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The "Conduit Metaphor" and The Nature and Politics of Information Studies (1)

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Abstract:

This article examines information theory from the aspect of its "conduit metaphor." A historical approach and a close reading of certain texts by Warren Weaver and Norbert Wiener shows how this metaphor was used to construct notions of language, information, information theory, and information science and was used to extend the range of these notions across social and political space during the period of the Cold War. The article suggests that this legacy remains with us today in certain notions of information and information theory and that this has affected not only social space in general, but in particular, the range and possibilities of information studies.

I. The Conduit Metaphor

Norbert Wiener, one of the chief founders of modern information theory and cybernetics, makes a rather startling series of claims in the beginning of the fifth chapter ("Organization as the Message") of the 1954 edition of his book, *The Human Use of Human Beings*. His claims are all the more startling in that they go to the very heart of communications and information theory (2) which, since the Second World War, has been constructed around what may be characterized as a transmission or conduit model. To begin, let us quote the beginning of this chapter:

The present chapter will contain an element of phantasy. Phantasy has always been at the service of philosophy, and Plato was not ashamed to clothe his epistemology in the metaphor of the cave. Dr. J. Bronowski among others has pointed out that mathematics, which most of us see as the most factual of all sciences, constitutes the most colossal metaphor imaginable, and must be judged, aesthetically as well as intellectually in terms of the success of this metaphor.

(1954, 95)

It would be a very complex task to fully unwind the various important elements in Wiener's work, and in cybernetics in general, that are present in this seemingly innocuous passage. But most obviously, there is the issue of the impulses behind Wiener's comparison of his textual intents with that of Plato's in the latter's use of

the metaphor of the cave in *The Republic*, a metaphor which concerns the "proper" attainment and type of knowledge within an utopian political state. This question of the structure and purpose of knowledge within an ideal political state is an important component of Wiener's Cold War text and we will return to it later. But in order to arrive there, I think that it is first necessary to understand how startling Wiener's argument is in the context of what was already understood as information theory and information science in the late 1940s and early 1950s. And it is the nature of that theory and science that I would like to engage in this essay.

But my purposes here are not "just" historical. I would also like to suggest that Wiener's conception of information theory and information science has an impact not only on what information "theorists" do today, but also on what information "practitioners" do, and even more importantly, on how "information" is understood as an important cultural concept for us today, and for our future, as a so-called "global information" society. Wiener was instrumental in not only formulating technical information theory, but as was also the case with Warren Weaver, he was instrumental in popularizing certain quantitative understandings of information in the post-World War II period. I would suggest that their cultural influence remains strong today through the currency of what the linguist Michael J. Reddy has termed the "conduit metaphor" (and its quantitative assumptions) in modeling what we believe the terms "information," "communication," and even "language" mean and signify. (3)

In the history of information theory, this model was canonically embodied in Claude Shannon's famous paper "The Mathematical Theory of Communication." Shannon's paper, a technical presentation of information theory in telecommunications, was popularized by Warren Weaver (then, director of the natural sciences at the Rockefeller Foundation) in an essay entitled "Recent Contributions to The Mathematical Theory of Communication." Both Shannon and Weaver's papers were published together in a book that took its name from Shannon's paper (Weaver's essay followed Shannon's in the original 1949 printing of this text, but precedes it in the most recent reprinting).

The conduit metaphor is depicted both in Shannon's paper and in Weaver's essay by means of a drawing. This drawing represents the standard sender-receiver, data-user model of communications and information:

[AUTHOR'S NOTE: The diagram, below, didn't reproduce well in HTML. Since many readers of this diagram would know it, I won't bother with trying to reproduce it here. Please see the printed text--mine, and better, Shannon or Weaver's essays-- for the diagram]

Information source---® transmitter----®— -----® Receiver----Destination
Message Signal - Rec'd Signal Message

-

Noise Source

Since Shannon, Weaver, and Wiener, the conduit model has remained foundational in information science. Information retrieval, for example, attempts to determine the probability between what a source will produce and what a searcher wants to receive, towards the goal of matching the source's data and the receiver's desires. This model of transmission and the ideal of one to one correspondence between source and receiver is what makes synonymous "communication" and "information" in Weaver and Wiener's texts.

