

Modelling the reciprocal dynamics of dialogical communication: On the communication-philosophical undercurrent of radical constructivism and second-order cybernetics

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Abstract. Even though both Ernst von Glasersfeld, the founding father of radical constructivism, and his epistemological alter ego, Heinz von Foerster, one of the principal architects of second-order cybernetics, would both repeatedly stress the formative importance of communication, neither would ever model communication as a phenomenon *per se*. I will propose a first modelling of communication as seen through the stereoscopic lens of these two schools of thought. I will first present, discuss and evaluate how communication is traditionally modelled. This will serve as an informed backdrop when I proceed to integrate the common denominators pertaining to communication from relevant works of both scholars. In addition to the fact that both would willingly profess to the ‘Linguolaxis’ of Maturana and Varela, i.e., that humans exist suspended in communication, two basic assumptions have proven formative. Firstly, that communication is perceived as a flux, as an almost William-James-like ‘stream of communication.’ Secondly, and this is more in the vein of Heraclitus, that both communicators and communication alike undergo transformations in the process of immersion. This implies favouring a view of communication in which communication *is* a perpetual oscillation between ongoing reciprocal perturbations (Glasersfeld), that occur over time, and the endeavours to re-establish (cognitive) homeostasis (Foerster). The latter must not be reduced to either mere compliance, as it were, i.e., that the ‘other’ does as s/he is told, or to the mutual understanding of a dominance-free communication of a Habermasian persuasion, but rather in the pragmatic notion of ‘compatibility’ (Glasersfeld). For illustrative purposes I will end this paper by translating these notions into a model depicting what I have labelled co-actional communication, in effect forging an exemplar.

Keywords: transmission; interaction; transaction; co-action; second-order cybernetics; radical constructivism

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1. Modelling communication – three formats in the history of ideas of modern communication theory

Etymologically speaking, the term ‘communication’ has Latin origin and is sometimes made to refer back to *communicatio* or message. This is often the case in university textbooks focusing on a narrower, instrumental view on communication. Where authors have a broader outlook on communication, the term is said to refer back to *communis esse* or being together. In the former perspective, communication is seen as a malleable tool, something to be designed and employed in the service of specific interests. In the latter, it becomes the very medium – evanescent though it may be – in which humans, as social beings, live. In order to get a handle on an entity as ubiquitous, pervasive, and yet as amorphous as communication, i.e., simultaneously avoiding the Scylla of *communis esse* while not being sucked into the Charybdis of *communicatio*, one needs an angle, a perspective, as it were (Gasset 1961[1923]). The perspective, that I evoke, is that of the history of ideas of modern communication theory². The reading of the history of ideas that I refer to has been elevated to a doxa of the field of communication theory (e.g., as propagated in university textbooks such as Beebe, Beebe, Ivy 2004; Windahl, Signitzer, Olson 2009; Littlejohn, Foss 2011; West, Turner 2018).

In a somewhat crude generalization, this doxa consists of two major components – albeit not situated at the same level of abstraction. The first is a timeline that stipulates that communication theory has undergone a transition of its general formats: *from* viewing communication as action *via* viewing communication as interaction *to* viewing communication as transaction; each of which, in turn, gives rise to a prototypical (Kleiber 1993) communication model. Real-life examples of instances of communication as action could be monologues, communication as interaction would add some kind of feedback loop (e.g., question–answer sequences after the monologue), whereas communication as transaction would be seen as a cooperative endeavour (e.g., a negotiation between the ‘sender’ and the ‘receiver’ as to the ‘meaning’ of an instance of communication). Although this timeline seems to depict a straightforward, incremental growth in both complexity and scope of the disciplinary understanding of what communication ‘is’, a *caveat* must be issued here. For even if these appreciations of communication, and the models that illustrate them, each may hold a set of distinctive features, they do in fact (also) co-exist and overlap in various ways – in theory as well as in practice.

² I take modern communication theory to begin with the seminal work of Shannon and Weaver (1949) on the mathematical model of communication.

It is, therefore, imperative that they not be perceived of as mutually exclusive or incommensurable in a (crudely rendered) Kuhnian sense (Kuhn 1995[1962]) but rather as evolutionary expansions (Lakatos 1978 *et passim*) of one another (see Kastberg 2015b for further details). The second component is a consensus in the extant literature that the basic fabric of any communication model depicting human-to-human dialogical communication is made up of a triad of factors, i.e., communicators, context and content. That is, whatever intricate elaborations may be brought to bear on a specific appreciation of communication, from an admittedly reductionist point of view this triad establishes a common ground. This triad will become obvious in the coming sections, even if the individual authors may use different terminologies. I will present, discuss and evaluate the three appreciations of communication one by one and, for illustrative purposes, I will anchor my presentation in the communication models that characterize them.

1.1. Communication viewed as action

As action, communication – whatever the modality – is a linear process *from* a sender *to* a receiver (e.g., Theodorson, Theodorson 1969). Communication-wise, the format is oriented towards the sender, i.e., communication is primarily a matter of sending out messages while trying to avoid “noise” (Shannon, Weaver 1949) (Fig. 1).

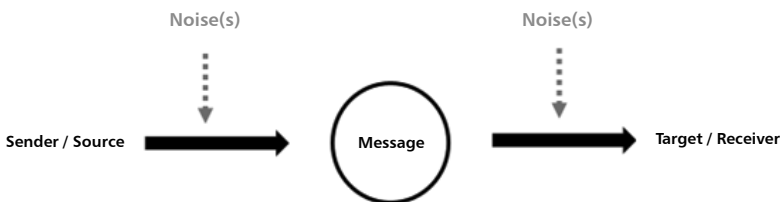


Figure 1. A rudimentary modelling of communication as action.

