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A (Cybernetic) Musing: Wholes and Parts, Chapter 1

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Editorial remarks: This is Ranulph Glanville's last column for CHK. He passed away in the middle of our usual dialogue and negotiations about length and content. He was in and out of hospital while this conversation was going on. Suddenly he did not reply and Aartje Hulstein told me he had died peacefuly. But even in hospital they had talked about his answers to my questions. We knew time was short as we worked along, but had no idea that it was so short. He died as he lived, working and producing in high spirit. Thus, only the first of his column's two planed halves were finished. And even that was not quite finished. But Aartje Hulstein, Albert Müller and Bernard Scott helped to fill in the holes, mostly references and the like. So, here it is "with a little help from his friends." It is only the first chapter of the two planned, he never had time to work on the second chapter, after which he planned to retire from writing the column. Retire he did, in his own definite way. Thus both life and column was cut short. His contribution to CHK was unique and it and he will be deeply missed. We will be publishing a Festschrift issue in his honor soon. S.B.

Introduction

It is, perhaps, the great truism of the systems movement to claim "the whole is greater than the sum of its parts." This points to the distinctiveness between what, in this account, are called parts and what are called wholes. And, while Aristotle did offer us this "superiority" view (the whole is greater than the sum of its parts), I have come to prefer Lewin's (1939) modification, that the whole is different from the sum of its parts, for reasons that will, I trust, become apparent.

So this column which again takes the form of two chapters, is concerned with the relationship between wholes and parts. In it I argue a position I have taken for many decades,[1] but have never, apart from an early period when I wrote about the architect's perception of space (e.g., Glanville, 1977), previously focused on in one place, and not in these columns:

1. parts are themselves wholes, to be treated as such;
2. their "part-ness" comes from what in second order cybernetics has been for more than 40 years called "observing by an observer," but which I shall, in the course of the column, reword as "composing by a composer."[2] Wholes are composed into the roles of parts in relation to other wholes.

1. I can see traces of this sort of thinking in teenage writings.
2. In changing observe to compose, I hope to move away from what some see as the quasi-objectiveness associated with observing.

Origins

This column did not arise, however, from thinking about wholes and parts. Its origin is, apparently, far removed from such concerns, hence the division into two parts. I will tell the story mainly at the end of chapter 2, but acknowledgement is appropriate, here.

Ever since we were first introduced by Niklas Luhman, my friend Dirk Baecker (who translated my little book *Objekte* [Glanville, 1988] into German) has complained that I do not write about society.[3] He has asked that I develop my theory of objects to accommodate a social dimension. I have responded that the theory does that already, but that I will get round to being more articulate about society, as opposed to the individual. It was in keeping this promise that I found myself writing more abstractly about wholes and parts, as a precursor to writing about individual and society, and that generated the two chapter sequence that I stick to within this column: First, I explore wholes and parts, then I explore society and individual in the light of my exploration of wholes and parts—which I carry out using concepts from that theory of objects, about which more later.

The notion of wholes and parts relating together is enormously powerful in western thought,[4] with roots in the ancient Greeks. What some would call the Cartesian project is to fracture wholes into smaller and smaller parts that it is hoped will be found to be unchanging and universal—an approach associated with science. There is clearly power in this approach.

Another approach which has great power and is essential to this column, is the idea of explanation that permeates everything. I hold that we build explanations of our experience (of what we take to be the world around us). These explanations are simply that: ways we account for our experience. They are not truths. Science is a system of the viable (see, e.g., Popper, 2002; Glasersfeld, 1995), though this is often forgotten.

Thus, when I say "X is …" I utter an explanation of my experience. I compose explanations into collections of objects which reflect Piaget's (1955) notion of object constancy and, at least in my theory of objects, give rise to an examination of how Objects can be, and how they can be (taken to be) autonomous, whole.

What is a Whole?

"What is a whole?" is an elusive question, yet one that seems central to our ability to talk of much experience, such as cognition—and even of the concept experience itself.

To capture a sense of what a whole might be, and hence of what might be parts and how they could come about, we have to question the nature of where we stand on the reality we chose to deal with. For instance, let us say (and I don't know how) that I am observing some whole I will call X. One question that arises is, is X a whole in and of itself alone, or is it a whole in conjunction with me—the observer. For that matter, am I also, perhaps, a whole? In other words, where does the wholeness lie?

3. And also that I do not write about anything new. In reply I am like an artist, learning what to do, not what to say.
4. So powerful it has led to a (rather technical) subject of its own—the science of mereology.

