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A CENTER AROUND ONE PERSON

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That I should have been selected to be the author of this paper is due to the fact that Warren's relation with Holland was of a special kind and that from Amsterdam, my home, I am in a good position to consult numbers of Warren's friends.

I have no personal knowledge of Warren's earlier history, but I had the text of a number of interviews with friends from those early days. Moreover, Warren told me quite a few facts and stories involving himself; actually, it was not too difficult to persuade him to do this.

Warren McCulloch came to European scientists as an ambassador from the Cybernetics movement in the United States, bringing new and exciting ideas. Warren's personal bias in favor of the Dutch sprang from his cooperation with the Dutch neurophysiologist Dusser de Barenne at Yale. De Barenne, trained as a psychiatrist, was interested in the neurophysiological basis of pathological mental states. In the Department of Physiology at the State University of Utrecht he developed a special method of research, the application of strychnine to the nervous system. His work attracted the attention of John Fulton of Yale University who invited him to come to New Haven where he became head of the Yale Laboratory of Neurophysiology.

Warren came to him in 1934 as his laboratory assistant. The result was a series of brilliant papers on cortical activity, excitatory as well as inhibitory. Warren greatly admired Dusser de Barenne's methodical research, his integrity, his devotion to a task he had set himself.

Reading some reminiscences of Warren's friends it must have been an indescribably busy and interesting time at the laboratory at Yale where the use of strychnine as an experimental tool in brain research was brought to maturity.

The young American's fresh improvisations and mechanical skill, and his knowledge of electronic apparatus, was an invaluable contribution to their collaboration. He remained at the laboratory after the untimely death of Dusser de Barenne, in 1940, to finish and publish the results of their work. These several years of research made a deep impression on Warren and established his great admiration for the Dutch, convincing him that all Dutch scientists were like Dusser de Barenne.

In 1946 Warren met Jan Droogleever Fortuyn, a neurologist who came to the United States on a Rockefeller Fellowship with the intention of studying neurophysiology. This meeting led to a friendship which lasted to the end of Warren's life. In 1948, during a visit to Amsterdam, a number of young scientists were fortunate to listen to Warren's exposition of his very original ideas on nervous nets. From then on relations between Warren and the Dutch scientists were firmly established. Several young scientists from Holland subsequently went to the U.S. and became his collaborators and friends. These included Bert Verveen, Herman Berendsen, Otto Magnus, Leo Verbeek, Ims Storm v. Leewen, all of whom now hold positions in universities or research hospitals or technological institutes in the Netherlands.

Communication with Warren was not always easy for me and it was a relief to notice that some outstanding Anglo-Saxon scientists at times had difficulties in following the flight of thoughts of our friend, not only because of his originality and depth but also because of an unusually large vocabulary which the reader will find reflected in the papers of this book and more specifically in his poems.

Warren McCulloch was by no means a half-hearted or soft man. He liked extremes and his friends - in the full sense of the word - were in his eyes first rate in their various fields. He

supported them morally and if need be in substance, finding jobs for them, taking them into his home. He detested dishonesty of any kind and also personal or scientific self-aggrandizement. He was serious, yet far from solemn, but on the other hand he was a man of the world, at ease in any company; his stature could not be misjudged. He liked to travel and to meet all types of people and to talk with them about their own field of occupation, whether tailor, carpenter, physician, or theoretical physicist. He loved youngsters, as he called them, and so he was always on the look out for young collaborators to follow up some of his hunches or to bring a hard core of data to his continuous search for schemes of "how the brain works." I think he was unusually apt in this. Quite a few people who became notable in their scientific fields started their careers with Warren or had been very much influenced by him.

Warren's knowledge was both broad and deep. He had an uncanny feeling for important developments outside his own field, in so far as one could ascribe a field to him. One example is that of the structure of water in the cell, and there was young Herman Berendsen, a Dutch scientist (not the first and not the last that he attracted to the USA), who wrote a fine thesis under his direction. Berendsen still plays a leading role in this field. Even today this man Warren lives vividly in the memories of a great many of his friends. A *liber amicorum* which he received for his 65th birthday is a "document humane" about the social side of science during his generation and of the group around him of which no less can be said than that it established a scientific cultural milieu of importance. I wonder whether such a situation will ever repeat itself.

