Who Qualifies for Communication?

A Systems Perspective on Human and Other Possibly Intelligent Beings Taking Part in the Next Society[*]

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Next society might be that in which computer-based artificial intelligences begin to take part in communication. We therefore need to rethink one of modern society's most cherished ideas: that only humans qualify for communication. We have driven spirits, gods, and devils, animals, and plants out of this realm. This paper looks into notions of society, communication, and the social propounded by the theory of social systems to investigate how and when artificial intelligences will be able to join human beings in that most demanding undertaking, communication. Independence, self-reference, and complexity are identified as some of the conditions artificial intelligences will have to fulfill. It will take new structures and a new culture for society to live up to this.

I

Next society's most distinctive characteristics will be to abandon modern society's idea that only human beings qualify for communication and to extend this peculiar activity to computers. This at least is Niklas Luhmann's hypothesis. He maintains that the closure of communication allowing for structural couplings with human beings' consciousness and nothing else will admit another case of structural coupling as computers come of age and learn how to participate in communication (Luhmann 1997, pp. 117–118). We will hence have to rethink what we understand by "social" and who can engage in social activities. We will make the case not for adding ideas on the parasocial to our rather unclear understanding of the social or even calling an end to it but rather for sharpening and perhaps radicalizing our conception of the social to re-integrate intelligent beings other than humans.

Luhmann's hypothesis is non-self-evident in several aspects. All the notions it employs need explanation. Indeed, the very hypothesis of a next society emerging is a challenge to sociology to reconsider both its phenomenological stance and its theoretical and methodological apparatus (Baecker 2007; Baecker 2007/2008). Thus, the notions of society, communication, human beings, consciousness, and computers all need clarification, and the notions of system, closure, and structural coupling, among others, seek to pose new kinds of questions and develop new kinds of descriptions.

Note, however, that the idea that only consciousness has access to communication and that therefore only human beings are engaged in society is a restrictive idea entertained only by modern society, which has driven ghosts and devils, spirits and gods, plants and animals out of the realm where partners in communication were to be found. This is the flop side of humanism's venerable attempt to liberate humans from natural and mystical confinement. The world of human beings has been emptied of any other kind of intelligence for listening to and talking with. Only the ecological movement has made any move to change this, at least taking note both of the hubris of human beings and of their loneliness in a world bereft of any other kinds of intelligence (Latour 1993; Latour 2004).

The advent of computers, computer networks, artificial intelligence, robots, software agents, and avatars presents the ecological movement with unlikely allies in its attempt to put the idea that only human beings qualify for communication at least in parentheses. All categories privileging human beings for both consciousness and communication are in some sense called into question. At the same time, unique features of human beings such as their bodies and senses, which constitute their "wetware" and distinguish them for the time being from artificial intelligences, are being rediscovered. Ironically these are the very features held in poor esteem by the same modern philosophy that thought human beings singular. Humans have lost reflexivity as their most distinctive feature and have in some strange kind of deal regained their body only to find it being scrutinized for virtuality, as well (Hayles 1999).

II

There are hence several questions we need to look at more closely. The first is the alleged shift from modern to next society, followed by the notions of society, communication, and the social that need clarification to establish who could qualify to participate. Last not least we will have to look at both human beings and computers so that we can compare them with regard to the potential for communication. We will skip questions of consciousness as they do not fall within the area of sociological competence. Moreover, consciousness may prove to be a function rather than an entity (James 1922), so that a better understanding of both communication and organism is required if we are to gain any insight into what we need consciousness for. Considered in terms of the cognitive sciences, consciousness may turn out to be a kind of delay function ensuring that bodily perception and social intercourse are not confused at the moment of linking or structurally coupling (Frith 2007).

Before looking at the notion of society, however, we have to introduce that of "next society" coined by Peter F. Drucker (2001, 2003). As Marshall McLuhan, Manuel Castells, Niklas Luhmann, and others agree, next society means that the introduction of the computer based on the invention of electricity is changing society as much as the introduction of the printing press based on movable letters and thus mechanics did in producing modern society. Quite some knowledge collected in the last century by the humanities is converging with surprising coherence toward the assumption that a few media for the dissemination of communication in human history have dominated in challenging what structures and cultures emerge in society. Four media epochs in society stand out: tribal society, catalyzed by oral language; ancient society, by written language; modern society, by the printing press; and next society, by electricity and the computer.

