

The Anticommunication Imperative

A Tribute to Herbert Brün

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Abstract

In the cybernetic tradition of Heinz von Foerster’s “imperatives”, this paper proposes “The Anticommunication Imperative”: **If you seek the new, compose asynchronicity**. This paper draws on narratives credited to Herbert Brün, both written and oral, that have inspired this formulation, of which the importance of anticommunication in the role the arts play in society is central. I connect Herbert’s idiosyncratic approach to systems and the stages of a system to the idea of anticommunication as essential for the retardation of their decay. I offer the idea of imperatives as one way of thinking about the design of a desirable society, i.e., a network of statements that point to what is not currently the case, but which, if they were the case, would be desirable.

BACKGROUND

I first met Herbert Brün in October of 1981 at a conference of the American Society for Cybernetics (ASC). I had been asked by Stuart Umpleby, who had become the President of ASC, to help organize the first ASC conference since 1974. My professional history with cybernetics did not begin until 1977, at a conference of the Society for General Systems Research (SGSR), where many ASC members had migrated for their annual cybernetics fix. As I was later to learn, I had just started my doctoral studies at the University of Pennsylvania in the fall of 1974 at the same time and place of that last ASC conference before the hiatus. I had not yet met Klaus Krippendorff, professor in Penn’s Annenberg School of Communication, who had helped organize the conference and who later became my teacher, so I was unaware of what was transpiring right under my nose. However, starting in 1977, Stuart, Klaus and I would attend four years of SGSR conferences, and we, along with numerous others, eventually reached a conclusion that it was time to re-install the ASC conferences.

I was to organize the program for the 1981 conference and, knowing my interest in cybernetics and the arts, Stuart suggested I contact Herbert Brün, whom he knew from his time at the University of Illinois. Under the conference theme “The New Cybernetics”, Herbert agreed to attend and present on the topic “The Composers’ Idiosyncratic Cybernetics”. I can report that the cybernetics presented was indeed idiosyncratic and left a mark that would remind me often that I must continue my interactions with this enigma. Despite equipment malfunctions and some other mis-understandings, which I think actually got turned into connection-making, Herbert and I became life-long friends. I mention Klaus and Stuart because, without them, I would never have

made a connection with cybernetics, or to the ASC or the 1981 ASC conference, for which I am eternally grateful. Without those connections, I would in all likelihood not have connected with Herbert Brün, and I cannot imagine my life without Herbert and his connections and our conversations. He is omnipresent in my mind's eye and ear.

IMPERATIVES

Heinz von Foerster initiated a tradition, or what could become a tradition, when he articulated in the context of cybernetics a set of imperatives:

The Ethical Imperative: *Act always so as to increase the number of choices.* (von Foerster, 2003a, p. 227)

The Aesthetical Imperative: *If you desire to see, learn how to act.* (von Foerster, 2003a, p. 227)

The Therapeutic Imperative: *If you want to be yourself, **change!*** (von Foerster, 2003b, p. 303)

Klaus Krippendorff later formulated the following set:

The Aesthetic Imperative: *Construct your own reality to see.* (Krippendorff, 2008, p. 19)

The Empirical Imperative: *Invent as many alternative constructions as you can and enact them to experience the constraints on their viability.* (Krippendorff, 2008, p. 22)

The Self-Referential Imperative: *Include yourself as a constituent of your own constructions.* (Krippendorff, 2008, p. 25)

The Ethical Imperative: *Grant others that occur in your constructions at least the same capabilities that you employ in constructing them.* (Krippendorff, 2008, p. 29)

The Social Imperative: *When communicating, preserve or open new possibilities for others.* (Krippendorff, 2008, p. 34)

In this tradition, I would like to add:

The Anticommunication Imperative: *If you seek the new, compose asynchronicity.*

The idea of “imperatives” in cybernetics is occasionally controversial. They are criticized as dictates or mandates: “you, do this”. As guidelines for behavior, it can be argued, imperatives should go unwritten or unsaid, operating under the surface in a society of caring, thinking people. To write or speak them is to reinforce their dictatorial tone and to undermine such a society. Of course, we do not live in such a society, and so it would be false to say that these imperatives are currently operating under the surface. However, a network of false statements—statements that are not currently true, but if they were to become true would be desirable—can be used as a type of “design” for a desirable society. Furthermore, in a society where the participation of its members is conditional on their access to power, I need others to provide me instructions for my

participation and for me to do the same to facilitate the participation of others. Hence, the instructional tone of imperatives may be a useful reminder that we do not yet live in a society of unconditional participation.

