Do Cyborgs Dream of Electronic Rats? The Macy Conferences and the Emergence of Hybrid Multi-Agent Systems

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Abstract

This paper looks to the social science contributions to the Josiah Macy, Jr. conferences on cybernetics as in some ways anticipating the emergence of multi-agent systems composed of human and non-human agents, i.e., the ways in which we (as human agents) now live in tandem with increasingly intelligent and autonomous agents. By considering these systems in light of the "question of the observer" the paper sketches the shape of a cybernetics premised on emergent multi-agent socialites.

Anthropology at the Macy Conferences

The Josiah Macy, Jr. Conferences on Cybernetics were pivotal in the development of cognitive science and Artificial Intelligence, especially with regards to what came to be known as "connectionism." In the ten Macy Conferences held between 1946 and 1953, many of the tools associated with AI—neural nets, von Neumann architecture, Shannon's quantitative definition of information—coalesced into the what some have called "strong AI" including the hegemony of mechanical models of cogitation (Dupuy 1994). Between Wiener's laconic definition of biological systems as essentially processing information and von Neumann's version of a Turing machine, the first generations of AI research along with the present contours of information society as we know it owe a great deal to the Macy Conferences.

But one of the less analyzed aspects of the Macy Conferences is their grounding in anthropology and sociology (Dupuy 1994). Indeed, were it not for Bateson's almost chance encounters with Warren McCulloch in 1942, together with his felicitous return to New York from his tour of duty with the O.S.S. in 1945, the Macy Conferences would have probably been confined to dialogues between the hard sciences and psychology on the parallels between body and mind. Indeed, Wiener (1961[1947]) was not optimistic that his new science of cybernetics would gain anything by engaging the social sciences. He concludes that "the human sciences are very poor testing grounds for a new mathematical technique" (24). But courtesy of Bateson's intercession, Margaret Mead, Gregory Bateson, Lawrence Frank and Paul Lazarsfeld became regular members; Klyde Kluckhohn was a repeat guest; others were also drawn into the cybernetic circle. What did these social scientists add to the debate? Not, pace Wiener, new maths, nor empirical confirmations of theoretical modeling of neural nets, nor challenges to Shannon's quantitative operationalziation of information. Oftentimes, they seem to be relegated to vague cheerleader roles, affirming the cross-disciplinary importance of the other cyberneticist's work, and exhibiting excitement at their genius.

But there's an anthropological/sociological dimension to the Macy conferences as well, one that emerges over the course of subsequent generations of cyberneticists: the question of the observer, together with the work of Maturana and Varela (along with the latter-day writings of Gregory Bateson) draw upon the Macy Conference's repressed anthropology. But the sociological and anthropological supplement to the Macy conferences may well go much further than this; I would suggest that the next developments in cybernetics will also draw on these subterranean currents. The following paper looks to the legacy of these social scientists in the development of hybrid multi-agent systems composed of both human- and non-human agents.

Traditionally, multi-agent systems are composed of either software or robot agents, although many researchers have described "human agents" as a baseline in their de-

velopment of software simulations (Woolridge and Jennings 1995; Woolridge 2002). Although this vein of research has been wildly productive, we note that our human life in today's world is characterized what Latour (1999) calls a deepening "imbroglio" of non-human agent interactions (or what Andrew Pickering similarly terms "the mangle"). In other words, in a world characterized by MAS, we need more than just *simulations*; planning more effective software agents, for example, requires rich, empirical descriptions of existing hybrid MAS because new systems will not merely supplement human behavior, but must mesh with extant MAS systems composed of both human and non-human agents. It is our belief that this meeting of AI research, cognitive science and the social sciences may constitutes a "fourth-wave" of cybernetics using the insights of AL and MAS simulations to not only describe our lives in information society but also to intervene in their hybrid assemblage.

Inside the (Black)Box

One of the enduring legacies of the Macy Conferences was the question of the observer, the role of self-reflexivity in cybernetic circuit. In a now-apocryphal story recounted by Hayles (1999), Stewart Brand (of the Whole Earth Catalog) sat down with Margaret Mead and Gregory Bateson in 1976:

> Brand asked them about the Macy Conferences. They agreed that including the observer was one of the central problems raised by the cybernetic paradigm. Reaching for a scrap of paper. Bateson sketched a diagram (which Brand had included in the published interview) of the communication system as it was envisioned before cybernetics. The drawing shows a black box with input, output, and feedback loops within the box. The space labeled "Engineer" remains outside the box. A second drawing represents Bateson's later understanding of cybernetics. Here, the first black box, along with the names "Wiener, Bateson, Mead," is encapsulated within a larger box. In this drawing, the observers are included *within* the system rather than looking at it from the outside.