This is not say that other things become less important, to mention only the potato, the plow, gunpowder, paper, the wheel (both in ships as land vehicles), bureaucracy, women's emancipation, television, and so forth. But these inventions can been seen as secondary in the sense that they were enabled or demanded by more important inven-tions in the dissemination media of communication (McLuhan 1967; Castells 1996). Moreover, the overwhelming importance of these media lies not only in liberating new kinds of far-reaching communication but in the challenges these new kinds of communication posed for the societal structure and culture. Where the structure and culture of a society are, for instance, adapted to oral communication, the invention of written communication comes as a surplus nobody is prepared for or knows how to deal with. Society has to develop modes for rejecting communications that come with these new media in order to adapt to it slowly and accept it selectively. This happened with the introduction of language, writing, the printing press, and the computer. In each case structures had to be developed to ensure the dissemination of communication, such as tribes, social strata, functional subsystems, and networks, depending on a culture form that also had to be developed to enable society to reduce the overflow of meaning to devices to control it, such as boundaries for tribal society, *telos* for ancient society, equilibrium for modern society, and, possibly, system for next society (Luhmann 1997, pp. 410–412).

We do not have to go into the details of the theory of the dependence of societal structure and culture forms on dominant communication dissemination media (Baecker 2007). We need it just to mark the threshold from modern society to next society. Modern society emerged when the printing press and whole populations beginning to read and to write produced an overflow of unprecedented comparison and criticism. This overflow was tackled by the Renaissance, humanism and the French Revolution, and was then channeled into the functional subsystems of society, such as democratized politics, the market economy, positive law, empirical science, intimate religion, passionate love, and autonomous art, all of which transformed communication from self-evident convention and tradition into restless second-order observation (Luhmann 1998). Yet, it order to encourage reading and criticism while dealing with this criticism in interaction, it proved helpful first to individualize human beings and then subject them to ideas of human reason, which, if they were to be effective, demanded exclusivity with respect to gods and animals. Ever since, moder-

nity has focused on the restless equilibria of individuals, markets, publics, scientific truths, love affairs, beautiful art, and so on, bound up with the conviction that reason, if not progress, is imminent. Talcott Parsons accordingly conjectures that in modernity the principle of the structural stability of social strata is replaced by that of media of interchange or communication (Parsons 1977).

All this means that we have to look closely at how society presents us with what kind of overflow of meaning produced by what kind of dissemination medium in order to understand what structure and culture are emerging both to ensure the overflow and reduce it to forms in which it can be handled. The notion of "form" as proposed by Georg Spencer-Brown (1972) is useful in this context since it combines indication of a selective operation with distinction from everything else, so that the re-entry of this distinction into the distinction ties selection into an understanding of its selectivity. We will be coming back to this.

The notion of next society is meant to emphasize that with the advent of electricity and computers, language, writing, and the printing press as the older media for disseminating communication are being transformed by a new dissemination medium that poses a new problem of overflow and thus demands new kinds of structure and culture of society. It can be posited that the overflow of reference to the absent was the problem posed by language and that boundaries restricting who talks to whom, when and on what subject were the answer that allowed tribal society to emerge; that the overflow of symbols extending far into the past and future was the problem posed by writing, and that *teloi* distinguishing the perfect from the corrupt were the answer that permitted ancient society to emerge; that the overflow of criticism of anything and anybody by anybody was the problem posed by the printing press, and that restless equilibria framed by reason or rationality provided the answer leading to the emergence of modern society. Then the overflow of control can be seen as the problem posed by computers and notions of system the possible answer that allows the emergence of next society. However, the leading hypothesis, like that of dissemination media producing overflows of meaning obliging a society to develop a culture form to handle it, is as non-trivial as

the corresponding notions of society, media, dissemination, overflow, structure, culture, and form. For thirty years, Niklas Luhmann prepared a book of some thousand pages to provide a description of the structure and the culture of modern society that would help us to know where to look, what to describe, and what notions to use in understanding society's transformation into next society, a transformation he cautiously hinted at but did not elaborate on (Luhmann 1997; Baecker 2006).

