

Observing Networks*

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ABSTRACT: If modern society, based on the introduction of the printing press, has believed in reason and was sorely tried as a result, a next society, emerging with the introduction of computers, believes in ecology and is similarly finding little resolve in this belief. This paper looks at a combination of systems theory, cybernetics, and sociological theory in search of a tool for inquiring into contemporary social forms. The idea of observing networks, drawing on Heinz von Foerster's notion of observing systems and Harrison C. White's network calculus of identity and control, is outlined to enable basic sociological intuitions about social forms to be integrated with an understanding of both complexity and recursivity organizing our perspective on the human condition in a precarious world. Social forms are shown to gain robustness not from substantial identity but from relational ambiguity. Observing networks, or so the hypothesis goes, combine bodies, minds, society, and – soon perhaps – intelligent machines. The paper looks at how an understanding of complexity, recursivity, system, form, and network may help flesh out the calculus of our human condition.

KEY TERMS: complexity, form, network, recursivity, society, system.

I.

The observer reproduces as a system, that is as an organism, a consciousness, a society, or – perhaps in the not too distant future – as an intelligent machine. Social forms are cultures of observers. They limit and foster how observers interlink as second-order observers within a network of ties, frames, scripts, and stories. Culture means that effort is always needed to comply with a form, and that such effort almost naturally draws attention to alternatives or at least to subversion.

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Social forms are always both complex and recursive. Complexity means that social forms combine observers and their perspectives into the unity of variety. And recursivity means that they draw on themselves when evolving nonlinearly in surprising ways. They are, as various concepts developed in cybernetics and systems theory would have it, reliable forms built from unreliable components (von Neumann 1956), forms of distinctions re-entering into themselves (Spencer Brown 1972), proemial relationships ordering exchange and exchanging orders (Günther 1979), synthetically determined but analytically unpredictable non-trivial machines (von Foerster 1991), or white boxes with black boxes trying to get out of them (Glanville 1982).

Social forms are forms that come about through complementary expectations (Parsons 1951; Luhmann 1995). If communication begins and ends with a mutual perception that accounts for situations framed by the other – in person or via some proxy – as being present (Ruesch/Bateson 1951; Watzlawick/Beavin/Jackson 1967), then social forms come about by defining the other as complementary. This complementarity is that of a difference; any turn-taking flip-flops a hierarchy. Asymmetry is pivotal; symmetry is a second-order asymmetry, the exception to the rule. Asymmetry sets in with the observer reflecting for himself or others that he is dependent on a situation that is already changing him (Mead 1934).

There is no way to avoid such reflection, however passingly. Dependence on situations translating into social forms produces independent observers. Mutual perception while playing for complements confronts the problem of double contingency, the realization that nobody can make a move as long as everyone is waiting for the other to make his move (Parsons/Shils 1951; Luhmann 1995). This is why complements are necessary in the first place. Restricting yourself in your commitment unbinds action (Elster 2000).

This paper examines how the notions of observer, form, system, network, complexity, and recursivity can be combined into a sociological tool for analyzing the network structure of 'next society' (Drucker 2003) and its culture of bodies, minds, society, and intelligent machines. We assume that next society is to electricity and computers what modern society was to mechanics and the printing press, their structure and culture, respectively, in both cases allowing communication to take place in abundance and to be handled sensibly (Baecker 2007a).

Our hypothesis is that the very asymmetry of social forms assures them an indexicality and reflexivity (Garfinkel 1967) that attract references to other possible observers, delineating a

network in which any social form can find a footing and switch to others. The skill of the observer is in maintaining the ambiguity necessary for any switch (Leifer 1991).

II.

Examples for social forms defined by complementary expectations abound. Erving Goffman's *encounters*, understood as "eye-to-eye ecological huddles" (Goffman 1972: 16), are among the most prominent. Their complementary structure consists in the roles of performance and audience being differentiated however fast they switch within their so-called 'turn-taking' (Goffman 1959; Sacks/Schegloff/Jefferson 1974). If nobody plays the role of audience, no performance arising from observation of the situation will outlast its first, however bold attempt. Many behaviors may thus simply go unnoticed, schooled as we are in more or less tactfully dissimulating our perceptions.

