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# A New Perspective on the Early History of the American Society for Cybernetics

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Participants at the 10<sup>th</sup> Macy Conference (de Rosnay, 2000).

1<sup>st</sup> row (left to right) T.C. Schneirla, Y. Bar-Hillel, Margaret Mead, Warren S. McCulloch, Jan Droogleever-Fortuyn, Yuen Ren Chao, W. Grey-Walter, Vahe E. Amassian.; 2<sup>nd</sup> row (left to right) Leonard J. Savage, Janet Freed Lynch, Gerhardt von Bonin, Lawrence S. Kubie, Lawrence K. Frank, Henry Quastler, Donald G. Marquis, Heinrich Kluver, F.S.C. Northrop; 3<sup>rd</sup> row (left to right): Peggy Kubie, Henry Brosin, Gregory Bateson, Frank Fremont-Smith, John R. Bowman, G.E. Hutchinson, Hans Lukas Teuber, Julian H. Bigelow, Claude Shannon, Walter Pitts, Heinz von Foerster.

## Introduction

**THE EARLY HISTORY OF THE CYBERNETICS MOVEMENT** in the United States was marked by widespread difficulties stemming from differences in opinion and disciplinary background, accompanied by a lack of willingness to accept different philosophical points of view. In this article we will explore how, despite these differences, a determined group of transdisciplinary thinkers – with interests ranging from engineering to neurophysiology – came together to establish what is now the American Society for Cybernetics (ASC). Although previous articles have addressed the history of this group, newly archived documents and correspondence among the founders of the Society shed light on the difficulties they encountered in their attempt to define a field of inquiry involving researchers from many disciplines. The goal of the present article is to use

these newly archived documents to illuminate the difficulties encountered by the field of cybernetics in subsequent years.

The term “cybernetics,” as the name for a field of inquiry, was introduced by Norbert Wiener in his 1948 book titled *Cybernetics: Control and Communication in Animal and Machine*. When first hearing the term, many people today associate it with computers, the internet, automation, or robotics, if they have heard the term at all. While these fields are related to cybernetics, the field itself is actually a much broader area of inquiry into communication and selection behavior in its most general conception. Although the broad relevance of cybernetics is suggested by the wide-range of definitions of the field, the lack of a universally accepted definition of cybernetics has inhibited the field’s cohesion. In fact, individual interpretations of the field are so varied that the ASC’s website lists more than 45 definitions of cybernetics (Defining Cybernetics, n.d.).

Further evidence of this barrier to a unified cybernetics is the title of the 2008 American Society for Cybernetics annual conference, “My Cybernetics.” This title acknowledges that each member of the Society has a different understanding of the field and different reasons for being interested in it. The multiplicity of views can be attributed to the highly diverse nature of the ACS’s membership. The Society attracts people from a wide range of disciplines – such as art and music, physics, mathematics, psychotherapy, and management. The systems of interest are specific to each given discipline, but the underlying concepts are the same. The essentially universal nature of communication, modeling, and selection processes makes it possible for people from many disciplines to find common ground. However, at the same time, the vast range of inquiry makes some people uncomfortable, since such a broad field can sometimes be interpreted as lacking focus. For all of these reasons, cybernetics ultimately resists a unified definition.

### **The Rise of Cybernetics**

The early history of cybernetics in the United States can be traced back to the end of World War II and the start of the Cold War. During the early years of the Cold War, the Josiah Macy Foundation in New York City held a series of conferences that are now known simply as the Macy Conferences on Cybernetics (Pias, 2003). Between 1946 and 1953, the Foundation held ten conferences which included specialized topics such as “Teleological Mechanisms in Society” and “Teleological Mechanisms and

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Circular Causal Systems” (Stewart, 2000). However, after the publication of Wiener’s 1948 book, all of the Macy conferences that were held focused simply on the topic of “Cybernetics: Circular Causal and Feedback Mechanisms in Biological and Social Systems” (Stewart, 2000; Umpleby, 2005). Some of the conference participants who would later lead the cybernetics movement were: Warren McCulloch, Heinz von Foerster, Julian Bigelow, Lawrence Frank, Margaret Mead, Gregory Bateson, Norbert Weiner, John von Neumann, Ross Ashby, Arturo Rosenblueth, and Lawrence Kubie (Umpleby, 2005). Many of these luminaries were present at the inaugural dinner for the ASC in 1964.