Questions such as these tend to be undecidable. This is because the decision depends on how you want to describe and value the relationships, and not on purported wholes in themselves. Thus, X might well be a whole, as might I be (as might we be, for that matter). There is no one decision, there is no one answer: there is a (continuing) choice, or, perhaps, there are several choices that may be made, possibly all at once. All three of the options are possible. So the whole might be X, might be X and me, (might be me). I can chose, but I cannot insist on an absolute correctness in any choice I make. My view might change over time, or through any other cause: There is no call for constancy, here.

Furthermore, wholes need not be physical things. A concept can be whole, as can experiences from which we derive (Piaget style) objects. These may be more significant than what we call *the physical*. We are not dealing with a necessarily physical world: Indeed, we may not be dealing with a physical world at all.

Some dictionary content may help. The Apple OS X version of the *Oxford Dictionary of the English Language* gives us the following. The noun *whole* is associated with

> a thing that is complete in itself
> all of something

while as an adjective *whole* means much the same, plus

> with no part removed.

So wholeness relates to autonomy: Something which is a whole does not need anything else to provide its wholeness. It is whole in and of itself. It becomes associated with autonomy, self-contained, complete in itself, self-governing, free from external control/influence— whether it is composed of X, (or me,) or the two together. The whole neither needs nor lacks anything else, to be whole; and if it is generated, it must be generated by/as itself.

The autonomy of each whole is what grants its independence and uniqueness. It keeps each whole apart, separate, different from others, of and on its own. In my understanding, wholes are autonomous systems and autonomous systems are wholes.

Autonomous, self-organising and self-reproducing systems are very much the subject matter of second-order cybernetics, especially around 1970, when several systems structured to be autonomous, self-organising and self-reproducing were developed. These include:

1. Gordon Pask's topics (procedures that execute themselves), and his formally identical individuals, the *psychological individual* (p-ind) and *mechanical individual* (m-ind). I present Pask's autonomous systems first because of his explicit recognition that several p-inds could be "housed" (my word) in one m-ind (as when a schizophrenic has warring voices in his or her mind): and

several m-inds could be housed in one p- ind (as when we come across crowd behaviour) (Pask, 1972).

Pask also refined the mechanism of a form of communication that does not require encodement and does not assume meaning transfer—the conversation. In his formulation, conversation is circular and has a life of its own (Pask, 1975, 1976).

2. Francisco Varela and Ricardo Uribe, led by Humberto Maturana, gave us autopoiesis. If people know of anything of second-order cybernetics, this is it. Autopoiesis considers *live* as a verb, rather than *life* as a noun. It is concerned with the process by which (biochemical) material, in an environment, can come to form into units that continue to generate themselves in balance with the environment, in a dependency of circularity. The Greek origins of the word indicate systems capable of producing, reproducing and hence maintaining themselves (Varela, Maturana, & Uribe, 1974).

   Autopoiesis is taken, often only in the most schematically analogous form, as a generalisation, the concept is used almost everywhere! Jantsch tells a story of Maturana begging him not to use it for non-biological purposes because Maturana sees autopoiesis as specifically biological (Jantsch went right ahead, regardless). The most extensive and significant non-biological use is probably by Luhmann (1995) in sociology.[5] This is not to say that Maturana and Varela did not develop aspects of autopoiesis themselves—see *The Tree of Knowledge* (Maturana & Varela, 1998).

3. Heinz von Foerster gave us eigen functions: a form of mathematical function in which the output of the function is recycled by the function forever—or until a stable and self-reproducing value is produced as a result of the potentially infinite recursion. Foerster wrote about these eigen objects in tribute to Piaget: He claimed them to provide a model of the way we can construct a persisting object from our perceptions, that is an object with constancy. Indeed, it might be said that Piaget already described this category of autonomous systems in the 1950s (Foerster, 1977/2003; Piaget, 1955).

   Foerster, in his PhD examiner's report, also asserted that by far the least known example, my theory of objects, was the first calculus for Piaget's *object constancy.* Not surprisingly, Objects,[6] for me, fit best the way I am describing the characteristics and behaviours of wholes and parts. The theory

5. It is always good to quote Maturana's own original definition: Autopoietic machine: a machine organized (defined as a unity) as a network of processes of production, transformation and destruction of components that produces the components which: (i) through their interactions and transformations regenerate and realize the network of processes (relations) that produced them; and (ii) constitute it [the machine] as a concrete unity in space in which they [the components] exist by specifying the topological domain of its realization as such a network. (Maturana & Varela, 1980, p. 135)
6. The word *object*, in English, has many, often contradictory meanings. Its meaning has expanded and inverted over a long history of use.