We have a first distinction, that between performance and audience, which underlies all others that may then be invented to figure.

More social forms were discovered by urban sociology. Cities, understood as ecologies of networks, organize themselves through a few social forms called neighborhoods, professions, markets, and news (Park/Burgess/McKenzie 1925). *Neighborhoods* are among the most demanding albeit fleeting social forms because their complementarity of closeness and anonymity instantly gives way to either encounter, structuring itself into performance and audience, or self-dissolution. Both Max Weber and Georg Simmel highlighted the evolutionary achievement of cities over tribes, describing the city as the surprising social form where strangers can live together, relying on a social distance nurtured by mutual aversion, which is, however, able to accept a relationship not based on kinship (Weber 1958; Simmel 2009; Baecker 2004). Neighbors complement each other in the highly artificial second-order asymmetry we call symmetry, which is in fact based on a social form cancelling itself, thus reducing the other to an element of a situation reassuringly affirming itself as the physical and social milieu in which one lives. These neighbors people streets, trains, shops, restaurants, hospitals, churches, schools and other so-called 'public' spaces.

Less demanding but more consequential are the other social forms that self-organize the city. *Professions* combine the expert with the novice, *markets* the buyer with the seller, and *news* the reader with the reporter. Those are well-established social forms anybody can opt for at

short notice even if one side of the chosen form, drawing on special performances, needs a great deal of background preparation relying on other forms such as classes, firms, or desks. Again, as with neighborhoods, we begin to realize that any social form needs to be embedded in a network consisting of other forms, as well.

Informed by urban sociology about an ecology of social forms, we may check classical and contemporary sociology for more examples while maintaining the idea that the relationship between these forms is ecological rather than cosmological, as ancient society believed, or functional as has been the belief of modern society. We opt for an understanding of our society as a next society, which feeds on tribal, ancient, and modern forms while in fact reconfiguring them.

First of all there is the social form of *kinship*, so strictly defined by complementary expectations that anybody knows that to address somebody as the father of my sister means to go for different complements than when addressing the same person as the husband of my mother (White 1963). Kinship is a most complex social form mixing all sorts of asymmetries or orders with all sorts of symmetries, or second-order asymmetries, going for similarities between brothers or sisters, old or young, and thus opening up the social space first for encounters free to produce new distinctions and then for social forms distinct from kinship.

One of the social forms to be distinguished from kinship, if not exactly orthogonal to it, is the *pecking order*. Pecking orders are precisely defined while open to dealing with a wide range of issues and to constant competition with respect to who is to report and to whom. More often than not, in fact, they fail to live up to their own sophistication and dissolve into the hierarchical order of a governance that relies on means for restricting further competition. Rulers and ruled prove able to constitute more stable social forms provided there are intermediate positions, viz. servants, soldiers, officials, or managers, who ensure that up stays up and down down. But here again we see that even stable complements do not come without intermediary positions, which, if they are to have an opportunity at all, must link up in wider networks. Servants provide resources and substitute for self-observation, soldiers ensure communication with adversaries, officials administer architectures of complexity, and managers make sure that nobody confuses situation with potential.

Social forms tend not to coincide with broader institutions. Institutions like family, government, church, or army draw on social forms that draw on them to emphasize their obviousness while understating their inherent risks. Institutions are the long shadow cast by

social forms that come and go much more rapidly. Yet while social forms rely on their own inherent complementarity, which has continually to demonstrate its efficiency, institutions tend to invoke a higher economy of social order that is monarchical, divine, or at least natural in origin (Agamben 2011).

A far from exhaustive list of social forms would also include laws, workbenches, desks, artworks, payments, beliefs, classes, banks, campaigns, crises, and games.

Laws are norms upheld by one observer while the other either deviates or complies, thus defining their complementarity in terms of agreement, conflict, and decree, which again draws heavily on the wider resources of a network. Laws are not rules normatively governing behavior but distinctions called upon in seeking agreement or broaching a conflict where neither agreement nor conflict had previously existed (Luhmann 2004).