What is most significant about Weaver and Wiener's formulation of information theory is the centrality of the conduit metaphor for any theoretical model or investigation of information or communication. As constructed through the conduit metaphor, "information" has, among other qualities, that of being quantifiably measurable and "factual," in the sense of being clear and distinct semantic units. These qualities are reflected in the goal of information transmission, namely, the sending and receiving of an ordinary message with as little extraneous "noise" or interference as possible. Such qualities favor linguistic and psychological theories that understand language to be intentional and conscious. And at the same time, such qualities suggest that language is lacking in informational content when it fails to perform intentional and communicative functions. In Weaver and Wiener's work, for example, evidence of the correct outcome of information transmission can be found in the correct performance of the message's intentions by the behavior of the receiver. Weaver sees correct performance as one of the three main aspects of information theory (i.e., the "effectiveness problem," Weaver, 4) and for Wiener, there is no difference between machine and human transmission if the performance of the original message's intentions are identical in both cases. (4)

Such exact "correspondence" connotations for information production and reception were not new to the post-War period, though the ability to model language upon technical communication systems was strongly enhanced by the military and political value such systems assumed during and after the Second World War for waging war and constructing defense, as well as for controlling home populations within a doctrine of "total" (hot or cold) warfare. Transmission and correspondence connotations for information existed at least since the 17th century, though the source of the "data" was often that of the physical world, and information constituted an uncertain affect rather than a certain effect. What was new in the post-war period was that technical systems and networks were now understood as models for language, information, and for social communications and production as a whole.(5) In "Recent Contributions to The Mathematical Theory of Communication," for example, Weaver argues that the semantic aspect of language is but one aspect of the more general problem of signal transmission. (6)

This is not to say, however, that this electrical or telecommunications trope for language as a whole was totally absent from earlier linguistic models. Ferdinand de Saussure, the father of modern structuralist linguistics, for example, spoke in his foundational *Cours de linguistique générale* (1906-1911) of the "speaking-circuit" ("le circuit de la parole") which was formed between two people in the transmission of their ideas through the medium of spoken language (Saussure 1949, chapter III). Weaver and Wiener's model for language is based on this same metaphor, though one seemingly exemplified by telecommunications technology. Weaver, for example, speaks of general communication as being "the procedures by which one mind may affect another" (Weaver, 3). For both Weaver and Wiener, information theory was generalizable to all manners of language and affects (including such phenomenon as the visual arts and ballet). In their writings, information technologies ceased to act simply as technical devices, and instead, became metaphorical descriptions for language and for affects in general. In their writings, language and affect were reduced to communication, and communication was defined by the conduit model.

II. Metaphor and Information Theory

The rich cultural history from which the conduit metaphor originates, together with its intrinsic multivalent connotations as a rhetorical trope, leads to a wide range of cultural meanings for any given use of the conduit metaphor. In Weaver and Wiener's writings, it is precisely the broad cultural range and the flexibility of this rhetorical figure that gives information theory explanatory power across all areas of human expression (language, dance, visual communication, etc.) and that attributes paramount social importance to information theory. In Weaver and Wiener's texts, the historical and social range of the conduit metaphor gives their texts (and vicariously, the authors and their fellow researchers) not just technical authority, but more importantly, cultural and social authority.

The other side of Weaver and Wiener's social claims for information and information theory, however, is that they are only made possible because the social and cultural aspects of information and information theory are built around a metaphor. This metaphoricity leads Wiener in *The Human Use of Human Beings* to the somewhat ironic problem of having to clarify, again and again, what information and information theory is and is not. (As if the very concept of information and the very notion of information theory could not be transmitted in the clear and precise manner that Wiener so highly valued as the goal of communication and information.) On the one hand, the metaphorical core of information theory gives it tremendous cultural and social importance, but on the other hand, this very metaphoricity makes it appear as somewhat less than "scientific," or equally, even less informational.

