

ALBERT S. BREGMAN (1936–2023)

STEPHEN McADAMS

McGill University, Montreal, Canada

AL BREGMAN WORKED IN EXPERIMENTAL Psychology for nearly 50 years, primarily studying auditory perception, but with occasional forays into visual perception as well. He directed his entire career toward understanding the way human listeners succeed in perceptually organizing the complex acoustic field into distinct sound sources and into the events and event streams they produce. Within this study area, Al made the most significant theoretical contributions of the many scientists working in the sub-discipline of auditory psychology. His conception of perceptual organization drew its main inspiration from the Gestalt psychologists, but he brought many concepts from computer science and artificial intelligence to bear on his theorizing, leading to the development of such concepts as: 1) primitive auditory scene analysis being an heuristic process to which a number of possible acoustic cues and sensory mechanisms contribute, 2) schema-based auditory organization being a selective process that draws information from the complex acoustic mixture according to pre-activated knowledge, and their interaction in 3) the old-plus-new organizational strategy, which provides a framework for understanding how perceptual continuity is perceived in the face of interrupting signals that can potentially mask a softer continuous target signal.

His experimental work has provided an impressive edifice that was summarized in his monumental book *Auditory Scene Analysis: The Perceptual Organization of Sound* published by MIT Press in 1990. This book is the modern-day equivalent of Hermann von Helmholtz's *On the Sensations of Tone as a Physiological Basis for the Theory of Music* published more than a century earlier. This book demonstrated an innovative way to study the psychology of auditory perception. His approach to the subject was revolutionary in the sense that it resurrected an abandoned methodology—phenomenology—and applied it in a way that satisfied modern scientific requirements. Al generated empirical findings too numerous to cite. Suffice it to list a few findings that he and his students published. Auditory stream formation (the organization of sequences of events into coherent mental representations) is based on a principle of

continuity in the sensory representation of the sounds. Auditory streams are the “objects” upon which attention is focused. The perception of sequence properties such as melody and rhythm are confined to sounds organized into auditory streams and are difficult to perceive across streams. And a continuous sound interrupted by a louder sound that covers the spectrum of the continuous sound can be perceived as continuing through the louder sound even if its properties are changing over time, as long as a process of interpolation can logically connect the bits of isolated sound perceived on either side of the interrupter.

Al's work, particularly following the publication of his book, stimulated a plethora of research in experimental psychology, cognitive neuroscience, artificial intelligence, signal processing, and even auditory neurophysiology, in Québec and Canada in particular, but also in North America more generally, as well as in Europe, Japan, and China. This richness of influence is in large part due to the impressive theoretical framework Al laid out, which gave many younger researchers a clear starting place to engage many of the issues brought to light by the framework itself over and above the explanations it brought to existing data. In this sense, Al's contribution to the field of auditory psychology is unique both in terms of its experimental breadth and theoretical depth. This uniqueness is to be measured at an international level, and quite clearly places at the forefront Al's contribution to psychology as a 20th and 21st century science in Canada, alongside other great Canadian psychologists and cognitive neuroscientists such as Donald Hebb, Endel Tulving, Ronald Melzack, Brenda Milner, and John MacNamara.

In addition, Al was a truly gifted mentor. His clarity of thought, deep interest in his field and in other fields as diverse as computer science, neurophysiology, and philosophy, and in particular his great generosity of ideas and suggestions, were a boon to a significant number of undergraduate and graduate students and post-docs. Al taught them to think as scientists and to take immense pleasure in the problem-solving enterprise that constitutes an experimental science. Al always manifested a deep devotion to science and to young scientists throughout his career as a teacher and mentor.

Another aspect of Al's personality that made him an uncommon scientist was his extreme generosity. He was

always willing to respond to a letter from someone seeking an answer to some question of auditory perception or perceptual psychology in general and was never condescending to those who knew less than he or who came from other disciplines with different vocabulary and concepts. In line with this spirit of stimulating the collective advancement of auditory science, he created a listserv network on the Internet called simply "Auditory," which has become the key discussion network for people interested in auditory perception and cognition the world over.

In sum, Al was an exceptional man and scientist in many ways, both professional and personal. He had a magical balance of qualities: brilliant yet unassuming,

hard-working yet playful, serious yet sensitive, ambitious yet selfless. He managed to combine depth of thought with a childlike sense of wonder and inquisitiveness about the world—a quality that stayed with him even as he became a giant in his field. Al contributed richly to the lives of his own family, to the lives of his many friends, and to the lives of his many students and colleagues. He lived a good life and enhanced the lives of those around him.

This piece was written by Stephen McAdams, with thoughts taken from Susan Pinker, Howard Steiger, Don Donderi, and Norman White.