While we could have a conversation about whether imperatives are cybernetic or not, my interest is not there but rather in conversations about the importance and usefulness of the concepts of anticommunication and composing and asynchronicity. Herbert Brün (2004a) made his idea of anticommunication central to his thoughts on the role of the arts in society. The idea of asynchronicity in conversation is drawn from the “conversation theory” of Gordon Pask (1976). The idea of composing asynchronicity is an attempt to meld the two.

TWO DOMAINS OF CYBERNETICS

Cybernetics links, through an observer, the domain of dynamics to the domain of relations. These are two distinct phenomenal domains, two ways of thinking and looking the world that can have quite different consequences. Ross Ashby, in his **An Introduction to Cybernetics** (1956), provides a calculus for moving from the domain of dynamics to the domain of relations for the simple case where an external clock is selected by an observer and the phenomenon observed is mechanistic (it operates by a single clock). Most of science today, of course, still relies on the (unstated) assumption that the observer’s clock is synchronized with that of the observed phenomenon, which allows the development of causal explanations. However, when the phenomenon observed carries its own clock, one not necessarily synchronized with that selected by the observer or one that can change (e.g., another observer), the calculus can become too complex to be workable. As a model or exemplar, the elegance of Ashby’s presentation still provides a starting point for thinking about the link between these two domains, and the vocabulary he was able to build from this link continues to be useful, particularly when thinking from the domain of relations—state-determinism, variety, constraint, fields of behavior, information, communication, regulation, control, self-regulation, self-organization, decay of variety, memory, homeostasis, ultra-stability, adaptation, the richly-joined system, to name a few.

The logic of the domain of relations is a logic of causality, including mutual causality—if A then B; or, given A, if B, then C; or even, if A, then B, and if B, then A (although this circular form requires special treatment). In its formal presentation, this is the Aristotelian propositional logic. It is also the logic embedded, although in a more informal and flexible way, in current human languages, although in different forms depending on the particular grammars and syntactical structures employed. This logic, whether formal or informal, is time-less (without time); it extracts the dynamics of the situations we experience in order to provide structure. When it works, it provides us with stability and a sense of security. It leads us to think that things happen because we or some other force causes them to happen, and that we can maintain some control over our circumstances if we have the necessary knowledge and power. This then comes to be how we think about making a difference in the world and in our lives.

The logic of the domain of dynamics is not so straight forward. To introduce time into logic is to embrace paradox in the current language, and to embrace paradox in the current language is to bring time into logic. By creating a new starting point, i.e., “drawing distinctions”, George

Spencer Brown (1972) took a departure from the logic of causality by shifting the focus from entities and the relations among them to distinctions and their dynamics. However, when this logic gets formalized as the calculus of indications, the dynamics of “drawing” is removed; and, of course, this logic is still not in the everyday language in which we live. I have found Herbert Brün’s development of the idea of anticommunication in his article “Drawing Distinctions Links Contradictions” (2004b) to be useful in pointing to the role of the arts in rendering the domain of dynamics useful as a way of thinking about our world and its predicament within the current language. A poem, a piece of music, a play, and their performances are ways to use language to play with dynamics. They don’t *cause* things to happen; they *trigger* a dynamics of interaction that can lead to new distinctions. Contradictions and paradoxes become desirable as avenues to new ideas, new alternatives, new choices. Every conversation, every interaction in language, becomes an opportunity to make a difference, not by causing predictable outcomes but by participating in a dynamics that triggers change, thus freeing the creative human spirit.