The metaphoricity of "information" becomes even more complex in Weaver and Wiener's texts when they approach the problem of stating exactly what are the

theoretical and practical activities of information theory. Weaver's text, for example, most explicitly utilizes metaphorical strategies of explanation when he attempts to describe information theory:

An engineering communication theory is just like a very proper and discreet girl accepting your telegram. She pays no attention to the meaning, whether it be sad, or joyous, or embarrassing. But she must be prepared to deal with all that comes to her desk. (27)

Information theory, here, is described by a metaphor that itself is a metaphorical description of the processes of information technology. The human agent in this narrative (a "very proper and discreet girl"--presumably, something like Weaver's imagination of a secretary) acts as a technical device for transmission, not screening the messages for content, but simply, technically passing them on from sender to recipient. By way of a series of metaphorical equivalences, information theory is defined by a description of information technology which originates by way of the conduit metaphor.

This series of metaphorical substitutions that define information theory lead to a very interesting conception of what a "scientific" information theory is. Literally, what Weaver is proposing in the passage above is that the role of information theory is not only to foster the development of transmission apparatuses, but more importantly, like a transmission apparatus or conduit itself, information theory is to transmit a message of some sort without interference.

The question that must occur to us at this point is, what is it that information theory should transmit and how could we define a successful transmission? This, I would like to suggest is a very large and difficult question, because it must engage Wiener and Weaver's texts in the context of various social, political, and cultural messages which their texts felt obliged to receive, direct, and send. In what follows, however, I would like to address three of the more successful messages that information theory manages to transmit through the theoretical apparatus of Weaver and Wiener's writings.

III. "Designing" Language, and the Conservation of "Man"

One message of information theory involves the operational understanding of language that information theory assumes and preserves. Weaver writes that, "Language must be designed (or developed) with a view to the totality of things that man may wish to say; but not being able to accomplish everything, it too should do as well as possible as often as possible. That is to say, it too should deal with its task, statistically" (27). Such a "designer" conception of language assumes that it is possible to have a knowledge of all that it is possible to say, or in other words, that we can have a language beyond language from which to design language, and that we can do this based on statistics.

The implications for such a theory of language are even more problematic when we remember that for Weaver such design encompasses not only "language," proper, but ballet, art, and all manners of cultural and social affects. Within the context of information theory's operational and statistical understanding of behavior and affect, all human actions are subject to statistical and predictive predication and design. Needless to say, Weaver's prescriptions have dire consequences for any statistically marginal dialects, forms, genres or identities that are not socially dominant, as well as for activities of language (such as poetry (7), art, and even, sometimes, critical theory) in which language's formal, critical, and generative functions precede and ground their more, so-called, "communicational" functions. In so far as Weaver and Wiener's understanding of "information" expands tropically to characterize language as a whole, as well as other types of signs and affects, the consequences of Weaver and Wiener's claims for an information culture (or as we now would say, an "information age") place severely restrictive limits upon meaningful activities in the social, cultural, and political realms. Though a "controlled" sense of vocabulary may be desirable for accurate information retrieval or transmission in a narrow sense of "communication" or "information," extending this notion of language to social communication as a whole (whether or not it is based on statistics) leads to a state that both echoes and socially deploys a "safe," but totalitarian, control over the limits and possibilities of meaning and expression.

Wiener's statements regarding the role of "phantasy" and metaphor and the relation his writing has to Plato's Republic may, now, appear more clearly to us. The role of the conduit metaphor in information theory is like the role of metaphor in Plato's allegory of the cave and in The Republic as a whole: it not so much plays the role of describing an empirical event, but rather, of transmitting and prescribing a certain model of language and society. And that model is an utopian one of a formally closed communicational society, similar to that which is found in the "closed world" of the Cold War (see Edwards, 1996). (8)

Information theory's model of language is one in which socially uncertain occurrences of language are understood as dangerous "noise." Rhetorically and socially speaking, Wiener's text thus performs a similar function as Plato's Republic in as much as the latter text presented truth in such a way as to urge the banishment of actors and "rhetorical" sophists from the state and to entrust its regulation to the authority of those philosophers who practiced a "rational" or as we might now say, a "scientific" discourse. For both Wiener and Plato, "clarity" is the way to truth and social justice, while non-certainty, vagueness, or ambivalence lead to error and social injustice (9). The irony of this formulation is, of course, that both The Republic and Wiener's The Human Use of Human Beings make their arguments using a rhetoric that is rich in metaphors and other literary tropes. Thus, both the epistemological and the social claims of Wiener (and as we have seen, Weaver's) texts are simultaneously established and made problematic by the very rhetorical devices that operate in their texts. Their "scientific" information theory is highly literary at many points, and it enjoys its social success partly on the basis of this literariness.

