

## Form and Medium: A Mathematical Reconstruction

Author: Michael Schiltz

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**Abstract (E):** This article discusses the relevance of the systems theoretical distinction between "medium" and "form" as a tool of scientific analysis in the social sciences. It is an attempt to construct a medium theory that remains true to George Spencer-Brown's logical calculus on the one hand, and that gives full "credit" to Niklas Luhmann's considerations on the medium/form distinction on the other hand. The theoretical usefulness of the distinction is demonstrated by means of the exemplary medium of money. The analysis shows the growing centrality of the medium/form distinction in Luhmann's epistemology to the point of becoming the bedrock of his constructivist theory of social systems in his later works. [mb]

**Abstract (F):** Cet article examine la pertinence de la distinction entre "media" et "forme" que la théorie systémique propose comme un critère d'analyse scientifique en sciences sociales. Il essaie d'élaborer une théorie des médias qui demeure fidèle au calcul logique de George Spencer-Brown tout en reconnaissant ses dettes aux réflexions de Niklas Luhmann sur la distinction média/forme. L'utilité théorique de la distinction en question est démontrée ici à l'aide du média exemplaire de l'argent. L'analyse montre la place toujours plus centrale du couple média/forme dans l'épistémologie luhmannienne, qui s'impose petit à petit le véritable socle de la théorie constructiviste des systèmes sociaux développée ultérieurement par Luhmann.

**Keywords:** social systems theory, calculus of indications, money, medium theory, Monty Python

### Article

## Introduction

"If one attempts to observe exactly how self-referential forms are realized operatively," so **Kay Junge** states, "then the distinction between medium and form may come as a practical tool" (Junge 1993: 112). If that is true, it is to regret that the epistemological grounds and the heuristical potential of the very distinction have become a topic of contention. Indeed, the distinction is *not* an obvious one. The notions of form and medium have their roots in quite different intellectual traditions, and both were consequently developed in reference to quite distinct research questions and quite distinct methods of concept and theory construction. This basic knowledge thus demonstrates the focal point of any discussion of the distinction between form and medium: the sheer improbability of its introduction into the theory of self-referential social systems.

First of all, there is FORM. At the heart of all of **Niklas Luhmann's** work from the late eighties through the nineties, the notion has received impressive attention. In one way or another, it would not be an overstatement to say that 'form' has affected virtually all recent studies of the new theory of social systems. The notion has been borrowed from the 'calculus of indications', developed by the British mathematician **George Spencer-Brown** (1994 [1969]). Put very briefly, and oversimplifying here for the sake of convenience, the calculus of indications develops the idea of 'something' as being ('a') difference (with something else), and (thus) eventually different from itself. All 'something', or: 'form', or 'being', is explained as the residual of a more fundamental level of operations (namely the construction of difference), including the calculus of indications explaining the very *Laws of Form*. The calculus' compelling use of latency, i.e. its attention to the importance of unmarked states for the construction of anything at all, has made it a powerful tool for sociological analysis. There, the side-effects, spillovers, and the seldom outspoken self-reference of all communications and social realities have always been a paramount concern. For the theory of social systems, the work of **Dirk Baecker** (especially 1993a; 1993b) is probably the most emblematic theorization and application of the calculus of indications.

This is in sharp contrast with the concept of MEDIUM. Both in terms of theorization and application, the development of this notion in systems theory has been fairly poor. A host of reasons explain this. First of all, the notion was introduced into the theory as *the counterpart of form*, and has always been discussed as such. In one way or another, it has been to 'form' what the 'environment' was to the 'system': a necessary precondition and product of operations, but as such something about which there is not so much to be said. Returning to the above formulation: it has been the obvious conceptual 'latency' needed to produce the 'form'. Second, and not in the least, Niklas Luhmann's conception of the form/medium distinction demonstrates an extraordinary preference for form over medium. Nobody is to blame here, it must be said. Luhmann simply observes the epistemological premises of the calculus of indications scrupulously when deciding that the distinction between form and medium, as it is a distinction and thus a difference, should in itself be regarded as a form (cf. infra). Third, and quite possibly the most compelling substantiation of the medium's knotty nature, Niklas Luhmann

introduced the form/medium in the context of a theory of the system of art, at a point where the distinction form/medium has no epistemological aspirations whatsoever. It has been introduced as a means to redescribe and found his advanced theory of communication, as also **Jörg Brauns** indicates (2002a: 10-11). Only much later, and *primarily because of the theory's growing preoccupation with form and difference!*, would it expand into the definitive distinction that eventually absorbs 'system-and-environment'. At that point, you feel the trouble. In origin, the 'medium' does not share the epistemological (constructivist) orientation so strongly innate to the notion of form, and it may very well not possess this orientation at all. **Fritz Heider's** *Ding und Medium* (1999 [1926]), which is the formative text in this respect, reveals the problem. It is hard to conceive of a medium in the same operationalist way the notion of form has been defined. Formulated negatively: it is hard *not* to conceive of a medium as an ontological container containing elements with certain pre-operational characteristics. Luhmann's repeated claim that form/medium should "das dingontologische Konzept ersetzen, das heißt überflüssig machen" (Luhmann 1995b: 166) is not fully convincing here, I feel. Probably, excessive reference to Heider's text (which, as said, does not have this strongly operationalist orientation of the *Laws of Form*) and its metaphors of the medium's 'Körnigkeit' and 'Viskosität' have reproduced some (quasi-)ontological predicament.

## What's the problem?

The above considerations provide sufficient ground for a problematization of the distinction between form and medium. This does not necessarily imply a critique or a rejection of the distinction (after all, especially in the context of a theory of communication, the explanatory potential stands unchallenged). However, as some systems theoretical publications testify (Brauns 2002b; Kraemer 1998), too many questions remain. First, there are some conceptual intransparancies, or else: aspects that concern theory construction. One lies with the strong indebtedness of the distinction form/medium to the calculus of indications. After all, this calculus has no need at all of any concept of medium. As will become clear in the following discussion, Spencer-Brown's *Laws of Form* is an austere exploration of the syntactical and semantical possibilities (Engstrom 1999) of drawing a distinction, and arranging indications of that distinction. Cannot the theory of social systems too suffice with this notion of form (distinction) only? Second, and as a corollary of the first the ever mounting importance of the calculus of indications in the new systems theory, up to its point of absolute supremacy has an undeniably disturbing side-effect for the theory's construction. Form/medium has possibly dethroned the distinction between system and environment, and may thus have corroborated some understandings that were still central to the theory in the 1980s. Is it not enough, so **Maren Lehmann** asks, that we had to believe that "es Systeme gibt" (Luhmann 1984: 30); should we also believe that 'es Medien gibt', especially when considering the quasi-ontological assumptions that seem to underlie the distinction (Lehmann 2002: 44)? Third, there seem to be some difficulties with the understanding of media -I have briefly touched this topic above. Apparently, it is important to conceive of media as 'forming' (!) within other media. But why is this so important? And how can such formation of media-within media-within media [and so on] happen? In the same line of thought: why does Luhmann attach so much attention to the relationship between medium and memory? As the reader can see, form/medium may have generated as much problems as it has solved; and time after time, we have observed that Luhmann's indulgence in the calculus of indications has been the main cause for the occurrence of such quandaries.