When speaking from the domain of dynamics, we use words like amplitude, duration, emphasis, event, sequence, rhythm, frequency, synchronicity, perturbation and, of course, change to capture our experience. When these words are put in sentences, however, they still embed the prevailing time-less logic and the dynamics we experienced gets lost in the world of objects (von Foerster, 2003c). Formal languages remove the dynamics absolutely; in fact, the value of formalism is that it extracts the dynamics to leave a skeleton of constraints to guide action and performance (like a script or score). While the linguistic development of the domain of dynamics presents challenges to cybernetics, it has still pointed to a rich set of concepts like process, non-linear dynamics (and strange attractors), structural determinism, self-referential systems, autopoiesis, organizational (and operational) closure, autonomy, observing, consciousness, conversation, the two tracks of language (descriptive and orientative), dialogic process, to name a few.

These two domains are about ways of thinking in cybernetics. There could be many other domains; in cybernetics, these two currently dominate and both are necessary. They are windows or filters through which I can look a situation; I can use either one, although one is usually more useful than the other. What is important in cybernetics and in everyday life is to be aware that there are two. When I create a system, I look through both windows and then go back and forth between the two (as in a dance), perhaps dallying in one more than the other depending on what I wish to look. I can’t think from both simultaneously; they are distinct logical domains.¹

Relations can also be thought of in terms of their negations—i.e., constraints. As thinking, languaging beings, we take experiences and formulate thoughts in a language. As soon as I begin to formulate a thought, I lose some of the dynamics of the experience, as my thoughts are constrained to the language I have, and I am only aware of that which I can formulate and the frictions/conflicts it produces (a form of dynamics). To try to capture the experience in a more dynamically robust thought, I may relieve the language of some of its logic and create a poem, recognizing that I am still working in a language, with the constraints of that language.

¹ Vincent Kenny (2009), citing Humberto Maturana (1980), talks about the non-collapsible domains of explanations (relations) and of experience (dynamics). Other illustrative distinctions between the two domains might include scores/scripts (relations) and performance (dynamics); language (relations) and speaking (dynamics); blueprints (relations) and designing (dynamics); a topological formulation of Mobius strips (relations) and a mathematician *cutting* a Mobius strip (dynamics).

The dilemma, which I prefer to call a dialectic, occurs when I try to formulate dynamics as a logical domain. As soon as I begin to describe my experiences in dynamic terms, I am pulled back into the domain of relations that I know. I claim that, to the extent I can think of dynamics as a domain at all, as opposed just to pointing to it, it operates differently from the domain of relations. A change of state of an element in a *pattern of relations* has a causal effect on other elements, allowing a prediction of further changes of state. A perturbation in a *pattern of dynamics* reverberates instantly throughout a system, triggering a new pattern of dynamics; no causal connections can be made, as that's not how it works. So, the domain of dynamics is not well-formulated, and perhaps cannot be; yet, I need it and return to it, as I desire to be a thinking AND caring human. What does pointing to this dynamics as a potential logical domain do for us? For me, it allows a way of thinking where I can claim that everything I say and everything I do makes a difference, not necessarily in a causal way but in a perturbed dynamics way, perturbations that would not happen without me and my intentions. It also allows a formulation of conversation as an avenue for realizing this participation and for creating choice.

The approach to systems in the next section below draws on both domains: relations and dynamics. Since these domains operate under different logics and the logic of dynamics eludes current language (with which I am stuck), I indicate whenever a shift in domains occurs. This shift is important in order to avoid the stable hierarchical structures that will emerge if one remains in the domain of relations. This approach to systems will lead to the dynamic idea of living in language as the retardation of decay, anticomunication as a necessary concept for retarding decay, and asynchronicity in conversation as a way to realize this concept in everyday life.