A different consideration amplifies the above problematic. The scientific claims of information theory are of interest not only because of their literary composition, but also, because of subsequent claims that are possible because of this literariness. Here, I will propose two types of claims that occur in Wiener and Weaver's texts that are possible because of the literary aspects of information theory. The first has to do with Wiener's explicit (and Weaver's implicit) humanistic reading of "science" (particularly in regard to what in philosophy has been called "the question of 'man'" (10)). The second has to do with the relation between culture and science that Weaver and Wiener suggest exists, at least, in the science of information.

Throughout *The Human Use of Human Beings*, Wiener argues that the measure of success for information theory and cybernetics are their ability to preserve the system or organism (most importantly, that system or organism which Wiener calls "man") from a hostile environment. If this is true, however, it means, as we have seen, that "man's" very survival is dependent upon the conduit metaphor's ability to direct man through language and the world.

But if "man" is to be preserved by a trope that is common in Western culture, and is particularly common in modernity, how can we be sure that what Wiener calls "man" is not defined by that same history and language? In other words, it is unclear in Wiener's work if "the organism" of "man" that is to be preserved by the conduit metaphor is not itself a product of the conduit metaphor, or at least, of cultural traditions which both "man" and the conduit metaphor may be symptoms of. This leads to the problem of asking whether the "science" of information science, which Weaver and Wiener propose, is dedicated to the unknowns of empirical research or to the conservation of a certain historical tradition and its set of cultural, social, and political values. Indeed, in as much as Wiener argues in *The Human Use of Human Beings* that "science" is dedicated to the survival and the service of "man," what else can this "science" be but the conservation of a language about what "man" is said to be? And further, isn't this conservation--or transmission--of "man" across time and culture exactly the role that Weaver prescribed for his obedient secretary in the role of theory: to pass on any message, just as long as it is what is "possible" to say, that is, just as long as it is what is proper to a normative definition of language, to a normative definition of "man"? The many metaphorical substitutions and the circular reasoning between a concept of "man" and that of "information" and information science theory in Wiener's and Weaver's texts suggest that this version of "information" and information theory is deeply humanistic, especially in terms of modernity's figuration of the human (that is--in terms of Wiener's book title--of the use of the human as operationally defined within modern industrialism and politics). In this light, Wiener's liberalism appears deeply conservative in as much as it attempts to save "man" from the "noise" around him, even in as much as that "salvation" is performed not only at the cost of, but toward the goal of, rationalizing and operationalizing language and all the affects of what we might call, the "human."

A third, related point is, perhaps, the most important. If the success of "man" is dependent upon the truth of the conduit metaphor as a clear scientific statement, this is to propose that the conduit metaphor is the one metaphor that is not a metaphor. To put this another way, the epistemological and social privilege that Weaver and Wiener give to the conduit metaphor suggests that it is the one metaphor that can clear up or control those rhetorical slippages and ambivalences that occur in human language practices, foremost because of such tropes as metaphor. Such slippages are, informationally speaking, noisy, and they threaten to plunge information and the "originating" and "receiving" agents at either end of the conduit diagram into the chaos of a language and society that is characterized by non-differentiation and the inability to clearly intend, receive, and to unambiguously measure the correspondence between intention and reception.

What is at stake, here, is the question of what authority can make a metaphor not a metaphor, and more generally, what authority can make language not language, but rather, a certain sense of "information" and "communication."