Yet, I believe that the solutions to these problems can be found in the very calculus of indications that has been presented as the main cause of difficulties. In the following considerations, I therefore adhere to Luhmann's preference for the notion of form over the notion of medium. I attempt to reconstruct a medium theory (*Medientheorie*) which is in full accordance with the line of reasoning of the *Laws of Form* on the one hand, but which will try to include as well all specifications Niklas Luhmann has designated as being central to his distinction of medium and form on the other. The aforementioned problems will figure at different points in the discussion; I hope to give the reader a satisfactory answer, at all points explaining the strong correlations of the distinction's characteristics with the development of Spencer-Brown's calculus. For the sake of convenience, I briefly classify the characteristics of form/medium as presented in *Die Gesellschaft der Gesellschaft* (probably the most consistent account) and show that the distinction generated a very specific problem consciousness with regard to the relationship between form and medium. Second, I pay attention to the scarce passages in the *Laws of Form* in which Spencer-Brown makes mention of the notion of medium. Next, the discussion turns to the peculiar construction of the calculus; a medium theory, so it will be explained, can only be perceived at an advanced stage of the development of the calculus, i.e. where the calculus indicates the possibility of indicating the place of the distinguishing mark together with the indications it is making: the form of the re-entry. At that point, it is possible to show the implications for a theory of social systems that is willing to take the calculus of indications seriously. I conclude the discussion with an epistemological reappraisal of the distinction form/medium. Form/medium, so I explain, must be considered the pinnacle of Luhmann's theory of knowledge. It expresses the reflection of the theory's contingency, and as such, the contingency of the theory's epistemology as well. At all times in the discussion I hope to illustrate theoretical ideas by referring to the medium of money, which gained a paradigmatic status in contemporary social theory. 'There is nothing quite as wonderful as money' (*Monty Python's Flying*

*Circus*), indeed. In the following paragraphs, I hope to demonstrate *why* this is so.

## Form and Medium

Remarkably but crucially to our understanding of the distinction, form/medium has been introduced with the objective of supporting an advanced **theory of communication**. This should be stressed over and over again. It is in the first place a conceptual attempt to highlight *and make sense* of the astonishing evolutionary improbability that accompanies all communication, and all social order. The question is clear: how, so Niklas Luhmann asks himself, can communication produce connectivity (*Anschlußfähigkeit*) that is needed in order to continue being recognized as communication and not as mere random noise? The answer: "Es muß erwartungsleistenden Wahrscheinlichkeiten geben [...]" (Luhmann 1997: 190). Form/medium, he then goes on to explain, is the exact expression of this function of transforming evolutionary improbability into evolutionary probability. More specifically, it should be considered the expression of the fact that the means to get around the inherent improbability of communication can be found *in communication itself*. As such, the distinction sets the systems theoretical notion of communication sharply apart from other conceptualizations. In systems theory, we are reminded here, communication is granted an autonomous level of complexity and order, operationally quite distinct from psychic systems. This should not be discussed here. Form/medium, being the most forceful embodiment of this idea, is the reaction against, and the rejection of the much older and common idea that communication is that what is going on in the twilight zone 'between' psychic systems: "Die Unterscheidung von Medium und Form soll uns dazu dienen, den systemtheoretischen unplausiblen Begriff der Übertragung zu ersetzen" (Luhmann 1997: 195). Yet, it is not a mere analytical tool. The difference between form and medium is the *operational* and *operational* guarantee for the constitution of operationally autonomous social systems. The latter employ the difference for their 'autopoietic, self-referential reproduction' (cf. supra). Shortly jumping forward in the discussion: systems employ the difference in a way that allows and enhances the construction of forms in the medium, without exhausting (*verbrauchen*) the medium. The medium thus guarantees the consistent ('meaningful') connectivity of systemic operations, in that it concatenates (<Latin *con-catenare*, linking together in a chain) different forms to a systemic unity. It provides the system with a perspective (<Latin *per-spicere*, to look through), so to speak. I stress this communication theoretical bias as it provides the clue to later considerations involving the calculus of indications. In origin the distinction is a communication theoretical device. It does, at its outset, not represent any epistemological awareness. We should simply keep in mind that form/medium is the image for systemic connectivity and concatenation, as described by **Humberto Maturana** and **Francesco Varela**.

◆◆◆◆◆◆◆◆◆◆ Yet, *Die Gesellschaft der Gesellschaft* is willing to define the scope of the distinction in a way broader than the theory's theory of communication. Immediately after the above phrasing, Luhmann adds remarks that reveal a pronounced **epistemological interest**: "[Das Unterschied zwischen Form und Medium] erspart uns außerdem die Suche nach 'letzten Elemente' [...]. An die Stelle der ontologischen Fixpunkte, über die in den Debatten zwischen Reduktionismus und Holismus gestritten worden war, tritt eine beobachterabhängige Unterscheidung" (Luhmann 1997: 195). So, here again the distinction is used to replace other, more common notions. As Luhmann makes clear (Luhmann 1995: 165ff.), form/medium also seeks to replace *Substanz/Akzidenz* or *Ding/Eigenschaften*, both springing from the old Aristotelian and esthetic traditions. Most basically, any attempt to delineate form/medium from the ontological tradition should pay careful attention not to reproduce the cleavages the old European ontology tends to reserve between the assumedly subjective 'form' and its assumedly objective 'medial' counterpart, be it *Materie*, *Substanz* or *Inhalt*. In Luhmann's case, the conceptual prerequisite is not to estrange the medium from the form. Being a distinction in the sense of Spencer-Brown's mathematics, this means attention to the *distinction between* form and medium as the important *unity* in the distinction. Form and medium should be unified in one way or another, their difference should be minimized, so to speak; or better: the asymmetry of the distinction should be irritated. Luhmann manages to do so by stressing the *constructivist* aspects of both the form and the medium: "[die] Unterscheidung von Medium und Form ist stets ein systeminterner Sachverhalt" (Luhmann 1997: 1995; see as well Fuchs 2002). In other words: both the form and the medium are categories of an *observer* -read: (self)observing system. One understands that this primarily means that form and medium cannot be considered something 'there is' (in the sense of **Willard von Orman Quine**). Form and medium are constructed (and reconstructed) in the operations and observations of a system. Much more than the problematic material examples of wax and gold, which Luhmann borrowed from the very 'old European' tradition he has been criticizing, the medium of **money** is emblematic here, I feel. No other medium is so clearly de-ontological. There is no identity in money, it is never present to itself, as it surrenders to the functional instability of *valuation*; and what else is valuation but the economic description of the circulation of money in and by the system of the economy? **Jean Clam** explains: "[I]a circulation est la vie de la valeur. La stance de la valeur, son retrait hors de la circulation, c'est son exposition à la nécessité de l'avoir à son non dépensier. [...]. C'est [...] dans la circulation que les 'choses' se dématérialisent" (Clam 1999: 134). In other words: the system of the economy enlivens and reproduces the difference between form (payment) and medium (money) at all times controlling or conditioning the

difference by means of prices (signals for expectations of payments).

