

Radical Constructivism and Radical Constructedness

Luhmann's Sociology of Semantics, Organizations, and Self-Organization

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> Context • Using radical constructivism, society can be considered from the perspective of asking the question, “Who conceives of society?” In Luhmann’s social systems theory, this question itself is considered as a construct of the communication among reflexive agents. **> Problem** • Structuration of expectations by codes operating in inter-human communications positions both communicators and communications in a multi-dimensional space in which their relations can be provided with meaning at the supra-individual level. The codes can be functionally different and symbolically generalized. **> Method** • More than Luhmann, I focus on the hypothetical status of the communication of meaning and the uncertainty involved. Meaning can be communicated because of reflexivity in interhuman communications; meaning cannot be observed. **> Results** • The communication (and reflexive translation) of denotations between semantic domains can generate “horizons of meaning” as reflexive orders that remain structurally coupled to individual minds. This elusive order contains a trade-off between “organization” at interfaces integrating (differently coded) expectations at each moment of time, and the potential of further differentiation among symbolically generalized codes of communication in a “self-organization” over time. **> Implications** • One can model the coding in the communication of meaning as latent variables (eigenvectors) that evolve as an implication of the interacting intentions and expectations. The structure of expectations can be visualized (at each moment) and animated (over time) using semantic maps. The self-organizing horizons of meaning operate in a multidimensional space different from the network topology, and at another pace, since meaning is provided to events from the perspective of hindsight. **> Constructivist content** • This perspective of the radical constructedness of social reality transforms the status of agency and organization in sociological theorizing from a source of change to a resource of communicative competencies and reflexive performativity. **> Key words** • constructivism, sociology, Luhmann, supra-individual, self-organization, intentionality.

Introduction

« 1 » In his paper “Who Conceives of Society?”, Ernst von Glasersfeld argued that “knowledge of society can be gathered only from your own experiences. This goes not only for children and innocent adults, it also goes for sociologists” (Glaserfeld 2008: 63). According to this radical constructivism, concepts are fundamentally private and subjective. As the author concluded (ibid: 64), his is a theory of rational knowing that provides us with “working hypotheses” (ibid: 104).

« 2 » I agree with von Glasersfeld about the hypothetical status of subjective concepts. However, working hypotheses can be theoretically informed. Furthermore, whereas hypotheses are generated subjectively

– as knowledge claims – they can be validated and become part of discursive knowledge. Discursive knowledge is developed in scholarly discourses; this domain is the subject of science and technology studies. The textual mediation of manuscripts – and anonymous referee comments – plays a crucial role in this validation process (Bazerman 1988:136f; Myers 1985). However, a focus on linguistic mediation is not a sufficient approach because codes operating in scientific communications can be expected to constrain and enable the use of language among specialists for cognitive reasons (Krippendorff 2008: 92f; Leydesdorff 2007).

« 3 » Niklas Luhmann (1986a, 1995a) raised the question of whether the evolution of paradigmatically structured communica-

tions can be modeled using the specification of *autopoiesis* as provided by Humberto Maturana and Francisco Varela (1980). In his autopoiesis model, however, the communication is operationally closed, whereas the linguistic basis of scholarly communication leaves room for relative and periodic closure and/or opening during the evolution of scholarly discourse. For example, pre- and post-paradigmatic phases can be distinguished (Van den Daele, Krohn & Weingart 1977). Thus, a hermeneutic perspective is also needed to explain the development of scholarly discourse at the supra-individual level. As Anthony Giddens put it:

“The process of learning a paradigm or language-game as the expression of a form of life is

also a process of learning what that paradigm is not: that is to say, learning to mediate it with other, rejected, alternatives, by contrast to which the claims of the paradigm in question are clarified.” (Giddens 1976: 144)

« 4 » In my opinion, Luhmann’s (1995a, 1997) sociology of communication offers important elements for such a reconstruction because of its focus on reflexivity in interhuman relations. However, Luhmann’s theory is rooted in a sociological tradition that can be traced back to the second half of the 19th century. This sociological perspective has focused on networks as coordination mechanisms that are carried by agents who fulfill roles in supra-individual dynamics. In the *Grundrisse* of 1858, for example, Karl Marx already formulated that

“[s]ociety does not consist of individuals, but expresses the sum of interrelations, the relations within which these individuals stand. As if someone were to say: Seen from the perspective of society, there are no slaves of citizens: both are human beings. Rather, they are outside of society.” (Marx 1973: 265)

« 5 » From a (neo-)marxist perspective, Roy Bhaskar drew the following conclusion:

“Now it is important to note that because the causal power of social forms is mediated through human agency, my argument can only be formally completed when the causal status of human agency is itself vindicated.” (Bhaskar 1998: 207)

« 6 » Without explicit references to these non-humanist backgrounds, Luhmann subscribed to the same objective when he drew the following conclusion:

“When, in old-fashioned style, the human being is considered as an ‘element’ of the social system of science, one is left with no basis for the discussion of ‘relations’ or ‘interactions,’ since neither relations nor interactions are human beings.” (Luhmann 1990: 275f; my translation).

« 7 » Using Maturana and Varela’s (1980) theory of *autopoiesis*, however, the realm of relations and interactions is considered by Luhmann as structurally coupled to individual consciousness. Interhuman communication and consciousness can be

considered as relevant environments for each other. As we shall see below, in addition to this *structural* coupling, reflexivity in both consciousness and communication is specified as an *operational* coupling between these two domains. Luhmann (2002a: 182) used the word “interpenetration” for this additional coupling.

« 8 » Let me first focus on structural coupling and Luhmann’s specification of *autopoiesis* at the levels of individual consciousness and interhuman communications, respectively. Consciousness is further distinguished from agency: consciousness is considered as a domain of relations among expectations enabling human beings to process meaning (internally), whereas behavior and action are attributed to personhood as integrating instances at the individual level (Luhmann 1991, 1994). Two steps are thus involved: firstly, from action to interaction as the basic (micro) operation of interpersonal communication and, secondly, from behavior to the entertaining of expectations both individually and at the level of one’s social network of relations (Leydesdorff 2003).

« 9 » In other words, the *explanandum* and *explanans* change positions between the perspectives of radical constructivism and Luhmann’s systems theory. Whereas Maturana (1978: 53f), for example, claimed that “denotation is the very function whose evolutionary origin should be explained” and that “language is the necessary evolutionary outcome [...] of a selection realized through behavior,” Luhmann positions behavior – and action – as reflexive to communication. Communication is considered as a source *sui generis* (Parsons 1968; Elias 2000: 366).¹ Unlike communication in primitive languages (such as perhaps among chimpanzees), however, a symbolic order is prevalent among humans that is both internalized and

1 | “Plans and action, the emotional and rational impulses of people, constantly interweave in a friendly or hostile way. This basic tissue resulting from many plans and actions of men can give rise to changes and patterns that no individual person has planned or created. From this interdependence of people arises an order of *sui generis*, an order more compelling and stronger than the will and reason of the individual people composing it.” (Elias 2000: 366; cf. Ludes 1989: 50ff).

can be used reflexively for the communication of denotations and connotations – in other words, meaning.

« 10 » Whereas the generation of connotations can be explained in the biological model – “a second-order consensual domain with other organisms becomes indistinguishable from a semantic domain” (Maturana 1978: 49) – the semantic contents cannot be communicated reflexively and with reference to other possible meanings because the biological communication remains constrained by the *autopoiesis* of the living – and hence “embodiment” (Varela, Thompson & Rosch 1991). The denotations are developed in accordance with the development of and resonances among life-cycles. As against Maturana and Varela, Luhmann (1986a; cf. 2002a) hypothesized² that the *communication* of denotations can generate a symbolic order autopoietically. This symbolic order provides us with a second contingency in interhuman encounters: in addition to interactions by observing one another’s behavior, *Ego* expects *Alter* to entertain expectations similar to *Ego*’s own expectations (Luhmann 1995a: 103ff; Parsons 1951: 91ff, 1968). The sharing and exchanging of expectations in a double contingency opens “horizons of meaning” (Husserl 1969, 1973).

