

In Memoriam

Professor Andrzej RAKOWSKI



1931 – 2018

We are deeply saddened by the loss of Professor Andrzej Rakowski who passed away in Warsaw, on April 3, 2018 at the age of 87. Professor Rakowski was an outstanding scientist, an internationally acclaimed authority on musical acoustics and psychoacoustics, a distinguished academic teacher and a mentor to many scientists in Poland and abroad.

Professor Andrzej Rakowski was born in Warsaw, Poland, on June 16, 1931. After graduating from the Józef Poniatowski High School in Warsaw he studied at the Warsaw University of Technology and at The Fryderyk Chopin University of Music, then called the State School of Music in Warsaw. In 1957 he received a Master of Science degree in electronic communication and in 1958 a Master of Arts degree in music theory. During the academic year of 1958/59 he was a British Council Fellow at King's College, Durham University, in Newcastle upon Tyne in the United Kingdom, where he studied acoustics of musical instruments with Professor Edward G. Richardson. In 1963 he defended a dissertation written under the supervision of Professor Ignacy Malecki and received a doctoral degree in electronic communication from the Warsaw University of Technology. In 1977 he obtained a Habilitation Degree in Art Sciences (Musicology) from the University of Warsaw and in 1982 was conferred the title of Professor by the Council of State of the Republic of Poland.

During his whole academic career Professor Rakowski was associated with the Fryderyk Chopin University of Music. He was the founder of the Chair of Musical Acoustics at the Department of Sound Engineering and served as the Chair's head from its inception in 1968 to his retirement in 2001. From 1972 to 1974 Professor Rakowski was a Deputy Rector for Scientific Affairs of the Fryderyk Chopin University of Music. In 1981 he was elected the Rector of the University and in 1984 was re-elected for a next term (1984–1987).

Professor Rakowski was also a part-time faculty member at the Institute of Musicology, University of Warsaw (1987–1997) and at the Institute of Musicology, Adam Mickiewicz University in Poznań (1998–2009). During the academic year of 1977/78 he was a research fellow and in 1992 a visiting professor at the Central Institute for the Deaf, in Saint Louis, in the USA. He also lectured at numerous universities throughout the world including: Stanford University (USA), University of Illinois (USA), McGill University (Canada), University of Alberta (Canada), Hebrew University (Israel), University of Hamburg (Germany), University of Cologne (Germany), and New University of Lisbon (Portugal).

In the early stage of his professional activity Professor Rakowski was also employed at the Documentary

Film Studios in Warsaw (1952–1953) and at the Polish Recording Company (1956–1958). From 1963 to 1970 he was an acoustic consultant at the Grand Theatre National Opera in Warsaw.

In the 1960s, Professor Rakowski's research was predominantly focused on the acoustics and sound quality assessment of musical instruments. His doctoral dissertation concerned the attack transients of flue pipe sounds. He carried out numerous applied research projects for the music industry in Poland aimed to improve the quality of pianos and other musical instruments.

In the mid 1960s Professor Rakowski began extensive research in psychoacoustics, focused on the foundations of sound perception in music. Musical psychoacoustics was the field in which his research achievements were particularly significant and most widely recognized in the international scientific community. He published his research in over 200 articles and presented numerous invited and plenary lectures at international conferences.

A substantial part of his research addressed various aspects of pitch perception: pitch discrimination, intonation of musical intervals, the capacity and accuracy of pitch memory, pitch strength of musical instrument sounds and the phenomenon of absolute pitch. A spectacular finding in his studies on pitch discrimination, reported in early 1970s, was that the differential threshold for pitch, measured in extensively trained musician subjects was as low as 1 cent, or even less, for a 1-kHz tone. This result triggered a thorough discussion around the limits of frequency resolution of the human auditory system and over the pitch discrimination measurement methods.

