Comments on Receiving the Fyssen Prize

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George A. Miller
The James S. McDonnell Distinguished
University Professor of Psychology Emeritus
Green Hall, Princeton University
Princeton, New Jersey, USA 08544

I must begin by expressing my gratitude, not only to David Premack for proposing my name and to the Advisory Board that endorsed his nomination, but most of all to Madame Fyssen and the Fyssen Foundation, both for supporting the branch of science that is most dear to me and for recognizing my own contributions to it. It is enormously gratifying to feel that someone has been listening, that someone cares.

I am keenly aware how fortunate I am to be here today. I know that there are others who are better known than I, others who have worked harder, others more intelligent, others who are probably more deserving. Yet here I am—the others are simply not as lucky as I am. It serves to remind me forcefully how often, over the years, fortune has favored me.

I think my first stroke of luck was to inherit from my childhood a common sense view of the universe. I was taught, and I still believe, that the universe contains three things that we should study and try to understand. There is, first, matter and energy, which provide the constitutive problem for the physical sciences. Second is life, the constitutive problem for the biological sciences. And finally, the constitutive problem for the psychological sciences is consciousness. What else is there beyond matter and energy, life, and consciousness? Later, when my sophisticated psychology teachers and colleagues tried to convince me that consciousness does not exist, or that if it does exist, it cannot be studied scientifically, I was never completely able to unlearn the simple ontology that I had internalized as a child. In the 1960s, when many American psychologists finally accepted a mentalistic definition of their field, they spoke of it as a cognitive revolution, but for me it was a counter-revolution. Somehow I always knew that mind is just as real as are matter, energy, and life.

Another fortunate turn in my life was that I came to the study of psychology with a prior interest in communication. My initial fascination with the theater led to a curiosity

about the ways that human speech can express and affect the human mind. My intellectual interest in speech paid immediate benefits: as a graduate student at Harvard University during the second World War, I was chosen as part of a team to develop and test military voice communication systems. Instead of suffering the dangers and hardships of battle, I was deferred from military service. So I was able to learn communication engineering, to master the methods of psychophysics and experimental psychology, to publish papers on hearing and speech, and to lay a foundation for a successful post-war career in academic psychology.

These events, which crystallized my interest in the psychology of communication, were fortunate in other ways. Psychology is a young and difficult science, rich in empirical observations but poor in verified theory. Lacking a strong theoretical base, the next best guide for research is a practical problem. And communication is a rich source of practical problems. Consequently, while my peers were studying simplified cases—studying the perception of simple colors or line drawings, or having sophomores memorize nonsense syllables, or watching rats press levers to get food—I was learning about human communication, a ubiquitous phenomenon of enormous personal and social importance. I count myself extremely fortunate that I have never lacked important psychological questions to study.

My interest in human communication has conferred still other benefits. One might think that it is a narrow specialization, but in fact communication is a subject that cuts across nearly all of the topics usually included in general psychology texts. Speaking is a motor skill; speech perception is a fascinating auditory process and reading is an equally fascinating visual process; planning an utterance involves complex thought and both short-term and long-term memory; different parts of the human brain have evolved special capacities for speech and language; linguistic development is an important aspect of mental development and the growth of vocabulary is closely related to the growth of intelligence; social psychology and psychotherapy both presuppose the availability of language. Indeed, a text on the psychology of communication is little more than a general psychology text in which only linguistic examples are cited. I was very lucky to have this special perspective on psychology, both broad and practical.

Communication is such a broad topic that it frequently led me beyond my usual disciplinary boundaries. Because I studied speech disorders as an undergraduate, I have always had an interest in the neurological substrate of language. Because I have always been a closet philosopher, I could use my interest in communication to rationalize reading Wittgenstein and the natural language philosophers. And because I felt at home in communication engineering, I was one of the first psychologists to learn about the

Weiner-Shannon measure of selective information and to apply it to problems in the psychology of communication. Information theory encouraged me to investigate the statistical properties of linguistic messages, a direction of research that I pursued vigorously until—another amazing stroke of luck—Noam Chomsky persuaded me that the statistical patterns of language are a consequence of the grammatical rules that govern the formation of words and sentences. My subsequent explorations of linguistics centered at first on the psychological aspects of syntax, but more recently (for the past twenty years) I have studied the lexical component of language, until I am now an amateur lexicographer. And my lexicographic adventures have led me into an ill-defined realm called computational linguistics—today, computers are the status symbols of science. All of these intellectual pleasures lie outside of psychology proper, but I could enjoy them because they were related to my attempts to understand human communication.

I must also count it as good luck that I have a bad case of intellectual claustrophobia. My restless desire to see the psychology of communication in the broadest possible context has opened up opportunities to me that a better disciplined psychologist would probably shun. In the 1960s it led me to join with Jerome Bruner in creating the Harvard Center for Cognitive Studies. Although my major concern was to develop a broad cognitive approach to the study of speech and language, the Center was much broader than my particular project. My fortunate association with Bruner opened my eyes to the complex problems of social psychology, cultural anthropology, cognitive development, educational psychology, thus greatly enriching the variety of perspectives from which I could view communication.

It was my intellectual claustrophobia that prepared me for membership in the loose confederation currently known as cognitive science—or, as I prefer, the cognitive sciences (in the plural). I was not the only person to feel that understanding the human mind is too important to leave to psychologists. When anthropologists, computer scientists, linguists, neuroscientists, philosophers, and psychologists decided they had to pool their resources, it seemed to legitimize my own experience, and I looked forward to accelerated progress in understanding human cognition. I am not convinced that the collaboration has been successful, but I remain hopeful. It is still an exciting possibility, and I am very fortunate to have been able to contribute to it.

All those who are willing to call themselves cognitive scientists agree that cognition is an important subject for scientific study. Unfortunately, they are not in full agreement about what cognition is. To many, cognition is the source of intelligence, and intelligence is best manifested in our ability to learn, to adapt ourselves and our behavior to new environmental circumstances. I have no objection to that definition, although my

own approach would place more emphasis on the symbolic processes that make communication possible. Words and sentences are about something, and this relation of *aboutness* seems to me to be the essence of what we call cognition. It is the fact that we human beings are Nature's most effective symbol users that is the source of our intelligence; our symbols enable us to learn and to adapt in ways that are impossible for simpler organisms.

Philosophers have discussed aboutness (or intentionality, as they prefer to call it), and the field seems divided over the question of whether aboutness is a uniquely human thing, or whether, if we understood it well enough, it would be possible to program it into digital computers. I am unwilling to prejudge the outcome of that debate, but I am convinced that we have not yet been very successful in our attempts to endow computers with a sense of aboutness. I find it fascinating, for example, that the kind of sense resolution of ambiguous words that people can make so easily is so difficult to explain to a computer. That is to say, an ambiguous word can be about two or more different things; people use its context to decide which sense is appropriate, but we do not yet understand how they do it. Until we do understand how people are able to "look through" printed letters and words to see the meaning that those marks are used to express, we will not have understood a central mystery of human cognition.

My major preoccupation these days is to understand the aboutness relation that makes linguistic symbols, and hence linguistic communication, possible. I am confident that the puzzle has an answer. If my luck continues to hold, I may live long enough to learn what it is.