AN IDIOSYNCRATIC APPROACH TO SYSTEMS

Herbert Brün writes about systems in multiple essays. For example,

A system is a result of a look at a collection of stipulated elements. *Stipulated* in that I say which elements I will look at. *Collection* because I stipulate that these elements I have decided to look are not yet ordered, and my look will decide on what I put the emphasis and on what I regard as not to be considered entities. (Brün, 2004c, p. 82)

and,

Without the concept of system, the concepts of relevance and significance are meaningless. But they are equally meaningless with regard to “universal” systems, where everything is as it is and could not be otherwise, because that is the way it is, “it” being everything. (Brün, 2004d, p. 207)

The latter quote seems to challenge the usefulness of the term “whole systems”, where it is commonly claimed that, by enlarging a system to include more and more elements, the observer can avoid the traps of subjectivity and reductionism and get closer to the “true” nature of the world. The alternative to whole systems is to incorporate processes into the observer’s system look, including the observer’s *looking* itself.

I have had many conversations with Herbert about systems, often in the company of Susan Parenti, Steve Sloan, Mark Enslin, Judy Lombardi, and others. Five distinct and useful characteristics of systems emerged from these conversations. There is nothing special about the number five; it could have been three or seven or ten. The current vocabulary led to five. The classic formulation of systems has just two characteristics: elements (components, variables, etc.) and relations. While dynamics is implicit in the classic definition of systems, it is not in the formulation per se. A consequence of this classic formulation is that, when systems become complex due to size and/or connectedness, they get structured as hierarchies; this is the only way to deal with the complexity in the domain of relations. Without dynamics, these hierarchies become stable and, in the social world, stable hierarchies have consequences that we may not want. In an attempt to avoid stable hierarchies or at least to render them temporary (floating), the five characteristics below incorporate dynamics more explicitly into the formulation of systems by moving back and forth between the two cybernetic domains.

1. Change of State. All systems have the potential to change. If a system does not or cannot change, there is nothing that would lead an observer to select it for observation. The observer actively participates in the identification of phenomena that are worth formulating as systems. The observer then *looks* the systems she experiences into (temporary) being.
2. Elements. A system is a unity composed of elements. All elements of a system also have the potential for changes of state, and a change of state of an element is accompanied by either a change of state of the system or a change of state of at least one other element. (Note that sometimes we need an element as a member of a system, even though it appears never to change, e.g., a catalyst. In these cases, it is the presence or absence of the element that is its change of state.)
3. Structure. We started in the domain of dynamics with the idea of change. With the introduction of elements, we move to the idea of entities, physical or abstract, but entities as opposed to differences/changes nonetheless. With entities we begin to move into the domain of relations. To distinguish a set of elements as a system as opposed to a heap or a mess, the idea of structure is added. Structure is the pattern of relations among the elements. From this pattern of relations, if stable, causal connections can be deduced. In simple mechanistic or engineered systems, this way of looking systems can be quite useful, as it may permit control of the system's states. When the structure itself is constantly shifting, as in living systems and social systems, deducing causal connections may not be possible, much less useful. However, the pattern can also be usefully viewed as a set of constraints on the possible states and changes.
4. Invariance. All systems exhibit the characteristic that some aspect remains invariant. Without this characteristic, we could not continue to identify the system as the same system. In simple mechanistic or engineered systems, the structure may be what remains invariant and we can stay in the domain of relations. This invariant structure is what renders the system predictable. In this case, a change of structure would indicate a failure or breakdown of the system. In systems where the structure is changing, yet the system

holds together as a coherent unity, an invariant pattern of changes is indicated, and we move to the domain of dynamics. In this system, the phrase, “The more things change, the more they remain the same”, becomes operative.

5. Closure. All systems possess a “mechanism” of closure that allows change while conserving some form of invariance. Closure could be considered the quintessential contribution of cybernetics to systems theory. In simple mechanistic and engineered systems, this closure is referred to as informational closure, or the resistance of the system to perturbations from its environment that could change its structure. The mechanism might be just a barrier that keeps the perturbations from reaching the system’s core structure, or it might be a simple regulatory feedback loop or a more sophisticated self-regulatory device. Informational closure prevents changes in the system’s potential changes of state—no new information is allowed. In systems where structure changes and it is a pattern of dynamics that remains invariant, the closure is in the system’s dynamics of operation, referred to as organizational closure. In living systems this mechanism is called autopoiesis. The system is not closed to information, as the structure is changing to adapt to new forms of perturbation. The perturbations may arise from the system’s own changes of state.

