spencer-Brown's CI is attractive for a system-theoretical reception and for testing his basic ideas in empirical research for a number of reasons.

First, Spencer-Browns CI explicitly works with arguments of self-reference. The basal operation of distinction-and-description is at the same time operation and operand. However, the calculus does not run self-referentially empty, but is founded incipiently in elusive motives to make certain distinctions, and retroactively in imaginary values, which allow to dissolve the paradoxes of self-reference.

Second, Spencer-Brown's CI explicitly works with a value of emptiness or void, which is achieved by a double crossing of a distinction, marking each form as in need of inherent supplementation.

Third, Spencer-Brown's CI explicitly includes the observer in every formulation of a statement. This results in considerable methodological challenges, because with the help of this calculus one can not only reconstruct observations in the object, but at the same time must account for the fact that every reconstruction is done by an observer who only sees what he can see with the help of his distinctions and does not see that he does not see what he does not see.

Fourth, the distinction between system and environment can be explicitly modeled using the concept of form. It becomes the difference that constitutes the system, and thus the "thin interface" (Simon, 1981: 131) between internal and external environments to which the system as a system reacts.

Fifth, the concept of the two-sided form as a cross can take up the suggestion already presented by Claude E. Shannon (1948) that every communication should be understood as the communication of an information that results probabilistically or possibilistically from the relation of a message to a set of possible messages (technical: alphabet; social: context).

Communication becomes communication of the overall state of a system, whatever results from this for the understanding of experience and action.

And sixth, the CI is at least as much an instrument for the analysis of individual forms as it is an instrument for the analysis of transitions of form (Latin: transformation; Greek: morphogenesis). It is possible that every form, once reintroduced into itself, must be thought of as a transformation of form. In this way, the calculus of indications becomes a suitable instrument for observing social situations that can be understood as eigenvalues of recursive functions (von Foerster, 2003), but which are preserved only in the iterations of the recursions of these eigenvalues and thus non-identical. This makes every social form a form of reduction of complexity, which can also re-enter the form and be reflected there.

Many questions of a systems-theoretical and sociological work with Spencer-Brown's calculus are unresolved. These include not least the questions of how forms can be *written* in an electronically supported writing program such as LaTeX, and also how they can be *spoken* in natural speech. Furthermore, it is still largely unclear methodologically what kind of variables can be written down in a formal expression: Where do you get the names or the knowlege that a form uses to calculate? And last but not least, among the aspects still to be clarified is the question of whether form analysis is not fundamentally dependent on procedures of a science of design or "transformative" research that seeks its placement in and with the object (Simon, 1981: 128ff.; Defila/Di Giulio, 2018).

This Call for Papers invites the submission of texts that theoretically and empirically document the current state of a system theoretically or otherwise stimulated work with Spencer-Brown's *Laws of Form*.

This Call for Papers encourages contributions to the following topics:

- Empirical case studies on forms of social systems;
- Mathematics in sociological systems theory with reference to Spencer-Brown's *Laws of Form*;
- Models in sociological systems theory with reference to Spencer-Brown's *Laws of Form*;
- Problems of self-reference in mathematics, logic and methodology with reference to sociological theory formation and empirical research.

We plan to publish the accepted papers presumably in volume 27 (2022) of the journal *Soziale Systeme*.

We ask for proposals in the form of abstracts to the two editors Prof. Dr. Dirk Baecker (Universität Witten/Herdecke, dirk.baecker@uni-wh.de) and Dr. Florian Grote (CODE University of Applied Sciences, Berlin, florian.grote@code.berlin) by January 31, 2021 and for submission of contributions by October 31, 2021.

Welcome are contributions in English, German and French.

Please, see our submission guidelines (in German) here: https://www.degruyter.com/view/journals/sosys/sosys-overview.xml.

Bibliography

Bunge, Mario Augusto (1983): *Epistemologie: Aktuelle Fragen der Wissenschaftstheorie*, dt. Mannheim: Bibliographisches Institut.

Defila, Rico, und Antonietta Di Giulio (2018): *Transdisziplinär und transformativ forschen: Eine Methodensammlung*, Wiesbaden: Springer VS.

Fararo, Thomas J. (2001a): *Social Action Systems: Foundations and Synthesis in Sociological Theory*, Westport, CN: Praeger.

Fararo, Thomas J. (2001b): Review: Problems of Form, in: *Contemporary Sociology* 30, 3, pp. 306–307.

Goguen, Joseph A. (1991): A Categorical Manifesto, in: *Mathematical Structures in Computer Science* 1, 1, pp. 49–67.

Goguen, Joseph A. (1999): Tossing Algebraic Flowers down the Great Divide, in: Cristian S. Calude (ed.), *People and Ideas in Theoretical Computer Science*, New York: Springer, pp. 93–129.

Hennig, Boris (2000): Luhmann und die Formale Mathematik, in: Peter Ulrich Merz-Benz and Gerhard Wagner (eds.), *Die Logik der Systeme: Zur Kritik der systemtheoretischen Soziologie Niklas Luhmanns*, Konstanz: UVK, pp. 157–198.

Kron, Thomas (Hrsg.) (2002): *Luhmann modelliert: Sozionische Ansätze zur Simulation von Kommunikationssystemen*, Opladen: Leske + Budrich.

Kron, Thomas (Hrsg.) (2015): *Hybride Sozialität – Soziale Hybridität*, Weilerswist: Velbrück Wissenschaft

Luhmann, Niklas (2013): *Introduction to Systems Theory*, transl. Peter Gilgen, Cambridge: Polity Press.

Mesarović, Mihajlo D., and Yasuhiko Takahara (1975): *General Systems Theory: Mathematical Foundations*, New York: Academic Press.

Pareto, Vilfredo (1916): *The Mind and Society*, transl. Andrew Bongiorno and Arthur Livingston, ed. Arthur Livingston, Bd 4, New York: Harcourt, Brace and Co., 1935.

Parsons, Talcott (1937): *The Structure of Social Action: A Study in Social Theory with Special Reference to a Group of Recent European Writers*, Reprint New York: Free Press, 1968.

Ropohl, Günter (2012): *Allgemeine Systemtheorie: Einführung in transdisziplinäres Denken*, Berlin: edition sigma.

Shannon, Claude E. (1948): A Mathematical Theory of Communication, in: *Bell System Technical Journal* 27, pp. 379-423 und 623-656.

Simon, Herbert A. (1981): *The Sciences of the Artificial*, 2. Aufl., Cambridge, MA: MIT Press.

Spencer-Brown, George (1969): *Laws of Form*, 5th, intern. ed., Leipzig: Bohmeier, 2008.

von Bertalanffy, Ludwig (1968). *General System Theory: Foundations, Developments, Applications*, New York: Braziller.

von Foerster, Heinz (2003): Objects: Tokens for (Eigen-) Behaviors, in: idem, *Understanding Understanding: Essays on Cybernetics and Cognition*, New York: Springer, 2003, pp. 261-271.

White, Harrison C. (2008): *Identity and Control: How Social Formations Emerge*, 2nd ed., Princeton, NJ: Princeton University Press.