This is important. Further, however, this issue can then be turned back upon the texts in question, and we can ask what authority can grant that the claims that Weaver and Wiener make in their texts originate in science and not in literature. Throughout *The Human Use of Human Beings*, Wiener repeatedly appeals to the authority of what he calls "the scientist" for what he calls "faith" in science, its techniques, and apparently, its tropes. But this appeal is circular: faith in science rests upon the authority of science, but this authority itself rests upon a faith in it. In telecommunication engineering, the technical testing of telecommunications transfer rates, transfer and reception quality, etc., provide grounds for a claim of an empirical information science. Such claims, however, do nothing to support the wider social and linguistic claims that Weaver and Wiener's texts argue for--from their epistemological notions of an organic agent as sender or receiver to their wider political claims for social justice or freedom of expression. These latter claims are political, cultural, and social, and they are based on metaphor, and paradoxically, on a certain faith that this metaphor is not a metaphor, but instead, is an authorizing mark for science. But as Weaver and Wiener's texts (and even elements of Shannon's "The Mathematical Theory of Communication") attest, such claims, too, makes up a substantial portion of what these authors call "information theory" and its social and professional claims. (11)

This, however, is not to say that Weaver and Wiener's series of rhetorical substitutions are not engaged in various social activities of science nor that they are without social or professional value. For, if at least an important part of a social science of information science is grounded in a common and culturally accepted series of tropes and narratives, if it quantitatively tests the meaning of these tropes and narratives in a society co-structured by them, and then, if it arrives at certain reasonable conclusions based on those tests, information science then provides a somewhat ironically useful function of social self-validation (and for the information profession, professional self-legitimation).

The problem occurs, however, when these tropes and narratives are given privileged authority over all other explanations and phenomenon in the field of information studies and in culture and society in general, and when the conduit model is used to evaluate and determine values that are contradictory or opposed to what it prescribes. For example, when the conduit model is used to evaluate the functions of poetry or art, or, as a different type of example, when it comes to dominate our understanding of the present and the future, as for example, within the tropes of "the information age," "the virtual society," or the reemergence of the 19th century European colonialist notion of "the global." We see such effects in the extension of the trope of "networks" from technical to organizational communities, in the privilege which a certain "factual" and "clear" information is given in communication (in writing in general, in the media, in organizations, in education, and in politics), in the demand that the arts themselves represent reality rather than "distort" it (realism), and even in the claim that history is the transmission of the past to receivers in subsequent generations (cultural heritage).

The problem, here, isn't whether information science is a "true" science. For, sciences have their technical and their social aspects. The problematic that appears out of Weaver and Wiener's texts is that of the specific construction of certain notions of information, knowledge, language, and social space out of a deference to the inscription of certain technical apparatuses and techniques during a certain political, social, and cultural period. The question for us, today, is that of the limits of the claims of a conduit centered information theory for information studies, in particular, and for knowledge, society, and culture, generally. For information studies, these traditional claims constrain and determine how we conceive and define the nature and scope of the field, what methods are allowable, what researchers, researches, and disciplines are valuable for information studies, and what types of language and social structures are seen as relevant to the field. For knowledge and culture generally, such limits effect how we might view, expect, accept, or resist pronouncements about "our" living in the "information age" and how we will understand certain technologies and certain organizational and social arrangements and rhetorics (12). Both the professional and the social realms are professionally important because, from an ethical and from a political standpoint, professional knowledge must acknowledge a responsibility for social and political conditions and for historical development, not only within its traditional field, but also outside of it.

Conclusion

Historically, in so far as information science has been largely concerned with issues of information retrieval, it not only has utilized the technology of electronic information transfer, but it also has tropically extended the notion of transmission and re-presentation from a technical to a semantic plane. This, however, raises the

problem of the inexactitude of language, a problem that information retrieval attempts to address through techniques such as vocabulary control, metadata, clustering, etc.. By extending the notion of information transfer and retrieval from a technical realm to that of language in general to that of all manner of signs and affects, however, Weaver and Wiener extended the social and professional range of information science, as well as ended up proposing a controlled or statistically normative model of language and social space. Such a strategy might be understood as fulfilling the two paramount concerns for the U.S. during the Cold War period: controlling and idealizing linguistic and social normativity, and, relegating linguistic and social marginality and political contestation to minority or curiosity status, or simply, to being social or linguistic "noise." The formal vehicle for perpetuating this, however, lies in characterizing language as a transmission and communication medium rather than as an agency for social, cultural, and political change. This legacy remains in the positivist or "pragmatic" manner by which knowledge and information are understood as intentional, self-evident, and quantitative entities which are readily taken up within a systemic process, and linguistically, in terms of the social valorization such entities are given in contrast to more hermeneutic or poetic linguistic entities or rhetorical devices.