Strictly speaking, it is not of primary interest what the receiver may retain from the communication, since, again strictly speaking, it goes without saying that (ideally) the receiver retains what is transmitted. The primary interest, consequently, is that the sender delivers, as it were. This idea corresponds with the idea of the receiver as “an empty vessel” (e.g., Feiman-Nemser, Remillard 1995), or the “recitation model” (e.g., Eisner 1991) of communication. Formal, monologous lectures would be examples of this kind of communication. Here everybody in the

audience is offered the same kind of information, and in the same way. In terms of retention or “deposit” (Dewey 1933), we have no way of knowing *in situ* what an audience may have learned from such an experience. From the point of view of communication theory, it is imperative that the underlying assumption (be it conscious or unconscious) which reads “that language transfers human thoughts and feelings” (Reddy 1979: 286) be subject to critique. For, as Reddy (1979: 286)³ elaborates:

After all, we do not literally “get thoughts across” when we talk, do we? This sounds like mental telepathy or clairvoyance, and suggests that communication *transfers* thought processes somehow bodily. Actually, no one *receives* anyone else’s thoughts directly in their minds when they are using language.

It is rather the case that communication “seems [...] to help one person to construct out of his own stock of mental stuff” (Reddy 1979: 286) knowledge of his/her own. This in turn leads to the communication-theoretical insight that *as* action this kind of communication does not elicit interaction, it may, however, elicit re-action. Returning once more to the lecture, applauding (or booing, for that matter) is an audience’s ritualistic reaction to any lecture; however, applauding *per se* does not mean ‘understood’, ‘accepted’ and ‘hereafter my actions will comply with what I have just heard’. The applause (or the lack of it) merely gives an indication as to the satisfaction of the audience. Satisfaction concerning how the lecture was delivered, however, is no guarantee of having understood, accepted or retained it. In order to gauge a deposit in the ‘other’ – or any change in the ‘other’, for that matter –, follow-up activities of an interactive nature, e.g., control questions, quizzes, or the like, are required.

1.2. Communication viewed as interaction

In communication-theoretical terms, we may conclude that whereas action may be necessary, it is by no means sufficient if the goal is one of ensuring some kind of deposit, some kind of change in the ‘other’. This is also the main reason for why – and this then forms the transition from action to interaction – in real-life communication activities of the action type there is a growing tendency to insert or add an interactive component of sorts. It may be deliberately adding an interactive quality to the talk, for instance in the sense that a talk uploaded to YouTube allows for feedback – albeit sometimes asynchronously – from Internet

³ Italics in the original.

viewers. Theoretically, then, it becomes a prerequisite for communication viewed and carried out as interaction that it cannot take place merely because a sender has sent out a message, so to speak, but first once a receiver has – in one way or the other – acknowledged being targeted. Or, as Schramm (1954) would probably phrase it, not until feedback has been detected (Fig. 2).

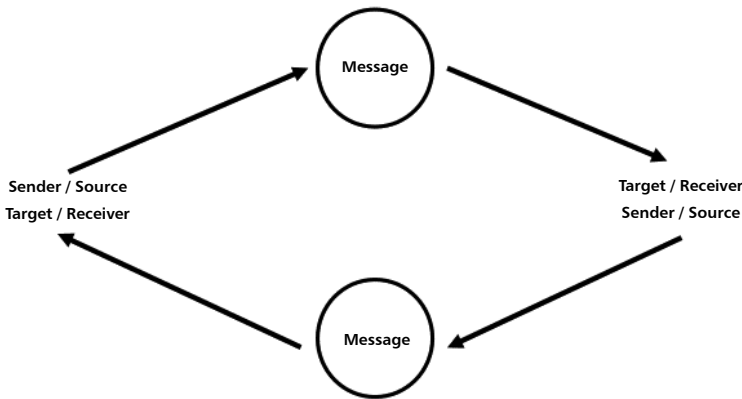


Figure 2. A rudimentary model of communication as interaction.

Whereas the action model of communication, also sometimes called the transmission model, views communication as a one-way linear process in which *A* sends a message to *B*, the interactional model is still linear, but the linearity is bidirectional. For communication to take place, two messages are involved. And whereas the action model stipulates a fixed constellation of sender and receiver, the interactional model implies role-shifting. There is still an initial message, which is being sent from sender to receiver, but for interactional communication to take place, the receiver must – in some shape or form – be seen to interact with the message, e.g., be seen to respond. This means that the original receiver becomes the sender of an ensuing communicative exchange, the original sender becomes the receiver – and so on and so forth. In interaction, then, sender and receiver must enter into a mutually recognized relationship of ‘agent’ and ‘reactant’ (Anderson, Meyer 1988: 161). Compared to the one-way linearity of communication as action, communication as interaction features a bidirectional, asynchronous linearity, a feedback loop of sorts, in which *A* and *B* take turns in playing the role of sender and receiver respectively – much as in a game of ping-pong.

Noise is also a factor in the interactional model. Apart from acknowledging the ‘mechanical’ noise that might stem from medium or channel, the interactional model ups the ante and sees the sender’s and the receiver’s respective fields of experience as a potential source of noise. In fact, the degree to which understanding a message is possible in the first place is a function of said sender’s and receiver’s respective field of experience. In line with a very basic semiotic vocabulary, the sender encodes his/her message, while the receiver then decodes it. The degree to which the receiver’s decoding is ‘correct’ – i.e., mirrors what was intentionally encoded – is contingent on the extent to which the receiver’s field of experience overlaps with that of the sender. The reasoning goes that fields of experience may be too diverse to allow for communication. In contrast to the action model, which does not *per se* allow for gauging the deposit of an instance of communication, the deposit in the receiver resulting from interaction can be appreciated (if not meticulously measured) in the feedback loop itself. The pivotal point being if – or to what extent – the receiver responds to what s/he just heard or experienced in a way that corresponds to what was intended by the sender or in a way that conforms to whatever is sanctioned by any contextual constraints in question.

