

Risto Näätänen

## Attention and Brain Activity



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In October 1988 when the Fellows were asked to describe their work plans for their stay in the Wissenschaftskolleg in the academic year 1988-1989, I presented the following plan:

*"The main purpose of my stay in the Wissenschaftskolleg is to write a book entitled "Attention and Brain Activity". This book delineates cerebral mechanisms of attention in humans as they presently appear in the light of data obtained by using various modern brain-research techniques. The main scope of the book is how we select environmental information, but the selectivity manifest in our thinking, consciousness, and motor behavior is also dealt with in the framework of an expanded attention concept. The analysis performed in the book starts by trying to describe the brain's automatic information processing in order to provide a basis for understanding voluntary or attentional information processing. Recent research using event-related potentials (ERP) and magnetocephalogram (MEG) has opened unforeseen "windows" to this silent or subconscious, basic, aspect of our cognitive brain function. At that level, there appears to be no selection, the brain's enormous capacity showing up in parallel processing of sensory information from multiple sources.*

*The physiological data reviewed seem also to reveal where and how selectivity in information processing begins. The neurophysiological basis of*

*this central aspect of our perception, conscious experience, and behavior is to a great extent clarified by studies on the event-related potentials and regional cerebral blood flow (rCBF) of the human brain function. A good deal of this work with event-related potentials comes from the author's own laboratory.*

*On the basis of these data, a new theory of selective attention and its brain mechanisms is proposed..."*

My first plans to write this book date back to the beginning of the 1980s — soon after we had found two new ERP components which seemed to provide much of the empirical basis for such a book — but my job as a professor and chairman in the Department of Psychology at the University of Helsinki permitted no undisturbed, long enough periods of concentration on such a demanding project. Moreover, my own laboratory where ERPs were registered had just become operational, demanding much attention. My time for the laboratory and experiments was, however, very limited in those years but the situation improved in 1983 when I was appointed as a research professor of the Academy of Finland for 5 years.

In 1985-1986 I had an opportunity to spend 5 months in the Neurosciences Institute, an institute resembling the Wissenschaftskolleg, located in the campus of the Rockefeller University in New York, and used part of that time to start writing the book. After my return to Finland, however, I had, among other things, to concentrate on experimental work and the preparation of the many data papers coming out from the laboratory which had now grown quite big. In addition, there were frequent foreign visitors, I accepted too many invitations to address different meetings, I did quite a lot of refereeing for different journals, etc. In short, my time was divided among too many commitments; the book project had to wait. "Now or never", I therefore thought when the invitation to spend a year at the Wissenschaftskolleg came.

Now, when this year is over, I wish there is no truth in that dichotomy since the book is not finished. Yet about 400 typed pages of that first draft will be finished before my departure but I expect that I will need another 3 months work to get the book finished. In addition, this has to be done quite soon after my return home for the field is rapidly developing. So, the situation is worrisome although not catastrophic. Fortunately, my research position in the Academy was prolonged by another 5 years until 1993.

Why, then, is the book not ready although I have worked here as hard as I had planned and the conditions have been as ideal as they initially looked like? If the famous Berlin Mauer had been able to prevent the mail from getting through, I would have succeeded. This mail brought me numerous manuscripts from my own laboratory which I, against my in-

initial decision to the contrary, checked and often partially rewrote, due in part to the worry for the continuation of the support of this very expensive laboratory. So I found myself doing here much of the same work which I usually do in Helsinki (and which I would have been able to do there easier and faster). The mail also brought numerous manuscripts of other laboratories for refereeing for different journals and for advice and comments but many of them I, applying to my situation although feeling some guilt, managed to return unread.

My book plan would still have tolerated all these side activities but on one ugly day before Christmas, the mail brought here for revision my extensive manuscript presenting a theory on brain mechanisms of auditory attention, submitted to the journal *The Behavioral and Brain Sciences* about 8 months earlier. I had wished that this 150-page manuscript would have needed some more time in the journal's office, so that I could have postponed its revision until my return home (with a finished book manuscript). Now, however, the time gap would have been far too long; so I decided to revise the manuscript very rapidly and then to return back to my book. Here I, however, greatly underestimated the time required, in particular because I started to improve the manuscript far beyond the requirements of the journal and its five referees. The price for this perfectionism was that the revision, an almost completely rewritten manuscript, now of 178 pages, was sent back to this journal with open peer commentary in July rather than in February, as originally purposed. Throughout most of the Spring, I had divided my time between the book and the article.

I do not, however, regret trying to make my theory as waterproof as possible, so that the one who wants to do the job better must also come to the Wissenschaftskolleg. When complaining about the delay of my book for the sake of the theory at the unforgettable (for me and two other Fellows in particular) lunch table of the Kolleg, one fellow Fellow — a famous philosopher (those are people who have their values in the right order) — commented that if you have a book and a theory, and one of them has to fall, let it be the book. Better neither, however: I will somehow have to organize an additional period of 3 months in order to complete the book rather soon after my return home — or to become a philosopher.