« 11 » Following another lead of Talcott Parsons (1968), Luhmann (1974) took this theory one step further: the linguistic media of communication can further be refined by codification, and then the symbolic order can increasingly structure a number of (qualitatively different) performative media (Luhmann 1997). Symbolically generalized media of communication are available for reflexive use by human minds. This second-order capacity for communication, for ex-

2 | Luhmann often avoided emphasizing the hypothetical status of his theorizing. For example, Chapter 1 of Luhmann (1995a: 12) opens with “The following considerations assume that there are systems.” Although systems are only “assumed,” the author adds immediately: “Thus, they [these considerations, L.] do not begin with epistemological doubt.” Elsewhere, however, emphasis is placed on the heuristic function of theorizing and the possibility of combinatorial gains by entertaining hypotheses (e.g., Luhmann 1977: 49; cf. Leydesdorff 2010c).

ample, enables us to communicate without needing the use of (natural) language (cf. Habermas, 1987: 384f). Non-verbal communication among human beings – unlike communication among chimpanzees – always reflects symbolic mediation (Leydesdorff 2000). For example, one can pay for a commodity with money without having to negotiate about the price.

« 12 » Whereas natural languages enable us to communicate meaning within boundaries – for example, those of a linguistic community – symbolically generalized media of communication (such as money, power, truth) enable us to communicate across borders or, in other words, globally. From this perspective, individual consciousness can be considered as a local platform of integration and potential translations among the various media available and continuously instantiated in a pluriform and complex society.

« 13 » Intentional action can thus be considered as a provisional result of organizing the interfaces among the symbolic media in a local instantiation. Institutional agency organizes the processing of meaning analogously, but at a supra-individual level. At this supra-individual level, however, a mechanism other than “viability” (Beer 1984; see also Glasersfeld 1981) is needed for continuation over time because the supra-individual level may add an element that cannot be derived from the living without mediation. Luhmann (2000) proposed decision-making among human beings as this organizing mechanism (cf. Achterbergh & Vriens 2009: 113 ff.).

Mechanisms of integration and differentiation

« 14 » What does this superstructure of theoretically informed hypotheses mean for individual consciousness and one’s capacity to construct radically one’s reality? The “horizons of meaning” (such as political meaning, scientific meaning, affective meaning, etc.) are analytically independent of one another and can be expected to operate with different frequencies. Political communications, for example, are structured by election cycles. Individual consciousness provides us with an additional degree of freedom or, in

other words, an internal axis for the integration of the variety of asynchronous and parallel developments across space and time by raising the question of “what do these different dimensions and frequencies mean for me?” The “*me*” can thus be differentiated from the “*I*” within consciousness (Mead 1934).³

« 15 » This differentiation within one’s mind and the different possible positions in terms of using communicative competencies makes us reflexively aware that others can be expected to entertain different sets of expectations. One needs to explain and translate into other frames of reference to reflexively understand interhuman communication.⁴ From this perspective, the domain of expectations provides us with a “second” contingency in which individuals can flourish. The sociological perspective can thus contribute to an “ecology of the mind” (Bateson 1972) and the sociological project can be reintroduced, but from a humanistic perspective (Luhmann 2002a, 2002b).

« 16 » Let me hasten to add that the symbolic orders of expectations at the supra-individual level should not be reified. In my opinion, the symbolic media remain constructs and in flux since constructed autopoietically in terms of expectations of interacting intentions. Language can be considered first as the evolutionary achievement that allows us to communicate both information (uncertainty)⁵ and meaning in

3| Note that the cybernetic tradition thus differs from the semiotic one as elaborated, for example, in the so-called “actor-network theory” (ANT) of Callon & Latour (1981; cf. Callon, Law & Rip 1986; Latour 1987). The semiotic *actant* is a result of its network of in- and output relations; next-order differentiations are not hypothesized but only considered in terms of observable relations (“co-words”) in the network.

4| Luhmann (1995a: 141f) defined understanding as a necessary component of interhuman *communication*. In my opinion, the concept of “understanding” as an attribute to communication is anthropomorphic and thus refers to consciousness. I take the liberty of using Luhmann’s concepts in my argument heuristically (Leydesdorff 2010c).

5| Luhmann (1995a: 67) defined information as a selection by a receiving system, with a reference to Bateson’s (1972: 315) definition of

the same pass (cf. Luhmann 2002a). Whereas other species can span a semantic domain and behave linguistically (Maturana 1978: 51f; 2000: 462f), the symbolic order enables us to specify understanding and misunderstanding; these reflexive exchanges allow for another order of magnitude in error-correction and learning.⁶ The symbolically generalized media of communication enable us, for example, to use jargons in specialties and to pay with credit cards instead of cash. The concreteness of action – observable as physical behavior – can increasingly be replaced by the expression and exchange of meaning using symbols; signatures for example.

« 17 » Luhmann (e.g., 2002b) cites Edmund Husserl as the philosophical source for understanding the results of interactions among intentions as social constructs that shape our cultural expectations. In the *Cartesian Meditations*, Husserl (1973) extended the notion of an individual *Ego Cogito* to the plural of *cogitantes*. *Cogitantes* are able to communicate with reference to *cogitata* – that is, objects of doubt. Whereas Descartes assumed that the individual *Cogito* encountered in its contingency the *cogitatum* as Transcendental – that is, God – Husserl “meditated” that this other of oneself could also be considered as the “intersubjective” domain of cultural expectations that embeds our psychology, but that can be accessed reflexively by *bracketing* the individual experience. The *cogitata* remain *res cogitans* – that is, uncertainty – but the reflexive specification of these uncertainties changes the perspective to a culturally constructed reality among other possible ones. Furthermore, the uncertainties at each moment can over time be formulated as expectations and hypotheses; hypotheses can be tested and theoretically informed.⁷

information as “a difference which makes a difference.” Different from this “observed” information, Shannon-type (or “expected”) information can be considered as (yet meaningless) uncertainty contained in a distribution, that is, as a series of differences (Hayles 1990; Leydesdorff 2010c).

6| This is one of the central arguments in Deacon (1997).

7| A hypothesis can be considered as an expectation that is theoretically informed and rationalized.

« 18 » According to Husserl (1962), a “Crisis of the European Sciences” had been generated because facts were presumed to be objective, while they remain in the intersubjectively (re)constructed *res cogitans* as theoretically informed hypotheses. Note the analogy with Maturana’s (2000) proposal to consider reality as “interobjectivity.” How can one study this intersubjectivity/interobjectivity as constructed – that is, without reification – and yet empirically? In this context, Luhmann’s (e.g., 1986a, 1986b) contributions can be considered as proposals for a sociological operationalization.

The social organization of “interobjectivity”

« 19 » Awareness of the other as a source of communicable and thus interactively enriching expectations, leads to a mediated definition of the social reality (Schutz 1967: 97 ff). Von Glaserfeld, however, insists on the priority of the question “who conceives of society?” and a focus on the individual constructors: “society” is for him nothing more than “a collective term for the handful of people we have learned to recognize in the above sense and to whom we may ascribe a number of common characteristics as well as individual differences” (Glaserfeld 2008: 63). However, a sociological perspective allows us to distinguish between this specific hypothesis about what I would rather call a “community,” and other possible forms of social organization.

« 20 » First, in the interhuman encounter, one can experience what von Glaserfeld (2008: 61) called a “second viability” if one imputes planning and foresight to others as well as ourselves. The interactions among these expectations – whether linguistic or symbolic – provide the variation for possible further developments of the communication of meaning. When these communications are at first only juxtaposed, “segmentation” is prevalent. Using a biological metaphor, this resembles the *morula* stage during embryonic development: each cell is still complete but no order or hierarchy is yet established.

« 21 » The transition from the *morula* to the *gastrula* is induced by the need at

the level of the emerging organism to synchronize cell cleavages across cells that are no longer adjacent. A rank order is thus induced by the one cell that happens to take the lead in this process. (Incidentally, this cell grows into the tail and not the head of the organism.) Using this model, recursive relations among communications that are no longer direct neighbors can be expected to induce stratification and hierarchy. A social system of communications in which hierarchical stratification prevails, for example, can be identified as a High Culture (e.g., an Empire). Note the difference with the biological system in the time order: the top of the social hierarchy has “the last word” reflexively (e.g., “*Roma dixit*”), whereas in the biology the *first* cleavage takes the lead.

« 22 » The decapitation (in 1793) of the anointed body of the King of France – who was king by the Grace of God – can be considered as the culmination of a process of modernization that took centuries. The symbolic constitution of the integration of society was gradually decentered from the embodied King to a system of discourses based on a written constitution. Political communication, for example, could internally be differentiated into a *trias politica* (Montesquieu 1949). This depersonalization paved the way for further differentiation of society in terms of different coordination mechanisms. The organization of society became even more complex because of the possible interactions among these different coordination mechanisms.