## Form/medium in the 3 dimensions of meaning

This conceptual strategy of drawing a certain distinction and simultaneously subverting and compromising (<Latin *com-pro-mettere*, putting in front together, i.e. not asymmetrizing) it, changes the outlooks of the distinction considerably. What may have looked as a simple, even trivial reformulation of the notion of autopoiesis, suddenly enfolds as quite a surprising and dynamic -in Luhmann's theory this most certainly means: *paradoxical*- construct. Putting the difference in the **factual** dimension of meaning, we are explained that the 'only' difference, if one may say so, between form and medium is a difference between strict and loose coupling (*strikte* versus *lose Kopplung*) of the elements of the system. This second distinction is the reformulation of the common theme of structured complexity. It expresses the fact that elements cannot be connected haphazardly, i.e. there cannot be a random relationship between them (otherwise there would be no system delineated from its environment). Price fluctuations in the economy are never purely arbitrary; indeed, the very idea of valuation includes the possibility of observing former payments, i.e. observing the effectuation of formerly projected expectations of payment. 1) Forms are strictly coupled elements, and are always present and actual. As seen in the above example, they cannot be on their own; they need a context of different but similar entities. A payment in the economy is meaningless if judged only in reference to itself. Rather, as a construct of a system, it is not a self-sufficient unity but gains its meaning in reference to other payments (forms). 2) The medium, as a *substratum* (<Latin, *sub-sternere*, 'stretching under') of loosely coupled elements, represents connective potential, including the motivation for constructing new forms. The medium of money allows the perspective in economic operations, without being fixed or stuck in a certain state, (let alone being consumed at any moment), but also without ever being observable as medium. The medium is the *ever present, yet non actual* (!) surplus inherent in each and every *present and actual form*, it is comparable to a horizon shifting with each and every systemic operation: "Es kann zum einen als die latente, gegenständlicher Grundlage oder *Ressource der Form* [i.e. money as the general economic capability of expressing things' value in quantitative terms], als auch zum Zweiten als ihr intendierter Inhalt oder ihre *Referenz* [the quantitative expression of value and its motivational context], als auch drittens als *Redundanz* [the reference of payments to other payments, and the consequent capability of the economic system to (self-)observe itself as an uncontrollable environment in itself (i.e. the 'market')] aus der Information im Sinne Luhmanns [interpretiert werden]" (Brauns 2002a: 12; square brackets mine). Whatever be it, it is this simultaneous processing of form and medium that deserves our attention here. At all moments, systems process the *whole distinction*, not only form. This is at the core of the first paradox, the paradox of dynamically stabilized systems. As every operation produces the whole distinction between form and medium, forms must be unstable because they are fixed (they disappear with every operation, and even their repetition is still repetition in a new operation resolving former operations). The medium, on the other hand, gains stability out of its instability (Luhmann 1997: 171; 209ff.): the horizon is always the horizon, exactly because of its capacity to shift. Returning to our example: money is itself only by virtue of adapting to separate individualities (forms).

This 'simultaneity' of form and medium brings us to a second possible way of looking at the distinction, namely in the dimension of **time**. At first, this appeared to be a fairly easy discussion. Form and medium are present in every operation, as said. But this is not all. In order to maintain the distinction between form and medium, we should grant a distinction between what is *present* and what is *actual* (cf. supra). Form is present *and* actual; the medium is present *and not* actual. Yet, the medium's non-actuality is not a missed chance. On the contrary, its non-actuality must be taken as a surplus-reference to what is beyond the actual. It is reference to the actual present as the temporal difference between past and future. The difference between form and medium thus produces an intricate, and as we shall see paradoxical understanding of simultaneity. Simultaneity must be different from simultaneity in the present, contrary to intuition. It is structurally more. Payments do not make sense in a world that is temporally indifferent. The economy thrives on difference, not in the least on temporal difference (what one has bought cheap yesterday can be sold tomorrow, hopefully at a higher price). The conclusion may be astounding. Time is *not prior* to the system, but *simultaneous* to it. This means: systems employing the difference between form and medium create and recreate time in order to be possible at all. This second paradox is the paradox of systemic time: form/medium presupposes the simultaneity of simultaneity and succession.

And third, it is possible to regard the distinction from yet another angle, i.e. in terms of the *relationship between* form and medium (the **social** dimension). This relationship is circular, Luhmann stresses, as we must concur that the distinction between form and medium, *as a distinction*, is in itself a form (Luhmann 1997: 197; 1995: 169). Not only is the medium always in the form: the form is also in the medium. Look: there is a way to define form and medium in each other's terms. Loosely coupled elements, as potential, are *not yet* actual. The medium is at all time 'not-yet-form', it is form that has not yet been formed. Form, on the other hand, is always a 'mediales Ding', as Dirk Baecker indicates (1993d: 163). This circularity is important, as it allows conceiving of the relation between form and

medium as a-foundationalist. Thus: not 'first medium, and then form', as if the medium would be the foundation of the form. In Luhmann's view, there exists a quite elegant, however complex loophole for the problem of the origin: 1) as the **form** is both present and actual, and 2) as the **medium** is present but not actual, and 3) as the distinction between form and medium is in itself a **form** (and thus at once present and actual!), the **medium** must have been formed out of **forms** imbedded in another -encompassing?- **medium**, which is in turn formed within yet another **medium**, and so on... an infinite regress of form/medium-building, indeed. "Es gibt in dieser Begriffssprache also nicht den Grenzfall des Materiebegriffs der metaphysischen Tradition: die vollständige Unbestimmtheit im Sinne einer bloßen Bereitschaft des Seins, Formen anzunehmen. Medien werden aus immer schon geformten Elementen gebildet, *denn anders könnte weder von losen noch von festen Kopplung die Rede sein*" (Luhmann 1995: 172; italics mine). Conversely, this implies a strong evolutionary potential for the construction of form/medium differences at several 'levels', so to speak. A form can be condensated (repeated), and eventually establish itself as a new medium of a higher order. As we will study in more detail later, this explains the -historical- development of the medium of credit in the medium of money (and hence, the development of a banking system in the system of the economy). Yet, one must permit a circular logic in order to accommodate these realities. Clearly, this infinite regress is the paradox of origin: neither form nor medium does have a beginning (or an end, for that sake).