To be sure, all older media of dissemination, not to mention media of success such as money, power, truth, love, or art, are here to stay, all in transformed guise and a changing social context. We still talk, write, and print, and we are still bound up with the culture forms that came with these media, such as the respect for boundaries, the longing for purpose (or *telos*), and of course the hope of reason and rationality. But it would be sentimental to believe these culture forms are able to deal with the overflow of meaning produced by computers and their networks and by the artificial intelligence possibly developing within this new medium for disseminating communication. Let us rather consider what notions of society, communication, and control prepare us to watch what will be happening with computers and with us in next society.

III

Unfortunately, sociology is as much a child of modern society with its insistence on individuality and reason as it is a child of industrial society with its experience of social inequality, urban society, and individual alienation. The ambivalent stance resulting from this double and antithetic childhood shows in many respects, in empirical research that looks into social problems while nevertheless seeking to be useful, as in a notional apparatus that, for instance, emphasizes the possibility and intentionality of action while at the same time suspecting "norms", "roles", "structures", "systems", or "networks" takeoff taking the lead in social dynamics. Rare are ideas in sociological theory that deal head-on with the ensuing paradoxes and focus on notions accepting that the emergence of society informs rather than results from individual action (Tarde 1969; Latour 2005; Luhmann 1995).

This is why the notion of communication never really took hold in sociology, despite the forceful case made by Michel Serres, Jürgen Habermas and Niklas Luhmann, each with his distinctive focus: Serres on the creativity of disturbance, Habermas on the possibility of reasoned consensus, and Luhmann on structures that render improbable communication probable (Serres 1982; Habermas 1984; Luhmann 1995). Those foci are not really such worlds apart as often believed. All, or so it seems, accept the non-triviality and the non-linearity of communication, so that all deal with surprise or with correlation not confined to causality. It would not be too difficult to imagine a parasite developing subtle kinds of reason to invest imponderable communication with structure enabling combination of the three approaches. But we will not be going into a sociological or socio-philosophical discussion (see, for instance, Rasch 2000), but concentrating on the notion of communication itself, informed, as it were, by our need to come up with an understanding of the concept commensurate with our understanding of society.

There are three features of any useful notion of communication we need to keep in mind when testing the qualifications of new intelligent beings for participating through communication in a society that thus transforms itself from modern to next society. They are selectivity, recursivity, and closure.

"Selectivity" is Claude E. Shannon's contribution to communication theory. Somewhat hidden by the famous but seriously misleading channel model of communication presented in Shannon and Weaver's book, the truly seminal contribution of Shannon's statistical notion of communication is to propose a notion of information emphasizing that information is the relation of a selected message to the set of possible messages from which the selection is taken (Shannon, Weaver 1963, p. 31). This means that one has to know about both the set of possible messages and the selection taken from it to know about the fact and the content of the information of a message. Shannon underestimated the range of his statistical idea in considering it an engineer's notion (ibid., p. 31). As I have shown elsewhere, we have to abandon the engineering idea that the set of possible messages is technically given for the

alternative view that this set is to be socially constructed along with any message in order not only to bring semantics back in into communication theory but also to establish its inherent place in the theory as the more general case of any communication (Baecker 1997, 2005).

To focus on the relation between one selection of a message and the set of possible, probable, or expected messages, i.e. to focus on the selectivity of any message as its information content is an idea George Spencer-Brown has made easier to grasp in his notion of "form", which makes the same point (Spencer-Brown 1972). As I see it, Shannon's definition of information, if generalized with respect to both exogenously given or endogenously constructed sets of messages, may some day be considered one of the most important ideas of the second half of the twentieth century, introducing the necessity to define units by difference, or units by complements that has proved so important for structuralist, post-structuralist, deconstructive, systemic, and constructivist thinking (Descombes 1980; Luhmann 2002).