Mead's and Bateson's realization that the observer was inextricably embedded in the systems she describes has been explored in detail, notably in Bateson's *Mind and Nature* and Varela et al's *The Embodied Mind*. But there's a second lesson here as well, implicit in the deictic shift from "Engineer" to "Wiener, Bateson, Mead." Why place these three in the same box? After all, they never did research together; exactly which cybernetic system would they all be implicated in? Why, the Macy Conferences themselves, of course. That is, we move from the faceless "objectivity" of an "Engineer" to three, human agents at the *Macy Conferences*, implying not only the relationships

of these observers to the system, but to each other—not just *any* human, but specific humans linked to each other and to the Macy Conference they helped to create. But Mead and Bateson never attempted to analyze these reflexive circuits in the system they described.

The opening Macy Conference was held March 8 and 9, 1946 at the Beekman Hotel near Central Park on Manhattan's East Side. After introductions from Frank Fremont-Smith, von Neumann and Lorente de No elaborated on parallels between computers and neurophysiology, followed (after lunch) by Wiener and Rosenblueth on circular causality. McCulloch then introduced his research on neural networks, followed by dinner and a joint presentation from Gregory Bateson and Margaret Mead. The next day was given over to presentations and commentary from Ralph Gerard, Lawrence Frank, Molly Harrower, Lawrence Kubie, F.S.C. Northrup and Paul Lazarsfeld.

Although the participants all agreed to hold a subsequent conference, conferees nevertheless did not all see these meetings as a particularly productive exercise. As Conway and Siegelman (2005: 159) write,

> Wiener had hailed the positive outcomes of the opening conference in which he had so much of his conceptual capital at stake, but McCulloch's take on the roundtable, with its colloquial and sometimes chaotic format, was more jaundiced than the view through Wiener's rosy lenses. "Of our first meeting Norbert wrote that it 'was largely devoted to didactic papers by those of us who had been present at the Princeton meeting, and to the general assessment of the importance of the field by all present," McCulloch dutifully recorded, then he set the record straight. "In fact it was, characteristically, without any papers, and everyone who tried to speak was challenged again and again for his obscurity. I can still remember Norbert in a loud voice pleading or commanding: '*May I finish my sentence?* and hearing his noisy antagonist . . .shouting: '*don't stop me when I am interrupting*!'"

There is more to the difference between these accounts then merely the desire to present a properly "scientific" face for the Macy Conferences. Wiener's strategic elision must be seen as an attempt to drive out an anthropological self-reflexivity that others, notably Mead, very much saw as one of the goals of the conference. As Heims (1991:72) recounts of Mead,

> She would have liked best a film showing who sat next to whom, whisperings among those seated next to each other, facial expressions, and all sorts of non-verbal behavior, but having only a verbal record, she wanted to include the jokes, the asides, everything said, so as to make a comprehensive document for a detailed social study of a small intellectually substantial group at work.

Mead and Bateson had, in fact, undertaken similar research in Bali, producing a vast photograph and film archive of

not only Balinese kinesis, but also Balinese interactions with material culture (Bateson and Mead 1942). And Mead's own work, summarized in her *Continuities in Cultural Evolution* (1964), looked to the effects of small-group dynamics on the emergence of ideas; she theorized that an "emergent cluster" could be the catalyst for revolutionary new paradigms, an idea she subsequently developed in her *Culture and Commitment* (1970):

> A formula distilled from these experiences would come to something like this: A conference would provide a guaranteed opportunity to meet some vividly first-class people in a noncompetitive and intense atmosphere. The conversation would come to an end and be resumed. There would be freedom to talk and freedom to listen, and the web of meaning would be woven as we talked, making a new pattern before our eyes . . .For such an emergent cluster no precise formula can be written. The only possible formulation is a delimitation of the conditions under which clusters of this kind can come into being. (Mead 1964:301)

The Macy Conferences seemed like the natural forum for this kind of emergence. The "chaotic" atmosphere (which drove several conferees away) was also an experiment in sociology of knowledge; out of the unstructured ebb and flow of ideas—the prototypical non-linear organization--something *new* might emerge. Indeed, hadn't Fremont-Smith introduced the conference by saying that "Each group, when it comes together, is an experiment"? (Heims, 25).