« 23 » For example, the market and political decision-making can be considered as two coordination mechanisms at the level of society. Their interaction leads to a political economy. Possible organizations of these interactions were historically retained among the variety of nation states constructed as political economies (in the plural) during the 19th century. The integration of the social production of knowledge as a third coordination mechanism in the 20th century can be expected to lead to the gradual transformation of political to knowledge-based economies (Leydesdorff 2010a; Leydesdorff & Zawdie 2010; cf. Strydom 1999).

The communication of meaning

« 24 » The coordination mechanisms in exchange systems of expectations can also be considered as eigenvectors in the networks of communications among the expectations (Foerster 1979, 1993). Note that these eigenvectors remain latent constructs of the communication. However, their position is determined not by single constructors or elements, but by the set – or, in other words, at a level that is systemic and therefore relatively global to the individual communications (links) and communicators (at the nodes) constructing and reconstructing the system locally. The causality flows forward and bottom-up with the communications, but the logic of control feeds back from the latent dimensions as an implication. In other words, the relations span a network with an architecture in which all units have a position. As these positions in the multidimensional space become increasingly condensed, they can also feed back to the relational operators (e.g., Luhmann 1997: 409). Thus, one obtains a double-layered structure of observable relations (vector values) and constructed eigenvectors (with eigenvalues).

« 25 » The next-order systems structure can be expected to evolve at a lower speed than the variation from which the selecting structures continuously emerge (Simon 1973a). Furthermore, eigenvectors stand orthogonally to one another (at each moment of time), and the number of eigenvectors needed to explain the development of the network is not *ex ante* given. In my opinion, Luhmann used this cybernetic model of a changing and historically variable number of eigenvectors⁸ to describe the possibility of functional differentiation in a communication system that self-organizes its own reproduction as a regime at the global level (Foerster 1960). However, von Glaserfeld (2008: 64 Note 4) noted that this metaphor of eigenvectors – as used by Luhmann – is “rather loose because the recursion of operations is not governed by fixed rules” (as in

8| Luhmann indicates the latent dimensions with the word “eigenvalue.” Technically, the eigenvalue of an eigenvector is the factor by which the eigenvector is scaled when multiplied by the matrix.

the static case). The functions develop over time because the system is further developing along historical trajectories.

« 26 » Historical retention can itself also be considered as one of the functions. “Organization” instantiates the system as relatively integrated for a next round of differentiation. The historical instantiation takes place at specific moments of time, but the functions develop in a self-organizing dynamics over time. Luhmann (2000) suggested that the symbolic medium of organization is decision-making. Decision-making can, for example, be formalized and codified into decision rules.

« 27 » Organization integrates historically what self-organization tends to differentiate as functions of subsystems at a (hypothesized) next-order level. In addition to these two mechanisms at the systems level, interactions at the bottom provide relational variation. However, the mechanisms of integration and differentiation can be uncoupled from specific individuals and is organized at a supra-individual level, although the mechanisms of individual actions and interactions remain always needed as a source of variation both disturbing the system and driving it toward change. Whereas organizations can be shaped over time along historical trajectories, self-organizing regimes develop evolutionarily in terms of combinations of structures in space (that is, as eigenvectors) and time (that is, as eigen-frequencies and their resonances; e.g., Luhmann 1997: 1124 ff); or, in other words, in a hyperspace. Integration and differentiation can operationally be considered as two sides of the same coin: without integrating instantiations (in the network space), the communications (differentiating in a vector space) cannot further be developed towards the edge of order and chaos, and thus one would fail to induce maximization of the communicative capacities.

« 28 » From this perspective, the individual mind can be considered as the minimal unit of historical organization. The mind participates in communication as an organizing unit among other such units – as a medium – and with a possible reference to next-order organizing units. Reflexively, the communication can be integrated and organized into a system of meanings with one order or another. This order depends on the

communicative competencies of the communicators and their networks. However, considering the self-organization among the codes of communication as “order” requires a decision, because these dynamics could just as easily be considered as disorder or chaos.

« 29 » Each description necessarily simplifies the complex dynamics of communication by organizing it from a perspective. When this integration is organized among individual minds (using an implicit or explicit rule), a specific organization of the semantics is shaped. When organization of the processing of meaning prevails at the level of society, a High Culture can be expected, with a tendency towards a single center of control and the illusion of cosmological order. However, abandoning the hypothesis of a single center of control provides room for functional differentiation among the different and potentially competing control mechanisms along the latent dimensions of the network. Note that the latent dimensions (eigenvectors) remain structures of expectation: these *cogitata* cannot be reproduced without *cogitantes*. The social order as an order of expectations remains radically constructed; the latent dimensions can only be accessed reflexively and their epistemological status remains that of a hypothesis.

« 30 » The option to organize the system of meaning-processing historically, both at the level of the individual mind and at the supra-individual level, provides us with another (since social) degree of freedom for the translation. For example, researchers in the laboratory may be able to validate new knowledge that engineers can use in a practical application for the development of new technologies (e.g., drugs or production processes). A division of labor in terms of combining different codes of the communication is thus made possible because of this “structuration” of the social in terms of structures of expectations (Giddens 1984: 162 ff.; Leydesdorff 2010b). Each historical manifestation has to be carried by the reflexive performativity of consciousness, but the reflected symbols can be selected differently with reference to the social needs for an intervention in a historical configuration. The communication of meaning is constrained by the historical conditions of reflexive understanding and learning (Leydesdorff 2000, 2010d).

« 31 » The symbolic orders can be instantiated and entertained in terms of fragments because the integration cannot be completed; differentiation can continuously be expected. Derivatives of the Latin verb “frangere” (to break) – such as “fragments,” “fractals,” “fragile,” etc. – are more relevant for the analysis than derivatives of “esse” (to be; e.g., “ontology”) because the different mechanisms remain operative concurrently and thus can be expected to disturb one another (e.g., Luhmann 1990: 635ff). The description of the cybernetic interactions among the subdynamics as a “system” can be questioned because there may be more systemness in some stages and in some interactions than in others.

A modification of the autopoiesis model

« 32 » Luhmann’s sociology requires a reformulation of Maturana’s *autopoiesis* model because the communication of meaning in interhuman relations operates differently from the observable communication of molecules (Luhmann 1986a). As Luhmann (1995a: 164) noted, the communication of meaning “cannot be observed directly, but only inferred” (italics in the original). The uncertain and hypothetical character of the communication of meaning suggests an extension of the Darwinian model of variation-selection-retention with the expectation of one more degree of freedom: variation, selection, stabilization, and possibly globalization.

« 33 » Some selections can be selected for stabilization at the trajectory level. This generates the layer of historical organization in the processing of meaning. Some stabilizations can be selected recursively for globalization at the regime level. Stabilization can be expected to occur along trajectories; in contrast, de-stabilization, meta-stabilization, and potential globalization can lead to regime formation and a symbolic order can thus be considered. These hypothesized – and therefore knowledge-based – regimes, however, can go into crises and then the system of expectations may move along trajectories to other basins of attraction. The regimes of communication, and transitions among them along trajectories, can be ex-

pected to absorb the creativity in the underlying layers selectively.

« 34 » In other words and using another biological metaphor, the complexity of communication can be considered as developing parasitically on top of the living systems (Serres 1980). This parasite, however, is not a viable system and its “living” is contextual because the historical carriers of the communication provide the medium. The abiotic selection mechanism in interhuman communications could perhaps be compared to that of a virus (Distin 2011: 203 ff.).

« 35 » The selecting structures at the systems level were defined above as the symbolically generalized expectations of codes operating as meta-representations. In other words, the system develops in terms of models that can be entertained reflexively by the modelers. Not the observers, but their observational reports communicate (Luhmann 1996)! The modelers are not only “structurally coupled” as a necessary environment of the modeling, but they also provide these reports with semantic content. There is no content in these expectations other than expectations generated in interactions among expectations.