Although there may be differences of opinion about the impact of Warren's papers, there is absolute concordance about his influence and the way he functioned as a *postillion de science*, as can be so nicely seen in his report *Where is Fancy Bred?*

There is in taped interviews with some of his friends no unequivocal opinion about his personal effectiveness as an experimenter; he liked to be in the experimental laboratory, to observe, to direct and certainly to talk. Once when I needed to

equilibrate electronic tubes, Warren knew the trick of how to do it, and when I thought I had invented an isolating stimulation transformer Warren had used such a thing at least 10 years before. He was one of those cyberneticists, a rare one, who knew brain from anatomy to physiology and psychopathology together with enough mathematics to have written with Walter Pitts, whom he relied on for his mathematics, one of the most famous papers in modern epistemology and symbolic logic.

At an early age he was fascinated by the relation between mind, logic, and number. By choosing to pursue this problem he disappointed his mother who hoped that he would study for the ministry. But she appreciated the fact that he continued disseminating the gospel of truth to his very end. Anyhow, he continued his study of mathematics, his favorite subject, but because he thought it might give him a deeper insight, he acquired a degree in psychology. Psychology did not entirely satisfy him either, and therefore he went on to study medicine for which he received his M.D., and thus became a psychiatrist.

From 1940 to 1952, Warren McCulloch headed the Neuropsychiatric Laboratory of the University of Illinois in Chicago. Remaining faithful to his first interest, he went on with his search for the (physio) logic essentials of the mind. It was then that he met Walter Pitts, one of the most unusual persons I have ever known, a kind-hearted genius, who could give Warren's flight of ideas the necessary background, as often was also done by his young - often young - often Dutch - students. Pitts had strange ways of living, he was absorbed in another world, which did not deter the McCullochs - to the contrary I would say - from housing him and taking care of him.

From his profession as a psychiatrist Warren knew his psychopathology and was a great source of legendary tales. He told us about Count Zeppelin who, after having been declared incompetent, got the money (some 10,000 Marks) from the family tailor for his last attempt to build an airship. When the successful Zeppelin made its maiden trip, a sinister note was added because the Count, who was just hospitalized with his now manifest

dementia, could see the airship flying over the asylum! Our friend could tell about his dealings with gangsters in Chicago for whom he sometimes was a kind of trusted physician living in no-man's land in a cheap tenement house in the neighborhood of the Cook County Hospital where at times gun shots could be heard and where the water supply could deliver little fish swimming in the bath. But lack of courage was not characteristic of him, and even severely ill he retained his personality that we respected and loved.

In 1952 Warren McCulloch got his great change; he went to MIT where he had his own laboratory, a "nursery pond" of ideas. After his retirement he remained attached to the Institute until his death. Nobody who visited his basement lab in the Research Laboratory for Electronics will ever forget the atmosphere there. Likely as not the lucky visitor will have met there many a man who was already famous or would become so.

I got to know Warren and Rook McCulloch well in 1953 on the occasion of the first conference on Information Theory in Amersfoort, organized by the late Cr. Vuysji who was one of the promoters of the Dutch Significs movement, represented by and in the journal Synthese. The link with Information Theory was the aim of this Significs group in order to cleanse scientific language and terminology of ambiguity and emotional content. One of Warren's papers was first published in Synthese. The conference was very well attended by important people like Warren himself, Donald MacKay from England, Bar Hillel from Israel, and Jan Schouten from the Netherlands.

This was the year of the Ramp, the rupture of the dams and the inundations in Holland: much of Zeeland was still under water. My wife's family, being contractors of waterworks for more than a century, were engaged in restoring the dykes, and so we had easy access to the actual undertakings. It was my first experience with Warren's enthusiasm, intensity, and broad knowledge. He could ask very relevant questions of the director of the works, who indeed was astonished by this. Years and years later Warren still could get excited about what he called "the glorious days of

the dykes" and having a terrific memory (he had been an eidetic in his youth) he could recall to us long forgotten details.

Warren had a great sense of beauty; had he not written a master's thesis using a modern psychological approach for the evaluation of aesthetic preferences for various proportions? He said he doubted that people preferred the golden Section, as the Greeks asserted, or even that they could recognize it. But he discovered that "Man can and he does!" His historical feeling expressed itself in his opinion that generally the older (in a culture) the art objects, the more important and impressive they are. By his enormous and wide knowledge, his infectious enthusiasm and humor, his entirely original vision on science, our friend inspired a scientific drive in very many.

I am sure he himself would have considered this as an achievement equalling in importance his written contributions to which this book bears witness. I can only repeat what I said in my inaugural lecture in 1963:

> "Dear Warren, — that you and Rook have enclosed Lies and me into your precious circle of friends has enriched our lives and has brought me into contact with an infinite world of thought."