> of objects is intended to provide a structure that allows us to accept that, although we all observe differently (and exclusively) we may act as though we observe the same phenomenon or entity. It is a structure that permits. It is not a truth, and the Objects are not physical objects, but objects of attention. They are both (grammatical) subject and object of their own self- observing. These Objects have consequent, remarkable characteristics including time generation and, through that, logic (Glanville, 1975, 2012b).

From the above we can see there are several (second-order) cybernetic accounts that depend on the development of characterisations of autonomous systems, and, thus, deal explicitly with/in wholes. All take forms that are arguable similar: together, they form a group of what may be seen as supportive allies.

However, there is still another question concerning wholes (when we take them to be made up of parts), that we need to address. Can we recognise part of a whole? To my mind there is something difficult here. If I were able to determine that a part is a part, would I not need to perceive the whole, to know the part is a part of that whole, and would I not be giving the quality of wholeness to some thing independent of my observing, and hence of my ability to know? Can I have part of a thought? It seems to me I cannot.

But I can, of course, situate and describe this "whatever-it-is-if-it's-not-a-part" as a whole, and relate it to other wholes in various ways. I can have a whole thought that I may decide needs some further work to complete it (I've not quite fully worked it out, yet). To my mind it seems that whatever I perceive I perceive as a whole, even if I then give this particular whole the role of a part of another whole (within), or even in itself seen through a projected future.

Parts, as parts, are ill-formed. You can see that something is (treated as) a part: You cannot see that it is a part unless you have seen it as a whole. By taking this position, not only have I described how I have come to appreciate my cumulative experience (my understanding of my understanding of my personal chronology), but I have also kept my model simple. I can accommodate multiple answers to questions of wholeness and part-ness because it is I-the-observer who places a particular whole in the role of part: I compose the wholes together.

Put another way, what I may come to call part of a thought is, in itself, a whole thought anyway! I am insisting that that which I perceive and cognise is perceived and cognised as a whole.[7] And I am insisting that everything I can recognise is a whole. Each has the integrity that retains the separateness of identity, of the self and its self-ness, and allows me to treat it as recognisable and constant and stable. That is autonomy.

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7. To me to quote the wisdom of the US Declaration of Independence, "We hold these truths to be self-evident, that…" we perceive wholes, not parts.

Being in the World

Unusually for this column, I have a personal, phenomenal background to this in the sense that this understanding was supported and developed through exploratory research into spatial perception and not just as an idea illustrated. I began my research career, more or less in parallel with my teaching career. I have elsewhere told the story of being brought in to teach a subject (architecture) that I had really not studied—I spent my time deeply caught up with other subjects, knowing nothing of the subtlety of the material architects handle and manipulate, learning with my students about that material, architectural space.

The work I refer to represented an attempt to create an agreed verbal vocabulary, derived from visual material, in which my students and I could communicate such that we understood each other, and could share our understandings. We did this by following a complex and rigorous procedure derived from the manipulation of George Kelly's (1955) Personal Construct Repertory Grids, initially devised by Laurie Thomas (1984). Eventually, and in the most hygienic manner imaginable, we produced a sub-selection of visual material that we felt went well with the verbal vocabulary we had negotiated. Looking at photographs through this visual/verbal vocabulary filter, however, demonstrated no agreement at all. In the end, the only way of showing any connection was to draw what the words meant to us.

What was the difference between drawing and writing? It occurred to me that it was instant wholeness. A sentence is (more or less) read in a linear sequence, an image seen all at once. The sentence builds from the accretion of verbal units; the image from an endlessly, potential enrichment. What I thought was that the words were parts being fitted together, but the drawings were wholes being elaborated, detailed up. This is the beginning of my first finely justified assertion that a part is a whole in a role.

This work was developed into a whole understanding of how we understand (architectural) space that contradicted the general understanding that characterised environmental psychology, which was based in the dominance of variables (parts). I developed an account that was I suppose more connected to what architects do and how they develop their understandings than to how assessors assessed that work give it pseudo structural truths, telling us what was, not what could be. And at the base of it was the idea that the world as we are in it is of wholes and that we compose these wholes.[8]

The Other

Behind this way of talking there is a strong but nevertheless generally hidden assumption or presupposition: that there are others about and with which I can make such assertions as that they are wholes (and that architectural space can well be

8. It is important to direct the reader to Gestalt Psychology. Gestalt means something like whole, in German. It is also the word used to mean design: bringing into wholeness. Gestalt psychology is a precedent to my own work.

understood in this way). This is to say that there is, in my universe of discourse, at least one other as well as me,[9] for otherwise, what point (for me) is there in being me?