But how does one delimit the group? No one meets in a vacuum, and the Macy Conferences, for example, included not only a "core," but also a number of invited guests. But were there other "guests" as well? In *Continuities*, Mead suggests that the presence of "vividly first-class people in a noncompetitive and intense atmosphere" was not enough. The setting was also a vital element:

> A cluster of institutions like the Menniger Foundation and its associates in Topeka, Kansas, comes close to the setting in which new ideas come easily. Here, in a city which is also the state capital, are two large private clinics, one for adults and one for children, to which come the privileged and the rich. Here are also a great veteran's hospital, state hospital, a state treatment center for children, an industrial school for boys, and a rehabilitation center for the blind. (Mead 1964:304-05)

Why these various hospital and schools would spur creative thought is an important question, one that Mead never explicating explained nor theorized; nor did she, in published accounts, attribute any special relevance to the setting for the Macy conferences (i.e., New York's several hundred universities, hospitals, research institutions, etc.). But how did a building, an institution or a practice impact human relations, cognition and imagination? Mead was sure they did, as was evident in her commentaries on the Menniger Foundation and the Salzburg Seminars, and Bateson would achieve a breakthrough in suggesting the role of environments in what we would now call "distributed cognition."

But there *were* disturbing, human/ non-human interfaces into the Macy Conferences. As Heims (18) recounts,

> The last five meetings were recorded by stenotypist and published after some editing by conferees von Foerster. Mead, and Teuber. Technically unsuccessful attempts had been made to record the first few conferences mechanically and transcribe them. Margaret Mead took detailed notes, but they are in her own shorthand. Consequently the most useful sources of information about the first five conferences are the available summaries and the considerable correspondence generated by the meetings.

Immediately, the human is supplemented by a mélange of tools: failed recording equipment, notebooks, letters, pens. These, in turn, are supported by teams of humans—to transcribe, to edit, to send. Hayles (81) has rescued one of these humans from her reified obscurity—Fremont-Smith's assistant, Janet Freed:

> She was responsible for turning these men's (and a couple of women's) words into type. She was the one who listened to the tape-recordings of the early conferences and strained to catch the inaudible strange words. When she sent McCulloch the typed manuscript of the second Macy conference, she plaintively wrote that she knew that there were "many, many blank spaces" but that Dr. Fremont-Smith had ordered her and her staff to listen to the recordings only twice and type what they heard.

The early recordings were reportedly atrocious; people like Kurt Lewin—partly because they are almost completely inaudible on the tapes—have been nearly effaced from the conferences (Lewin died before the third conference). But how to account for these relationships between the human and the non-human?

Actor network theory—a body of sociological theory mostly associated with the work of sociologists Bruno Latour, John Callon and others—gives the material world its due by considering it as an active agent rather than a passive "adjunct" to human action. In fact, Latour considers the human and non-human partners in action: "Action is simply not a property of human *but of an association of actants*" (Latour 1999: 182). Whether opening a door, shooting a gun, discovering pasteurization or surveying the rainforest, humans and non-humans come together to form shifting hybrid networks; our lives are embedded in these mediations between human- and non-human actant "mobilized in the series" (ibid., 181).

One of the most powerful tools Latour has given MAS is a way of describing and analyzing the give-and-take between the human- and the non-human, the way in which the temporary, shifting hybrid networks he describes are only possible if all parties have given something up, exchange properties, rendered their boundaries permeable. For example, when human and non-human link up, there are *translations* (Latour 1999: 179), "displacement, drift, invention,. mediation, the creation of the link that did not exist before and that to some degree modified the other two." In a famous example, "Guns don't kill people," nor do "People kill people with guns": instead, it is the hybrid network of which the person and the gun form a part that has done the killing (1999). Accused of the worst sorts of solipsism by many scientists, Latour might be said to have really grounded sociology in empiricism by emphasizing material bases of social life rather than idealisms.

But however useful Latour's ANT is to a world of non-human agency, it is hard to grant them agential equality with their human counterparts. After all, what do non-human actants *intend*? Wouldn't it be an example of the pathetic fallacy to suggest that they "intend" anything? In the Macy Conferences, this is a fair question; one of the more novel inventions of the cyberneticists was the "teleological mechanism." As Dupuy (9) writes,

> What the expression "teleological mechanisms" was meant to signify was the capacity of certain complex systems, through their behavior, to mimic--*simulate* the manifestations of what in everyday language, un-purified by scientific rigor, we call purposes and ends, even intention and finality. The cyberneticians believed that behind these manifestations there lay only a causal organization of a certain type, which it was their business to identify.