Organizations are needed to be able to talk about *workbenches*. They complement people who do not have to know what they are accomplishing and are instead in quest of a career, fun, or revenge, on one hand, with people in search of purpose, strategy, and, on all accounts, markets to fill in the knowledge they others lack, on the other. Their asymmetry has become focal in modern society even if earlier societies had already capitalized heavily on the inconsistency between technological and social demands on behavior (Udy 1959, 1970; Marx 1990). Our notion of social forms dispels any idea that this inconsistency is to be overcome revolutionarily or evolutionarily; instead, it is one of many inconsistencies permitting the human condition to be probed.

Desks are the instantiation of a bureaucracy pitching authority against subjects expected to fit into categories invented by forms and backed by offices that may belong to a state, a business firm, a church, hospital, school, university, or whatever. Sophistication in dealing with desks depends on how to fill in the blanks in a form depending on the scope given to any particular clerk and realized by a subject (Yablon 1990).

Artworks are social forms that complement an artist's improbable imagination with a spectator's willingness to accept and experience it without expecting any further action or being expected to act in certain ways. Artworks show that surprising forms are possible (Luhmann 2000).

Payments are social forms as well, complementing the expectation to be supplied with the expectation to be remunerated without any further obligation ensuing. The means for paying may vary as long as it solves a debt situation (Gurley/Shaw 1960).

Beliefs may be considered to be communications assuring somebody of a certain place in the world while those assured give due respect to those administering a world providing these places (Luhmann 1985). Churches, sects, and religious movements feed on an asymmetry of belief and comfort, which again has a fleeting robustness that is not to be confused with institutions that match doubt with doctrine.

Classes are social forms that complement teachers by pupils and pupils by teachers (Dreeben 1968). Usually, the suggestion is that before any class there is knowledge on only one side of the identities involved, whereas after the class the knowledge, indeed the same knowledge, is also on the other side, such that the former can also examine the latter. Talcott Parsons showed that, in order for such a complementary role structure to function, the teacher must identify a little with the pupil and the pupil with the teacher (Parsons 1959). If they overshoot either the identification or its blocking, the teacher becomes too much of a buddy or too stern while the pupil either becomes an overachiever or too much of a rascal. But besides this, classes are reliable social forms which in some ephemeral mode, relying more or less on practice versus theory and on intelligence versus teaching by rote, succeed in transferring a knowledge that nevertheless differs on the two sides of the structure. Blackboards, slides, in fact didactics and pedagogics are 'boundary objects' (Star 1989) maintaining the suggestion of the identity of knowledge while nurturing the difference of judgment.

Banks do not have to do only with money. They are social forms that ensure liquidity, the storage of value, and above all credit, also with respect to other media of communication such as power, love, truth, knowledge, or belief (Baecker 2009). Protest movements and political parties bank on uncertain chances to invest and earn power, feeding on the solidarity of affect, and be it rage (Sloterdijk 2010). Romantic relationships as well as families are banks storing investments in love and crediting some liquidity in situations when currency is suddenly lacking. Research institutes operating on the basis of earlier discoveries are credited with the ability to harness discoveries while still doing their research. And universities are banks that take deposits and give credits in terms of intelligence to be applied to still unknown situations (Parsons/Platt 1973). In any of these cases, and they will not be the only ones, there are complementary expectations that actions undertaken by the one may be able to earn the expenses incurred by the other. Again, the structure is asymmetrical in that the two sides are

able to check each other out without running the risk of their situation being identical. Instead, both are looking at the same account, which for the creditor is in credit and for the debtor in debit. Ideologies, passions, theories and methods, and competencies are examples of accounts of various banks.

Campaigns are social forms pitching a message to a possible follower. *Crises* are social forms letting problems seek solutions. And *games* are social forms that complement players who win by players who lose, investing a seemingly symmetrical present with an asymmetrical future that, although unknown, is made certain to arrive by the game. We could give many more examples; as we have said, the list of possible social forms is not exhaustive.

Societies emerge from the suggestion and supposition that somehow the environments to which all these social forms relate in their different ways have some common grounding. Ideologies, entertainment, even the notion of public opinion, which draw on and enforce this reference to a common grounding, are needed to document, again by producing difference, that society as such does not exist. It nevertheless remains attractive to emphasize commonalities by looking to the environment for generalizable clues to be converted into 'objects' and 'symbols' that nobody has reason to doubt. This is how realities emerge, to be distinguished from presentations needed to support social forms. Actually, reality consists only in the possibility of switching. This is the reality on which we propose to focus our understanding of 'society.'