1.3. Communication viewed as transaction

The transactional view on communication (e.g., Barnlund 1970; Kincaid 1973) is in two important respects quite different from the previous two communicative formats. First of all, when viewing communication as transactional it does not suffice to talk about sending out messages nor asynchronous responses to them. Communication viewed as a transactional endeavour is a process in which communicators are simultaneously engaged in the process of sending and receiving messages. This, among other things, entails abandoning the traditional roles of sender and receiver in favour of ‘communicators’. The transactional model of communication has also abandoned the inherent linearity of messages being sent – be it of a mono- or a bidirectional persuasion – in favour of depicting communication as a spiral. West and Turner (2018: 12) put it like this:

In the linear model of communication, meaning is sent from one person to another. In the interactional model, meaning is achieved through the feedback of a sender and a receiver. In the transactional model, people build shared meaning.

Viewing this building of shared meaning as the end point of transactional communication, eventually led Rogers and Kincaid (1981) to propose what still

counts as the illustrative capstone of the transactional format and label it “the convergence model of communication” (Fig. 3).

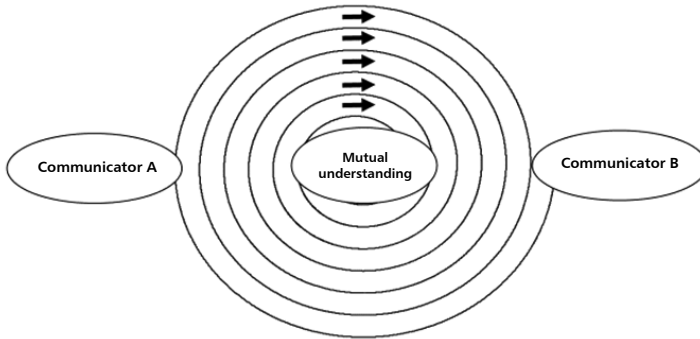


Figure 3. A rudimentary model of communication as transaction.

In this model of transactional communication, it is apparent that there are forces at play in communication that exert an almost gravitational pull on the communicators, a pull that seemingly compels them to gravitate towards each other, i.e., to build shared meaning, to reach consensus or mutual understanding. In some university textbooks, this is literally depicted as a Venn diagram, where – set-theory-like – the two individual fields of experiences of *A* and *B*, respectively, overlap to create a shared field of experience (e.g., West, Turner 2018). Where the interaction model leans towards pre-Gadamer hermeneutics, the transactional model leans towards the Gadamer version in which horizons are fused. The notion of being-together-in-communication paired with the ideal of two, in principle equal, communicators striving for mutual understanding, also paved the way for acknowledging that even though the term of choice is still ‘message’, the message no longer possesses meaning *a priori*. Neither is meaning a matter of correct decoding. Meaning is something that is assigned to messages by cognizing agents in a process of negotiation. This, needless to say, is in line with the *telos* of communicative action that we find explicated in the writings of Habermas (1981), as well as in Putnam’s ideal of the deliberative and participatory democracies of late modern societies of a Western persuasion (Putnam 2004)⁴. For all its domination-free prowess, however, this model is, in and of itself, a normative ethical statement,

⁴ As I have dealt extensively with models of communication and their underlying philosophies/ideologies elsewhere, I will refrain from doing so here, but merely point to two relevant papers: Kastberg 2015a, 2015b.

and, as such, it imposes on communication – as well as on communicators – a non-negotiable incentive for consensus⁵.

2. En route to a fourth communication format by way of a few critical remarks

In referring to communication as co-actional, I build on the above critical presentation of the currently dominating format of transactional communication. In order to infuse a productive angle into my critique, I take my point of departure in and build upon three insights that I consider overlooked in the extant literature. The first is Dance's (1967) modelling of communication as helical, the second is the specific vein of constructivism inherent in the transactional format, the third is the lack of understanding of what I believe to be crucial relational aspects in appreciating communicators.

In his "helix model" of communication, Dance (1967)⁶ proposes that all present instances of communication should be seen as cumulative, as building on and as being influenced by all past communications. This communicative historicity, however, does not imply either a verbatim or a mechanistic reproduction of the past; it is rather the case that past communications leave traces that rub off on all future communications. What Dance's modelling of communication also shows is that communication is not driven towards consensus. In his illustration, there is no inward pull, no spiralling towards mutual understanding, but rather an orientation outwards, an orientation spiralling toward future communications (Fig. 4).



Figure 4. Dance's helix model of communication.

⁵ Whereas few people of a democratic persuasion would want to question what seems to be an altogether comely (political) ideal, this ideal is, nevertheless, also laying down the (ethical) law for what constitutes "good" communication, what "good" communication ought to be – as well as for its opposite.

⁶ In all likelihood, the underlying idea goes back to George Herbert Mead and the so-called Chicago School of 'symbolic interactionism', of which he was the (posthumous) founder.

Dance sees communication as a dynamic, in principle, never-ending, ever outwards-spiralling process, which – in that capacity – features an almost evolutionary trajectory of development. In addition to giving the concept of communication a certain – and in my book, needed – organic plasticity, this also seems to highlight the almost commonsensical notion that while mutual understanding may be a laudable goal of communication, it is neither a prerequisite for communication nor for the end of communication.