That is, the cyberneticians' machines *wanted* things, planned for them, expected them, in a way that anticipates autonomous agents populating multi-agent systems. Or, rather, to draw less on the "pathetic fallacy," it's not so much that, for example, Claude Shannon's "electronic rate" wanted something than it was that there was no difference between circular causality in physical and mental contexts; all of these systems "appear to us to contain meaning finality, directionality, and intentionality."

Here, the cyberneticians do Latour one better—despite his subversion of what Sawyer calls "individualist emergentists" (Sawyer 2005: 77), it is the human actant that initiates the network—i.e., the translations, displacements and delegations that make up the human/non-human hybrid. In cybernetics, the non-human agents hold their own goals as in MAS, where, according to Woolridge (2002:11) agents are "at least to some extent capable of autonomous action" and "capable of interacting with other agents."

Examining the Macy Conferences within this context generates surprising emergences imbricated in non-human agency, as humans and non –humans swap agencies across Gestalts of machinic desire. .

Post-War NYC

The Macy participants stayed at the Beekman Tower (575 Park Avenue) on Manhattan's upper-east side, enjoying, if one is to believe 1940-era advertisements for the hotel, "fresh air and sunlight" as well as a view of the East River. It is possible; there were, after all, sheep grazing in Central Park until the 1930s. But it was not a bucolic NYC that greeted visitors. It was a crowded city, bulging with war veterans and the pent-up ambitions of world tired of the self-sacrifices World War II demanded of them. Facilities for the burgeoning population (almost 8 million in 1946) were woefully inadequate and could not be improved in the midst of wartime shortages: houses and cars unbuilt, buses and subways overflowing. Perhaps the Beekman was a good place from which to watch the "space of flows," as Manuel Castells has said in a different context. NYC seemed to be the epitome of the thermodynamic city— pressure mounting, building, the kinds of forces that fuelled the growth of Levittowns, that catalyzed a baby boom that accompanied the drive towards Civil Rights. What Langston Hughes wrote of a "Dream Deferred" could be applied to post-War NYC as a whole: could it explode? But It would be a mistake to construe these economic and demographic pressures as linear equations. Consider the following stories from the March 8 *New York Times*:

> Passengers forced to stand on crowded Fifth Avenue buses really don't mind it at all and may be expected to protest vigorously if the Fifth Avenue Coach Company ever goes back to its pre-war a seat-for-every-passenger policy. . . .The arbitrator, who said women, particular, were "glad to stand in the daylight above ground where they are not subjected to the treatment they might receive in the subway," maintained that standing in the Fifth Avenue buses was more comfortable than in other buses.

An acute housing shortage, in another NYT article, produces unexpected results:

> Prospects of obtaining an apartment immediately in the Fort Hill Village development in near-by Freenburgh appeared dim today to James F. Moore, the former Navy lieutenant who seized a beachhead in a three-and-a-half-room suite yesterday only to lose it later when the management called the police, but he was assured of a bunk in other person's apartments as long as he wanted.

> Of the 156 families in the development, twenty urged him to live with them until his solving was solved. He won their sympathy so completely during his one-

man "invasion" that many rushed to shake his hand this morning as he departed from his night's abode in one of the suites to return to his office in New York. (Apartment 'Seizer' Wins Bunk . . .)

Does pressure (demographic, spatial) always produce the same results? Is there a Maxwell's Demon to these kinds of social stressors? Both articles involve the anomalous reaction of people to what many would characterize as unendurable levels of overcrowding. When systems accommodate high levels of stress, how do we explain it? Are newspaper accounts like this isolated outliers, or does this constitute a challenge to more linear understandings of social change? How do we characterize the effects of individual movements on the system?

Bateson and Mead (1941) had struggled with this in their war-time article on strategies for "morale building," and the problem of what they called "morale resonance":

> When a behavior pattern—panic or determination— spreads rapidly, apparently passed from one group to another, it is certain that the necessary basic attitudes were already in some sense latent in the personality of the individuals concerned ready to respond when some other individual gives them overt expression.

Unable to account for higher levels of social emergence, Bateson and Mead take recourse to a kind of Socratic anamnesis: individuals were already "inclined" to high morale and were only waiting for a leader to bring out their "natural" inclinations. But weren't there other possibilities?

To say that this was a subterranean theme in the Macy Conferences is not an exaggeration.