Anyway, if selectivity and not transfer is the focus of mathematical systems theory, then our first answer to the question of who qualifies for communication is just about anybody and anything able to make this kind of selection, i.e. comparing a message in this fashion with a set of possible, probable, or expected messages. Any entity whatsoever that can do statistics and recalculate its expectations in the light of experience qualifies for communication.

Note that in the following pages we will not be talking about "entities", as would be the more expected phrasing, but about "units", much as this suggests the membership of a larger whole. Wording here is bound by cultural prejudice. We are using the term "unit" to avoid the implication of self-containment coming with "entity" and to allude to an understanding of the whole, which is prominent in Martin Heidegger's philosophy, the "whole" here not suggesting that indeed there is a cosmological closure of the world but instead reminding one of the necessary "Ergänzungsbedürftigkeit" of any one unit, a necessity to be supplemented by something it can not contain itself (Heidegger 1995).

IV

Of course, this is a necessary but not a sufficient condition. A second condition is also necessary: recursivity between communicative events, i.e. messages, with the precondition of recursivity between units participating in communication. It is difficult to separate this second condition from the third, closure (or, indeed, from the first one, selectivity), but it nevertheless helps clarify our concept of communication if we look at recursivity and closure separately to begin with.

Recursivity means three things. First, that any message is to be considered a message only if there are further messages, preceding and subsequent. Indeed, without further messages there would be no set of possible messages, which is crucial for the concept of selectivity. A message is to be specified only in relation to other messages, which means that communication is primarily determined by itself and not by the world it brings news from. This self-determination (or "closure", see below) ensures that communication needs not one but several elements, or better, events, if it is to take place, and the recursivity between these events is to be used to find out what the communication is about. Communication is a multi-event event. It needs distributed intelligence.

The second thing recursivity is about concerns distribution as well, or "multiple constitution", as Luhmann calls it (1995, pp. 38–39). Several units have to be involved in communication in such a way that any participating unit realizes that the occurrence, continuation, and understanding of communication depend not on one but on multiple units, at least on a specified or unspecified other or you to be addressed. This is why Heinz von Foerster postulates the "hermeneutic principle" that the listener, not the speaker determines what is being said (von Foerster, Poerksen 2002). And this is why, in their first comprehensive attempt to bring Shannon's notion of communication to both psychiatry and cultural theory, Jurgen Ruesch and Gregory Bateson invented the indicator of error correction to provide an empirical clue as to whether communication is going on or not (Ruesch, Bateson 1951). Since communication is not to be confused with causality (which is certainly also difficult to address empirically), we

need evidence that it is indeed happening; and this evidence may be that there are several units contributing to it, which, when committing errors, are addressed with respect to these errors and are able to correct them precisely because they have been so addressed. Error correction would be evidence of mutual awareness, and mutual awareness is the precondition for a unit to perceive itself as participating in communication. Even more importantly, error correction would be evidence for feedback, positive or negative, and thus, again, for recursive closure. And the last but not least important thing that recursivity is about is self-affection, a notion introduced by George Herbert Mead (1934) meaning that any unit participating in communication can do so only if it proves to be affected by communication and thereby participating in communication. The first listener, even if not the most perceptive, is the speaker himself. It should be noted that the self of the affection involved makes a distinction between the self speaking and the self listening, so that the unit participating in communication is to be determined as much by what it experiences in communication as by how it intentionally tries to influence communication.

Thus, recursivity involves messages referring to messages, units mutually perceiving themselves, and any unit also affecting itself when taking part in communication.

V

If we add the third concept, closure, which is in fact implicit in both selectivity and recursivity, we end up with an operational concept of communication able to check what it means to communicate and who qualifies to join in. Closure means that only communication qualifies to reproduce communication (Luhmann 1992); no human beings, no gods, no animals, no devils do. This, again, is a feature that distinguishes systems theory from network theory. In network theory, at least in its sociological versions, the most heterogeneous elements are welcome, people as much as organizations, stories as much as practices, tools as much as sites, as long as they constitute units that gain their identity from attempts to control and be controlled by units in the same network (White 1992), or which figure as references in the same

controversies (Latour 2005). Networks do not have boundaries, systems do. That is why "network" is a structural notion, whereas "system" is an operational notion (Baecker 2009). Systems produce and reproduce themselves by one and the same type of operation, which in the case of social systems and in Niklas Luhmann's version are communications taking shape as events. They combine, for just a moment, utterance, information, and understanding, and disintegrate in almost the very same moment (Luhmann 1992; Luhmann 1995). This is how and why they literally produce the necessity to find continuation through further events connecting to them; if they fail to do so the social system comes to an end.