In 1977, in an article published in the *Catgut Society Newsletter*, Professor Rakowski presented a novel idea of measuring the precision with which the pitches of musical instrument sounds are perceived by the listeners. He proposed a measure of pitch perception precision, termed the pitch strength, derived from the dispersion of multiple adjustments of the pitch of a pure tone to the pitch of the investigated sound.

A topic to which he devoted special attention in his research on pitch perception was the phenomenon of absolute pitch. He conducted several studies, in collaboration with foreign researchers, to estimate the prevalence of absolute pitch in various countries and explain its etiology. He demonstrated that there are different kinds of absolute pitch, known as the *full absolute pitch*, and the *partial absolute pitch*.

In his extensive research on pitch perception Professor Rakowski also addressed several other problems, such as the relation of the psychological pitch scale to the pitch scale in music, the intonation of pitch in music, and the perception of musical intervals. He proposed a theory in which he pointed at various commonalities between the perception of pitch as a com-

munication language in music and the natural speech communication language.

Another area of Professor Rakowski's research interest was the perception of timbre. He conducted a number of experiments in which he investigated the sensation of roughness produced by beatings of pure tones in various frequency ranges. In his experiments he examined the relation of roughness to the perception of sensory dissonance and musical dissonance.

Professor Rakowski was very highly esteemed as an academic teacher. He was a thesis supervisor to 16 doctoral students and to numerous graduate students. A spectacular application of his research on sound perception in teaching methodology was a unique ear training course for sound engineering students, called *Timbre Solfege*, which he had developed together with his close collaborators, Professors Tomasz Łętowski and Krzysztof Szlifirski.

Professor Rakowski was very active in numerous scientific and cultural organizations in Poland and abroad. He was an ordinary member of the Polish Academy of Sciences, a member of the State Commission for Academic Degrees and Titles, a member of the Committee on Acoustics of the Polish Academy of Sciences and served as the Committee's President (1996–2007). He was a member of the Polish Acoustical Society, the Polish Phonetic Association, the Musicological Section of the Polish Composers' Union, the Acoustical Society of America, the European Acoustics Association, the International Society for Psychophysics, and the Catgut Acoustical Society. He was one of the founding members of the European Society for Cognitive Science in Music (ESCOM) and served as the President of ESCOM from 2001 to 2003. Professor Rakowski was a member of the scientific advisory boards of *Archives of Acoustics*, *Musica Scientiae* and *Music Perception*.

Professor Rakowski undertook a variety of organizational and scientific activities intended to improve the music education level of the youth in Poland. In the years 1982–1984 he prepared, with a team of 50 experts, a report on the musicality level of the Polish society. He headed a government research project *Music Education in Poland* (1985–1987) and supervised a project conducted for the Ministry of Culture and Arts, aimed at the development of a music teacher model for the general school system in Poland (1995–1997). He also chaired the Experts' Panel for Music Education at the Polish Music Council.

Professor Rakowski was an Honorary President of the Committee on Acoustics of the Polish Academy of Sciences, an Honorary Member of the Polish Acoustical Society, an Honorary Member of the Polish Phonetic Association, and a Fellow of the Acoustical Society of America. He also received a Scientific Award from the Polish Academy of Sciences, three Achievement Awards from the Polish Ministry of Culture and

was awarded an Ignacy Malecki medal by the Polish Acoustical Society. For his distinguished service and accomplishments Professor Andrzej Rakowski was conferred a number of Polish state decorations: the Commander's Cross of the Order of Polonia Restituta, the Officer's Cross of the Order of Polonia Restituta, the Knight's Cross of the Order of Polonia Restituta, the Gold Cross of Merit, and the Silver Cross of Merit. He also received a Gloria Artis Gold Medal for Merit to Culture from the Polish Minister of Culture and National Heritage.

Professor Andrzej Rakowski's legacy will live both in his outstanding contribution to acoustics and in numerous students and colleagues whom he inspired during more than a half of a century of his scientific and educational activity. We will miss him very much and remain deeply grateful for what he has given to us as a scientist, mentor, teacher, and a memorable, extremely friendly and charming person.

Andrzej Miśkiewicz