« 36 » Perhaps it is questionable to call a social order that is so rooted in expectations among the carriers a “system” because of the biological connotations of the concept of “system” and the ensuing tendency in systems theory to reify the dynamics. Unsystematic interactions are crucial for the dynamics because interactions provide the variation. Each description of the social order of expectations as a system may reduce the complexity and volatility by invoking a meta-biological metaphor for the explanation (e.g., “morphogenesis”; cf. Archer 1995). Given the concurrence of and recursion in selection, stabilization, and globalization, it may be more important to specify the cybernetic mechanisms. The biological terminology can provide us with heuristics for the specification of hypotheses about how the social dynamics of meaning processing is *different* from the biological expectation (Leydesdorff 2006).

« 37 » From this cybernetic perspective, the social can be entertained as a radical construct that is continuously being reconstructed. The next-order system remains reflexively available to the carrying systems in-

sofar as one is communicatively competent to access and translate among the differently coded communications. Unlike a “hyper-cycle” with a hierarchy implied in the description, Bruno Latour (1988) used the metaphor of “infra-reflexivity” in this context: there is no “hyper,” “super,” or “sub,” but only interaction among radical constructions, each of which can be expected to contain its own (and evolving) eigenvector(s).

« 38 » In a series of four volumes entitled “Gesellschaftsstruktur und Semantik” (The Structure of Society and Semantics) Luhmann (e.g., 1980) further developed what it means sociologically to understand communication as increasingly complex, evolving, and functionally differentiated. He argued that the development of the possible semantics upsets and, in the longer run, revolutionizes the structure of society because the historical organization has to adapt to the possible dynamics at the global level under the condition of functional differentiation of the symbolically generalized codes of communication.⁹

« 39 » The invention of the printing press, for example, changed the order of priority in communication from the first original manuscript to be copied (e.g., the Bible) to the last-printed version, which may have been further annotated, updated, and corrected for transcription or other errors in previous versions (Luhmann 1981b). As long as the prevailing organization of society was historically constrained in the cosmology of a High Culture, some communications could perhaps be forbidden, censored, or “ex-communicated.” However, the Struggle for Investiture in the late Middle Ages opened the Western social system to the possibility of another order of relations between the Church and the Empire, based on functional differentiation. The individualistic revolutions of the 16th and 17th century, for example, made it possible to ask such crucial questions as von Glaserfeld’s (2008) “Who Conceives of Society?,” that is, the question of a concept of reality centered in an *Ego Cogito*.

9] From the very different perspective of evolutionary economics, Christopher Freeman and Carlota Perez (1988) developed a similar model of adaptive adjustments in the institutional layer to self-organizing dynamics (cycles) in the market.

The dynamics of expectations

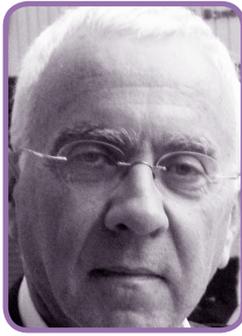
« 40 » The constructedness of the possible dynamics of expectations presumes construction at the level of the individual mind, which was specified most emphatically by the proponents of radical constructivism. Among our concepts, however, we can also entertain expectations about the expectations of others. Building on Husserl’s notion of intersubjectivity as the carrying ground for both (inter)objectivity (Maturana 2000) and subjectivity (e.g., Luhmann 1986b, 1994) and using other sources such as Parsons’s (1951) notion of “double contingency” and the psychological reflections in the pragmatist tradition (e.g., Mead 1934), two shifts could be proposed by Luhmann:

- from action to interaction, and
- from action as a behavioral category to reflexive perception and experiencing.

The internal richness that can thus be perceived correlates with a richer perspective on cultural constructs that can be entertained intersubjectively.

« 41 » Furthermore, Husserl’s philosophical – since “transcendental” – concept of intersubjectivity was operationalized by Luhmann (1986b, 1994, 2002b) in terms of interaction, organization, and self-organization *in the communication of meaning*. Interactions among intentional communications generate variation; for example, knowledge claims in scientific communications. Some knowledge claims can be selected as more meaningful than others, using latent standards such as those developed in scholarly discourse. The operation of the standards leaves traces behind in historical organizations, which periodically have to be reorganized because of new developments at the field level. In the sociology of science – but analogously in other cultural domains – one can distinguish empirically between developments at the group and field level (e.g., Gilbert & Mulkay 1984; Leydesdorff 1995; Mulkay, Potter & Yearley 1983; cf. Whitley 1984).

« 42 » For example, when knowledge claims – generated in the context of discovery – are further selected, first as manuscripts, then as validated knowledge in refereed articles, and eventually incorporated into the global archive (Garfield 1975), dif-



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ferent formats of specific organizations (libraries, departments, journals, etc.) that process these communications in relation to other contexts, are reconstructed. The organizations couple the operation of the code(s) of science to other functional dimensions such as economic viability, institutional prominence, political relevance, etc.

Conclusion

« 43 » In summary, I argued that the possibility of communicating meaning in interhuman relations adds to the semantic domain that Maturana (1978) specified in terms of his "biology of cognition." Human languages enable us to invoke a symbolic order in interhuman communications that can further be constructed by codification and symbolic generalization of the meaning in these communications. In addition to historical stabilizations of patterns in the organization of meaning, meta-stabilization and globalization – that is, in this context, symbolic generalization – is possible. In a pluriform society, "horizons of meaning" can be expected to be developed in different directions. This self-organizing differentiation is countervailed by integration at the organizational level that functions as a retention mechanism for new options. This latter layer can be organized in terms of networks of relations or punctuated as reflexive instantiations in individual minds.

« 44 » Note that agency and organization can thus be transformed into another function of the communication. From this

perspective, agency can be considered as the smallest unit of operation in the construction of communicative competencies that can be both reflexive and performative. Institutional agency is based on the aggregation of individual competencies in organization. As against Jürgen Habermas (1981) who argued in favor of integration of differentiation into the vernacular and therefore a "communicative competence" in the singular, the capacity to understand and to translate among differently codified meanings requires the development of different competencies in the plural. This transformation of agency and organization from a source of change – by taking action – to a functional resource of the communication tends to transform society and its economy from a politically integrated "political" economy into a "knowledge-based" one. Note that the progression of this ongoing transition remains an empirical question (Leydesdorff 2012, 2013; Leydesdorff & Zawdie 2010).

« 45 » As against von Glasersfeld (2008), I argued that society can be considered as more than the sum total of individuals in a community because of the possible communication of meaning operating interpersonally on the communication of uncertainty (that is, Shannon-type information). Husserl's notion of "intersubjectivity" was sociologically operationalized by Luhmann in terms of interactions among, organization of, and self-organization in this communication of meaning, shaping a complex dynamics that can be modeled using *autopoiesis* as a heuristics. I criticized Luhmann for using this biological model without suffi-

cient reflection because operational closure remains only a tendency in an otherwise uncertain domain of expectations.

« 46 » In another context (Leydesdorff 2010b), I argued that, using Giddens' metaphor of "structuration," one can obtain a sociological model akin to Luhmann's by replacing Giddens' "structuration of action" with "structuration of expectations." The structures "structuring" the instantiations can be considered as Luhmann's function systems. According to Giddens (1976: 64), these structures are "virtual," but have remained otherwise unspecified in his theory (Leydesdorff 1993). Luhmann provided us with an operationalization that accounts for both the instantiated organizations of meaning and the self-organization of meaning over time.

« 47 » As against Luhmann (e.g., 1990, 1997), I would consider self-organization in the differentiated communication of meaning as an inherently uncertain process that may operate with shades of grey instead of the binary black-and-white of false/true (Künzler 1987; Leydesdorff 2010c). For example, some statements are relevant to truth-finding more than others. In my opinion, Herbert Simon's (1973b) characterization of the criteria as oriented towards heuristics and problem-solving improves on the formulation by expressing the dynamic development of the symbolic codes of communication along with the communications from which they originate and on which they feed back.

« 48 » Access to these symbolic media remains a reflexive operation and requires

communicative competencies of the communication carriers. Unlike the Greek gods, the self-organization of the functionally selected communications remains reflexively coupled to sub-optimal trade-offs among codes in organizations and among individuals. A perspective on organizations as organizing interfaces among differently codified communications in processes of translations, however, can enrich and perhaps transform the (neo-)institutional perspective that dominates currently in organizational sociology and social network analysis (Leydesdorff & Zawdie 2010; Seidl & Becker 2006).