The second critical remark pertains to the formative aspect of the so-called CCO principle, i.e., the most recent offspring of the transactional appreciation of communication. The CCO principle stands for “communication constitutes organization” (e.g., Putnam, Nicotera, McPhee 2009; Schöneborn, Blaschke 2014). The CCO principle in many ways echoes Bateson’s credo that we communicate content as well as relationship. The constitutive force of communication implies that in communication we discursively co-construct not only, say, the identity of communicator *A* and communicator *B* – one or both of whom could be an individual or an organization –, communication also constitutes, alters, maintains power and status amongst communicators as well as the identity, power, status etc. of the ones talked about – be it individuals, organizations or indeed any other entities. Even if the slogan-like statement, that communication constitutes reality, is not meant to mean that communication alone would produce the keyboard on which I am currently writing, or the study in which I sit, it is, nevertheless, tarnished by the brush of transubstantiation. Heeding this, one of the champions of the CCO principle therefore also cautiously puts forward this *caveat*:

Advocating a communicative constitution of reality does not amount to falling into some degenerate form of constructivism (or solipsism). It means, on the contrary, that for instance, preoccupations, realities, and situations get expressed and translated in what we say or write. (Coreen 2012 quoted in Schöneborn, Blaschke 2014: 303)

What this boils down to is that the CCO principle is curiously on a par with Heinz von Foerster⁷, when he – almost half a century ago – said that what we constitute communicatively is not reality *per se*, but exactly those descriptions of reality that our conceptual and perceptual interfaces – as well as our motor skills – would allow us to:

I could by no means claim in all seriousness that the lectern, my wrist watch, or the Andromeda Nebula is being computed [*i.e.*, *constructed in an ontological*

⁷ Born as Heinz von Förster.

sense] by me. At the most, one could say that a “description of reality” is computed, because with my verbal references (“lectern”, “wristwatch”, “Andromeda”), I have just demonstrated that certain sequences of motion of my body combined with certain hissing and grunting sounds, permitted listeners to interpret these as a description. (Foerster 2003[1974]: 232)

In the same critical vein, it worries me that holding that communication constitutes reality – and not, say, descriptions of it – seems to be perilously close to an input-output-logic of a causal nature (or to the ‘*communicatio*’ introduced in the beginning of this paper, or – indeed – to the linear model of communication discussed above). The strategic corporate journalist (e.g., Kounalakis Banks, Daus 1999), for instance, may be endowed with exquisite public speaking skills, but try as s/he may, there is no ‘open sesame’ that would always ensure that a message is understood and its intentions complied with by a desired stakeholder. There is, alas, no algorithm for human understanding and no communicative panacea for non-compliance. The Austrian zoologist Konrad Lorenz (1903–1989) is said to be the father of this admittedly cynical yet quite astute observation:

What is thought is not necessarily said
 What is said is not necessarily heard
 What is heard is not necessarily understood
 What is understood is not necessarily accepted
 What is accepted is not necessarily carried out
 What is carried out is not necessarily remembered

The third and last critical remark, before I turn to modelling my co-actional appreciation of communication, pertains to the very core of transactional communication itself, i.e., the apparent easiness with which the built-in drive towards consensus is taken for granted. According to both the transactional and the CCO view of communication, the communicators are engaged in a process of co-constructing mutual understanding of reality and of one another. However, this appreciation of communication does not – to any large extent, at any rate – deal with the relational aspects of communicators apart from stating that the “transactional model [...] requires each of them to understand and to incorporate the other’s field of experience into his or her life” (West, Turner 2018: 13). It seems – even if I am being a tad polemic here – that as a byproduct of obtaining mutual understanding, of reaching a shared field of experience, of communicatively constituting a common reality, communicator *A* is being reduced to a trivialized avatar of communicator *B*.

Needless to say, there is more to the relational aspects of ‘ego’ and ‘alter’ than this. In an attempt to approach this ‘more’, I turn to classical sociology. One of the main claims in the work of Schütz is the appreciation that the ‘other’ (or ‘alter’) is – *mutatis mutandis* – like me (‘ego’) (Schütz 1976[1969])⁸. While this notion is highly problematic (and for many different reasons), it is, however, not altogether without merit. Even if mirroring the ‘other’ on oneself may lead to a crude sociological reductionism, intuitively doing so is nevertheless sensible in order for each and every one of us to be able to navigate in a world full of, well, ‘others’. Speaking from the standpoint of communication theory, what is important here is that Schütz points to the fact that the relational qualities of ‘alter’ are probably not altogether different from those of ‘ego’. In turn giving rise to viewing the ‘other’ as being as dynamic and as relational an entity as ‘ego’.

This, in turn, found its crystallization point in the Parsonian notion of “double contingency” (e.g., Parsons, Shils 1951: 105 *et passim*). Double contingency is basically an elaboration on the relational phenomenon that when communicating with the ‘other’, ‘ego’ recognizes the ‘other’ and at the same time ‘ego’ recognizes that the ‘other’ recognizes ‘ego’. What double contingency brings to bear on the understanding of the relationship between communicators is the fact that in the recognition of the ‘other’ there are expectations of an interactional kind; i.e., ‘ego’ has expectations towards the ‘other’ but, at the same time, ‘ego’ expects that the ‘other’ has expectations towards ‘ego’. Despite its seemingly relational merits, it is obvious that Parsons’ double contingency is in line with the interactional appreciation of communication. The ‘other’ is always seen from the viewpoint of ‘ego’, and the expectations are always the expectations of ‘ego’ – also when ‘ego’ has expectations towards the expectations of ‘alter’. And whether the expectations are met is to be established based on the feedback that ‘ego’ receives. In that sense, the expectations (and the expectations of expectations) are add-ons to the sender’s individual field of experience. So what Parsons’ interactional appreciation of communication apparently bars him from seeing is that it is not merely one communicator, i.e., the sender or ‘ego’, that establishes a double contingency. They both do it – and simultaneously at that. In effect turning the double contingency into a *double* double contingency (Kastberg 2011). In a pre-operative interview, for instance, surgeon and patient alike establish a *double* double contingency of reciprocal expectations. The surgeon expects to be in command of expert clinical knowledge pertaining to the operation at hand, s/he also expects that the patient expects so. At the very same time, the patient, on the other hand,

⁸ Naturally, Schütz did qualify this statement; see Schütz 1976[1969] for further elaborations of this particular concept.

expects the surgeon to be in command of expert clinical knowledge and expects that the surgeon expects that the patient expects so, too, etc. In order to describe exhaustively or indeed to understand the relationship between communicators, one has to abandon the privileged position of 'ego' and take into consideration this *double double* contingency.