During the 1940s, 50s, and 60s, cyberneticians focused largely on engineering, control, and regulation in humans and machines, as well as communication and circularity (Foundations, n.d.; Umpleby, July 2006c). This became known as first-order cybernetics. The interdisciplinary nature of cybernetics was quite unusual during this period because many disciplines – such as physics, medicine, and the humanities – were becoming more specialized. However, although cybernetics was interdisciplinary, it was by no means unified. Each splinter group focused on its own interest and applied cybernetic theories and concepts for its own purposes. The diverging interests of these groups are part of the reason why cybernetics as a field lacked cohesion.

The 40s and 50s saw the development of the Society for General Systems Research (now the International Society for the Systems Sciences (ISSS)) and the American Society for Cybernetics (ASC) (de Rosnay, 2000). During the late 1950s the group of cyberneticians that were focused on robotics and artificial intelligence (AI) split off (Umpleby, July 2006c). Those that remained under the name cybernetics were more focused on neurophysiology and social systems. When these fields also split from cybernetics, in the late 1950s, the amalgam of interested parties left failed to form well a defined group around common interests. These tumultuous early years, however, did not prevent cybernetic organizations from thriving during the 1960s.

By the 1970s, the focus of the cybernetics movement shifted to second-order cybernetics, or biological cybernetics, which focuses on the role of the observer (Foundations, n.d.; Umpleby, July 2006c). In the more recent past, some cyberneticians have focused on social cybernetics, or the interaction between ideas and social systems (Umpleby, 2001). For a breakdown of the three primary areas that cybernetics has focused on over the past half century see Table 1.

	Engineering Cybernetics	Biological Cybernetics	Social Cybernetics
The view of epistemology	A realist view of epistemology: Knowledge is a “picture” of reality	A biological view of epistemology: How the brain functions	A pragmatic view of epistemology: Knowledge is constructed to achieve human purposes
A key distinction	Reality vs. scientific theories	Realism vs. Constructivism	The biology of cognitions vs. the observer as a social participant
The puzzle to be solved	Construct theories which explain observed phenomena	Include the observer within the domain of science	Explain the relationship between the natural and the social sciences
What must be explained	How the world works	How an individual constructs a “reality”	How people create, maintain, and change social systems through language and ideas
The key assumption	Natural processes can be explained by scientific theories	Ideas about knowledge should be rooted in neurophysiology	Ideas are accepted if they serve the observer’s purposes as a social participant
An important consequence	Scientific knowledge can be used to modify natural processes to benefit people	If people accept constructivism, they will be more tolerant	By transforming conceptual systems (through persuasion, not coercion), we can change society

Table 1: Three branches of cybernetics, adapted from Umpleby (1990).

Recent interest in such fields as chaos theory and complexity has, in many respects, drawn interest away from cybernetics, possibly because of an overlap in research and interests, combined with relatively better defined fields of inquiry. Often the overlap with cybernetics is not recognized. For instance, the University of Illinois at Urbana-Champaign in 2008 hosted its 8<sup>th</sup> annual symposium on Understanding Complex Systems. At this symposium many of the participants were introduced to the work of the Biological Computer Laboratory (BCL) for the first time, despite the BCL’s having worked on many of the same issues that are currently of interest to complexity theorists (personal communication, Stuart Umpleby, August 7, 2008). Ironically, the BCL was founded in the 1950s by cybernetician Heinz von Foerster and was located just a few blocks from the building where the conference was being held.

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## Early Leadership of the ASC

In the early 1960's the founders of the American Society for Cybernetics (ASC) recognized the rising interest in systems level concepts across many disciplines and formed the ASC to serve and unite this diverse group. As we will discuss, the leadership during the formation of the ASC played a critical role in how the purposes, structure, and culture of the society developed. One of the most active early members of the ASC was Dr. Paul S. Henshaw, who served as the Acting Chairman of the Board during the ASC's infancy. Other active members included: Warren McCulloch, Frank Fremont-Smith, John Dixon, and Jack Ford. Below is a list of Honorary Founders of the American Society for Cybernetics (ASC Archives, n.d., document #12):

Julian Bigelow, Institute for Advanced Studies  
Frank Fremont-Smith, New York Academy of Science  
Herman Goldstine, International Business Machine Corporation  
Yuk Wing Lee, Massachusetts Institute of Technology  
Warren McCulloch, Massachusetts Institute of Technology  
Oskar Morgenstern, Princeton University  
Filmer Stuart Cuckow Northrop, Yale University  
Francis O. Schmitt, Massachusetts Institute of Technology  
Hans Lukas Teuber, Massachusetts Institute of Technology  
Heinz von Foerster, University of Illinois

Correspondence in the ASC archives indicates that the founding members encountered great difficulty in coming to an agreement on the Society's goals, mission, structure, and leadership, including whether to view cybernetics as an art or a science (ASC Archives, n.d., documents #2, #3, and #4). For instance, when referring to the early members and fundraisers of the ASC, Paul Henshaw stated, "people want to know what the new organization is to do – what its goals are, and indeed what its mission is" (ASC Archives, n.d., document #3).