Looking back from society at *people* watching this kind of artificially common environment, we do not, of course, see social forms, invisible to the non-sociological eye, but masses, crowds, and, possibly, publics. *Masses* are physical clusters of people, often triggered stigmatically by environmental stimulus answered by an inner urge everybody has difficulty recognizing as his own (Canetti 1962). *Crowds* are complementary to individuals who can offer no clue to account for their switches (Riesman 1950). A truly sociological notion is that of a *public*, which is at the same time audience and on its way to switching (Tarde 1989; Ikegami 2000).

Irony has it that these publics find their own social complement in not just social but sociable forms of company at dinner parties, festivities, and social gatherings that emulate aristocratic manners while trying to opt for equality. The consequences are well known. A bourgeois society develops that sets up equality as the norm, supported by a statistician's sociology,

which counts individuals and their actions instead of looking at social forms (Karafillidis 2010).

III.

These social forms are the molecules of our society emerging from as much as constituting elements we call identities or observers. These molecules are the gravitational centers of all kinds of flows, swarms, and fields of communication, action, and experience, which in other respects fluctuate freely and chaotically inside an ecology of networks in which the social forms are embedded. Aiming for an understanding of both complexity and recursivity, we propose to call such forms *eigen*-forms of recursive functions operating as complex systems (von Foerster 2003; Kauffman 2003).

This bid to combine complexity and recursivity will hopefully also help settle a dispute between Heinz von Foerster and Niklas Luhmann, one of whom opted for recursivity and the other for complexity as the centerpiece of analysis and modeling. Von Foerster claimed that Luhmann blurred and thus impaired the understanding of recursive communication with the description of too much complexity (von Foerster 2002), whereas Luhmann could have answered that the complexity he was trying to describe was the complexity of social systems recursively reproducing themselves while dealing nonlinearly with their environments, including other systems within their environment (Luhmann 1995). We may add that for Luhmann the appeal of 'complexity' consisted also in an attempt to show that society is able to reproduce without falling back on overly simplified 'solutions' to complexity such as that of a fascist society, whereas von Foerster preferred recursivity because it seemed to be able to bridge an understanding of living and artificial systems, or of biology and physics.

We will not go into this dispute at this point, since both had good reason to opt as they did. Instead we attempt to show how the arguments of recursivity and complexity might be combined, as indeed they already were in the theories of Luhmann and von Foerster despite the controversy, since both were interested in recursively complex systems.

Looking at complexity first, we propose to call any system 'complex' that encompasses 'essential variables' within an organism and its environment. We thus take up Ashby's concept of 'system' (Ashby 1960; cf. Baecker 2005), to be distinguished, for example, from Luhmann's concept (Luhmann 1995). Whereas Luhmann defines a system in terms of the

boundary it draws autopoietically to separate itself from its environment, thus postulating that there are indeed such things as systems, Ashby more cautiously considers the system to be an observer's notion identifying certain feedbacks between an organism and its environment, such that "... the free-living organism and its environment, taken together, may be represented with sufficient accuracy by a set of variables that forms a state-determined system" (Ashby 1960: 36).

We call this system a complex one because, consisting of two components, the organism and its environment, which cannot at any time be reduced to each other, it is defined as the unity of a variety, which fits certain understandings of the notion of complexity (e.g., Luhmann 1975; Weaver 1947; Morin 1974), perhaps discovered as long ago as the 3rd century CE by Diophantus (Stillwell 2002: 383/4).

Note that the unity of the variety of at least two components irreducible to each other is an asymmetrical unity. This fits in with our understanding of reliable forms, forms of distinction, proemial relationships, non-trivial machines, and black boxes, as mentioned above.

'Organism' is a term for both self-reference and recursivity, 'environment' a term for this self-reference being not only insufficient but pathologically dangerous when defining the identity of the organism. Alfred North Whitehead (1979) called any European philosophy since the days of Plato a 'philosophy of organism' since it always tries to deal with the paradox of defining a unity in terms of a distinction, or a self-sufficient entity in terms of self-insufficiency. Both Heidegger's notion of the necessity of *Ergänzung* ('completion') of any *Dasein* within some receding 'whole' and Derrida's deconstruction of any intellectual concept with respect to the pervasiveness of indispensable but mostly hidden *suppléments* embedding it in a discourse and its indexical references have confirmed this seminal intuition of European philosophy to our day (Heidegger 1995; Derrida 1982).