These discussions and critical remarks serve two purposes: They serve as a skeleton structure for my understanding of communication, an understanding that I have labelled co-actional. They also serve as a vantage point from which to look for kindred spirits, as it were. In the following sections, I will be adding flesh to the skeleton structure by way of presenting and integrating select ideas from second-order cybernetics and radical constructivism. Ideas that are congenial to the ones I have sketched out in my critical remarks. I will begin by introducing my epistemological ur-point of departure, as it were, namely Heinz von Foerster's notion of the logical machines.

3. Trivial and non-trivial machines

Even though Heinz von Foerster, one of the principal architects of second-order cybernetics, would stress the crucial importance of communication (e.g., Foerster 2003[1993]), he would never model communication as a phenomenon *per se*. However, he would, as a rule of thumb, resort to formalism whenever he needed to clarify concepts and relations between them. Two of his most formative formalisms are his two "logical machines", i.e., the trivial and the non-trivial machine. Both of which to me – for all intents and purposes – are also communication models:

Von Foerster uses the word "machine" to denote a conceptual devise used to carry out computation. Contemplating things together must be carried out in something, and for simplicity's sake the calls that "something" a machine. (Segal 2001: 85)

These machines are conceptual frameworks that serve two main purposes. They "provide the most direct approach to linking a system's external variables, e.g., stimulus, response, input, output, cause, effect, to the system's internal states and operations" (Foerster 1981: 154–155). As machines in his sense, their "formal interpretation is left completely open" and may be used to depict the operational modalities of a whole system or of integral parts of systems. The trivial machine has three parts (Fig. 5): an input (X), a transfer function (F), and an output (Y).



Figure 5. Heinz von Foerster’s trivial machine.

As an example, consider the light switch: “The input is flipping on. The transfer function is allowing the electricity to flow through the circuit. And the output is the bulb’s filament getting hot and our seeing light” (Segal 2001: 86). The main quality of a trivial machine is that it always operates in a predictable manner. In fact, its sole *raison d’être* is its complete reliability. Every time the light switch is flipped on, the light turns on. In case the light should not turn on, a ‘trivialisateur’ is summoned to (re-)trivialize the machine. In this case, an electrician would hold the position as ‘trivialisateur’ making sure that the input–transformation–output–logic functions predictably again. At a somewhat more abstract level, Foerster also considers math teachers ‘trivialisateurs’ in as much as they, too, are called upon to turn (unruly) children into trivial machines, who will, for instance, after having been appropriately trivialized, dutifully answer questions such as ‘what is 2 x 2?’ with a trivialized ‘4!’, and not, say, a non-trivial ‘green’ (Foerster 1999). In other words, trivial machines are ubiquitous and their underlying logic furnishes us with a compass of predictability when navigating our otherwise unpredictable, hypercomplex environment. This predictability supports (and/or restrains) us in all aspects of our existence, from science to everyday life (Table 1).

Table 1. Input – transfer function – output. Adapted from Segal 2001: 94.

	Input	Transfer Function	Output
1	Cause	Law of nature	Effect
2	Stimulus	Central nervous system	Response
3	Motivation	Character	Deeds
4	Goal	System	Action
5	Minor premise	Major premise	Conclusion
6	Dependent argument	Independent argument	Function

Nevertheless, relying solely on the logic of our trivial machines bars us from appreciating the contingency of that which could be or the benefits of system breakdowns, so to speak. The trivial machine operates on an input-*A*-always-renders-output-*B* kind of logic; it is analytically determinable and wholly independent of previous operations. In that sense, it resembles the action model of communication. As we saw, however, the linearity of the action model is not in line with current theoretical appreciations of communication; nor is it compatible with what we intuitively understand to take place during the back and forth of any real-life dialogue. Consequently, the trivial machine will not be pursued any further.

In contrast to the trivial machine, the non-trivial machine has a game-changing internal state (*Z*), i.e., what makes this machine non-trivial is its true recursivity: every time it operates, it changes its rule of transformation (Fig. 6).

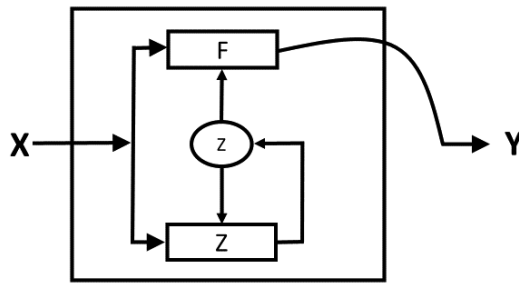


Figure 6. Heinz von Foerster's non-trivial machine.

