Open Peer Commentaries

on Manfred Füllsack's "Constructivism and Computation"

Circularity and Distinction

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> Upshot • The aim of my commentary is to reflect on fundamental issues related to circularity, distinction and the properties of observers.

« 1 » In my commentary, I will start with the notion of distinction in relation to Manfred Füllsack's target article (§§13–17, 31f). Füllsack takes as his theme the properties of second-order science, where it is given that the observer is part of the system. Starting in the middle as he does, it may not be clear to the reader how the stance changes in relation to acceptance of a world that is being investigated and how that world is changing in relation to what the observer does or what is done to the observer. Indeed, Füllsack raises that question of the nature of the observer throughout his essay. I have decided to put down as systematically as I can the point of view of distinction/observer, that is, the point of view that any elemental distinction is accompanied by an observation. This is the investigation of the matter of second-order science from the inside, as it were. The world as seen by the observer/distinction is a direct and intimate world (I do not say a subjective world). But we find that on exploring this world, it exfoliates into complexity, just the kinds of complexity discussed by Füllsack. Indeed, what I present here can be seen to arise also in Füllsack's treatment but perhaps a bit differently. We see, by starting with a distinction, that the issues of complexity and randomness arise in relation to the determination of recursions. All this happens without any assumption of a world outside the observer/distinction. I believe that the next paragraphs can be fruitfully used for a discussion of the epistemology of Füllsack's paper. I do not assert that the epistemology below is identical or opposed to Füllsack. It is simply a description in my own terms of the movement toward world and complexity that is inherent in the making of a distinction.

« 2 » Distinctions appear with an observer. There is a circularity inherent in the pair distinction/observer. An observer must make a distinction, otherwise nothing is observed. A distinction is not distinct unless it is observed to be distinct. Thus an observer and a distinction must occur together.

« 3 » Statements occur in language. The understanding of distinction in relation to language is circular. In language, we have a method of commentary on our distinctions. The very elements of language are inherent in acts of distinction. For example, we may take the single sign < as a bifurcation from no distinction at its cusp to two distinguished states at its branches. The sign has a directionality with the cusp to the left of the branches. As such, we can call it a left bracket and allow that along with making a distinction internally (the branching), "it" also makes a distinction externally (left from right on a line). Similarly, we can consider a right bracket >, with its internal distinction coupled with its making of a distinction in the line. Placing the left bracket to the left of a right bracket, as in < >, allows us (note the appearance of us – a designator for an observer observing/being the entire linguistic construction) to make a distinction between the inside of the brackets and the outside. By the time (sic) that we have constructed the mirror-paired brackets, we have a formalism for an elemental distinction. The formalism < > is much simpler than the language that surrounds it, but it can hardly be understood without that language.

« 4 » Language refers not to things but to distinctions. Distinctions, when seen as language, can refer to acts of distinction and to language. In speaking, we imagine an entity or observer that is distinct from our speaking. But when the speaking is seen (by that observer – it is indeed circular) to be the very production that supports the language and the observer, when the observation is seen to be identical with elemental acts of language, then it is seen that the apparently complex production of language is part and parcel of the act of distinguishing.

« 5 » In this circularity arises the texture of reference, literary complexity and mathematical complexity. The brackets themselves give rise to mathematical domains. For example, counting: < >, << >>, <<< >>>, … And in this counting arises the possibility to refer to "process completed" and "process continuing" (the distinction of the three dots …).

« 6 » If there are sequences, they may be recursively predictable, or there may be no method to apprehend the sequence except itself. Thus arises the notion of "random" (in the sense of Andrey Kolmogorov and Gregory Chaitin, e.g., Chaitin 2001). The distinction random/patterned arises early in the temporality of process generation. These concepts enable the language to handle the distinctions that later become entropy and other measures of form.

« 7 » An individual distinction is random in Chaitin's sense. There is no knowing it except through itself. Repetition is an idea whose creation might never have happened, but once it did, the Pandora's box was open for all possibilities, regular and random.

« 8 » The generations of distinctions and awareness appear to happen in a complex world. The world is distinguished from

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the simplicities of the observer and the world can be studied in the circularity of its creation.

« 9 » We do not know if there are worlds beyond our distinctions. Any world that we study is a distinction/observer for us who are it in full circularity.