While I might be able to stay in the domain of relations for simple mechanistic and engineered systems, more complex systems (where the system’s structure changes) have me shifting back and forth between the domains of dynamics and relations. Our language is not developed for the domain of dynamics, so I shift to the domain of relations to get the language, and then back to avoid losing the dynamics.

All systems undergo processes that lead to their decay, sometimes called self-organization. In simple mechanistic and engineered systems, there is decay in the variety of system states as the system migrates to a basin (a stable state or cycle). This decay may be experienced as a breaking in, a wearing out, a running down or a failing. We, as external agents, may service these systems to retard their decay—e.g., oil changes in automobile engines. In systems whose structure changes, there is a decay in the system’s structural options or flexibility. This decay may be experienced as maturing, learning, aging or civilizing. Life is the retardation of this decay, and humans can reflect and be deliberate about it. This is the role of composition in human endeavor and of the arts in society.

Herbert Brün writes about the five stages of a system, with particular attention to projects and societies as systems. (Brün, 2004e, pp. 183-184.)

Stage I: *Disorder*. If a system in a situation of total disorder is said to possess a high information content, this usually means that a great number of different possibilities for partial or total organization of the elements or events in this system are offered for choice. By making a choice, I extract information from the system. In order that my choice may be significant and the information carry a meaning, however, the relationship between the chosen and the not-chosen possibilities must be perceived.

Stage II: *Experimental*. When chaos is first attacked by an attempt at organization, it is obvious that the information gained will carry very little meaning because too little is known about the other possibilities inherent in the chaos. Thus the significance of the first choices cannot be appreciated. This period of first attacks may be called the “experimental” stage in the process of reducing chaos to order. Though seemingly uncommunicative, it cannot be avoided if one wishes to attain to higher degrees of order.

Stage III: *Speculative*. The next period could be called the *speculative* stage. By this time, the quantity of information gained allows for a number of statistical hypotheses as to the direction in which further information and the decrease of disorder in the system might be expected to move. In order to attach significance and meaning to the chosen possibilities at this stage, one has to accept as communicative the relationship between information that has actually been gained and the eliminated possibilities that are only hypothetically assumed.

Stage IV: *Reflective*. In due course the system will find itself in a state of order in which the quantity of information gained allows for a correct definition of the whole system, even though not all the possibilities of organization have been applied. Speculation gradually is replaced by variation. This period could be called the *reflective* stage. Communication becomes easier while the store of information runs low. Further attempts at yet-untried possibilities of organization tend to result in repeated significance and meaning, demonstrating thus, the decline in usefulness of the system as a source for the means of communication of a new thought.

Stage V: *Administrative*. The transition to the final, the *administrative*, stage, during which a system is totally organized, is an almost unnoticeable process. This is due to the fact that the now wholly communicative system at the same time becomes wholly uninformative. Therefore, the information that a system is dead can only come from another system, which is in a higher state of disorder.

Herbert's descriptions of the stages of a system point to the dynamics of retarding their decay—experimenting, speculating, and reflecting. They also point to systems as human creations, where retarding the stages of a system requires intentional intervention. Without an actor to perform this intervention, there would be no retarding, no dynamics, no need for domains. It would not happen without us, as actors, and our intentions. This dialectical way of thinking from two domains must be deliberate (as opposed to improvised) and is thus distinct from what I call nature, i.e., what would happen without our intentions.

The composer works to keep projects experimental and speculative, and perhaps reflective, shifting to new projects when the decay reaches the administrative stage. Human creativity becomes an alternative to biological explanation as a way of thinking about the human condition and human uniqueness. We may not be able to stop the decay, but its retardation can be taken as an ongoing process of living; and, although we are not all composers, we can still use the implied processes in our everyday lives. The human capability to retard decay in creative and intentional ways is the promise of thinking and caring, for which I want cybernetics to raise awareness.