« 49 » More generally, I have pursued above a specific line in Luhmann's theorizing that, in my opinion, is available in his writings of the 1980s more than in the later writings of the 1990s. Whereas, for example, Luhmann emphasized in the first complete presentation of his theory (in 1984) that "*communications cannot be observed, but only inferred*," (Luhmann 1995a: 164, italics in the original), however, a general theory of observation became increasingly central to

his later writings (Fuchs 2004; Göbel 2000: 207ff; Gumbrecht 2006; Leydesdorff 2006, 2010c). In my opinion, a differentiation between expectations – based on inferences – versus observations that can be used to update (and even test) expectations provides us with access to a model that can then be developed into a theoretically informed set of working hypotheses.

« 50 » For example, the descriptions such as those in Luhmann's historical analyses of the development of semantics and social structures could nowadays be enriched with the possibility of statistics on semantic maps and their development in terms of coded structures among eigenvectors in the social networks of communication. Without damaging any of the assumptions of radical constructivism about the subject-centered origin of concepts, the further elaboration of mechanisms that turn private knowledge into intersubjectively validated discursive knowledge can thus be made visible in terms of the historical organization of meaning in contingent domains (Leydesdorff 2011; Leydesdorff & Welbers 2011). This sociological

analysis can enrich our philosophical (self-) understanding as an additional enlightenment on the possible constraints and contingencies of communication (Luhmann 1998: 18; cf. Glaserfeld 2008: 64). The specification of the dynamics of expectations may first seem as abstract as philosophical reflections, but given Luhmann's operationalization, the epistemological status of specification of our expectations has changed into the formulation of hypotheses. Expectations about these dynamics can be theoretically informed and rationalized, tested in terms of simulations, and measured in terms of empirical footprints in the development of organizational formats.

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Open Peer Commentaries

on Loet Leydesdorff's "Radical Constructivism and Radical Constructedness"

Symbolically Generalized Communication Media: A Category Mistake?

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> **Upshot** • Leydesdorff emphasises the uncertainties involved in the communication of meaning. Luhmann posited three types of media, each of which reduces one type of communicative improbability. The theory of cultural evolution supports Leydesdorff's emphasis on the uncertainty of communication, and agrees that different media are needed for communication within and across social boundaries. But it highlights the distinction between media and the symbolic codes that give them structure; and it raises the question whether Luhmann's symbolically generalized communication media are really media at all.

« 1 » There are fascinating similarities between Luhmann's sociological thesis that social systems use communications as their mode of autopoietic reproduction and the philosophical thesis that language provides the mechanism for cultural evolution. Both theses raise the immediate problem of defining communication, and for both the key lies, as Leydesdorff (§47) suggests, in the uncertainties that are involved in the communication of meaning. In this respect, cultural evolutionary theory provides some support for Leydesdorff's modification of the autopoiesis model – but it goes further

than Leydesdorff in criticising Luhmann's model.

« 2 » The theory of cultural evolution (Distin 2011) is that the complexity and diversity of human culture is the result of a process of the same type as that which accounts for the complexity and diversity of nature: a gradual, inter-generational process of change in a population's characteristics, as a result of the (almost) successful inheritance of variations in the information of which those characteristics are an expression. But information cannot be inherited unless the next generation is capable of interpreting and responding appropriately to it. In biology, variations in information are transmitted between generations *along with* the cellular machinery for their interpretation and expression. In human societies, communication is dependent on ego's understanding of the meaning of alter's utterances, and this means that the inheritance of cultural information depends more on ego than it does on alter. Communication has not taken place until ego makes a link between the sound or gesture that he has observed and the information that he believes alter to have selected – and the meaning that is communicated relies on ego's understanding of that link. A range of different meanings can be inferred from the same utterance, depending on ego's understanding.

« 3 » The problem, as Luhmann has identified and Leydesdorff emphasises, is that this makes communication deeply improbable: it is improbable that ego should understand alter's intended meaning; improbable that this meaning should be preserved with sufficient stability to reach ego over boundaries of time and space; improb-

able that ego should accept and act upon what has been understood. And this matters, because social systems are wholly dependent on communication.

« 4 » It is important to put this statement into an evolutionary context. The foundations for human sociocultural evolution were of course laid in a variety of physiological, cognitive, and social preadaptations, but one of the most significant was our ancestors' uniquely cooperative disposition (cooperative in the sense of cooperating to play a game by certain rules, rather than of cooperating on the outcome). Communication is only biologically advantageous to a species in which cooperation is a low-risk activity, and for our deeply cooperative ancestors, the adaptive advantage of communication was so great that it provided the evolutionary impetus for the intricate grammatical structure of modern natural language (Hurford 2007).

« 5 » Alter understands what ego means because they cooperate in the use of a shared language. For cultural evolutionary theory, the distinction between a language and its medium is important. A language is a symbolic code, which follows certain rules. Symbols cannot exist in the abstract – they must be realized in some kind of medium – and I divide languages into two types, depending on the kind of media they use. Natural languages use the media of human sounds and gestures. I have coined the term "artefactual languages" for representational systems such as the written word, musical notation or the conventions of architectural drawings, which are realized in objects made or fashioned by humans (Distin 2011).

« 6 » The speech and gestures of natural languages are structured by systems of compositional rules about how information is to be represented by individual sounds and signs. In this way, they make understanding more likely because they increase the probability that similar utterances will be selected to represent a given selection of information, and hence that ego will infer from alter's utterances a meaning similar to that which alter intended (cf. §10). In this sense, the codes and media of natural language correspond to Luhmann's communication media – so long as we bear in mind that, in cultural evolutionary terms, *communication media* is shorthand for *codes realized in communication media*.

« 7 » Natural languages are not representationally perfect systems, because they do not need to be: meaning can be clarified and corrected by nonverbal cues and a shared social context. Nor do they have a limitless capacity: there is only so much information that we can hold and manage in our collective brains. But they were sufficient to provide a substrate for the beginnings of cultural evolution; and the result, despite the system's limitations, was an explosion in the amount of information that early humans were able to trade, beyond the capacity of memory and speech alone. Natural language had helped to reduce the improbability of *communication*, but now a new selective pressure emerged: the cultural pressure for a shared language that could *represent* information more effectively. What evolved, under this selective pressure, were artefactual languages: codes realized in objects made or fashioned by humans – Luhmann's dissemination media (cf. §11).

« 8 » The structures and media of artefactual languages offer a variety of representational advantages to the cultural information that they carry, including stability, longevity, capacity, cognitive scaffolding and representational precision, all of which increase the probability that meaning will be maintained. They also increase the probability that communication will be successful over borders, because these languages are detached from the humans who use them. Whereas natural languages do not enable us to communicate unless we are within sight or sound of one another, artefactual languages are realized in media

that can transmit information over temporal, spatial or social barriers, forming cultural bridges between otherwise unrelated groups of people.

« 9 » The very act of bridging those barriers further reduces the probability of successful communication (§12): how can ego understand utterances that are detached from the shared social context that supports natural language communications, and why should he accept the meaning of utterances that come from beyond his normal circle of cooperation? Luhmann's answer is that successful communication is motivated by the establishment of shared frameworks for particular sociocultural contexts, which he terms *symbolically generalized communication media*. When ego operates within a particular framework (e.g., truth, love, money, law), the probability of his successful communication with others who operate within the same framework is greatly increased.

« 10 » In his account of this third medium, it is telling that Leydesdorff writes:

“Whereas natural languages enable us to communicate meaning within boundaries – for example, those of a linguistic community – symbolically generalized media of communication (such as money, power, truth) enable us to communicate across borders or, in other words, globally.” (§12)

« 11 » This description appears to conflate Luhmann's distinction between dissemination media and symbolically generalized media – a conflation that is justified if Luhmann has made a category mistake in drawing the distinction where he has.

« 12 » Moreover, in his adoption of Luhmann's terminology, Leydesdorff appears to blur the distinction between the “stuff” in which symbolic codes are realized and the codes themselves. This distinction matters: the same medium can be structured by different codes (e.g., the medium of human speech can be used by different natural languages), and the same code can be realized in different media (e.g., these words could be etched in clay, printed on paper or displayed on a screen). Alter's meaning can be understood by ego because of the evolutionary achievement of *linguistically-structured* communication media; it

can reach ego across spatial, temporal and social barriers because of the evolutionary achievement of *linguistically-structured* dissemination media. But when Leydesdorff (§12) appeals to symbolically generalized communication media to explain how alter's meaning can be accepted by ego even though it has been communicated over such borders, does he overstretch even his own use of the term “medium”?