Still, questions remain. Granted this construction of form and medium is fruitful for sociological analysis, granted that it fits in the framework of Luhmann's theory of communication, is the distinction sound? Is it in accordance with the operationalist and constructivist epistemology the theory of social systems commits to? Or how, in other words, does form/medium fit in the framework of the calculus of indications? Does the calculus, as a calculus of form (and form only), permit the construction of the notion of medium, and, if yes, why does the calculus not employ it?

## The 'medium through which'

As already briefly indicated, the most interesting and ironical contribution of the calculus of indications to our discussion here is the fact that it does *not* (need to?) employ the notion of medium at all. Spencer-Brown does mention the concept in 2 significant paragraphs of the 'Introduction' to his *Laws of Form*, however. In the first paragraph, it is coined in explicit reference to observation and perception, and even to his notion of form as a boundary, a distinction. Spencer-Brown here explains his intent to bring together "the investigations of the inner structure of our knowledge of the universe [the mathematical sciences] and the investigations of its outer structure [the physical sciences]. Here the work of Einstein, Schrödinger, and others seems to have led to the realization of an ultimate boundary of physical knowledge *in the form of the media through which we perceive it*" (Spencer-Brown 1994 [1969]: xxv; italics and square brackets mine). The second passage relates to the difficulty of presenting the aforementioned investigations in the form of a calculus, and again includes an allusion to the notion of observing. "Medawar observes that the standard presentation required of a research paper represents the very reverse of what the investigator was in fact doing. In reality, says Medawar, the hypothesis is first posited, and becomes *the medium through which certain otherwise obscure facts*, later to be collected in support of it, *are first clearly seen*.... In mathematics we see this process in reverse [...]" (Spencer-Brown 1994 [1969]: xxvi; italics mine). Yet, at this moment, it is appropriate not to stretch beyond the boundaries of the calculus. Let us have a look at what we know about the calculus, or better, what Spencer-Brown wants us to know about it.

## Definition, Primary Arithmetic, Primary Algebra

First of all, we should be aware of the economy with which Spencer-Brown opens the calculus. This is not a common logical calculus which finds itself founded on postulates. Eventually, as Spencer-Brown indicates, it is not even a logical calculus. "[L]ogic is not, and has never been, a fundamental discipline" (Spencer-Brown 1994 [1969]: p. xi). And therefore, The *Laws of Form* must be seen as a book of mathematics, an "arithmetic whose geometry as yet has no numerical measure" (ibidem). Its investigations take place at a prediscursive level (Clam 2000a: 68-69), at a level where 'something' comes into being so to speak. Postulates, in the sense of principles *external* to the calculus or principles relating to the (im)possibility of logical expressions, cannot exist here. Spencer-Brown shows himself very sensitive on this matter. For him, it is important just to choose a simple point of departure: "We take as given the idea of distinction and the idea of indication, and that we cannot make an indication without drawing a distinction. We take, therefore, the form of distinction for the form" (Spencer-Brown 1994 [1969]: 1). This is quite a trivial issue. Contrary to what several authors seem to believe, nothing special has been said here. As Niklas Luhmann has pointed out, it is the 'therefore' in the above sentence that deserves our attention (1993: 198). It expresses a very basic experience of dealing with the world, with 'things', 'stuff'. From there, Spencer-Brown can develop a definition of form ("Distinction is perfect continence"), and two axioms contained in the definition. The *law of calling* refers to the descriptive aspect of distinctions. Once (a delineated) something has been given a name (call), recalling it does not alter it. Returning to the money metaphor: 100 € is 100 €, also if it is called twice or even five times -'for any

name, to recall is to call'. The *law of crossing* concerns the injunctive or more clearly operational aspect of distinctions. Here, a difference 'does make a difference'. One can only be in the form, or not -'for any boundary, to recross is not to recross'. Again, nothing revealing here. As pointed out later in the calculus, the axioms are "more or less simple statements about the ground on which we have chosen to reside" (Spencer-Brown 1994 [1969]: 44). The definition and the axioms are put forward with Ockhamian parsimony. It is all we have got, and Spencer-Brown is determined not to grant us more: "in general, *what is not allowed is forbidden*" (Spencer-Brown 1994 [1969]: 3; italics in the original). Yet, there is no reason to worry. In 'A note on the mathematical approach' Spencer-Brown stresses that this economy of axioms will nevertheless be rewarding. If we are only willing to trace the story 'from the beginning', we will get the universe (Spencer-Brown 1994 [1969]: xxix) and even more (ibidem: xxv).

Indeed, the calculus is developed linearly out of the definition of the form (formally abbreviated to  $\sqcap$ , 'the mark of distinction'). The calculus grows into a *primary arithmetic* which serves, in turn, as the foundation for a *primary algebra*. At several points in the appendices, but also in the preface(s), introduction and the 'note on the mathematical approach', the difference between these is stressed, and Spencer-Brown definitely favors the primary arithmetic over the more commonly investigated level of algebras (e.g. Boolean algebra) (1994 [1969]: xxi-xxiii; 87ff.). Yet, why is it so important to found the primary algebra on the primary arithmetic? This question is insufficiently investigated in contemporary research. Indeed, as has been argued by **Elena Esposito**, these former parts of the calculus have altogether been unjustifiably ignored in favor of the chapters on re-entry (1993: 99-100). She explains that both the primary arithmetic and the primary algebra are instrumental to a sound understanding of cybernetic *constructivism*, especially where it relates to the difference between first order and second order observations. Personally, I feel the interpretation of the arithmetic and the algebra in terms of respectively a *syntax* and *semantics* (compare: Engstrom 1999) may be equally illustrative here. It all boils down to appreciating the arithmetic and the algebra as autonomous parts of the calculus that correspond to existent (because observable) levels of observation. 1) The arithmetic(/syntax), as Esposito formulates so fortunately, represents the 'formalization of autopoiesis'. Here, everything is about the very execution of rules relating to constants ('specific objects'). It is a first order level of observation indeed, a level where operator and operand are not differentiated, and where there can be no difference between the injunctive and descriptive aspect of distinctions (or  $\sqcap$ , or  $()$ , or  $<>$ ). In economic terms for instance, this is just about paying, or not doing so ( $<\text{paying}>\text{not-paying}$ ). 2) The algebra(/semantics), which could be constructed through the theorems of connexion is a different matter. This is a *calculus taken out of the calculus*, a level where the very forms developed in the arithmetic are object of other forms at a higher level (in turn bound by the rules of the arithmetic!). It is about arrangements (and hence: indication *and distinguishing*) of arithmetic forms (*distinctions*). Here, operator and operand are distinguished, and so are the descriptive and injunctive aspects of distinctions. Here, the  $\sqcap$  can be treated as a -descriptive- mark, and need not necessarily be taken as a -injunctive- 'cross!'. Esposito explains its consequences for systems theory: "Die Algebra formalisiert einen spezifischen Typ der Autopoiesis (und fordert dafür die Gltigkeit aller arithmetischen Formeln): die Autopoiesis eines Systems, dessen Operationen Beobachtungen sind. Tatsache bleibt jedoch, da Operationen (auch Beobachtungsoperationen) nur von einem externen Beobachter beobachtet werden knnen: Daraus ergibt sich jene ffnung, die die Integration der Beobachtung erster Ordnung mit Beobachtungen hherer Ordnung enthlt und erfordert" (Esposito 1993: 104; see as well 105). This brings us closer to the opening considerations of the discussion. The autopoiesis of the economic system is not an aggregation of payments and non-payments. It is, to be precise, about the organization *and generalization* (second order) of *the difference between paying* (first order) and *not-paying* (first order), in a way that guarantees economic reproduction, and hence the reproduction of the difference as well ( $<\text{paying}>\text{not-paying}$ ). This implies as well the construction of a societal domain in which money, and only money (and not power, or love, or truth) is the 'legal tender' of communication. The difference has thus been distinguished from other possible distinctions (e.g. powerful/powerless or true/untrue) in factual, social and temporal terms (Baecker s.a.: 5-6) and serves as the main motivation for itself -articulated *self-reference*.