At a very abstract level Foerster argues – in line with the biosocial constructivism of Maturana and Varela (2015[1984]) – that a human being as a living system is, in fact, a non-trivial machine, forever suspended in computing “a self-perpetuating [social] reality, or – as Maturana and Varela state – [being] autopoietic” (Brier 1996: 231). At a somewhat more mundane level, the non-trivial machine comes to the fore every time we enter into a dialogical exchange (be it with a coworker, a spouse or a stranger etc.) and walk away with a ‘deposit’ in a Deweyian sense. That is, every time we have learned something new, we have changed our internal state, hence our ‘rule of transformation’ for future engagements. Looking closer at the non-trivial machine, we see that in many ways it shares a common starting point with Dance’s helix model of communication. It does so in acknowledging that communication is not so much a matter of sending and receiving messages but of communicators, as well as what they converse about, evolving over time.

Based on these insights, the non-trivial machine adds a substantial layer of sophistication to the previously presented models of communication – including the convergence model –, which is also why the non-trivial machine will make up the structural backdrop of the co-actional modelling of communication in the following sections.

4. Modelling communication as co-actional

Distilling a point of departure from the above presentations, discussions and evaluations, I present the modelling of communication that I have labelled co-actional. As is the case for all models, this is a “minimal hypothetical machine [...] not for the purpose of implementation, but for the purpose of illustrating ideas” (Fischer 2014: 370). My minimal hypothetical machine is a rudimentary modelling of the reciprocal dynamics of dialogical, of co-actional communication. I will begin by showing the model, in effect using it as an anchor, and then proceed to present and discuss its core elements and their relationships in some detail (Fig. 7).

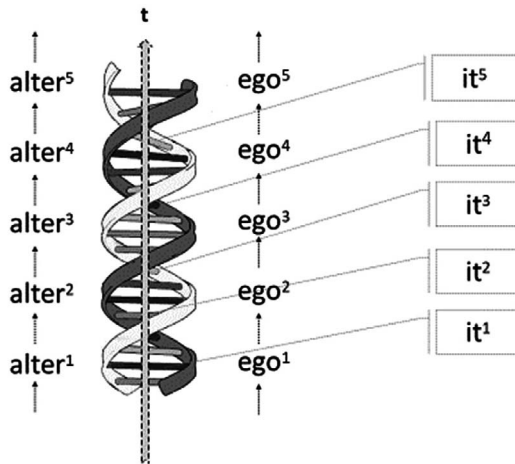


Figure 7. A rudimentary modelling the reciprocal dynamics of dialogical communication.

4.1. A triple helix of I, you, and it

Going *ad fontes*, so to speak, I have allowed myself to begin by stipulating my version of the aforementioned triad (see Section 1). That is, to stipulate that

any dialogical human-to-human communicative encounter entails two⁹ communicators and that, which they converse about. In the words of Danish philosopher Ole Thyssen: I, You and It, respectively (2016). When it comes to modelling co-actional communication in this sense, I do in fact envision its constitutive factors as three trajectories that in their synthesis form a triple helix, that is, a triple-stranded, interdependent, spiralling structure in which the strands all pivot around the same constant, i.e., time (I will return to the factor time presently). This interdependency, however, does not imply that the factors merge; nor is that foreseen. The idea of the triple helix of co-actional communication is, of course, a metaphor borrowed from the double helix of the DNA strands (Watson 1980[1968]). Dwelling for a moment on the basics of DNA, it is well known that certain nucleotides in the strands punctually bind together across the double helix, a binding that is referred to as a base pair. In much the same way, the trajectories of the three factors of co-actional communication can also be said to be linked punctually. What DNA research calls base pairing, however, is – in the case of co-actional communication – rather a punctual linking by means of what radical constructivists refer to as perturbations (Glaserfeld 1989¹⁰). Even if the ‘I’ exists autopoietically, the ‘I’ only makes sense thanks to a ‘You’, and they both only make sense against the backdrop of an ‘It’ (Thyssen 2016). Or, to quote Foerster, when he would talk about triangular interdependencies in general: “You need all three to have all three” (Foerster 2003[1979]: 284). In that sense the triple helix becomes a self-supporting, triangular construction, in which the interdependencies allow the three factors to stay suspended for as long as communication takes place.

4.2. The factor time t

This, in turn, establishes the stepping-stone to the factor time t that I have inserted into the co-actional model. This is in stark contrast with the previously discussed communication models; there, time was either taken for granted – and hence not recognized – or time was perceived of as ‘anytime’ or maybe as ‘all the time’ – in effect conflating past, present and future. Instead of taking time for granted, and thus in all probability consciously or unconsciously overlooking this factor, I explicitly view time as a critical factor when it comes to

⁹ Naturally, there may be – and often are – more than two communicators (and sometimes communication is intra-personal), but since the number of participants *per se* does not alter the theoretical foundation of this conceptualization, I refrain from widening the scope at this point.

¹⁰ This idea is introduced at a disciplinary level of abstraction in Kastberg 2014.

understanding what communication ‘is’ and what it ‘does.’ Whereas – for all sorts of analytical purposes – isolating (and for all intents and purposes wanting to cryo-serve) communication in a time-less model may be legitimate, this take on communication bars us from evoking the radical constructivist, i.e., Kantian, notion of time as being an *a priori*. In sum, it bars us from seeing the “inseparable relationship between time and meaning” (Tada 2018: 1). For, as Tada (2018: 7) continues, all “self-referential systems [...] are [...] temporalized”. In fact, the notion of temporalization is crucial for the understanding of the fourth format of communication, for it is this undercurrent of an ever-progressing and irreversible time *t* that allows us to reconnect with the primary theorem of the non-trivial machine. That is: every time the system – *in casu*, communication – operates, it changes its rule of transformation. In the illustration above, the effect of time is depicted by means of elevated numbers, numbers that are meant to symbolize the progressive changes in I, You and It, respectively, over time, i.e., for as long as communication takes place. In the next section, I will address some of the ‘mechanics’ of such changes.