« 13 » Cultural evolutionary theory, like Luhmann's sociology, recognises the tension between communication's importance and improbability, and seeks to identify the evolutionary achievements that enable us to overcome communicative problems. It pivots on the claim that languages, by enabling humans to receive and transmit variations in cultural information, provide the mechanism for cultural evolution. Information is represented in linguistic symbols and it is not possible for ego to extract from those symbols anything like the meaning that alter intended, unless both ego and alter are cooperating in the use of a shared language. Natural languages enable humans to communicate within the boundaries of established social relationships, and they rely for their success on a set of shared assumptions and a common social context. Artefactual languages enable humans to communicate *beyond* the boundaries of established social relationships, in order to get things done together even when they are members of different social groups, and they rely for their success on a set of shared assumptions about the knowledge that language users will bring: a common *cultural* context. The use of an artefactual language is a cooperative game just as the use of a natural language is; and if you do not know the shared set of rules then you are excluded from both the group of people who use that artefactual language and the semantic field that it represents. Conversely, your competence in that artefactual language will provide cultural access to that group, just as competence in a native natural language provides social access to a particular group.

« 14 » Thus, when alter chooses to communicate in a particular artefactual language, it is true that she loses the communicative advantages that her native natural language provides within its normal social

context – but she gains the representational advantages that her chosen artefactual language provides within its normal cultural context. And because artefactual languages evolve to represent information in a particular semantic field, ego's efforts to learn that language indicate that he is *already* motivated to understand what others have to communicate in that particular cultural context.

« 15 » Rather than positing a separate medium to reduce each level of improbability, then, the theory of cultural evolution suggests that the threefold improbability of communication is reduced, in each socio-cultural context, by the linguistic structures and media that have coevolved with the relevant semantic field. A common natural language enables ego to understand alter (because both are using the same system for linking utterances to information); it enables alter's communications to reach ego across the boundaries between individual consciousnesses (because it has evolved under selective pressure to enable just such communication); and it motivates ego to pay attention to alter's communications (because, as a multitude of sociolinguistic research has demonstrated, a common natural language, and in particular a common dialect and accent, determines access to co-

operation). A common artefactual language enables ego to understand alter (because both are using the same system for linking signs to information); it enables alter's communications to reach ego across spatial, temporal, and social boundaries (because it is detached from its human users and their social contexts); and it motivates ego to pay attention to alter's communications (because a common artefactual language determines access to the semantic field with which it has coevolved).

« 16 » This analysis suggests that while natural languages correspond to Luhmann's (linguistically-structured) communication media, and artefactual languages to his (linguistically-structured) dissemination media, the term *symbolically generalized communication media* is a misnomer. I have argued elsewhere (Distin 2011: 146–165) that money is an artefactual language; but Luhmann's other examples, such as truth, love, and power (§9), cannot meaningfully be called either languages or media.

« 17 » Like Luhmann's sociology, cultural evolutionary theory emphasises the role of ego's understanding in determining the meaning of alter's communications. As Leydesdorff highlights (§47), this makes the communication of meaning an inherently uncertain process, which may

be partially successful rather than wholly (un)successful. From the perspective of cultural evolution, Leydesdorff is right to emphasise the uncertainty of communication, but in following Luhmann's terminology he is wrong to conflate the concepts of media and the symbolic communication codes that structure them. The threefold improbability of communication is reduced, not by three corresponding types of media, but by the use of languages that have evolved to facilitate communications in a particular cultural context. These languages coevolve dynamically with the communications that they facilitate (§47) and with the media in which they are realized. Their use is a cooperative game, which reduces the improbability of communication in proportion to the competencies of the players (§44).

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Some Reflections on Meaning

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> **Upshot** • My focus is upon the uneasy relation of “person/culture,” a relation that any serious consideration of the important work of Luhmann cannot gloss over. The author indeed tackles this issue, but perhaps a fuller consideration of the work of Humberto Maturana sheds light on the argument.

« 1 » In contrast to Loet Leydesdorff's paper, in which the focus might be said to be on the *social* and *cultural* domains (and the ways in which these come to be what they are), my own focus of interest lies in

what the *person* is (and what are the ways in which the person living with others comes to live the way they do in society). To be clear about this, these are different perspectives on a single shared interest: an interest in what it is to be a human being in the biological, social, and cultural senses.

« 2 » My commentary attempts to bring to light just what these two somewhat differing perspectives are. It is motivated by the belief that this has bearing on the endeavors of radical constructivism, second-order cybernetics, the biology of cognition, and Humberto Maturana's more recent attempts to describe the foundations of humanness as concerning a biology of love (Maturana & Verden-Zöller 2008). Also, it touches on some of the more problematical aspects of the phenomenological tradition.

“Working hypothesis”

« 3 » I have difficulties with the author's referring to the “working hypothesis” of the constructivist (§§1, 2, 47). My own take is that this stress (at least for Ernst von Glasersfeld) is upon the way that such hypotheses function as the agency or a “common sense” motor for everyday human living. In other words, though absolutely central and vital, it is a “low level” (in the sense of micro) rather than intellectual matter. But this low level predisposition is a precondition for understanding the human being as never an entity that simply “bumps” into brute reality (as do billiard balls, or by stimulus/response). The working hypothesis in this implication is what signals the necessary shift from the non-reflective to the reflective. The reflective entails the “working hypothesis” as inherent to it (it is explorative), whereas the

non-reflective is instructed and acts strictly within the terms of a given instruction. Maturana's insight into the organisational closure of the nervous system *requires* a mechanism in terms of which the entity understands and participates in a community of shared interests and endeavours without such instruction.

“The communication of meaning”

« 4 » This is another phrase that I find confusing. It raises several related difficulties in the author's way of describing things. The problem arises because the author is seriously taking on one of the key challenges of this (constructivist, etc.) camp, the challenge of attempting the tricky task of describing from both within and outside a “domain of communication” at the same time. I have nothing but respect and applause for the attempt to relate Maturana, for instance, to more conventional intellectual traditions, where others simply avoid the complexities of such *reflexive* thinking and leave the biology of cognition in a dusty, unswept cul-de-sac.

« 5 » As regards “the communication of meaning” itself, it seems there is something missing. From my own perspective, meaning is not something communicated. Rather, meaning is a quality (indeed perhaps *the* critical human quality), which is generated as part of the essential dynamic of communication. This is akin to Maturana's stress that the key fundament of language is its connotative nature, and that the denotative is the thing to be explained. And this dynamic comprises the play of three different domains: the conceptual, languaging, and the symbolic. Now the point about this “play” is that it is not necessarily a play of complementarities, whose braiding marks out some unitary domain of reality – say “human meaning.” Rather, it tells part of the unfinished story of a fuzzy and *asymmetric* complex that, for the moment, I will refer to as “person/culture.” This complex entails aspects of our living as persons (as persons with other persons in society), but – and this is my claim – its quality is that it is *unfinished* and evermore shall be so. Any “supra” or “metalevel” commentary on this happening remains within the boundary conditions of such an *asymmetric* dynamic, and necessarily (just as for Kurt Gödel et al.) remains an essential uncertainty out of which mean-

ing emerges as a constant engagement in living as a person.

« 6 » The crucial thing achieved by Maturana's position, with the inherent focus upon the “organisational closure” of the nervous system and the mechanism of structural coupling to explain co-existence, is that it “outs” or perhaps, better, neutralizes the dualistic problematic of individual versus other. When taken seriously as the fundamental architecture for biological and cognitive being, then the fuzziness or uncertainty of things becomes simply part of the background for that fundament. And the consequent challenge is to experience and explain our living coherently, given such ontological uncertainty.

« 7 » With the above in mind, let me be explicit that the lurking problematic concerns that which Maturana has taken to calling the “person” in place of the “human being” or the “subject.” For me, the *person* (in the sense of Maturana) concerns the flow of living of human beings both within and without and between social and cultural and biological “skins” as an ongoing and open (i.e., asymmetrical) flow in terms of which meaning is something to be seized or “constructed” rather than something to be found or discovered “out there.” I see such a person (in other words, the human condition) as irreducibly situated on the choppy waves and current of uncertainty (and, indeed incompleteness). The biology of cognition describes the *why* of this (via organisational closure and structural coupling) – and the importance of this is not a reduction to biology nor that it strands us within the terrors of that bed of uncertainty (existentialism), but that it allows us to *make sense* of the centrality to the coherence of our human living through the generation of *meaning* as an intrinsic aspect of our interactions and their recurrences.