If there is any intuition common to all systems theories, be they biological, physical, sociological, or of the engineering kind, it seems to consist in accepting the basic asymmetry of a system operating a distinction, a boundary, with some self-referential closure on the inside of the distinction and some indefinite but always shadowing ground outside (Varela/Goguen 1979). The self-reference of closure is postulated for both observer and the organism possibly observing itself. One needs to feel comfortable with European philosophy to be able to talk about it at all, even if and the more so if such self-reference is to be labeled 'elusive' (Lawson 1985). In the Anglo-Saxon tradition the notion of self-reference is almost

tantamount to mysticism and is to be avoided in favor of statistical correlations, perhaps increasingly of a Bayesian, 'self-correcting kind (Gigerenzer 2005).

Operationally it may be conceded that self-reference is nothing more than a concept for circumscribing the necessity of an 'organism' to produce and reproduce a closure by distinguishing the two sides of the distinction asymmetrically and by ensuring that operation follows operation, or that for any 'end' there is also a 'beginning' (von Foerster 1984). The intuition is that of a Turing machine granted infinity in exchange for purpose (Tholen 2001). 'Self' indicates 'inside' to be able to refer to 'outside.' Again we are dealing with inherently relational and reflexive definitions that have nothing to do with substantial definition or essential determination (Fuchs 2001). All substance and essence consist instead in the recursive production and reproduction of the system of an organism within its environment, featuring as more or less stable states certain *eigen*-values, *eigen*-functions, or *eigen*-forms.

Thus, complexity comes with self-reference and recursivity, self-reference being elusive since it refers to a closure, which is identified by being distinguished from its environment, and recursivity being non-linear because at any instant it is to be determined as indeterminate, a source of noise and perturbation.

The mathematics of a complex system is given by George Spencer-Brown's calculus of indications (Spencer Brown 1972), which provides all the necessary ingredients: (1) the operation of a distinction, called 'cross,' (2) an elusive self-reference through attribution of this operation to an 'observer' drawing the distinction and thus distinguishing himself, and (3) a shadowing unmarked state as the indeterminate outside of any determinate distinction, including (4) the self-application of this calculus to an observer who is defined by drawing the distinction to indicate 'forms' of distinctions, such as the operation, the inside, and the outside of the distinction.

Thus, we note that for any system, S , there is to be the distinction ('cross,' \lrcorner) of an organism, O , from its environment, E , such that the system is self-referentially ('re-entry,' \llcorner) able to reproduce within an always surprising environment:

$$S = O \lrcorner E$$

As 'organism' will qualify any closure which an observer has reason ('motive') to provide with self-reference, including an observer looking at himself. As 'environment' will qualify any space of indeterminacy to be determined and re-determined by the recursive reproduction of the organism. Since 'cross' is tantamount to closure, we can also write:

$$S = \begin{array}{|c|} \hline \text{—} \\ \hline \text{—} \\ \hline \end{array}$$

IV.

Returning to our social forms, we now have a first understanding of what they accomplish, being, as it were, *eigen*-forms of communications of observers bound by asymmetrical structures but free to switch from and to any of these structures as they see fit and are able to muster others.

We have a complexity of observers reproducing within their environment and encountering other observers for whom the same condition holds. We provide any of these observers with albeit elusive self-reference, which means that any of them acts non-trivially (von Foerster 1991) and that any social form attracting them has both to solve and to reinstitute the problem of double contingency (Parsons/Shils 1951; Luhmann 1995).