In this article, we have suggested the social and political arrangements that are the result of such a view of language, and also, which must be present in order to make such a view of language appear as the "true" nature and the "pragmatic" role for language in society. We have also shown how such a view is itself socially promulgated by the use of those very rhetorical devices that may be seen as rather non-informational, and how the very model of information transfer or "communication" in a social realm is itself based upon series of metaphorical substitutions which, ironically, problematize its social, cultural, and even its scientific claims. We have seen that this epistemology and methodology promotes a limited social and political space, in general. And we have seen that this epistemology and methodology have prevented information studies from engaging problems and senses of information outside of the narrow linguistic and social range dictated by the conduit metaphor. Our conclusion is that the epistemological and linguistic nature and limits of information studies need to be rethought outside of the paradigm of an information science that was valorized in the writings of Shannon, Weaver, and Wiener, so as to better account for language and society, as well as to open up the "information future" in ways that are more open than, and more critical of, dominant political and social institutions that have existed throughout our Cold War society.

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Notes:

(1) I would like to thank Claire McInerney and Michael Buckland for reading versions of this paper and for their helpful suggestions, as well as the suggestions of the anonymous reviewers of this paper.

(2) In Shannon, Weaver, and Wiener's texts the terms "communication" and "information" are often used interchangeably, though the term "information" is also used to signify the content of communication. The relative synonymy of these two terms continues a tendency that was prevalent before the Second World War, as well (e.g., in the texts of Paul Otlet and other European documentalists and social theorists). From a contemporary perspective, we may object that these two terms now signify different events and research fields. This paper proposes, however, that they share a common heritage in an epistemological model which is still in use today. Further, the ease by which information technologies converge with communication technologies and visa versa, today (e.g., in the case of the internet which is understood as both a communicational and an informational medium), suggests that the issue of defining the "real" difference between these two terms is less important than that of accounting for their historical congruence in theory and in practice.

(3) Michael J. Reddy, "The Conduit Metaphor-- A Case of Frame Conflict in Our Language about Language." Reddy cites Wiener's *The Human Use of Human Beings* in the very beginning of his essay as one application of the conduit metaphor for both a technological and a social sense of "communication." Reddy's essay may be read, very profitably, as a critique of the manner by which the conduit metaphor constructs a "frame" or metalanguage for information theory and, subsequently, for information science. Such a "frame," like all metalanguages, is both social and linguistic, and thus occupies one or several genres of linguistic activity. I would suggest that this issue about the metalanguage of information science in social and professional space constitutes one of the central problems for critical information studies.

(4) "To me, personally, the fact that the signal in its intermediate stages has gone through a machine rather than through a person is irrelevant and does not in any

case greatly change my relation to the signal" (The Human Use of Human Beings, 1954 edition, p.16).

(5) The tropic quality of technical information systems for modeling social formations is, possibly, even stronger today when organizational models often include terms associated with digital information systems (e.g., "networks," "interfacing," "the virtual organization," etc.). In popular management discourses (and even in more critical discourses), for example, there is significant slippage between understanding digital information systems as components of, as well as models of, social organization. This slippage, of course, has both theoretical and practical implications for assessing goods, value, labor, and knowledge, as well as for constructing future social relations.