Closure, of course, means that consciousness, intention, purpose, and action fall within the environment of the system. They may be and continually are referred to at the behest of the system, but they do not compose the system nor do they constrain the system more than by necessarily being referred to. Thus, if there is no consciousness available to be addressed by a social system, the system falters. Equally, if there are no actions to which the system can refer in describing who is doing or planning or remembering what, the system once again falters. And last not least, if there are no intentions and no purpose to be addressed and to be changed by the system, the system loses its ability to steer itself, i.e. to gain a structure that helps it find next elements.

Note that we are again talking about the premises of a theory, about assumptions leading the search for evidence, which is then used to design a description of what is going on. One cannot see nor prove closure any more than one can see or prove a system, or a communication, or the autopoiesis of a system. All these are assumptions that are either useful in the search for evidence and its weaving into a description or not.

In our regard, closure means that we are free from humanist bias in searching for possible communication. Instead, we can inquire into the qualities of human beings that seem to qualify them so indisputably and without parallel for communication. Indeed, the very search for other possible candidates for participation in communication means distancing oneself from assumptions that human beings are in some sense of a rational or

otherwise unique nature, possessing, for example, not only brains but also a consciousness, that entails an inability to avoid communication with each other – whether the desire to talk assumed by Aristotle or the wish to engage in exchange posited by Adam Smith. If we do not accept such anthropological thinking we have to look more closely at the possible reasons why human beings qualify for communication. And if these reasons apply to other entities as well, then we are dealing with a concept of communication that may lend itself to other intelligent beings, as well.

There are three such reasons applicable only to human beings since the exclusion of spirits, gods, devils, plants, and animals, namely independence, self-reference, and complexity. All three reasons may well prove to be one, but again it helps to spell them out separately.

"Independence" means that any human taking part in communication does so as an independent organism with a more or less independent consciousness having its own memories and expectations. This independence means that at any instant the human being taking part in communication may feel free to turn away and leave. No communication however powerful can change this. Indeed, all communication tries to reconfigure independence to establish secure expectations. But if this reconfiguration is to succeed, communication must presuppose the continuing independence of the organisms participating. The only exception is the exercise of violence, which, however, as long as it is no more than the exercise of violence, ends communication.

The closure of communication, i.e. the condition that communication alone and no thought, no perception, no action, no desire can prompt communication, is tantamount to assuring the independence of the participating entities. None of these entities can itself become an element of communication; it needs to find a way to induce communication, which then needs a reason of its own to continue, and has no way of ensuring that the entity that induced it will stay the course. Without going into sociological details, we can say that *all* social systems can work only by encouraging human beings that might participate to give up the independence they gain. The terms of trade between giving up and gaining indepen-

dence vary widely, and neither equilibrium between these terms nor voluntariness are required; but if not even a minimum of independence prevails we do not dealing with communication.

It would be hard to tell whether independence is in play if humans or other kinds of intelligent being did not practice "self-reference". Any closure of communication involves units that are able to refer both to communication and to themselves. Without the distinction between other-reference and self-reference no decisions would be taken or attributed on how and when and why such a unit may participate. It is interesting in itself that human beings need not only consciousness but even more so a body they can refer to if they are to know where they begin and where they end (Merleau-Ponty 1963). The same condition holds in communication. As any "theory of mind" maintains (Byrne, Whiten 1988; Whiten 1991; Whiten, Byrne 1997), mutual awareness demands both mutual awareness of the other and awareness of oneself being aware of oneself. This leads to intriguing knots of interminglement, the price to be paid for taking part in communication without being absorbed by communication, never mind how fascinating for both body and mind these kinds of knots may turn out to be (Laing 1970).