Circular Causality

Norbert Wiener and Arturo Rosenblueth had worked on systems for aiming ordinance during the war. Rosenblueth alluded to this then-secret research with his Macy presentation, larding his presentation with torpedoes (Conway and Siegelman 2005: 133).

This was "circular causality," a branch of mathematics (and a tool-box of concepts and metaphors) that described the way systems in the world "feedback" information upon themselves. As Conway and Siegelman (133) summarize,

> All these purposeful actions were governed by circular communication processes and guided to their goals by error-correcting negative feedback—in Wiener's new communication technology, by information that looped back continuously to its source to show how far off the mark it was straying and the corrections needed for the system to reach its goal.

That is, not only did circularly causal system "feed-back" upon themselves, they did so with a purpose:

This new causality was one in which living things and machines alike behaved *with purpose*. It was a sizeable leap: from machines which took aim at targets to creatures and machines with aims of their own, and the first formulations in scientific terms of the strange circular logic of feedback that lay at the root of all intelligent behavior. (132)

In describing thermostats, nervous systems, and all manner of animal behavior as fundamentally involving communication between constituent parts linked in a system, Wiener and Rosenblueth were paving the way for an information society that would characterize all of life as chiefly involved with the exchange of information. But what did circular causality—as an agent—want?

Iatmul

In the 1930s, Gregory Bateson had studied the Iatmul of New Guinea. there, he had described various instantiations of *naven*, a ritual complex mediating between *wau* (mother's brother) and *lau* (sister's son) in the context of what Bateson termed "schismogenesis", the way individual behavior becomes differentiated from other individuals in either "symmetrical" or "complementary" ways. Wardle (2001:24) calls it "this elaboration of difference towards cultural meltdown"; that is, competition between groups escalates to the point where the only result can be open conflict. In the New Guinea villages Bateson describes, schismogensis continuously boiled beneath the veneer of village sociality Given the frequency of schismogenesis, Bateson wondered why Iatmul society didn't simply explode altogether, given all the pressure.

> But this picture of schismogenesis cannot be true of Iatmul society as I observed it. Evidentially, what has been achieved is only a one-sided picture of the processes which, *if permitted*, would lead either in the direction of excessive rivalry between symmetrical pairs or groups of individuals or in the direction of excessive differentiation between complementary pairs. At a certain point, if these were the only processes involved, the society would explode. (Bateson 1958: 268-69)

Both forms of schismogenesis describe potentially runaway escalations—the increasingly dysfunctional (from the perspective of the anthropologist) character of interactions in the context of social stress.

It would be helpful, Bateson knew, if these were somehow opposite each other, but Bateson was never able to demonstrate that the appearance of one led to the appearance of the other. That is,

> The sociological function of this self-corrective circuit cannot be so easily demonstrated. The questions at issue are whether excessive symmetrical rivalry between clans will in fact increase the frequency with

which *laus* act symmetrically vis-à-vis their *waus*, and whether the resulting increase in frequency of *naven* will tend to stabilize the society. (290)

But then, in 1942, Bateson begins to theorize *naven* in the context of what would be known as "cybernetics":

Substituting the notion of self-correction for the idea of purpose or adaptation defined a new approach to the problems of Iatmul culture. Schismogenesis appeared to promote progressive change, and the problem was why this progressive change did not lead to the destruction of culture as such. With self-corrective causal circuits as a conceptual model, it was now natural to ask whether there might exist, in this culture, functional connections such that appropriate factors would be brought into play by increasing schismogenic tension. It was not good enough to say that symmetrical schismogenesis happened by balance the complementary. It is now necessary to ask, is there any communicational pathway such that an increase in symmetrical schismogenesis will bring about an increase in the corrective complementary phenomena? Could the system be circular and self-corrective?

That is, symmetrical, competitive behavior between *wau* and *lau* clans can be said to be "balanced" by *naven*, here the self-corrective mechanism driving the "ship of state," as it were, the servomechanism of the social.

The Macy Foundation

The Macy Foundation had also heavily invested in circular models of causality as both diagnosis and prescription for the many, societal ills it purported to treat (Heims 1991). But as both Dupuy (1994) and Heims note, society as a self-correcting organism is an ultimately conservative—and even reactionary—vision. What Gregg and Williams (1948: 601) criticize in anthropological functionalism can also be said of systems theory: in anthropology, that "the point is to examine societies already in existence and to assume that these societies are functioning harmonious wholes—are in equilibrium—by the mere fact of their existence. In many ways, the cyberneticists were writing very much in this functionalist tradition: this was Ross Ashby's homeostat the service of the common weal. One could (as, indeed, Collins (2003) has) dismiss much of cybernetics for its hostility to progressive change. But, of course, circular causality was more robust than this. Society, after all, need not return to equilibrium; positive feedback could mount in successive cycles and society could fragment apart.