## Space is the Place

I already mentioned Spencer-Brown's reference to the calculus of indications as arithmetic whose geometry as yet has no numerical measure. It is about drawing distinctions in a plane space. This reference to space and the spatial aspects of his form(s) is important. It does, first of all, preclude any misunderstandings of the *Laws of Form* as a formalization of our *relationship with* the world (i.e. a cognitive or communicative matter). As said, the calculus is about the formation of things, and cognitive constructions are only a limited category thereof. Upon more careful investigation, however, it will be clear that throughout the calculus' development, references to space become more numerous and important. Possibly it is a matter of mathematical elaboration. With the development of the primary algebra, the calculus has been made sufficiently complex to allow a certain degree of reflexivity. The notion of 'space' is the key to reflexivity. And this is the level where a discussion of form and medium can be fruitfully commenced.

Let us have a look at the following crucial remark in the notes to the calculus: "In all mathematics it becomes apparent, at some stage, that we have for some time been following a rule without being aware of it. This might be described as the use of a *covert convention*. [... Its] use can be considered as the presence of an arrangement in the absence of an agreement. For example, in the statement and theorem 1 it is arranged (although not agreed) that we shall write on a plane surface. If we write on the surface of a torus the theorem is not true [...]. The fact that men have for centuries used a plane surface for writing means that, at this point in the text, both author and reader are ready to be conned into the assumption of a plane writing surface without question. But, like any other assumption, it is not unquestionable, and the fact that we can question it here means that we can question it elsewhere [...]" (Spencer-Brown 1994 [1969]: 85-86; italics in the original - square brackets mine).

The passage is doubly meaningful. **A:** First of all, it may be seen as a belated reference to the definition or form, presented at the very beginning of the calculus: "Distinction is perfect continence". The hint to a primitive sort of self-reference in the definition has always given rise to misunderstandings, and Spencer-Brown himself remains conspicuously silent on this matter. It is a "definition of distinction as a form of closure," he mysteriously adds in the notes (idem: 77). Yet, it is only through the above citation that we can understand why. It was our choice to write in a plane surface that has made that distinctions indeed do cut off an inside from an outside, that 'differences do make a difference' (Gregory Bateson). Covert conventions at a level deeper than the level of form, preceding the level of form, have determined what the form would do. There lies a chance for developing a medium theory here. In this concrete case: the *medium of the plane surface makes the difference*. And in general: the topology of the medium makes the difference between distinctions making a difference and distinctions not making a difference. "It is now evident that if a different surface is used, what is written on it, although identical in marking may be not identical in meaning" (idem: 86). Spencer-Brown has shown us that the 'medium is the message' (Marshall McLuhan).

**B:** There is however a corollary, and much neglected, pedagogical implication in the above citation. Briefly returning to Esposito's remark on the expansion, the growth of the calculus, we may better understand the function of the covertness of the covert conventions in the primary arithmetic. Not only does the primary arithmetic imply the identity of operator and operand, and of injunction and description. It also presupposes the identity of form and the space in which the form is written. At the first-order level of economic elements, one can only pay, or not; and neither paying nor not-paying necessitate a conscious knowledge of what money is. A remarkable degree of *degeneracy* or *condensation* indeed (Spencer-Brown 1994 [1969]: 81). The realization of covertness, or its *overt* negotiation in later parts of the calculus, on the other hand, shows that it need not be so. There are levels at which form and space can be distinguished. Form *can* be distinguished from the space in which it has been written, if we are only willing to experiment with a different space, i.e. if we are willing to distinguish different kinds of space. For example, if we decide to write distinctions on a ball, distinctions do still make distinctions, but we will have to specify *how we are observing them in order to know which distinction contains which*. The observer will have to mark his place in space. But how is that possible? How can an observer mark himself and the observations he is making? How can he connect somehow the first and second order levels of observing? The calculus of indications shows the answer: if one is willing to write on a space which connects these levels, i.e. which is constructed so in order to support shifts between first and second order, i.e. a medium that supports 'flippety' (Heinz von Foerster) -a torus, for instance.

But why would one do so? Factually, the answer has already been indicated in the above paragraph. We (may) do so because we believe it may be useful to indicate the observer *and* the indications he/she is making. For Spencer-Brown, the question is, it must be said, a purely mathematical one. His interests lie with showing the *validity* of imaginary values (e.g.  $\sqrt{-1}$ ), the *use* of which has been common in e.g. electromagnetic theory. As they can be used meaningfully for the solution of equations which cannot be solved otherwise, we must accept 'imaginary' as a 'third' category independent from 1) true (tautology:  $x=x$ ) and 2) untrue (contradiction:  $x=-x$ ), so the argument goes. For Niklas Luhmann, the problem is to describe selfreferentially operating social systems, consisting of operations which take their own results as a base for further operations. These are forms that 'in-form' themselves, indeed. Two-valued logic cannot provide a conceptualization here, for a reason that is clear: limiting itself to the possibilities of the plane space, it cannot indicate an observer. With **Joseph Schumpeter**, we must only think of the example of money creation in the economy to realize the large insufficiencies of two-valued logic to describe the intricacies of this process (Schumpeter 1986 [1954]: 320ff.; 1113ff.). Here, especially, imaginary values must be at work.