The ASC was incorporated on July 31, 1964 and held an inaugural dinner on October, 16, 1964 at the Cosmos Club in Washington, DC. However, the society was by no means well defined at this point (ASC Archives, n.d., documents #1A and #1D). The founders desired to introduce the newly formed organization to members and the public with a major conference on Cybernetics (ASC Archives, document #1B). In November 1964, the ASC assisted several Washington, DC-area universities in organizing a symposium on cybernetics and society (Dechert, 1966). However, it was almost two years before the nascent

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society formally elected its first President, and the ASC did not hold its own full conference until 1968, nearly four years after its incorporation (Umpleby, 2005). During this time there was much ado about the nature of cybernetics as a field and the purpose and function of the Society, as well as its leadership and long and short term plans.

### **Selecting a Leader**

Six months after incorporation, the founding members unsuccessfully attempted to recruit Julian Bigelow as the first president of the ASC. It is relevant that Bigelow was an engineer, while many others in the young field came from humanities like philosophy. A few years before, in 1959, Charles Percy Snow gave his seminal Rede Lecture, “The Two Cultures,” in which he lamented the divide between the sciences and humanities (Snow, 1961). Against this background, Bigelow understood that the interdisciplinary nature of cybernetics would impede the formation of the society, since at the time there was not a cohesive cybernetics field within the academic community for the society to serve, a fact that was recognized by the society’s founders as well.

Accordingly, Bigelow would not even consider the offer to become ASC president until the ASC addressed his concerns, outlined in a March 1965 letter to Paul Henshaw and the ASC Board (ASC Archives, n.d., document #7):

- (1) “...Recognition of prevailing processes, and valuable referential usage [of the term cybernetics] does not in my opinion establish the proposition that “Cybernetics” is the name of a well-defined discipline or branch of science, or of engineering, or even of philosophy.”
- (2) “We do not have a well-defined disciplinary area, we do not have a living scientific literature within the U.S.A., and in consequence of these facts we do not have a clear basis for recruiting members and setting rational criteria for admission.”

Bigelow was clearly concerned about the prospects of forming a coherent field of inquiry from such a vast, interdisciplinary ground. Based on these worries, he suggested two courses of action for the formation of the ASC:

- (1) Move forward with the ASC without further concern for the lack of a well defined disciplinary area and “adopt the policy of admitting to membership any persons who express an interest in joining”; or

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- (2) Wait to move forward until determining “whether there is a disciplinary area or technical need of some structurable sort within which the ASC could hope to survive as a scientific society, and could hope to fulfill a worthwhile mission.”

While he acknowledged that the first option held some value, he strongly supported the second because he didn't think the first would result in an academic society capable of contributing to understanding, but would rather be a sort of club or social gathering forum for people with similar interests. Bigelow indicated that if they were to proceed under the first it would be a “grueling and inefficient process for which I simply do not have time available” (ASC Archives, n.d., document #7).

Bigelow went on to outline his vision for moving forward:

- (1) Transition the founding members into an “active role in the planning of the next phases of the Society's activity.”
- (2) Gather extensive outside expert opinions from the academic disciplines “spanned” by Cybernetics to determine if the “formation and promotion of an active Society for Cybernetics would serve a useful function in their particular area at this time.”

In recommending this course, Bigelow was hoping the ASC would lay a foundation for a unified field of cybernetics, with systems level thinkers from varied disciplines coming together to make progress in cybernetics that could then be applied to systems phenomena.

Throughout 1965, the ASC leadership focused on the lack of clarity in the society. The group agreed that the term cybernetics was still not sufficiently defined and that there was a need for coherent language. Membership was still lagging, thus they decided to focus on getting younger researchers involved and on broadening membership acceptance to non-Americans.