Yet, the interesting question now is whom or what we may be inclined to consider an observer. Moreover, any account of observers has to include you and me, the reader and the author. If we round up the usual suspects in all kinds of systems thinking, we come up with living systems (organisms), neurophysiological systems (bodies and brains), mental systems (minds, consciousness), social systems (society), and soon, perhaps, artificially intelligent systems. We, reader and author, act within a network of bodies, minds, cultures, and machines, continuously but unreliably observed by our skins and stomachs, our feelings and moods, our questions and doubts, our colleagues and competitors, peers and kin, our keyboards, screens, desks, streets, and traffics, our accounts, certificates, contracts, debts, and promises. To whom are we to grant the status of observer? To whom not, and why not? We know that we tend to take everything for granted that works as it should, and which is thus

unseen and inconspicuous. Are we to define observers by their capability if not willingness to be obvious, if not to disturb?

If in the social sciences we remain faithful to an understanding that what is unremarkable and taken for granted is at least as interesting if not more so than what is ostentatious and eye-catching (Malinowski 1944), then undisturbed and routine matters are as significant a point of departure and reference for our analysis as any perturbation and impact they may have on a system. In fact we are not dealing with static matters where nothing happens as long as nothing happens but with highly temporalized, restless systems that have to operate at any moment to reproduce the elements ('events') of which they consist (Luhmann 1995). Thus to maintain routine is already a performance, possibly one of the most demanding of performances, constantly concerned to compensate for all the minor errors and deviations that happen without having to trigger major responses.

This is why 'communication' is such a fruitful concept. Communication is complex in itself, since it relates messages to sets of possible messages (Shannon/Weaver 1949), calling on a relationship that is uncertain at both ends if we drop Shannon's assumption that a set of possible messages is technically given (as an alphabet, for example) to instead assume that a set of possible messages has to be socially constructed at any instant (as 'context') if the message is to relate to this set in the first place (Baecker 1997 and forthcoming).

Communication demands that self-reference be assumed for all participants, since any double contingency would otherwise be lost (Baecker 2011). And, perhaps most instructively, communication means going for and working on both redundancy and variety (Bateson 1972).

We thus propose to call 'observer' anything and anybody able to take part in communication, choosing from among the selections offered by communication, referring nontrivially to a self able to co-define, together with references to the environment, the state an observer is in, and relying on a complexity that relates a closure to an environment, and vice versa. We may then call a 'system' not just a closure within its environment, but an observer within its environment, and can then talk about 'observing systems', as Heinz von Foerster has put it (von Foerster 1981), thus once more equating closure with observation, and both with system. Observing systems, then, may be materialized in domains as diverse as life, consciousness, culture, and technology, as long as any observer has enough reason to entertain a relationship with them that is understood as interaction involving not necessarily understanding but at least control (Ashby 1958).

V.

The observing systems we are talking about are embedded in observing networks. This is why we have taken care to introduce otherwise well-known notions like 'system,' 'recursivity,' 'complexity,' and 'communication' anew, not knowing, of course, whether we would not wind up in the same old deadlock.

Network is a term referring to environments used differently, be it competitively, aversively, indifferently, or co-dependently, by various kinds of observing systems. We call such an environment an observing network where the notion of network is used to account for the presence or potential presence, even if tacit and implicit, of observers of different kinds. We hence draw on a notion of network introduced by Harrison C. White (1992), which (1) accounts for heterogeneous elements ('identities'), such as individuals, organizations, stories, practices, and locations or sites, (2) does not account for boundaries since the very reason for talking about networks is to do a calculus of possible links complementing, changing, or also substituting previous links, and (3) describes any of its element as an identity seeking a footing with offers and withdrawals of mutual control, supplemented by self-control, that always remain uncertain. Any actor in such a network is considered an observer whose main skill consists in maintaining an ambivalence that is the precondition for being able to switch links and social forms if not networks altogether (Leifer 1991).

Our understanding of network seems compatible with Humberto R. Maturana's notion of network as distinct from 'organizational closure' and 'structures,' all operating within 'autopoietic' systems (Maturana 1982). We may conclude that a network enables closure by pervading if not actually by crossing it.

Moreover, we define a network as consisting of second-order observers trying to account for different observers, their perspectives, and their distinctions. We are thus obliged to include you and me, reader and author, in such a network communicating about the network of observers. And you and I are body, mind, culture, and machine.