In one sense, a posited universe of discourse (a whole of wholes) is already an other: what else could it be? Given our indicated universe, there must already be two wholes for this explanation to be developed at all!

We can produce further direct arguments about the inescapable other. For instance, using the language of distinction drawing, why distinguish a self, if an other is not also distinguished: If you are alone, what does it matter if you distinguish yourself (if you can be taken to exist) or not?

For that matter, the drawing of a distinction, in the circular Spencer-Brown interpretation, involves the creation of two sides: The mark of the distinction creates a value both within and without the mark. In other words, each distinction distinguishes not one but two wholes and is, in itself, also a whole. "Not one, not two," in which Varela (1976) diffuses what is inside and what of the boundary, in a way reflecting, perhaps, the shimmering of a Möbius strip and to be found not only in my PhD (1975), but also my second paper on Black Boxes (Glanville, 1982).

Or, referring to Pask's work, what would a conversation be without another to converse with? I can summarise by asserting that, in cybernetics, especially in second order cybernetics, when there is a self, there is always an other—that is the nature of distinguishing.

These arguments can be found in Glanville (1990).

Components/Parts

If our universe is made up of wholes, the crucial question arises, how might those wholes we call parts become such parts?

I have argued that part-ness is not a form of defective whole-ness: everything is a whole, and to rephrase Gertrude Stein[10] "a whole is a whole is a whole." To be more precise, we are not talking about wholes on their own, but what we understand (compose) as/into wholes: We are talking about explanations of experiences and their consequent ontology, not about ontology per se (about which I believe I have little or nothing to say).

The only place that part-ness could reside, if not in the wholes, is in a composer's composing. I have switched to the word *compose* for the assembly of wholes by what I (along with others) have previously called the observer. It is my intention throughout

9. Andrew Pickering (personal communication) believes second-order cybernetics is exclusively concerned with the self, and sees this as an overriding weakness. Were it so he would be correct. But key thinkers in the field have, right from the outset, been at trouble to include the other. Consider the following titles and their associated works: Foerster's (1991) "Through the Eyes of the Other"; Glasersfeld's (1991) "Knowing Without Metaphysics: Aspects of the Radical Constructivist Position"; both of which appear in Steier's book *Research and Refexivity* (1991); Pask's (1975, 1976) massive magnum opus, *Conversation Theory*; and my own "The Self and the Other: The Purpose of Distinction" (Glanville 1990).

10. Stein's original is "A rose is a rose is a rose." In similar vein, Sigmund Freud reminds us that sometimes a cigar is just a cigar.

this rest of this column, to replace the troublesome words observe and construct by what I have come to see as the far more accurate and less tainted word, compose. Henceforth, I propose we talk of composers composing compositions. Thus, Foerster's characterisation of the two orders of cybernetics should be restated:

> first-order cybernetics, the cybernetics of composed systems.
> second-order cybernetics, the cybernetics of composing systems.

In the position put forward here, it is the observer who assembles (the composer who composes) the experiences we call observations (compositions) in such a manner that some can be read as parts of others. An observation is a composition. Part-ness arises in a composer's composing wholes together in relationships that present some as constituents of others.[11]

I summarise (using my old catch phrase): a part is a whole in a role.[12]

In other words, this universe of discourse is composed of wholes that may themselves be composed together so that some wholes take on roles as parts of other wholes: For instance, each whole in the universe of discourse is understood as a part of that universe; just as I compose the whole I call *I* into the role of part of a whole I call *passengers*: On a train (for instance) I am just one of the many of those who make up the body we call passengers. I can also compose the wholes I call *Blue* and *Danube* into the role of parts of the whole I call *Blue Danube*. There is a number of ways of composing wholes together.

In this way of composing, it is easy to see the justification of Lewin's slight rewrite of the popular expression I introduced at the outset to characterise systems theory, that a whole is greater than the sum of its parts. Lewin (1939) said, "The whole is different to the sum of its parts": for each part, and the whole it is composed into, is a separate whole, the part-ness being attributed by a composer.