Little ASC correspondence exists regarding activities during the remainder of 1965 through May 1966. The correspondence that does exist suggests that the society went through two distinct phases after receiving Bigelow's suggestions. Initially, from April – August 1965 they unsuccessfully endeavored to act upon Bigelow's recommendations. They called the founding members together for an August 1965 board meeting entitled “Shall we go forward or terminate?” The agenda for the meeting included the still pressing need “to determine just what is the purpose of ASC?” and to outline membership criteria. These agenda items clearly show that the Board recognized the importance of Bigelow's concerns,

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although there is no evidence of any clear consensus on these issues following the meeting.

Nonetheless, despite the apparent lack of consensus on the purpose of the ASC, some of the founding members looked to transition into a more active role, as suggested by Bigelow. This is reflected in a stern letter of disapproval from Jack Ford to the ASC Board dated October 1, 1965, in which he states:

It is time to face the fact that we are a corporate body made of separate and coequal mature members with legal and ethical obligations to our membership and founders and that we have a set of operational rules by which we must function in fulfilling these obligations. These facts must be realized by each and every one of us if we are to reestablish the integrity of the Board... and if we are to appear as a group of responsible directors aware of our duties to, and respect for, the membership and – it is to be hoped – one another.” (ASC Archives, n.d., document #9).

However, there were no responses to Ford’s letter found in the ASC’s files kept by John Dixon, who served as Correspondence Secretary at the time. In fact, no correspondence could be found dating between October 1965 and June 1966.

Then, in June 1966, the ASC announced the selection of Warren McCulloch as their first President. McCulloch was a philosopher, psychologist, medical doctor, and most famously a neurophysiologist. Considering McCulloch’s interdisciplinary inclinations, he was likely less appreciative of Bigelow’s concerns. Based on this abrupt shift and correspondence thereafter, one can assume that the leadership proceeded in opposition to Bigelow’s preferred course of action. Evidence for this is largely negative—that is, based on what the Society did *not* do. As far as the records indicate, they did not clearly define the ASC or membership criteria, nor did they poll experts in the field; what they did was to forge ahead without consensus on the concerns raised by Bigelow.

With its first president secured and its course set, the ASC began pushing to establish its structure more definitively. McCulloch reorganized the administrative leadership, separating the powers of the Board and Executive Committee – as had been proposed some time earlier. Additionally, Henshaw resigned from the Board shortly after McCulloch became President, which is likely explained by early

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correspondence indicating that there was tension between the two (ASC Archives, n.d., documents #2 and #13). Henshaw was replaced with Heinz von Foerster as the Board's Director and Lawrence Fogel was named Vice- President.

### **Moving Forward**

McCulloch immediately established five standing committees (1) By-laws and Constitution – which were immediately revised, (2) Program, (3) Membership, (4) Finance, and (5) Public Affairs (ASC Archives, n.d., document #14). He also set out to establish a Scientific Council and a Council of Fellows (it is unclear if this ever took hold). By August 1965 the rejuvenated ASC began appealing to various institutions for assistance in establishing cybernetic programs and publications. The ASC received support from the National Science Foundation for the establishment of a cybernetics journal, which became known as the *Journal of Cybernetics* (now *Cybernetics and Systems: An International Journal*) (Umpleby, 2006a). Also, the Society proposed to establish conference programs on cybernetics in conjunction with the Josiah Macy, Jr. Foundation and the Rockefeller Foundation. Both proposals were denied, as were other conference proposals – primarily on the grounds that the ASC was not specific enough in its goals, definition of the field, and conference topics.

Between 1966 and 1978 correspondence and activity waned once again. Few records exist about the ASC's activities during this period. It is known that in its first 10 years the ASC held at least five conferences on the topics of Purposive Systems, 1968; Cybernetics and the Management of Large Systems, 1969; Cybernetics, Simulation and Conflict Resolution, 1971; Cybernetics, Artificial Intelligence, and Ecology, 1972; and Communication and Control in Social Processes, 1974. The group produced the *Journal of Cybernetics* for several years. Additional publishing efforts included *Communications of the ASC*, *Cybernetics Forum*, and the *Journal of Cybernetics and Information Science*. The *Journal of Cybernetics* is now *Cybernetics and Systems: An International Journal* (Umpleby, 2006a). However, the other early publications have all been discontinued.

During this period of inactivity, a disagreement with ASC leadership caused a group to split off from the ASC (Umpleby, 2005). This group went on to form another organization, the American Cybernetics Association (ACA), which was based in Philadelphia, PA (Umpleby, July 2006b). As you can see, the field of cybernetics was in a

constant state of flux and dissolution, with many groups breaking away. This repeated disbanding reveals the state of discontent and disagreement among cyberneticians.