(6) "Part of the significance of the new theory comes from the fact that levels B [the semantic aspect of communication] and C [the effectiveness aspect of communication], above, can make use only of those signal accuracies which turn out to be possible when analyzed at Level A [the technical aspect of communication]. Thus any limitations discovered in the theory at Level A necessarily apply to levels B and C. But a larger part of the significance comes from the fact that the analysis at Level A discloses that this level overlaps the other levels more than one could possibly naively suspect. Thus the theory of Level A is, at least to a significant degree, also a theory of levels B and C" ("Recent Contributions to The Mathematical Theory of Communication," 6)

(7) The contemporary poet and theorist Barrett Watten's (1988) book, *Conduit*, is one case in point. *Conduit*, however, fights back, utilizing a poetic technique to construct meaning, particularly that of a critique of the conduit metaphor and the information/communication model that we have been discussing in this essay. I am indebted to Watten for leading me to the Reddy essay on the conduit metaphor, cited above.

(8) In addition to Edwards' excellent book, see Haraway, 1981, Hayles, 1999, Heims, 1980, and Heims, 1991 on the topic of information theory and cybernetics in its Cold War context. (And for discursive analyses of this topic, particularly see Edwards, Haraway, and Hayles' texts.)

(9) For example, Wiener gives an extended discussion of the role of "clear" communication in the attainment of civil justice in both the 1950 and 1954 editions of *The Human Use of Human Beings* in the chapter entitled, "Law and Communication." For Wiener, "The problems of law are communicative and cybernetic--that is, they are the problems of the orderly and repeatable control of certain critical situations" (1950, 117). Such "control" and such "situations" are both linguistic and social. The role of cybernetics in civil justice is to clarify and regulate statements and actions by both civil law and the populous so as to eliminate "misunderstanding" by one or the other. In this formulation, what remains unaccounted for, of course, is cybernetics' own political and social position.

(10) For more on the history of "the question of 'man'", especially in the context of the emergence of the human sciences, see Michel Foucault, *The Order of Things: An Archaeology of the Human Sciences*.

(11) Metaphor in the sciences can be studied in many ways. It is important to recognize here that the issue is not the mere presence of metaphor in science or in information science, in particular. The issues here are: 1) the manner by which the conduit metaphor sets limits upon the research field of information studies and also limits discourses on information and knowledge in modernity and the "information age" (particularly through limiting the legitimacy and power of various types and senses of "vocabulary," such as in the arts), and 2) the various meanings of the term "science" in a type of information studies centered around the conduit metaphor.

(12) Within Information Studies literature, the limits and possibility of vocabulary as a whole are little discussed, despite the fact that, as Michael Buckland points out, "problems inherent in vocabulary help explain the nature and history of conceptions of Library and Information Science" (Buckland, 1999b). Buckland's remark here (as well in his remark, elsewhere, in regard to the limits of "science" in (L)IS (Buckland, 1999a)), is important in two ways. First, it points to the centrality of vocabulary as a whole to (L)IS. And second, it points to the manner in which certain conceptions of language orient the term "information," information theory, and the field of information studies in some directions rather than others. In so far as both European documentation and postwar (L)IS (and cybernetics) view language through classification, retrieval, and system constraints, what the linguist Roman Jakobson called "the poetic function" of language is relegated to a lower status than demonstrative signification. The social privileging of such views of language are, in the U.S. at least, exponentially increased by commercial, military, and private agencies of research funding, media broadcast, and education for whom language is largely viewed as a problem of transmission and "communication" (and thus as we have seen, in terms of statistical control). The political aspects of vocabulary are, however, brought out in art practices, poetics, and critical theory where vocabulary is understood as a social, cultural, and political problematic that plays a central role in deciding how the future will be developed through language and other signifying and affective events. That art and poetics remain problematic areas for vocabulary (for example, in the assignment of metadata to artworks or poetry, outside of an historical or archival framework), points to conflicts in how vocabulary is understood and how it functions in a "scientific" paradigm (including the privileged paradigms of "science" and "information" in modernity) versus a paradigm of literary, artistic, critical, or revolutionary intentions which rigorously explore or creatively exploit the tropic qualities of language toward social change. As this paper has suggested, Buckland's comment (1999b) that the term "controlled vocabulary" suggests a "perhaps, dangerous uncontrolled vocabulary" is not just theoretical speculation, but rather, it is a concrete reality in the politics of language in modernity. Though the conduit metaphor would lead one to exclude the poetic function of language as degenerate or even threatening to information studies, a less

restrictive view would position it as an open challenge to the adequacy of our understanding of the field.