Remember that what is argued here is not a physical reality, but the structure of an explanation. You will not (I believe) be able to find any thing that is no thing but what we call Blue outside the world of experiential perception, cognition and explanation, although perhaps you might be able to find some wholes in the realm, for instance, Danube. To quote the first two statements of my (cybernetics) PhD thesis,

> 0.0 In order to know something exists we must be able to observe [compose] it.[13]

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11. A composition can be made in at least two ways. It can be put together from building blocks hanging together; a sort of combination of elements, and can also be made in a way that brings into being the new (think of musical composition for both co-existing). It implies what I refer to below as glue.
12. George Klir asked me if he could use my quote as a chapter heading, and I agreed. When published, he had changed the word order to a whole is a part in a role. He maintained it made no difference. I maintain it shows the difference between first- and second-order cybernetic understandings
13. The word compose gives us an idea of being actively involved in making the something (the Object). The word observe is much less involved and is taken by some to suggest to some an objective existence independent of the observer: to accept that things exist and we happen upon them, rather than that we have the central part in making our experience, and so cannot know what exists separate from us, if anything. Compose also has the concept of assembling things together (wholes as parts of other wholes), but also of novel creativity.

> 0.0,1 If we cannot observe [compose] it, we cannot know it exists. We cannot necessarily affirm its non-existence, either.[14](Glanville, 1975, p. 15; see also: 2012a, p. 32; 2012b, p. 233; the word [compose] has been added by me for this publication.)

Glue

While we may reasonably agree that wholes might be composed together to make a new whole, there remains a question of how, acting as parts, they may somehow remain glued together, so that this arrangement persists across time and between different people. Without this ability, we live in an ephemeral world. Indeed, the ephemeron's single day may be a rather extended life compared to what we face: the time of bringing the wholes together in their relationship, which might be a matter of milliseconds or less, might be closer to the point! So what is the glue that maintains the relationship?

First of all, we should remember that the relationship does not exist in independent wholes but is composed by a composer (who, of course, is a whole him/herself) of his/her experiences. The glue is used in the way the composer sees; and the relationships, not in the wholes, and not as some special separate thing. I compose the wholes I experience (for instance) under the names Blue and Danube together to make something different; Blue Danube. It is the relationships I compose between the three (not just two) that brings them together. So the glue exists in this strange world that is partly imaginary and partly (hoped by many to be) real: that is the world of (radical) constructivism and of (second-order) cybernetics (Glanville, 2012a).

Note, the outcome of the composition is another whole (Blue Danube): So the question of persistence is the same as the continuation of any autonomous system, as we explored above. The persistence of the new whole is just the same as the persistence of the old ones. Once the relationship has been composed, and the consequent new whole composed into place, the survival of the new whole means the composition is preserved. The new whole is the outcome of the process of composition and it survives in the same way as all other wholes. This is, of course, simply an explanation: not what is, but an explanation for our experience.

You might ask how composition happens. Piaget's (1955) recursive mechanism for the establishment by a child of constancy (conservation, persistence, preservation) of an object provides an inspiration. However I will not answer that further here, for the simplest explanation I have come across is in my long threatened restatement of my theory of objects. I ask the reader, for the moment, not to ask how but to indulge me.

I have covered—as far as I can in this column—how the relationships of composed wholes persist across time, rather than as an ephemeron. I now address how it exists between people.