In the summer of 1979, talk began of resurrecting the inactive ASC. Membership numbers were still a concern and the group acknowledged that if it could not generate enough members, it would likely become an interest group within the Society for General Systems Research. With this in mind, Barry Clemson, then President of the ASC, convinced the ACA to join back together with the ASC. The new organization retained the ASC name, but used the ACA's by-laws.

In 1980, Stuart Umpleby became president of the restored ASC. His Vice President was Doreen Steg, the former President of the ACA. Umpleby saw his task as improving the management of the ASC, while Heinz von Foerster, a member of the Board of Trustees, provided scientific direction (Umpleby, 1981). During the fall of 1981, the ASC held its first annual meeting in seven years (Umpleby, July 2006b). A second conference was held in 1982.

### **Differences in Perspective**

Tying this early history together, a picture emerges in which the formation of the ASC was hampered by the contrast between two perspectives on the interdisciplinary nature of cybernetics, stemming from the early leadership's diverging views on the value and function of interdisciplinary communities. One perspective, that championed by Bigelow and held by engineers and physical scientists (such as Henshaw), saw the interdisciplinarity as an impediment to the formation of a unified field, which would need to be united by a coherent language and common interests. Supporters of this perspective appeared to believe this impediment could be overcome, although it is not clear if that would be done at the expense of or in the name of interdisciplinarity. In contrast, interdisciplinarity was welcomed by McCulloch and other cyberneticians with strong humanities backgrounds, who were under the impression that the unification of cybernetics would follow without significant difficulty due to the common interests of those in the field.

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## The ASC Today

The early differences in perspective on cybernetics have carried through to the present day. As the focus of the ASC and cybernetics shifted to second order cybernetics in the 1970s, many engineers left the ASC and moved toward computer science, artificial intelligence, robotics, and control systems engineering. The technical aspects of cybernetics have been developed in these fields, while the ASC has made contributions to psychotherapy, management, education, biology, and philosophy.

Looking at the ASC today, the question must be asked, what progress toward a unified cybernetics has been made in the last 40 years? The early leadership of the ASC moved forward without a clear definition or cohesive language, apparently in the hopes that these would develop in the Society's future. One could argue that the opposite appears to have happened – cybernetics has become a distributed topic of research applied to and developed within a wide range of specific fields, but it is still struggling to create a coherent field of its own. The ongoing struggle of the ASC to recruit new members confirms the limited success of the organization in building membership or addressing in the needs of existing members. The effort to define a coherent and unified field of inquiry continues, so far without much success. Additionally, the literature and language used remains highly differentiated (Umpleby & Dent, 1999). However, several cybernetics journals continue to prosper, largely due to an increasing number of articles by scholars from other countries.

In 2005, the leadership of the ASC, seeking to ascertain the developing needs of the cybernetics community, conducted a survey of its members to assist in determining the future direction of the Society. The survey's results were clear: the membership felt conflicted about the value the ASC as an organization provided (Corona & Umpleby, 2006). This information was presented to the officers, along with a full report that laid out a framework for increasing the effectiveness of the organization and ways to take action on the areas of most concern for ASC members – such as by having a more clearly defined agenda for conferences, including new content and presenters from year to year, increasing access to resources and educational materials, and improving communication, both between members and between members and ASC administrators (Corona & Umpleby, 2006).

The survey report was, for the most part, disregarded and the group continued to operate much as before with little involvement by members, for example in organizing local chapters. It should also be noted that a

similar survey and report was produced by students in 2001 and was also largely ignored (Francis, Doherty, Nsenkyire, Nsenkyire, & Makani, 2001).

At a recent meeting of the George Washington University seminar on reflexive systems participants contemplated the need to move beyond debating definitions and terminology. The group reflected on how the need to reach consensus on terminology has been an enduring problem for the various fields of systems thinking, such as cybernetics, systems dynamics, complexity, and chaos theory. The group concluded that a large part of the problem stems from the interdisciplinary nature of the field. Our research into the early history of the ASC strongly supports this conclusion.

As a way forward, we suggest that the Officers of the ASC examine other interdisciplinary fields of study that have experienced difficulties for successes and failures. This will help determine what best practices exist for achieving interdisciplinary success, many of which will likely overlap with the recommendations made in the 2005 survey mentioned above.

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