More importantly, this was what Bateson called a "dynamic equilibrium"—equilibrium is never a done deal in society, merely a single point in a cycle followed by renewed cycles of feedback and adjustment. Subsequent cyberneticists (cf. Wallerstein) have added that the "equilib-

rium" points of the system likewise migrate; the system, in other words, is never static. That is, circular causality was the motor of *return*, the self-correct of the system necessarily requires the system to return to its parts, adjusting their course and thereby changing the system in turn. Cybernetics is certainly a conservative model for society, but it is also the admonition of the multi-directionality of change.

If we apply cybernetics reflexively, than we would have to say that the Macy meetings themselves embodied circular causality, with loops of positive feedback driving the intellectuals against each other in a schismogenesis of ideas. If it's true that the performance of "naven" acts as a form of "negative" feedback diffusing the positive feedback of inter-clan antagonism and competitive display, then might we consider the Macy Conferences as a form of cybernetic *naven*--repeated, ritual practices designed to address symmetrical schismogenesis with more complementary behaviors? That is, not only can we consider the Macy Conferences through the lens of cybernetics (as Mead had urged), but we can also (cybernetically enough) consider them the products of cycles of circular causality of which they formed a part, i.e., as feedback cycles working themselves out over the course of ten iterations between 1946 and 1953.

One of the primary conflicts animating the Macy Conferences was between Warren McCulloch and Lawrence Kubie; McCulloch, of course, is credited (along with Walter Pitts) with the first description of a neural net, while Kubie has been called an "orthodox Freudian" (Essig 2006). Kubie had been included in the core group of conferees for his promising proto-cybernetic theorizing on neurosis as a form of circular causality. At the Macy Conferences themselves, however, this materialist impulse was nowhere to be seen; his first paper to the group at that first conference "was not about neurotic loops, addressing instead traditional Freudian energy-based explanations for neurosis" (Essig 2006). Thus, two interpretive schemes battled for supremacy over most of the Macy Conferences—the first, the materialist reduction of what would become modern neuroscience, the second, Kubie's continued investment in subjectivity and the unconscious as the primum mobile from which other interpretive orders derive. Over the course of the Macy Conferences, the "two cultures" debate continued.

Hayles (1999) sees this as all coming to a head in what she called "Kubie's last stand"—that is, the battle that resulted in his defeat at the hands of the materialists. But Kubie had started it first, delivering a paper at the 7th Macy conference entitled "The Relation of Symbolic Function in Language and Neurosis," which suggested, among other things, that, as Fremont-Smith summarized, "language is a double coding: both a statement about the outside and a statement about the inside. It is that doubleness that gives

this conscious/unconscious quality to it" (Fremont-Smith, quoted in Hayles 1999: 71). Kubie very much anticipates the focus on the observer Bateson and Mead would later outline to Stewart Brand. Of course, it also suggested an irreducible subjectivity that was the very antithesis of the scientific positivism the other cyberneticists were building on. Warren McCulloch, in particular, was incensed by the implied attack on scientific truth and delivered a rather ad hominem rejoinder in a 1953 paper in Chicago, where McCulloch called psychoanalysts "charlatans" and questioned their sexual propriety.

Kubie, on hearing about McCulloch's presentations, could hardly let the matter stand, and delivered a paper at the 9th Macy Conference in what Hayles characterize as a "state of controlled rage" where he did more than just merely defend psychoanalysis—he asserted its interpretive supremacy, suggesting that only psychoanalysis could break free of neurosis and transference to apprehend the truth. In his hubris, Todd Essig (2005) comments, "he lost, and lost big," resulting, Essig laments, in the marginalization of psychology (and questions of the unconscious) from the development of the information age.

Hayles (1999) has characterized this as the debate between contextualization and objectification, i.e.,, between proponents of "embodied" theories of information, communication and cognition (which included MacKay, Bateson, and Mead, among others) and the proponents of an "objectified" science of abstract systems and information quanta. Certainly, much of what has proven desultory about the present "information age" originates in the triumph of the "materialist" model over more contextualized understandings—e.g., the confusion of the multiplication of information with knowledge, democracy and empowerment.