"Complexity" therefore comes naturally. Depending on the given notion of complexity, both communication and the units taking part in it are either multi-elements, multi-relations, continually changing multi-elements and multi-relations systems or they are units that, as distinctions, combine a system side and an environment side that are both complementary and cannot be reduced to each other (Morin 1974). Complexity means that no understanding but only control is possible, a control, moreover, that cannot refer to the complex other, but to oneself and to one's own part in interaction with the other (Ashby 1958). Control is another word for the buildup and use of a memory. Complexity is a feature of this memory of interaction, which, however, may prove identical with what we take to be a system, be it social, mental, or artificial.

Thus, the closure of communication, even disregarding sociological descriptions of its structure and culture ensuing from this closure, show independent, self-referential, and complex

units taking part in communication, a highly liberal image of intransparent individuals liberated to take part in communication at will developed by modern society in distinction to a more traditional notion of individuals belonging to social strata that order and structure society. In modern society it is the choice of the individual that lends structure and order to society. Yet both "individual" and "subject" are wild cards to be defined by various social systems (Luhmann 1989; Lehmann in print). They do not have to be humanistically or anthropologically fixed to be assigned to human beings and human beings alone. Just about any unit able to manifest these properties qualifies for communication. I gladly leave it to the experts in theology, ethology, artificial intelligence, and artificial life to come up with promising candidates among spirits and devils, animals, and machines.

VI

In conclusion, we emphasize that our scrutiny of selectivity, recursivity, and closure seeks to clear the ground for reformulating a notion of communication that is not bound to either humanist or modern prejudices but examines what makes a relationship social.

In other words, our inquiries seek neither to open up the notion of communication for so-called parasocial relationships nor to call an end to the social because its modern preconditions no longer hold. Parasocial relationships assume selectivity, recursivity, and independence at only one end of a communication channel whose other end is occupied by a spectacle to be watched or a machine to be used that is denied all freedom of behavior (Horton, Wohl 1956). Our concern cannot be such an understanding of parasocial relations since we focus on the communicative event itself, not on the participants, examining its *eigen*-dynamics, which have no need of "real" persons or the "presence" of both actors to develop and thrive in the hands of self-recruited editors, programmers, audiences, and users. And the end of "the social" assumes, not without historical plausibility, that the career of the notion requires us to assume that social relations link human beings, and only human beings – and that, together with 'reason', social relations not only connect

humans but distinguish them as such (Baudrillard 2007; Latour 2001). We cannot go along with this historical reassessment either, because we find it much more interesting to follow how the social comes to be understood as constituted by relations of dependency between independent individuals and the generalization of this understanding to include complex entities other than human.

Our concern is not the parasocial or the end of the social or any, as it were, quasi-intelligences but the possible transformation of modern into next society, prompted by computers, the "invisible machines" (Luhmann 1997, pp. 304–305) equipped with their own memory and linked into complex networks as only human beings had been, and which are moreover fast and able to rely on rich algorithms and to handle vastly greater amounts of memory than any human. Back in the 1990s, Niklas Luhmann pointed out that we need not worry about computers even if they develop consciousness unless they prove capable of taking part in communication. This, however, they are unlikely to achieve because to do so they would have to be capable of dealing with knowledge and ignorance alike, which remains unlikely, but is necessary in communication (Luhmann 1997, p 303). Because why would anybody engage in communication if it were not for ignorance to be remedied, or, sometimes, ignorance on the other's side to be maintained (Sacks 1992)? Indeed, a society featuring more intelligent beings than we are hitherto used to would not change as much as a society which would have to deal with those intelligent beings engaging with communication in not only faster and more connective ways but perhaps also in ways relying on algorithms we humans have no chance to detect let alone to understand. Again, we do not have to understand communication or the units taking part in it in order to nevertheless being able to go along with it; control, as we know (Ashby 1958), is sufficient. But we may have to deal with ways of control mastered by computers that are superior to ours.