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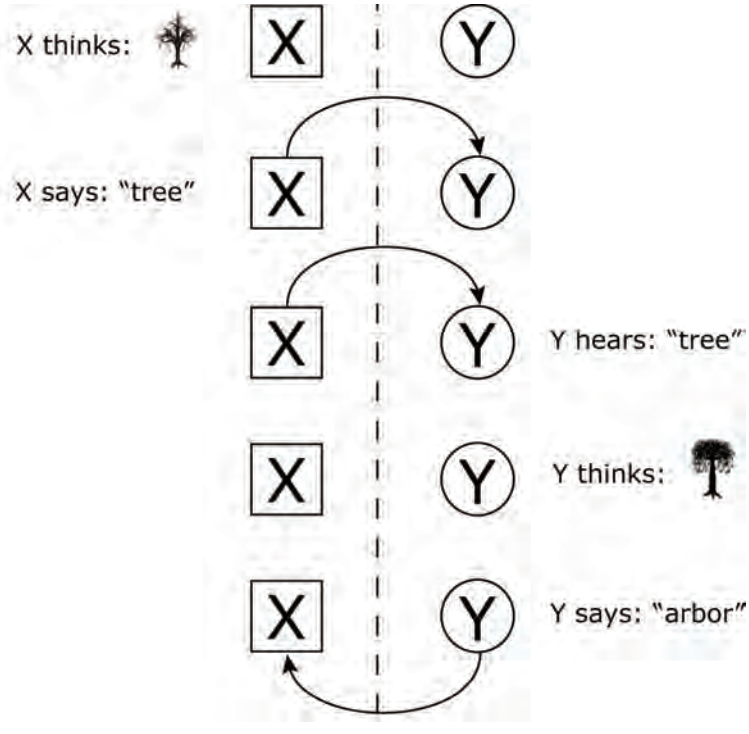
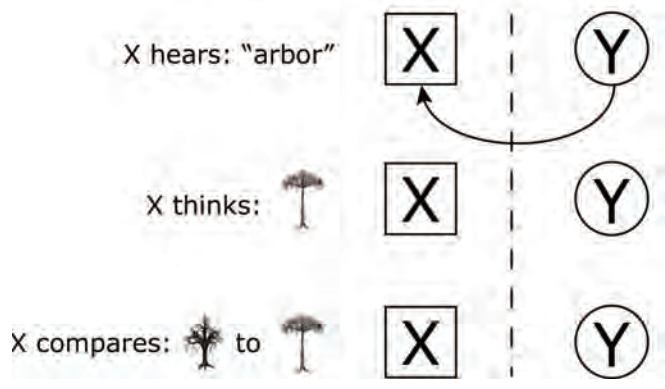
14. This is in many ways the central point of radical constructivism (Glasersfeld, 1995) and parallels what Foerster used to discuss through the concept of undecidability. We do not know, independent of our own minds, what is in our minds. James Clerk Maxwell gave us a most wonderful quote: "The only laws of matter are those that our minds must fabricate, and the only laws of mind are fabricated for it by matter." See also Glanville (2012a).

Remember, wholes are not physical objects, they are not from the world of realism or positivism. They are just an explanation of an experience, and each one of us has our own explanation and our own experience. We chose, after Piaget's explanation, to think it is of some thing.

How do we communicate between each other, to share experiences and their explanations? Through conversation: Pask's cybernetic, mechanical, interactive process of uttering, listening and constructing personal meaning.[15] Conversation demands of us that we take responsibility for our own meanings. It allows us to communicate without requiring that we understand the same thing as each other—or even believing it's possible, let alone desirable. All we need to do is build individual streams of personal meanings that intertwine in parallel, and continue to do so to the satisfaction of both participants. (Conversations can have more than two participants, but not less. However, as we have learnt, the participants may be personae (e.g., Pask's p-inds) housed in one body (m-inds). Some readers may recognise in this aspects of Maturana's (1995) co-ordination of co-ordination. I have explored Paskian conversation in this journal on many occasions (e.g., Glanville, 2009).



15. Pask was not the only person discussing conversation in the early 1970s, but he was the one who examined conversation as mechanisms Others were much more interested in modes, moods and meanings.



So the glue is the composition of wholes (in the roles of parts) together into new wholes, by means of conversational communication.

Summary, Chapter 1

In this chapter I have set out my arguments concerning wholes and parts, specially that a part is no more than a whole composed by a composer (observer) into the role of acting as a part. I have argued also for how these parts can acquire some permanence by composing this whole, which I take to operate like Piaget's constant objects. And I have introduced the question of wholes, of autonomy, and of the other as a central pre-occupation in the early days of second-order cybernetics.

In the second chapter, I explore in greater depth wholes that are composed of complements, bringing together those aspects of our understanding we often leave as separated and hence competitively unco-operative.

And then, sometimes, a way of creating a whole is to present and represent it to oneself, recursively, modifying as one sees necessary on each recursion: Piaget's object constancy, again. Under particular circumstances that I have explored elsewhere (Glanville, 2007), this can lead to novelty, as in designing. This way of forming and using wholes brings me full circle back to some of that early work, thinking about how architects conceive of space, as a whole into which richness is progressively introduced; as well as to how we can share the composition of such wholes between people; and thus the establishment of society and individual, with which I may at last bring a small gift to the bountiful and generous table of Dirk Baecker.[16]

16. This position is presented and developed in the online keynote lecture "How Design and Cybernetics Reflect Each Other" given in Oslo, October 15, 2014 at https://www.youtube.com/watch?v=tTN_9mJIWNw .

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