## Re-entry

Spencer-Brown's solution to the problem of many-valued functions is well-known. He constructs a tunnel 'subverting' the plane, and connects the distinguished sides. As hinted to above, the topological qualities of space are thus altered. We are now writing in a space that grants a form the possibility of access to itself, yet denies the possibility of identity with or presence to itself (Schiltz/Verschraegen 2002: esp. 65ff.). Hence, we are writing in a space that connects the level of first-order

(operand) and second-order (operator) observations. That space is a torus. If considered operationally, distinctions written on a torus can subvert their boundaries and re-enter the space they distinguish, turning up in their own form. The marked state cannot be clearly distinguished from the unmarked state anymore, leading to the 'indeterminacy' of the form. As the calculus explains, the state envisaged as such is a state not hitherto envisaged in the form. It is neither marked nor unmarked. It is an imaginary value, flipping between marked and unmarked, thanks to the employment of *time*. The form of the **re-entry**, as described here, has been the source of many commentaries.

What I do find particularly interesting for our discussion is the notational treatment Spencer-Brown reserves for the form of re-entry. This is yet another extremely dense, possibly obscure, passage. It is explained that the re-entry necessitates an 'engendering' or 'generous' (><degenerated) understanding of the symbol of the mark  $\sqcap$  : "It now becomes necessary not only to indicate where a re-insertion takes place, but also to designate the part of the expression re-inserted. Since the whole is no longer the part reinserted, it will be necessary in each case either to name the part re-inserted or to indicate it by direct connexion. [...] In a simple subverted expression of this [latter] kind neither of the non-literal parts are, strictly speaking, crosses, since they express the same boundary. It is convenient, nevertheless, to refer to them separately, and for this purpose we call each separate non-literal part of any expression a marker. Thus a cross is a marker, but a marker need not be a cross" (Spencer-Brown 1994 [1969]: 64-65; square brackets mine). We are explained here that, in self-reference or equations of the higher degree, the form is both identical to and different from itself. On the one hand, we are still indicating as we were indicating in the beginning (cross). On the other, the indications we are now making come to be seen as dependent on a hitherto unexplored possibility of the form to employ itself for further indications (marker).

Spencer-Brown here manages to express, in a formal way, what I have referred to as the flippety of a torus. Now, the torus, we rightly remember, was the *medium* we were writing in. Yet, in the above citation does *only make mention of form*, mark,  $\sqcap$  . Thus, at this point, the medium can finally be understood as a formally identical to some aspect of form, namely this bridge between the re-insertion and the re-inserted. This means: the medium must be the marker. The medium is the 'thing' that is in charge of avoiding direct self-reference: after all, direct self-reference would be timeless, formless, invisible. Instead, the medium develops the time of the tunnel which the form needs to re-enter its own space. What that means for a theory of social systems can be explained as follows. 1) The medium is always present, yet it is not always visible. If we define the medium as a form, we easily understand why: in the plane space, distinctions are drawn from the perspective of encompassing distinctions: the boundaries of the white piece of paper. And obviously, these are invisible in the distinctions drawn, exactly because we are writing in a plane space. At the level of first order observations, one does not need any comprehension of the medium of money in order to pay or not. 2) This is clearly different when ascending the ladder of the calculus, and observing the self-reproduction of e.g. the system of the economy. There it is necessary to include the viewpoint of the observing system in order to enable its autopoiesis. The economy does not 'simply' concatenate payments (cross). It a) must have access to itself as a distinction that makes a difference between payment and non-payment (marker), and b) *it must in a way be alien to itself in order to insert itself into itself*. The economy comes to be seen dependent on a very specific topology, i.e. a topology that enables the distinction between payment and non-payment to be re-entered in itself. This is the topology of money. Money is the flippety between <payment>non-payment and <<payment>non-payment>. And as flippety, it must be difference, and closure. The medium is self-referentially closed difference, an idea also developed at some length by **Maren Lehmann** (2002). Only then can it be a meaningful part of the system's operations. This second level is obviously the level at which Niklas Luhmann has initiated his medium theory.

## Connectivity, Multiple Re-entries, Memory

Such conceptualization diverts sharply from an intuitive understanding of a medium. As seen here, a medium is far from a Euclidean container. Rather is it introverted space, it is identical to the *topology of the form*, it is the form's 'deep structure' (Jeffrey Gordon Long). And therefore can it not be seen apart from the form, as Luhmann has argued. The main difference between form and medium, so to speak, is that they are not identical to each other. Their relationship is as the relationship of the dance and the dancer, indistinguishable yet not identical (Fuchs 2001). The only difference between form and medium lies in the way they come to be separated in any systemic operation, I would say. In case of the economy, this means that they respectively represent the *unity* and the *difference* of the *difference* between payment and non-payment. The payment, i.e. the operational performance of the system's *form*, constructs the unity. Here, the economic system would like us to believe, a convergence of interests take place. Ego sells something to Alter at a price at which he is willing to sell rather than to keep it (or sell it later at a possible higher price), and Alter agrees to pay a price which seems reasonable to him. On the side of the medium, it is a completely different story. The medium is the form of connectivity (*Anschlu~~ff~~igkeit*), deciding which indications may be next, and which are out of the question. In order to guarantee connectivity, and this certainly means as well: in order to reconstruct the function



of money!, the difference between payment and non-payment must be reconstructed so to enable future payments, in order to enable future form. "Für die Theorie der Wirtschaft und des Geldes heißt dies: daß man neben (und zugleich mit) der Tauschfunktion des Geldes, die verbindet, ihre Funktion als Knappheitsregulativ sieht, die trennt" (Luhmann 1989 [1988]: 267). In other words: exchange and scarcity do tell the same story, but from a different perspective. 'Money often costs too much' (Ralph Waldo Emerson).

The above considerations may aid us in understanding the conrtraintuitive idea of the economy's **doubly closed circuit** or *Doppelkreislauf* (Luhmann 1989 [1988]: 131-150). Already **Talcott Parsons** had indicated that every payment does not only produce a surplus of payment potential on the part of its receiver. Simultaneously, an equally large minus of payment potential is created on the part of the one who pays. I.e. a payment produces a 'solutio' of debt and the creation of debt at the same (payment  $\equiv$  non-payment). This reveals the principally reflexive nature of all money. Money spent on something might have been spent on something else, and every payment 'knows' this. Money spent now cannot be spent anymore in the future; every payment reflects this. And in the social dimension of meaning: the fact that money has been spent on something means that it has managed to create a social sphere in which its use has been sufficiently influential to distract other possible ways of negotiate a 'transaction' of the 'commodity' (e.g. by means of force, or influence). The social dimension in particular demonstrates Luhmann's point. What I have just referred to as the reflexivity of the medium, can be reformulated as well as the economy's self-referential closure. The economy enables the convergence of perspectives in its payments (*Ausgleich*), and simultaneously recreates divergence or asymmetries to which it can respond with new payments. This difference is all what it takes to close itself as an autonomous societal domain. *Tertium non datur*. The economy is the dynamics of compensating for an ever-present shortage; it is the dynamics of reproduced scarcity. If seen in the mathematics of the calculus of indications, the re-entry of the distinction into itself amounts to either tautology or paradox: 'money is better than poverty, if only for financial reasons' (Woody Allen).