ANTICOMMUNICATION AND CONVERSATION

Not all human interaction is communicative. The concept of communication arises in the domain of relations. When A and B are related, we say they communicate. The tighter the relation, i.e., the smaller the range of A's and B's mutual behaviors, the more communicative is the interaction. If A says, "Go close the door", and B goes and closes the door or knows to go and close the door, we say the relation is communicative.

Human interaction, of course, also involves a dynamics. If we choose to look ourselves as systems closed in their dynamics of operations, we need perturbations of that dynamics to keep it running, to keep it alive. We are "greedy" for perturbations of all types, one type of which is interaction with others. There may be particular dynamics of interaction that we crave and that lead us to seek recurrent interaction, or to want to extend the interaction. When this interaction happens in a language, I call it conversation.

I use the word conversation when I wish to speak of a particular dynamics of interaction in a language that starts with an asynchronicity and moves toward synchronicity. An asynchronicity is experienced as a friction, a conflict, an inconsistency, being on different planes, being out of synch with the other. For the friction, conflict, etc., to serve as a stimulus for a conversation, it must be just enough to create a curiosity or suggest a question or solicit a comment that serves as an opening to explore the participants' mutual interest in the friction, conflict, etc. and its potential resolution. There is a hope on the part of the instigator of the friction, conflict, etc., that the other will reciprocate and that the dynamics will intensify and diversify as the participants seek together a resolution—both (or more) remaining open to the possibility of a new idea, new approach, new awareness.

Asynchronicity is not natural. In fact, nature provides the model or standard for synchronicity. So, asynchronicities do not occur without the human and human intent. They are recognized or composed and turned into opportunities for conversation. Conversation is not about communication; communication is secondary and will end the conversation if and when it is achieved. Conversation is also the converse of control (Pask, 1987). Control is a way of looking systems that can be useful when we wish to block or correct for external perturbations. Conversation opens up the possibility for more perturbations and, in doing so, to the possibility of new ideas, new structures, new ways of thinking and new ways of thinking about ways of thinking—cybernetics. It generates choice.

Heinz von Foerster (2003b, pp. 295-7) talks about the two tracks of language: the descriptive and the orientative. The descriptive track is "what is said" and is particularly important in communication. The orientative track is "what 'what is said' does" and is particularly important in conversation. Of course, these tracks run in parallel and the use of language enacts both. I do not intend to pit communication against conversation; they arise in two different domains and are useful concepts in different circumstances. My interest is in raising awareness of the role conversation plays in maintaining and creating the distinctions that constitute a society.

Herbert Brün (2004f) coined the term "anticommunication". I use the term here to speak of human interaction in a language (verbal, gestural, visual, aural, kinesthetic, mathematical, etc.)

when the intent is not to seek mutual understanding, but rather to explore differences and their frictions in the search for new ideas, new formulations, new designs, new ways of thinking. Anticommunication is not to be taken as “against” communication; it is simply contrary to communication, another form of human interaction in a language, where composed (or at least recognized) asynchronicities in our interactions with others in language trigger (stimulate, provoke) a dynamics that engages its participants, through listening, caring, thinking and responding, in dialogues that have the potential to generate new alternatives, new choices. Hence,

The Anticommunication Imperative: *If you seek the new, compose asynchronicity.*

TOWARDS A DESIRABLE SOCIETY

I do not at all know if Herbert Brün would approve of an anticommunication imperative; it may be too communicative.² What I do know is that I have enjoyed my many conversations with him, and I offer the imperative as a provocation for further conversation. Herbert has often expressed dismay at the current state of human affairs and at the limits that the prevailing languages of the world place on thinking creatively about alternative societies. Being communicative in those languages is not going to lead to a new society, but rather reinforce the reward-oriented hierarchies that currently dominate thought and practice in virtually all aspects of the current society. Anticommunication, however, because it is not tied to current languages, has the potential to jolt thinking and action, to point to new languages, and with them to new concepts of society.³ This is the role of the arts in society—to create frictions, conflicts, etc., with the potential to stimulate or provoke conversations. Through the dynamics of conversations, we have the potential to participate in the design of our societies, not in a causal, power-oriented way, but in a way supported by the as yet incompletely formulated domain of dynamics.