4.3. Perturbations, eigenvalues and compatibility

Speaking from the point of view of systems theory, it seems to be generally accepted that “if irreversible processes should occur [then] the entropy of the system [...] must increase, hence, as time goes on, the system would disorganize itself” (Foerster 2003[1960]: 8). Although that may be the case in many an instance of communication, that is not necessarily the outcome of a communicative engagement – even if it may drag out. As we saw earlier, communication cannot command causality, i.e., communication is not a trivial machine, but in the process of communication, correlations may very well emerge. In the vocabulary of second-order cybernetics these correlations equal ‘eigenvalues’, i.e., “those stable dynamic modes a [...] system drifts into when it is perturbed again and again in the same way” (Brier 1996: 236). Foerster (2003[1977]: 265) defines eigenvalues like this:

Eigenvalues represent equilibria, and depending upon the chosen domain of the primary argument, these equilibria may be equilibrial values (“Fixed Points”), functional equilibria, operational equilibria, structural equilibria, etc.

Perturbations in communicative engagements (Glaserfeld 1989) may take on many forms. Verbal indications of perturbations could be questions as to understanding and meaning, they could be conversational repair mechanisms, state-

ments of consent, utterances of disagreement etc. Such perturbations trigger – at a basic biosocial level – endeavours on behalf of one or both communicators to re-establish equilibrium in the communication flux (Glaserfeld 2015[1995]: 234), spur the drift towards eigenvalues. If two people are able to converse in, say, the English language, then it is because they have been exposed to and participated in this kind of communication for so long that eigenvalues have emerged – the eigenvalues in question being e.g., English grammar, lexicon and pronunciation. These eigenvalues, however, must not be mistaken for the shared meaning or the mutual understanding of the transactional view. This very idea(l), which translates into some kind of conflation of identity of *A* and *B*, is deemed inadmissible from the point of view of radical constructivism. Here “[u]nderstanding [the ‘other’ is] always a matter of compatibility, not of identity” (Glaserfeld 2015[1995]: 230¹¹). Understanding in a radical constructivist view means that communicator *A* builds up a conceptual framework that, in the situation at hand, *A* deems compatible with what *A* surmises communicator *B* seems to have meant. This kind of compatibility, however, cannot be vetted as to its correctness, i.e., as corresponding to an ontological reality or to what communicator *B* actually meant – provided *B* is aware of that in the first place. Compatibility in this sense can only be interpreted by *A* on the basis of *B*’s ensuing action (be it verbal or otherwise), i.e., if *B* acts in such a way that *A* is satisfied that *A*’s understanding does not interfere with or contradict *A*’s expectations as to *B*’s ensuing action (Glaserfeld 2015[1995]: 232–233) then there is compatibility. Here, however, we must not forget that what is deemed an adequate response by *A* could indeed be prompted by any (other) number of reasons in *B* – in effect highlighting the inherent and acknowledged indeterminacy of co-actional communication. This acknowledged indeterminacy, in turn, of co-actional communication is congenial to the two tenets of radical constructivism (Glaserfeld 1990: 22):

1. (a) Knowledge is not passively received either through the senses or by way of communication; (b) knowledge is actively built up by the cognizing subject.
2. (a) The function of cognition is adaptive, in the biological sense of the term, tending toward *fit* or *viability*; (b) cognition serves the subject’s organization of the experiential world, not the discovery of an objective ontological reality.

As such, it mirrors Piaget’s credo that “intelligence [...] organizes the world by organizing itself” (as quoted in Glaserfeld 1982, Footnote 2).

¹¹ My translation of the German “*Verstehen [ist] immer eine Sache des Zusammenpassens und nicht des Übereinstimmens*” (Glaserfeld 2015[1995]: 230).

4.4. Suspended in communication

It is exactly this being immersed in and navigating a social world that frees radical constructivism and second-order cybernetics from the haunting specter of being perceived as a mere academic exercise in solipsism. Foerster puts it like this in an interview:

Of course, every human being is tied into a social network, no individual is an isolated wonder phenomenon but dependent on others and must – to say it metaphorically – dance with others and construct [social] reality through communality. (Poerksen 2003: 23)

If “communication is not just a peripheral epiphenomenon of human actions but the primary mode of explaining social reality” (Schöneborn, Blaschke 2014: 302), then communication is not a state, nor a medium or another ‘something’ that we enter. Analogously to Gadamer’s claim that we do not enter the hermeneutic circle, we are already living in it, we are beings-in-communication. In that sense, pairing fundamentals from second-order cybernetics and radical constructivism with insights from the field of communication and linguistics is relatively straightforward. The Sapir-Whorf hypothesis, or linguistic relativity hypothesis¹², for instance, shows some traits that are quite clearly in tune with what Maturana and Varela would later call “*linguaging*” or “*Linguolaxis*” – a term that they would sometimes alternate with “*being-in-the-language*” (Maturana, Varela 2015[1984])¹³. The Sapir-Whorf hypothesis holds that the structure of a given language affects the cognition of its speaker and thus that a speaker’s worldview is relative to said speaker’s language:

It is quite an illusion to imagine that one adjusts to reality essentially without the use of language and that language is merely an incidental means of solving specific problems of communication or reflection. The fact of the matter is that the ‘real world’ is to a large degree unconsciously built up on the language habits of the group. (Sapir 1970: 69)

¹² This was never really proposed as a hypothesis as such by its two main proponents, Edward Sapir and his student Benjamin Lee Whorf, but it has, nevertheless, entered into the extant literature under that label.

¹³ My translation of the German “*in-der-Sprache-sein*” (Maturana, Varela 2015[1984]); a notion, needless to say, which leans heavily on Sartre’s (and for that matter: Heidegger’s) ‘being-in-the-world’.