« 8 » To repeat – uncertainty becomes not some existential threat (where it lurks in the phenomenological tradition), but is understood as an inherent aspect of the capacity to generate meaning as the carving of coherences out of the flow of what I would call the “ontological uncertainty” of our living (as a biological factor in the evolution of humanity).

« 9 » To return to my starting point, meaning is not so much “communicated be-

cause of reflexivity in interhuman communications” while remaining unobserved (cf. Leydesdorff's Method in the abstract), but is an essential characteristic of that reflexivity. Meaning is something *lived*, not something either observed or communicated.

A note on the symbolic and the cultural

« 10 » The symbolic order only *partially* enables us to “specify understanding and misunderstanding” (§16). More properly, in line with Maturana, the symbolic order allows us to interact more flexibly and within a “fuzzier” set of realities than might otherwise be the case (including the cultural). This is how I take Maturana's notion of the *multiverse*. The personal (or subjective) nature of each such reality, and the shifting sands of uncertainty as we realize and embrace our human living in the sea of the shifting realities of others, does not *lessen* through our lived interactions. Rather, it can become understood and experienced as a – if not *the* – vital part of human-living-in-uncertainty through the *play of exchanges* in terms of the *tokens* of those symbolic orders. The acceptance of tokens having a shared abstract value, and the emergence of the system of trust that this implies, are fundamental in the bringing forth of a *more flexible domain of trust*. It is just such a domain that has as its elements respect for the other as the other, or what Maturana calls the emotion of “love” (acceptance of the legitimacy of the other in their domain of operation, see Maturana & Verden-Zöllner 2008). Maturana's implication is that this “emotioning” is the crucial evolutionary development of humans rather than the conventional view that it was the more abstract higher function of mind, or rationality (*ibid*).

« 11 » I do not imply that the above are absent from this important and original paper. Merely, I would repeat, there is a difference of *focus of interest* between my own take and the author's on these interesting matters. Without going too much into detail, one might summarise these as, on the one hand, the European phenomenological tradition (which Francisco Varela went on to embrace), and, on the other, the position held by Maturana, which appears to be outside any particular intellectual tradition. When I came across this position it caused

my own trajectory to be the converse of Varela's. I found it far more optimistic and indeed recognisable than the purely (as I saw it) intellectual phenomenological stance. I had taken seriously Michel Foucault's analytic of the endless nature of a micro-physics of power and the ineluctable hold of power/knowledge in any particular discourse (e.g., Foucault 1970). This other intellectual position offered a far more coherent and positive way forward than Foucault's in-depth critique of the human sciences.

« 12 » At the bottom, the issue is whether the *focus* of one's own interest is the state or culture or, conversely, the person. From Foucault, my reading was that culture is bound to assert forever its own dynamic over the human psyche in ever more insidious and subtle ways – a somewhat pessimistic outlook. I felt that these other individuals, and this other tradition, were – whether naively or not – freed from that dark conclusion. This other tradition affirmed a more positive message for the human psyche in this complex age, one in which the dynamic is a more creative tension between norms and persons, in terms of which there will always be the eruption of novelty and creativity as an “escape valve.”

« 13 » To conclude, such a *focus* (in the sense of a choice of vantage) carries an *ethical* statement as to what it means to be human. Our conclusions, after all, reflect our experience of our journeys, and those journeys are, as Gregory Bateson (1972) reflected, laid down in our walking. Leydesdorff's paper is valuable in that the author does not shy away from these issues but attempts to push them to their very boundary conditions. My sole reservation, and perhaps difference from the author, can perhaps be summarized by whether one believes that one might finally take a step of some sort beyond (or above) such an ethical horizon. Perhaps the search for certainty is the scourge of our age, more than for previous ones. Uncertainty and incompleteness have been culturally integrated as pathological and as threats to our coherence of living. They have been treated as conflicting with reason and logic, as denying the rational, when all that is needed is a reconceptualization of what it is to be logical, what it is to be rational, and what constitutes the emotional. Here Maturana's corpus is wonderfully inspiring.

« 14 » My view is that there is no such ethical horizon to be strived for (whether

ontologically or epistemologically), but that we re-integrate into our culture and ways of living together the joy and certainty we can generate for ourselves in the *exploration* of the age-old reflection on what it is to be human. The certainty is no longer something “out there,” but in the *understanding* (the assuredness) that to be a person and generate meaning erupts from an irreconcilable tension that permeates the most trivial as well as the most important of the happenings of our living. Indeed, without such a tension there would be no meaning.

« 15 » Meaning is a function of uncertainty not of certainty. Lack of certainty is the necessary condition for meaning to emerge (as the reflective).

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Author's Response: The Continuous Reconstruction of a Pluralistic Society as an Order of Expectations

Loet Leydesdorff

« 1 » In response to the interesting comments of Kate Distin and Roger Harnden, let me focus on the relationship between the biological (and evolutionary) systems view and the socio-cultural perspective. Perhaps more than any other question, a core issue of sociology (political theory, etc.) has been: “How is social order possible?” I argued in this issue that Luhmann (1995a) made an important contribution by changing the answer to this question into a communication-

theoretical one. In his *oeuvre*, however, the main operationalization remained focused on historical instances (e.g., Luhmann 1980, 1981a, 1989, 1995b). In my opinion, the challenge is to elaborate the theoretical steps into designs that can be tested in empirical communication research.

« 2 » I shall argue in response to Distin that for this purpose I need Luhmann's (1997) distinction between symbolically generalized codes of communication and diffusion media. One can consider this as a distinction within the domain of “artefactual languages” that Distin distinguishes from natural language. In response to Harnden, I argue that, from this cultural perspective, the non-verbal when perceived as vital and “rooted” remains codified, although an interpersonal encounter may not require articulation in a natural

or artefactual language. Harnden's ethically motivated stance thus exemplifies my answer to Distin that one needs to assume symbolically generalized expectations about codes of communication – in this case, love and affection – that provide interhuman communications with a specific feedback and perspective.

« 3 » In Harnden's contribution, this symbolic coding is constructed in terms of Maturana's (e.g., 1978) theory and philosophy (the so-called “biology of cognition”). However, “interobjectivity” (Maturana 2000), or transcendental “intersubjectivity” (Husserl 1973), was transformed by Luhmann in two different studies (Luhmann 1986a and 1986b, respectively) into contingencies that are, in principle, amenable to empirical research *because* these domains are now considered as mediated (McLuhan

1964). Mediation implies communication in terms of distributions among agents and therefore the possibility to use various statistics for the specification of uncertainty (Leydesdorff 1995).

The self-organization of the coordination mechanisms of society

« 4 » The intellectual history of the problem of social order in modern times begins with Hobbes' *Leviathan* of 1651. In the midst of the English Revolution and shortly after the execution of Charles II in 1649, Hobbes argued in favor of the installment of a sovereign with absolute power because, in his opinion, such a submission of the individual provides the only solution for "the war of all against all" ("*bellum omnium contra omnes*"). This latter "state of nature" would otherwise prevail in a society that was no longer integrated religiously and cosmologically.

« 5 » As against the religious solution of the Middle Ages, in which one's individual soul could be rescued from Nature by God's Grace, Hobbes addressed solving the problem of order at the level of society. Whereas the individual solution was religiously sanctioned, the social solution is not "given." Ever since the decapitation of the king of France, the killing of the father in each of us (Freud 1930), and Derrida's (2004) consequent decapitalization of the word, hierarchical order is no longer inherited and the question of social order can be formulated as one about the different and possibly conflicting coordination mechanisms operating in society.

« 6 » I mentioned Montesquieu in this context and the constitutional system of checks and balances since the 1780s. In what can be read as essentially a critique of Marx, who emphasized the development of *Capital* as a unique coordination mechanism prevailing in history, Weber (e.g., 1968a) considered cultural history as a battlefield of values. In his opinion, the values can be considered as secularized versions of the Greek gods (e.g., Weber 1968b: 604). Perhaps Parsons (1968), but certainly Luhmann (1971) made the move to consider these transcendental values as functions of communication based on different codes (cf. Merton 1957).