Culture theories, at least in the vein of Bronislaw Malinowski, are prepared to relate bodies, minds, culture, and artifacts within their environments in the way we propose to do here (Malinowski 1944; see also White 1949). The notion of 'culture,' beginning perhaps with Jean-Jacques Rousseau, already has this distinct ability to look at bodies moving and feeling, at minds aiming and failing, at artifacts framing and guiding, and at social forms demanding, seducing, and alienating when asking such innocuous a question as whether people in certain

scalable ad libitum, of the form per se. Yet any distinction has to ensure that both sides of the distinction are separated from each other by negation, while still being linked by implication. This is what Spencer Brown invites us to do: to consider a distinction to be a connection at the same time.

The observing society, *obs^{society}*, is to be conceived as the possibility of switching social forms, or complementary expectations, thus attracting, sorting, and rejecting actions and experiences that either fit or not. This opens a vast field for research, for looking into how bodies, minds, and machines comply with these social forms, exert pressure, experience offers of a certain design, or simply act as bottlenecks constraining all other observers. We think that if a cognitive science worthy of the name ever develops, it will be able to pursue such a research program, owing a great deal to Malinowski and Parsons, but surpassing them in integrating technology issues and possibly taking ecological ideas even more seriously by examining more closely how in their network any of these forms produces media apt for new forms (Heider 1958).

There are a number of pointers on how to conceive the other observers populating our network. If we take bodies as a proxy for organisms including their brains and their entire neurophysiological architecture, we might conceive of *obs^{body}* as a calculus continuously comparing rewards and ventures, prone to develop habits and the blindnesses coming with them (Freud 1996; Frith 2007). Minds will prove difficult to model. Maybe we can even skip them, guessing that *obs^{mind}* is nothing but an imputation developed in the co-evolution of body and society, or of organisms and social forms, to enable them to be kept separate and not confused (James 1912). This assumption will certainly hurt philosophers but their compliance will be rewarded by the rich avenues of inquiry opened up into the relationship between bodies and societies.

To enable us to think about technologies, machines, artificial intelligence, artificial life, and artifacts in general, or *obs^{machine}*, is one of the main reasons we take the trouble to rethink cultures of observers. Entering not only our ecological era but also a 'next society' (Drucker 2003), we have cause enough to venture the hypothesis that the introduction of electricity, the computer, and its networks into society is having at least as great an impact on that society's structure and culture as the much earlier introduction of language, writing, and the printing press (McLuhan 1964; Castells 1996; Luhmann 1997; Baecker 2006, 2007a, 2007b, and 2007/8). The computer, the 'invisible machine' (Luhmann 1997), is the richly connected, fast operating, arithmetically inscrutable, and globally networked machine that, for the first time

since modern society banished spirits, gods, and devils from its communication, takes part in this communication in a way modern 'humanist' society thought only human beings would be able to do. As this modernity becomes historical (Latour 1993) and our society switches from its modern belief in function, reason, and equilibrium to observation of communication, systems, control, and play (Baecker 2007a), we have just begun to inquire into the computer and its network, exploring and exploiting the possibilities of instantaneous electronic connections through knowledge management, decision support, computer aided design, manufacturing, selling, and innovation, search engines, social media, and crowd sourcing.

What we here define as an observing network, $obs^{network}$, is a network of different systems producing components, elements, or events that belong both to themselves and their environments, such that their 'autopoiesis' (Maturana 1981) relies on a common network world, a 'medium' (Heider 1959), which is nevertheless different for each. Yet, through control, it allows identities to seek a footing for their next operations (White 1992).

VI.

We thus have good reason to use the systems theoretical notions of self-reference, complexity, and recursivity in combination with concepts of network (Maturana 1981; White 1992) in tackling a sort of research that considers 'syncopated complexity' and 'truncated logics' (Fontdevila/Opazo/White 2011) the order of the day and looks at networks peopled by all kinds of observers who may all be formalized and modeled as ethical robots whose calculus has been described by Warren McCulloch as a Turing Machine "with only two feedbacks determined, a desire to play and a desire to win" (McCulloch 1965: 200).

The very asymmetry of social forms and the possibility of switching ensure that no observer can be certain who is to play for what kind of gain. Playing for mating is pivotal, but also dissimulated at any time (Baecker 2007/8). Asymmetry and switching mean that all observers focus on relations and only with respect to relations on substance. They look for closure to open it. They confine with indexicality and reflexivity to be always able to make a next move.

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