This echoes Danish Nobel Prize Laureate Niels Bohr's credo that "we are suspended in language" (Rasmussen 1987: 22–23). But instead of pursuing the idea of language into the realm of linguistics or indeed linguistic determinacy – which is certainly *not* implied in either Bohr's nor Matura's or Varela's *homage a language* – I allow myself to superimpose unto their notion that what we are 'suspended in' is in fact not 'linguaging' in particular, but indeed rather 'communicating' in general¹⁴. As beings suspended in communication, we are, as we have seen, not merely the deferent reproducers of firm and stable communications; alluding to Wittgensteinian language-game theory, we are forever suspended in the process of co-producing the co-actional 'game' of communication as we play it.

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¹⁴ I will refrain from elaborating on this distinction here; I wish merely to state that the notion of language to be inferred from the three natural scientists' writings is much akin to what we may call the linguistic code; whereas, by communication I evoke all codes, all modalities, all interactions.

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Моделирование взаимной (реципрокной) динамики диалогической коммуникации: О философском подводном течении коммуникации радикального конструктивизма и кибернетики второго порядка

Несмотря на то, что и Эрнст фон Глазерсфельд, основоположник радикального конструктивизма, и его эпистемологическое альтер-эго, Хайнц фон Фёрстер, один из главных архитекторов кибернетики второго порядка, неоднократно подчеркивали формирующее значение коммуникации, – ни тот, ни другой никогда бы не смоделировали коммуникацию как явление само по себе. В своей работе я впервые предлагаю моделирование коммуникации, рассматриваемое через стереоскопическую линзу этих двух школ мысли. Для этого я сначала представляю, проанализирую и оценю, как традиционно моделируется коммуникация. Это послужит информационным фоном для интеграции общих обозначений, относящиеся к коммуникации, из соответствующих работ обоих ученых. В дополнение к тому, что оба ученых с готовностью восприняли принцип лингволакса (*linguolaxis*) Матураны и Варелы, т.е. то, что люди существуют в замкнутом пространстве своей коммуникации, два основных постулата оказались формирующими. Во-первых, коммуникация воспринимается как поток, почти как «поток общения» у Уильяма Джеймса. Во-вторых, и это в большей степени относится к Гераклиту, что и коммуникаторы, и общение претерпевают трансформации в процессе погружения в него. Это подразумевает предпочтение такого взгляда на общение, при котором общение «является» вечным колебанием между продолжающимися взаимными возмущениями (Глазерсфельд), которые происходят с течением времени, и – столь же вечными – попытками восстановить (когнитивный) гомеостаз (Фёрстер). Однако, гомеостаз не должен сводиться к простому соглашению, т.е. к тому, что «другой» делает то, что ему говорят, или к поддержанию хабермасовской идеи об общем понимании свободной от доминирования коммуникации. А скорее в прагматическом понятии «совместимости» (Глазерсфельд). В иллюстративных целях – и для того, чтобы несколько уменьшить (гипер-)сложность этого восприятия коммуникации – я закончу эту работу переводом этих понятий в модель, изображающую то, что я назвал со-действенной (*co-actional*) коммуникацией.

Dialogilise kommunikatsiooni vastastikuse dünaamika modelleerimine: Radikaalse konstruktivismi ja teise astme küberneetika kommunikatsioonifilosoofilisest allhoovusest

Ehkki nii radikaalse konstruktivismi rajaja Ernst von Glasersfeld kui ka tema epistemoloogiline *alter ego*, teise astme küberneetika üks peamisi ülesehitajaid Heinz von Foerster, rõhutasid korduvalt kommunikatsiooni alustrajavat tähtsust, ei modelleerinud kumbki neist kommunikatsiooni kui nähtust *per se*. Oma artiklis pakun välja kommunikatsiooni esmakordse modelleerimise nähtuna läbi nende kahe mõttekoolkonna prisma. Selleks tutvustan kõigepealt, kuidas kommunikatsiooni on traditsiooniliselt modelleeritud, analüüsin seda ning annan sellele hinnangu. See toimib informeeritud taustana, millelt liigun edasi lõimima kommunikatsiooni puudutavaid ühisnimetajaid mõlema teadlase teemakohastest teostest. Lisaks tõigale, et mõlemad kirjutanuks meelsasti alla Maturana ja Varela *linguolaxise* printsiibile, s.t, et inimesed eksisteerivad kommunikatsioonist ümbritsetutena, on määravaks osutunud kaks põhilist eeldust. Esiteks see, et kommunikatsiooni tajutakse voolamisena, peaaegu „kommunikatsiooni vooluna“ William Jamesi laadis. Teiseks, ning see meenutab pigem Herakleitost, et nii kommunikatsioon ise kui ka selles osalejad teevad sellesse süüvimise protsessis läbi muutusi. Sellest ilmneb, et soositakse vaadet kommunikatsioonile, mille kohaselt ongi tegu pideva võnkumisega aja jooksul toimuvate pidevate vastastikuste häirituste (Glaserfeld) ning samavõrra pidevate püüdluste vahel taaskehtestada (kognitiivset) homöostaasi (Foerster). Kuid homöostaas, mida ei tohi taandada ei lihtsaks n-ö soostumiseks, mis tähendab, et teine teeb seda, mida tal kästakse, ega Habermasi-laadse domineerimisvaba kommunikatsiooni ühiseks mõistmiseks, ilmneb pigem pragmaatilises „ühilduvuse“ mõistes (Glaserfeld). Illustratiivsel eesmärgil – ning et sellise kommunikatsioonimõistmise (hüper)keerukust veidi kahandada – lõpetan artikli, tõlkides need mõisted mudeliks, mis kirjeldab seda, mida nimetan koostegutsevaks (*co-actional*) kommunikatsiooniks, s.t sisuliselt valmistades selle näidise.