Along with Hayles, one might see this as the dead end that delayed the development of what came to be called "second wave cybernetics" until the late 1960s. On the other hand, if we look at it through the lens of circular causality, another possibility emerges. On a theoretical level, debate snarled about the question of a system that could account for both ideational and physical, cognitive processes, levels of emergence that would be both (after Sawyer) account for the emergence of higher-order phenomena as well as provide for "downward" causation, where the subjective impinges upon the objective and the material. The issue wasn't so much "decided" at the Macy conferences, as simply played-down, with the realization that issues of "reflexivity" belonged to an untenably fuzzy, "subjective" realm.

But what could have been the alternative? Given a slightly different mix of participants, and a more progressive political era, the more context-driven theories of Kubie, Donald MacKay, and (later) Gregory Bateson could have triumphed over the reductionism of Wiener, McCul-

loch and Pitts, but developing a hierarchy of interpretive orders is not really what "circular causality" was about. Instead, "circular causality" strives towards a radical equality of components in a system—effects and causes redouble, throwing both linear causality and simplistic determinism into question. Moreover, "circular causality" is, if nothing else, a theory of *return*. The final word on the question of subjectivity versus objectivity could hardly be considered a desideratum from the perspective circular causality considered as an agent. Instead, the issue became the cybernetic motor driving the Macy Conferences, driving the participants together at the Beekman and apart to their respective disciplines, repeating in the next cycle.

As in "naven," the participant's battle for supremacy was a schismogenic scrum of competing paradigms; if competition was allowed to merely escalate, schism could be the only result. Instead, participants balanced their symmetrical competitiveness with occasional complementary roles. Mead and Bateson, for example, subordinated their anthropology to the nomenclature of the physical sciences. Kubie, too, threw McCulloch an olive-branch of sorts by characterizes his work as a "naturalist," i.e., as an impassionate observer of human emotions (American Society for Cybernetics). Ideas, too, were subject to the same processes, with "reflexivity" taking a complementary (and subordinate) role vis-à-vis cybernetics materialist pretensions. In other words, the effect of subsequent Macy conferences was to diffuse the sweeping consequences of considering the observer as embedded in the system.

For the Macy conferences to continue, negative and positive feedback processes must be balanced in dynamic equilibrium. Here, perfect consensus would spell an end to the conferences as much as perfect controversy. It is no mistake that the Macy conferences end after 1953; stasis is not a possibility for a dynamic system. The dialogue of the conference had finally come to an end. But the urge to conference continued—Fremont-Smith, von Foerster, Bateson, and Mead: each would go on to subsequent cycles of conferences and workshops, returning again and again to the question of observer.

It is possible to see a host of agencies at the Macy Conferences—New York City, Beekman Place, the Macy Conferences themselves considered as institution and practice. But "circular causality" was the genius loci that enable human agents to come together year after year for a conference that, from the perspective of the human agents, was remarkably unproductive. After all, what in hindsight are counted as the great contributions of cybernetics: Wiener and Rosenblueth's circular causality, McCulloch's and Pitt's neuron and von Neumann's architecture, were all introduced in the very first conference, while Claude Shannon was never a core member. Why, then, did they need to meet again and again? Here, we might see the participants succumbing (Latour calls this a process of "prescription"

in his earlier work) to the teleologies of circular causality itself, the move to "dynamic equilibrium," and the homeostatic preservation of the system from its schismogenic tendencies (Latour 1988). The system cycled on until at least the 1970s (if not until today). Gregory Bateson would finally begin to sort things out at his own conference in 1968. As Mary Catherine Bateson recounts of what was called the "Alpach Conference," it:

> was largely a statement of what Gregory had come to mean by the "cybernetic nature of self and the world." his statement after thirty years of mulling it over of the paradigm he found at the cybernetic conferences of the Macy Foundation. He had learned there was a way of thinking about individual organisms, societies, and ecosystems as complex assemblages of inter-related arts that depend on internal feedback loops of communication to maintain certain truths about themselves, as the body maintains its temperature and as the populations of predator and prey are maintained in balance in the forest, in spite of fluctuations. But the insight into the nature of stability that cybernetics brings, namely that each is achieved buy a constant process of correction across a multitude of variations and oscillations, the poise of a tightrope walker, is only the first step. This process of adjustment to achieve homeostasis takes place in a complex systems at many points, conserving the values of many different variables, in multiple interconnected loops, and within any such system there are points of vulnerability and subsystems with the potential for runaway. Causation moves in circles rather than in simple straight-line sequences.