So, we live and work in the middle between the domains, a dialectic in which we move back and forth as we seek resolution. Incompatible and/or opposing ideas interact to create new incompatible and/or opposing ideas. There is an attention to language, to dynamics, and to the dynamics of language. The idea of a society that is constantly in flux as new desires are integrated into its (temporary) design, and new ways of thinking emerge to guide its processes, suggests that the arts have a key, perhaps never-ending role to play as we move towards the desirable. As participants in these processes, recognizing and composing asynchronicities in our everyday lives may be an idea worth considering.

² I did find some examples where Herbert Brün has used the imperative form in his formulations. For example,

To be a student: learn how and in what to distinguish yourself.
To be a teacher: learn how and what to share. (Brün, 2003, p. 119)

³ See Marianne Brün (2004) for a discourse on the relation between language and reward-oriented hierarchies.

REFERENCES

- Ashby, W. R. (1956). *An introduction to cybernetics*. London: Chapman & Hall.
- Brown, G. S. (1972). *Laws of form*. New York: The Julian Press.
- Brün, H. (2003). *Irresistible observations*. Champaign, IL: Non Sequitur Press.
- Brün, H. (2004a). For anticomunication. In A. Chandra (Ed.), *When music resists meaning: the major writings of Herbert Brün* (pp. 60-70). Middletown, CT: Wesleyan University Press.
- Brün, H. (2004b). Drawing distinctions links contradictions. In A. Chandra (Ed.), *When music resists meaning: the major writings of Herbert Brün* (pp. 225-226). Middletown, CT: Wesleyan University Press.
- Brün, H. (2004c). Toward composition. In A. Chandra (Ed.), *When music resists meaning: the major writings of Herbert Brün* (pp. 77-88). Middletown, CT: Wesleyan University Press.
- Brün, H. (2004d). Composer's input outputs music. In A. Chandra (Ed.), *When music resists meaning: the major writings of Herbert Brün* (pp. 201-215). Middletown, CT: Wesleyan University Press.
- Brün, H. (2004e). From musical ideas to computers and back. In A. Chandra (Ed.), *When music resists meaning: the major writings of Herbert Brün* (pp. 177-190). Middletown, CT: Wesleyan University Press.
- Brün, H. (2004f). Technology and the composer. In A. Chandra (Ed.), *When music resists meaning: the major writings of Herbert Brün* (pp. 163-176). Middletown, CT: Wesleyan University Press.
- Brün, M. (2004). Paradigms: the inertia of language. In A. Chandra (Ed.), *When music resists meaning: the major writings of Herbert Brün* (pp. 292-300). Middletown, CT: Wesleyan University Press.
- Kenny, V. (2009). There's nothing like the real thing. *Constructivist Foundations*, 4(2), 100-111.
- Krippendorff, K. (2008). An alternative paradigm. In F. Bermejo (Ed.), *On communicating: otherness, meaning, and information* (pp. 11-36). New York: Routledge.
- Maturana, H. R. (1980). Biology of cognition. In H. R. Maturana & F. J. Varela, *Autopoiesis and cognition* (pp. 2-58). Boston: Reidel.

Pask, G. (1976). *Conversation theory: applications in education and epistemology*. Amsterdam: Elsevier.

Pask, G. (1987). *Conversation and support*. Inaugural address for the guest lectureship in general androgology. University of Amsterdam, The Netherlands.

Von Foerster, H. (2003a). On constructing a reality. In H. von Foerster, *Understanding understanding: essays on cybernetics and cognition* (pp. 211-227). New York: Springer-Verlag.

Von Foerster, H. (2003b). Ethics and second-order cybernetics. In H. von Foerster, *Understanding understanding: essays on cybernetics and cognition* (pp. 287-304). New York: Springer-Verlag.

Von Foerster, H. (2003c). Objects: tokens for (eigen)behaviors. In H. von Foerster, *Understanding understanding: essays on cybernetics and cognition* (pp. 261-271). New York: Springer-Verlag.