« 10 » These comments are a ladder for me to walk up to the considerations in Füllsack's article. Since I have constructed them for the sake of making a connection and further conversation with Füllsack's ideas, I will not say that the ladder should be thrown away. Nevertheless, anyone reading these paragraphs is encouraged to construct his or her own ladder from personal distinguishing to the distinction/observation that "is" the world. The issue of observer and world is beautifully illustrated by Füllsack in his discussion of the possible "cutout" nature of observing observing (§10). When we model observation and distinction, there is a tendency to introduce extra distinctions that make our models more cumbersome than what goes on in actuality. The personal observer observes himself without making a sharp distinction between himself as the observed and himself as an observer. This occurs through circularity, which I believe creates within our awareness a persistence of vision that smooths the edges that might otherwise be there. Occam's razor does not always cut; it also joins.

« 11 » Consider the last implicit injunction to the reader – to construct his or her own ladder to the world. The point about including the observer in science is, I believe, that each of us must make the effort to understand and create on our own terms. In this respect, mathematics is a clear example of second-order science. For there is no one else who can substitute the understanding that one finds for oneself, and mathematical knowledge is changed as each new personal understanding arises. The same is true of other science, but there, the issue of "taking another's results on faith" arises. At this point, issues of agency and collaboration arise, just as they do in Füllsack's Figure 1. The discussion of the relationship of the personal power of individual observers and the collective power of collaborating observers in the making of science is the beginning of an aware performance of the creation of new knowledge.

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Systemic-internal and Theoretical Views on Second-Order Observations

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> Upshot • I address Füllsack's main conclusions in his article regarding the meaning of second-order observations. Especially envisaged are the epistemological and ontological difficulties raised by his scrutiny of the merging between systemic-internal conditions of second-order reflexivity and the thematic-theoretical accounts of selection, intentionality and purposiveness in evolutionary systems.

« 1 » Courageously, Manfred Füllsack articulates some well-established constructivist categories concerning the significance of observation, observer-dependency of cognition and "second-order cybernetics," introduced in former work by Heinz von Foerster, with views on eigenbehavior originating from John Conway's "Game of Life" and with some economic extensions of the "intentional stance" of Daniel Dennett's modeling of cognition in psychic systems. The author did not discuss the meaning of the word "science" in his title, assuming that the reader has a benevolent attitude to his endeavor under the heading of "second-order science." The author's essay missed the terminological distinction between observations, descriptions, theory, types of theory and meta-theory. Some equivocal meanings and arguing would vanish if he had started by clarifying these analytic levels. Below, in §7, when I refer to the need for restriction to a metaphorical sense of the teleological language of theory, I have in mind a consequence of the blurred use of these levels throughout the article.

« 2 » Coherently, the author follows George Spencer-Brown's distinction between marked and unmarked space in order to lay down the formal structure of the binary space generated with the emergence of an observation (see §§2, 8, 9, 13, 14 and footnote 3 of §9). He again uses the marked/unmarked border to emphasize the singular character of the structure of a distinction as a whole that can re-enter in itself, making feasible the fixing of the source of the indicative stance of the initial distinction within new emerging distinctions of new observations. This reflective frame constitutes the formal condition of an observation of observers, or so-called second-order observation, according to von Foerster's theoretical proposal (Foerster 1993: 46f) and taking into account the work on circular causality since the beginnings of cybernetics (Pias 2003–2004). According to Füllsack's terminology, this elementary calculus and the consequences that may follow from the admission of an algorithmic increase in neg-entropy in systems as an outcome of re-entries of basic observational distinctions can establish the grounds for a link between second-order observation and complexity formation / reduction in systems. The systemic importance of this link goes from physical systems to biopsychic processing of information. The co-reference of first- and second-order observations is the basis for James Crutchfield's "intrinsic emergence" and for Terrence Deacon's "teleodynamic processes" (§23). Departing from Robert Rosen's anticipatory systems (§27), the author also developed the consequences of that basic link for economic expectations and economic eigenbehavior. In a general formula, the author says that both types of observations, first- and second-order, co-evolve.

« 3 » After a proficient distinction between first- and second-order observations and observers, the author moves to a very important thesis – the blended structure resulting from the evolutionary co-condition-