In this respect is it possible as well to explain what was meant with the building of **media within media** (cf. supra). The self-referential closure of the economy means that the economy has developed a way to employ the negative side of its difference, i.e. 'non-payment'. As said, the economy is not a mere concatenation of payments; that would contradict the very necessity of recreating scarcity, i.e. the impossibility to pay (*Zahlungsunfähigkeit*). It involves the positive employment of non-payment as well, i.e. as something that can be paid for as well, i.e. something that can reflexively be the object of an economic payment (hence: non-payment  $\rightarrow$  payment). The abbreviated expression for this paradoxical arrangement is 'credit'. Its function has been articulated through the differentiation of a system of banking within the economy: "Die Banken haben das Zentralprivileg, ihre eigene Schulden mit Gewinn verkaufen zu können, also Zahlungsunfähigkeit 'kapitalistisch' verwerten und in Zahlungsfähigkeit verwandeln zu können" (Luhmann 1989 [1988]: 145-146), and this on the basis of the employment of *time*. The paradoxical process of *binding* payment with non-payment (payment, because non-payment) deserves our attention here. For it is in the reflection of the distinction between payment and non-payment (and this is clearly only possible in a reflection!), that the self-referential closure of a *new* medium can be effectuated. Dirk Baecker explains the 'medial' characteristics of credit as follows: "Wir können [...] genauer formulieren, daß Banken mit Einheiten (Zahlungsversprechen von der Bank und an die Bank) handeln, die Formbildungen im Medium der Differenz von Zahlungen und Nicht-Zahlungen sind. [...] Die in der Wirtschaft locker gekoppelten und sich im Gang der Geschäfte je unterschiedlich reproduzierenden Differenzen van Zahlung und Zahlungserwartungen [...] werden von Banken zu Einheiten *fest* verkoppelt, die sich im Kredit- und Einlagengeschäft auf vielfältige Weise rentabel oder profitabel, also die Autopoiesis der Zahlungen wiederum *fordernd*, ausbeuten lassen" (Baecker 1991: 51-52; italics mine).

Let us return once more to the definition of a medium as a closed distinction depriving the form of direct self-reference. I have repeatedly stated the importance of *indirectness* (and the corollary creation of 'time'). As said, direct self-reference would be invisible. The form would have perfect access to itself, and thus be identical to itself. Clearly, this cannot be the case. Self-reference presupposes a certain self-estrangement in order to enable the form to indicate itself in itself. A 'payment', or the possibility of 'solutio' of debt, can only be itself through the recreation of what it reacts to, namely debt, this time on the part of the one who pays. The clue to self-reference was time: in the tunnel, the form creates a temporal difference with itself. The 'solutio' of debt now implies the impossibility of that money for solutio in the future. Here, I should be more precise: indirect self-reference, and thus: time, is formative for the understanding of **memory**. Indeed, Spencer-Brown has constructed the form of the re-entry in a way that there is a formal unity between re-entry and memory. We briefly remember here that, when writing on a torus, we may conceive of the possibility to emit a pulse through the torus, which, *after a certain time* (!), returns to the starting point, and then travels through the tunnel again. In accordance with the axioms at the beginning of the calculus, the indicated value will be changed every time the pulse crosses the -subverted- distinction. The medium thus 'keeps track' of the result of the last pulse. Compare: a payment creates debt on the part of the payer because it coincides with the transport of an amount of money. That certain amount is 'gone', and cannot be used anymore; "money is always there but the pockets

change" (Gertrude Stein). The money 'gone' has restructured possibilities for connectivity. Therefore, one could speak of a primitive form of memory. Yes, *primitive*, indeed. The debate on memory is a very complex one, especially in the humanities and the social sciences (for examples in network theory, see e.g. Junge 1993; Kauffman 1978). Furthermore, as Spencer-Brown himself explains, it is not quite sure "that this is exactly how memory happens within an animal" (Spencer-Brown 1994 [1969]: 100). Yet, we know that it works in electromagnetic circuits and computers, and this should suffice to observe its *function*. A memory is the way in which the medium in-forms the form. It introduces an image of the form into the form (the marker), hence presents the infinity of the self-referential form in a finite guise (as it only remembers the result of the last operation; the operation itself and everything preceding it is forgotten), and hence reduces the complexity of connectivity. The form can react to its past, and thus found a way to predict what is going to be next (Spencer-Brown 1994 [1969]: 56ff.). This is memory that enables hindsight and foresight at the same time (von Foerster 1969). Not just 'anything goes'; form-building is not a matter of random-walk. At the minimum, the 'velocity' of the 'pulse' will determine when a re-entry can occur. We observe clearly: the function of memory, and thus the medium, is in the *constraint*. The medium constantly (re)programs the direction of the cross and its own moment-to-moment topological qualities (as a marker), and is thus the determinant of connectable form(s), connectivity. It *structures* possibilities for connectivity.

What this means in the context of a theory of social systems can be illustrated again by means of the distinction between payment and non-payment. Above I have explained that the form of the re-entry can function as a memory by introducing an 'abbreviated' expression of the form into the form (the so-called 'information' of the form). It is clear that, in the economy, **prices** have this function. And again the economy proves to be emblematic, as prices are memory forms of an extraordinarily specialist nature. On the one hand, prices allow a *reduction of complexity* that is unknown in the other function systems. They literally cut off past operations, i.e. past payments. Obviously, past payments (and past non-payments) have their role in the construction of a price, but they are not reflected or observed in the price. This is by the way valid for the other uses of quantitative expressions in the economy. Payments, too, do not give more information than strictly necessary. They do not contain information about intentions of the payer, not even about the origin of the money. One can pay with borrowed, or even stolen money. *Pecunia non olet*, the Romans said. On the other hand does this capacity for the reduction of complexity allow a potential for the *construction of new complexity*. As strong and visible symbols for the economy's self-reference (quantitative expressions do not correspond to realities in the system's environment), prices propose the build-up of *internal* complexity.