Conclusion: Mead's Notebook

As Mead (2005:292) explained in a 1974 address to the Society for General System Research,

> I was later present at the time of birth (and I think that is what it should be called) of the Society for Research and general Systems in the United States. I proposed at the time that we do a little general systems thinking about ourselves, and before we firmed the society, we take everything we knew—which was not much—that had come out of cybernetics, and all we knew about the properties of systems and boundaries and things of that sort, and apply them to society. And they only laughed and said: "You mean, that we should think about ourselves?" And nobody has, as far as I know, since.

Mead can be credited with subsequent advances in second- and third-wave cybernetics, bringing in the long-repressed position of the observer. But what has been called the "Meadian we" included here not just the other scientists making up the Society, but the non-human agents that enabled their conferences. In fact, Mead was certain that the tools we use are important:

> I am not sure in what form we should communicate with each other. I am pretty sure it should not be tapes, because they take too long, but some form of coded tape might be more suitable than linear printing when we are trying to think about something that is non-linear. I believe that unless all the people that enliven and stimulate this kind of thinking in different countries begin to think about the relationship of the form of the organization to this form of thinking, the thinking itself won't get very far. (293)

Not only does the form of scholarly communication *reflect* the theories of participants, but they can additional catalyze (or hinder) the non-linear thinking she believed vital to the growth of cybernetics. Is it possible to think of a journal as an agent?

In her homage to her parents in *With a Daughter's Eye*, Mary Catherine Bateson seizes on Mead's notebook as metonymy for Mead's approach to research:

> The notebooks stand in my mind for a whole way of working whereby she was constantly taking in new material and using it, so that an interesting piece of work she was thinking or writing in Boston, elaborated in Cincinnati, incorporated in a lecture in California. She tried to be conscientious about giving credit and would often put people working on related matters in touch with each other, but no amount of care for references to formal pieces of work could sufficiently reflect the extent to which all her speeches represented a legion of voices. John Todd, the ecologist, has designed a ship to be named for her, built as a wind-driven ecological hope ship that will move around the world providing various kinds of ecological first aid. Picking up seeds and seedlings of rare plants, particularly food plants, and propagating and growing them at sea so that they can be ready to plant or introduce as new crops on arrival in the next port, and this is what she did with ideas. (Bateson 1984: 67)

Here, Mead's notebook transcends symbol. Notice how Bateson moves from the notebook as the record of Mead's thinking and travels to a more active agency, a ship that, in a pique of the pathetic fallacy, "picks up" plans and "propagates" them elsewhere. Mead's notebook is more than a tool—or even, pace Bateson, an extension of mind (Bateson 1982). In fact, it records, synthesizes, generates—a secret agent in league with Mead, we can see the notebook as an agent in her prolific career.

If we could only read Mead's notebook (unreadable in her own short-hand) we might learn more about the Macy conferences. Would Mead's notebook have recognized the other non-human agencies at the Macy conferees? Would it have recognized the agential properties of neural nets? Of von Neumann architectures? Would the notebook, in short,. have acknowledged the Multi-Agent Systems of which it formed a part?

From this perspective (however fictional and fantastic), we can see a first-generation cybernetics that not only tried to describe (and to simulate) physical, physiological and psychological processes, but to actively intercede in their development, in other words, to form hybrid multi-agent systems. At the time, these hybrid agencies were obscured by what Latour refers to as "black-boxing," "the way scientific and technical work is made invisible by its own success" (Latour 1999:304), with accounts of the Macy conferences relegated to hagiographies of its human participants. But, we are compelled to return to the Macy Conferences in a simultaneous instantiation of both circular causality and what Freud called the "return of the repressed."

There are at least two unexplored legacies of the Macy conferences. The first is a clarion call for anthropological descriptions of the human/non-human systems of which we (humans) form just one part, impacted by and impacting those active (and more and more autonomous) non-human agents that govern our online and financial lives. We know what the non-human agents want, but what kinds of purpose emerge in hybrid systems? Here, anthropology (and the social sciences in general) can do much more than provide the baselines for more effective simulated socialities; they can help to describe emergent socialities that arise in the novel systems that we form with our tools and institutions. Second, those descriptions should be taken into account in the development of subsequent MAS, which needs to accommodate not some prototypical "human" as an assemblage of unchanging characteristics but already existing hybrid MAS made up of humans and non-humans.

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