« 7 » I agree with Distin that the wording "symbolically generalized media of communication" can be considered as a misnomer since, in my opinion, the expression – introduced by Parsons (1963a and b; 1968) – is elliptic. The codes are generated from and operate within interhuman communications as eigenvectors of a network, and they cannot operate without mediation. Not the media, but the codes are latent and can therefore be generalized symbolically. Functional differentiation among the codes enables the communications to process more complexity than in a hierarchically organized configuration. The differently coded coordination mechanisms span different (and potentially orthogonal) horizons of meaning. One can operationalize the latent dimensions as eigenvectors using a factor model of the networks under study. In other words, the eigenvectors (or factors) span dimensions that can function as different horizons of meaning at the systems level.

« 8 » The reconstruction and integration is performed historically and locally by reflexive agencies and organizations. The mechanisms are relational (as different from positional; Burt 1982; Leydesdorff in press) and these couplings at interfaces need to be further specified (e.g., Luhmann 2000, 2002a). The historical cases provide us with manifest observables and thus access to the evolutionary dynamics. The latter is complex because it is composed of a number of different and potentially reflexive subdynamics (Leydesdorff & Zawdie 2010).

Symbolic codes and artefactual languages

« 9 » The relations between codes and media in Parsons' and Luhmann's work were extensively discussed by Künzler (1987, 1989). Unlike Parsons' linguistic codes, Luhmann's codes can be considered as meta-biological and therefore turned "on" and "off" in a binary mode, as in the case of DNA (Habermas 1987; Leydesdorff 2000, 2006). Künzler (1987: 331) then proposed understanding meaning as *ratio essendi* of language, and language as *ratio cognoscendi* of meaning. That is, language can be considered as the embodiment of meaning, whereas meaning cannot be known outside of language. Meaning, however,

can also operate among us when one is silent because meaning does not only codify information: meaning can also be codified recursively into a symbolic order (Deacon 1997).

« 10 » The artefactual languages observable in writings and printings – Luhmann's (1997) "Verbreitungsmedien" – provide a sufficient condition for the emergence of a High Culture as a stratified organization of society. Empires can be distinguished empirically in terms of the artefactual languages that mediate their control. Innis (1950), for example, specified how the invention of papyrus changed the modes of communication and control in Egypt when compared with Mesopotamia. More recently, the invention of the printing press (Eisenstein 1979) and, most recently, the Internet have disorganized prevailing orders.

« 11 » Artefactual languages, however, cannot explain the longer-term transformation of a pre-modern and cosmologically integrated society into one that can be considered as functionally differentiated in terms of its (symbolically generalized) codes of communication. The symbolic generalization of expectations can operate counterfactually because the codes are latent (as eigenvectors). The manifest observables are instantiations among other possible instances. The system evolves in terms of what happens in relation to what the events mean for what could have happened. What could have happened can only be specified from a systems perspective (by reflexive agency participating in the communication).

« 12 » One is able to carry the differently coded communications to the extent that one is reflexively and communicatively competent to do so. At the individual level, this order is a psychological and not a biological one. From this perspective, social order is not established by writing a constitution unless such a constitution reflects in writing the civil liberties that prevail in society. Such liberties as political freedom, academic freedom, or the economic pursuit of happiness are grounded in models of coordination and communication that we have reflexively internalized. A symbolically generalized order reconstructs our horizons of meaning as an order of expectations that can operate counterfactually (Grant 2000).

« 13 » In the theory and computation of anticipatory systems, in my opinion, new semantics have been developed that may be helpful. Anticipatory systems were first defined by Rosen (1985) as systems that entertain a model of themselves. Entertaining this model, an anticipatory system has an additional degree of freedom to select in the present, among possible next states; for example, different phenotypes can be manifestations of a single genotype. Dubois (1998) distinguished this operationally as incursion from recursion (with reference to a previous state), and then further introduced hyper-incursion, that is, a system that can use future (as opposed to past) states for making a choice in the present.

« 14 » A weakly anticipatory system can then be defined as a system that entertains a model for the specification of possible next states; a strongly anticipatory one as a system that uses expectations specified on the basis of a model for its own reconstruction (Dubois 2003: 112f.). In my opinion, one can read Luhmann's theory as the hypothesis that society communicates meaning and reconstructs itself in terms of communications about possible future states. However, this reconstruction is done in a distributed mode and in different dimensions. Luhmann (1995a) suggested three dimensions: that communications are distributed spatially, over time, and substantively (cf. Lucio-Arias & Leydesdorff 2009a). Society as a strongly anticipatory system "structurates" (Giddens 1979) our individual expectations as weakly anticipatory (since also biologically contingent, that is, embodied) systems (Leydesdorff 2010e).

« 15 » In other words, communicative competence is not just knowing how to write a cheque, but also understanding the meaning of an economic transaction (with or without being able to write a cheque). One acknowledges this understanding in the symbolic communication, for example, by signing the cheque. The meaning of an economic transaction is supra-individually warranted, that is, at the level of society, and no longer valid only within in a specific organization, nation, or empire. In this sense, the meaning is symbolically generalized in a code that operates both in the transaction and at the next-order systems level. The expectation is that one pays a debt; if one

fails to pay, the transaction is damaged. The expectations structure the ensuing action, such as the writing, the enforcement of the law, etc.

Society as a counterfactual order of expectations

« 16 » An order of expectations is well known to us from science: scientific theories specify conditions that can be fulfilled and then events that can be expected to occur. The scientific model describes a set of possible future states of the system under study. Thus, a model is constructed discursively, which enables us to specify possible future states. Observations can inform the expectations in the form of observational reports. Unlike a truth that is given *ex ante* (as in religion), scientific knowledge is provisional, emerging discursively, and historically volatile. In other words, scholarly communication instantiates an order of expectations.

« 17 » Scholarly communication is more reflexively transparent than the operation of other symbolically generalized codes of communication (Luhmann 1990). The latter can be reflected by science (e.g., in the economic sciences), but are not themselves part of science and therefore not accessible as another text (Ashmore 1989; Latour 1988). In the symbolic order, however, prices provide us with expectations of value, art with a reference to enjoyment, and – more generally – social order remains an order of expectations that is supported and sustained by social institutions.

« 18 » This reflection on symbolic generalization brings me back to Harnden's ethical argument for the priority of *living* (with a reference to Maturana). It seems to me that Maturana's prime example of "love" as naturally given, such as between an infant and its mother, is tainted by the cultural metaphor of the Madonna with Child. However, Maturana's argument is about speciation because the mother-child relationship among humans is characterized by longevity, while among chimpanzees it is not. From this perspective, the mother-child unit constitutes a basic organizational format in human society.

« 19 » I do not wish to deny these biological "givens," but only their usefulness in explaining social phenomena immediately, that is, without sociological reflection. From

the perspective of the present, each previous state of the system may seem more "natural" than the cultural constructs currently under reconstruction. However, theorizing is culturally mediated: one entertains models of other possible states. For example, we have access only to the "naturally given" via a reconstruction. Was childhood so happy? Or is the pre-oedipal mother already beset with conflicts? Is love between husband and wife more "natural" than love in same-sex marriages? Since there is no possibility of a "return to nature," one should be advised to develop the appropriate instruments for understanding society as an order of expectations.

« 20 » In my opinion, important steps have been made, albeit in terms of decennia: from a sociological perspective, the social is no longer considered as given or transcendental. The communication of meaning allows for operationalization (Leydesdorff 2011). However, Luhmann (1995a: 164) emphasized that "*communication cannot be observed, but only be inferred.*" Instead of observing naturalistically, one can specify hypotheses about the systems of reference and the communications operating. The distributions generated by communication cannot be observed directly without uncertainty, but can be put to excellent use for measurement and thus for observation-based statistics and hypothesis testing. For example, economic transactions can be described in terms of transaction matrices, or scholarly communications and their lineages in terms of citation statistics (e.g., Lucio-Arias & Leydesdorff 2008, 2009a and b).

« 21 » Furthermore, Füllsack (in this issue) proceeds to the simulation. The theory and computation of anticipatory systems provides models that enable us to appreciate instantiations (of expectations) as incursions and hyper-incursions (Dubois 1998; Füllsack 2009; Leydesdorff 2008, 2010e, 2011; Rosen 1985; cf. Giddens 1979). In other words, a focus on biological or linguistic observables without specification of theoretically informed hypotheses – that is, expectations – does not allow for making inferences about the communication of meaning.

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