The time of computers being engaged in communication probably has not yet come. Yet, more recent investigations of so-called embedded systems go a long way toward understanding some demands on interaction, such as robustness, and on the necessary complexity, or heterogene-

ity, of participating entities (Henziger, Sifakis 2007; Lee 2008). John von Neumann's idea of the "synthesis of reliable organisms from unreliable components" is also being taking more and more seriously, the idea that features can emerge in a system on the system level that no element contributes (von Neumann 1956), and Claude E. Shannon's idea that "the system must be designed to operate for each possible selection, not just the one which will be chosen since this is unknown at the time of the design" (Shannon, Weaver 1963, p. 31). Should it prove possible to artificially implement mutual error correction with relative ease, the next step could be to enable artificial intelligences to deal with ignorance, thus following Terry Winograd and Fernando Flores' idea of making "breakdown survival" the most telling proof of intelligence (Winograd, Flores 1986).

We therefore propose to align certain engineering ideas on artificial systems and certain sociological ideas on social systems through a Spencer-Brown equation in the interests of systems research appropriate for the demands of next society (Baecker 2005, pp. 63–64):

$$\text{communication} \quad = \quad \boxed{\text{degree of freedom} \mid \text{constraint}}$$

Any entity able to read constraints into degrees of freedom without necessarily feeling obliged to attribute a degree of freedom or constraint to itself, to the other, or to the situation, but which allows both features, negating and implying themselves, to float freely in exploring and exploiting a situation qualifies for communication.

Any assessment of the consequences of introducing new technologies, *Technikfolgenabschätzung*, must accordingly, as it certainly already does, integrate sociological theory of society. Introducing not only electricity and computers but also artificial intelligent beings into communication means that both the structure and culture of society will have to change. We will need structures that allow for these beings to develop their own intransparency on the basis of independence, self-reference, and complexity. And we will need a culture that describes and conventionalizes the

reasons to either reject or accept communications we (and others) attribute to computers. The alternative to developing such structures and culture would be, or so it seems, another Luddism, which should and will be a societal option.

Acknowledgement/Note

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Die Natürlichkeit künstlicher Intelligenzen und Umwelten

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Der Beitrag versucht eine dritte Perspektive jenseits zweier aktueller Debatten zu gewinnen: der Debatte um künstliche Intelligenz und der Debatte um Ambient Intelligence. Zwei Fallbeispiele aus diesen Bereichen werden diskutiert: „augmented reality" und „embodied conversational agents" (Konversationsagenten). Dabei zeigt es sich, dass Fragen nach der faktischen Möglichkeit von künstlicher Intelligenz auf eine pragmatische Ebene heruntergebogen werden sollten. Was natürlich oder künstlich ist, kann nicht a priori beantwortet werden, sondern muss jeweils empirisch, d. h. anhand der konkreten sozialen Handlungen und Interaktionen und ihrer Bewertung durch diejenigen, die in sie eingebunden sind, diskutiert werden. Dabei ergeben sich interessante Fragestellungen: Wie finden die Interessen verschiedener Akteure Eingang in künstliche Organisation sozialer Handlungen? In welcher Weise erscheinen von künstlichen Akteuren bewohnte künstliche Umwelten ihren BewohnerInnen letztlich als natürlich?

1 Zwei komplementäre Ansätze

Der Großteil der philosophischen und sozialwissenschaftlichen Debatten um das Konzept und die faktische Möglichkeit oder Unmöglichkeit der Künstlichen Intelligenz (KI) war und bleibt auf die Frage ausgerichtet, inwieweit digitale Computer menschliche Denkprozesse und eventuell auch Handlungsweisen nachahmen können (Turing 1950). Während zunächst die Frage im Mittelpunkt stand, ob auf dem Wege formal-symbolischer Modelle ein hinreichendes Maß an Menschenähnlichkeit auf den Ebenen von Struktur und Verhalten erzielt werden kann[1], stützt sich ein Großteil der neueren kritischen Einwendungen gegen die KI auf das Argument, dass menschliche Intelligenz essentiell von den vielfältigen, komplexen und, so heißt es, nicht formalisierbaren Beziehungen zwischen Mensch und Umwelt abhängig sei.[2] Diese Beziehungen seien von der KI-Forschung lange