In this respect, especially the function of **quantitative expression** deserves particular attention. As quantitative expressions indeed, prices are extremely generalized. They are abstractions, I have already said, for which there is no corollary in the environment; as a certain quantity, a price (e.g. 100 €) is that price (100 €). Yet, in the theory of social systems, this certainly also means that quantity *restructures* everything that plays a role in an economic transaction, be it operationally or structurally. It selects and *discriminates* aspects of the transaction, and lends the transaction its definingly economic aspect. Price, as form, and thus: distinction, is about the difference between more or less, and that is it. That (and e.g. not idiosyncratic motivations for buying something) is how it makes the difference. When Woody Allen asks God to give him a clear sign, 'like making a large deposit in my name at a Swiss bank,' he is talking about just that. Quantity and prices are an extremely *selective* way of the economy to project an image of itself into itself, and *therefore* are they such an effective way of memory as well. After all, they allow the presentation of the instable and versatile nature of the economic environment in terms of the controllable instability of generalized abstractions. As Luhmann states, the clarity of abstraction (100 €=100 €) is the very motivation for its swift adaptation: the possibility to change prices, 'correct' them in a response to market realities (Luhmann 1989 [1988]: 20). Only as such is it possible as well to observe expectations of payments and trends (observations of the observation of expected payments). But this is not the whole story. The power of a memory device must be seen as well in the way it may generate major structural evolutions in the organization of a function system, i.e. in its potential to organize processes of *positive* and *negative feedback*. Modern economies do not only form around expectations of price, as described above. In a reaction to the sensibility of prices, a substantial part of their dynamics concentrates around expectations of the *change of price*. "Dabei kann es sich sowohl um spekulative Ausnutzung von vermuteten Chancen handeln als auch um Absicherungen, etwa um Bildung von Vorräten an Kapital oder an Waren oder auch um Überproduktion für den Fall einer etwaigen Steigerung der Nachfrage, die man durch mehr Absatz (statt durch Erhöhung der Preise) ausnutzen möchte" (Luhmann 1989 [1988]: 30). Quite right, the establishment and evolution of a banking system within the economy, or the installment of the semantics of risk (see: Luhmann 1991) may be considered direct offsprings of the economy's dedication to describe itself in terms of price.

### Coda: the epistemology of form/medium

Last but not least, I promised a clarification of the metaposition of the distinction form/medium far beyond the scope of heuristical application. Here too, the *Laws of Form* provide the definitive clue. After indicating the possibility of self-referential

forms ('re-entry' p. 56), it offers a perspective on the position of *the calculus* ('Re-entry' p. 69ff.). As a way of organizing distinctions, it must be one possible form, distinguishing the forms it has been describing as forms making a difference. The calculus re-enters its own space. The very calculus of indications has been a 'tunnel' (Baecker 1993c), through which Spencer-Brown and the reader have traveled to arrive at the form of the first distinction, which is now seen as legitimized, justified by all canons, theorems, demonstrations and proofs that followed it. The *Ur-teil*, the 'first judgment', literally 'primal distinction', was deliberate and historically contingent. Yet, all what followed was its necessary consequence: "The whole account of our deliberations is an account of how [the first distinction] may appear, in the light of the various states of mind which we put upon ourselves" (Spencer-Brown 1994 [1969]: 68). In a more dramatic phrasing: "The Universe is simply what would appear if it could" (Spencer-Brown 1994 [1969]: viii). *For that very reason*, the clarification of the laws governing this universe must be considered a trivial matter: "Coming across it thus again, in the light of what we had to do to render it acceptable, we see that our journey was, in its preconception, unnecessary, although its formal course, once we had set upon it, was inevitable" (Spencer-Brown 1994 [1969]: 106). The paradoxical combination of *contingency* (of the first distinction) and *necessity* (of its consequences) demonstrates in what fundamental respect the epistemology of the *Laws of Form* differs from classical epistemologies. The calculus of indications, ultimately a function of itself, has established itself as an imaginary value. It can be continued endlessly, as Spencer-Brown does not fail to indicate. On the one hand, its inclination towards the imaginary makes the calculus correlate with what it seeks to describe: as all reality or 'world' the calculus is 'form' that seeks to get a hold of itself, but does not manage to do so. On the other hand, its constructivism obviously implies the loss of a privileged position of scientific knowledge. This may be considered the bad news. Reminiscent, for the last time, of the money metaphor: nothingness is the price one pays for everything (compare: Spencer-Brown 1993).

For Niklas Luhmann, presenting a theory of social systems, this mathematical conclusion is expressed as the **autology** of the distinction between form and medium: form/medium is a distinction, thus form. It, too, must reflect the *trivialness* of its *necessity*. But it did not confine itself to the mathematical notation of the calculus of indications. Conscious of its social formulation in the social sphere of society, the theory of social systems is simply one possible way of presenting society in society (*die Gesellschaft der Gesellschaft*): it is only one possible form in the all-encompassing medium of meaning. This leads to quite an irritating question. If the medium of **meaning** is indeed the ultimate medium of psychic and social systems, i.e. if meaning is 'the medium of itself', then what is its 'form', the distinction through which it can be expressed? I perceive only one answer: the medium of meaning must be identical to the difference between form and medium, and the re-entry of that distinction into itself. Its consequent indecidability is the symbol of our dealing with the world. It expresses the fact that all our attempts to get a hold of the world are doomed to frustration (compare Spencer-Brown 1994 [1969]: 102 ff.). Meaning as our *phenomenology* of this world can only be partial, as the difference between form/medium can only be actualized as a form. In mathematical terms: meaning is a **lambda-domain** occupied by communications that, by acting on themselves (=being a function of themselves), produce new communications in the same domain which can in turn act on themselves and further expand the domain.

This changes considerably our view of the distinction between form and medium as a tool for scientific analysis. Its function is definitely not the description of the 'objects' (e.g. payments) in the domain and their respective 'qualities' as qualities that are eternally true (i.e. observer-independent), as traditional epistemologies demand. Rather, the self-referential construction of the medium of meaning demands the construction of a distinction capable of reflecting itself as an object (=communication) of the lambda-domain of meaning, interacting with other communications, and expanding the domain's horizon. Seen in the terminology of topology, the distinction between form and medium is a **fixed point**: it is the one, sole 'point' on the map of social theory that coincides with the corresponding point in the terrain of society it is trying to map. That point contains its own explanation (i.e. its all-reference and self-reference coincide). It is the pinnacle of self-reference in a domain that is self-referentially built. Therefore, the theory of social systems is not only in the metaphorical sense a sociological formulation of **Quine's paradox**. When applied to itself, Luhmann's theory 'yields a falsehood' (absolute because contingent), acting upon itself... Yet, therefore, just as Quine's paradox, can it be an absolute theory, a fixed point, a theory which is also a theory of itself. Beyond such metatheory there is 'nothing more' to discover. And 'nothing more', we know now, is quite a lot...

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**Bio:** Michael Schiltz is a member of the department of Oriental Studies at the Catholic University of Leuven, Belgium. He wrote *Power and Paradox: A Systems Theoretical Sociology of Postwar Japanese Defense Police* (forthcoming), on Luhmann's systems theory (with special emphasis on Spencer Brown's logical calculus) as applied to international relations in general and Japan's foreign policy in particular. Currently, he is engaged in a social theory of regimes. The present article was written during a research stay at the Centro di Studi sul Rischio of the University of Lecce, Italy.



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