

Howe Proceedings: Preface

As an undergraduate, Roger Howe studied mathematics at Harvard University. There he was encouraged especially by Herman Gluck, then a Benjamin Pierce Assistant Professor, who was Howe's instructor in freshman year and later advised his senior thesis. In his junior year, Howe was ranked first on the Putnam Exam. Having become fascinated with the Fourier transform through several courses, in his senior year, he took a reading course in group representation theory from George Mackey, which provided valuable preparation for Howe's later research. Howe had spent his early teenage years in California, and after graduation from Harvard in 1966, he returned to California for graduate studies at UC Berkeley. He obtained his PhD from Berkeley in 1969 under the direction of Calvin Moore. Howe then spent 5 years at Stony Brook, interrupted by visits to the Institute for Advanced Study, where he attended lectures of Harish-Chandra on representation theory of p -adic groups, and to the Sonderforschungsbereich at the University of Bonn. In 1974, he accepted a faculty position at Yale, where he remained until his retirement in 2016. At Yale Howe has held the Frederick Phineas Rose Professorship and the William R. Kenan Jr. Professorship. He also has had numerous visiting positions in the United States, Europe, and Asia.

Having been enchanted in graduate school by A.A. Kirillov's description of the unitary dual of nilpotent Lie groups in terms of coadjoint orbits, in his thesis Howe extended the orbit method to discrete nilpotent groups. Shortly after obtaining his Ph.D., he realized that the methods of his thesis could also apply to describe representations of p -adic groups, which had recently attracted interest because of their relevance to the theory of automorphic forms. He devoted a large part of the 1970s to p -adic groups. In particular, the year 1977 saw a bumper crop of publications famously appearing in a single issue of the *Pacific Journal of Mathematics* containing many of his path-breaking contributions to the area as well as his early work on nilpotent groups. Howe's work on nilpotent groups attracted the attention of Horst Leptin, who was co-organizer of a biannual Oberwolfach Tagung on representation theory and harmonic analysis. This led to a long involvement with

that series, of which Howe eventually became co-organizer with Detlev Poguntke, and later Eberhard Kaniuth. Conversations with Gunter Harder and Jacques Tits in Bonn helped Howe formulate the theory of dual pairs and theta correspondence, which he first spoke about at the Arbeitstagung in 1974. This has become an highly active research field in representation theory and number theory. Moreover the duality phenomenon he discovered has served as a fruitful organizing principle for the representation theory of classical groups, complementing the philosophy of cusp forms as enunciated by Harish-Chandra. Throughout his career, Howe has had an abiding interest in invariant theory; many of his influential papers have “invariant theory” as the key word in the title. In particular the paper in which he introduced the theory of reductive dual pairs is called “ θ -series and invariant theory,” and he viewed it as a transcendental version of Classical Invariant Theory as exposed by Weyl.

Howe’s writing is characteristically clear and relaxed in style—his textbook (with Eng-Chye Tan) on SL_2 portrays itself as “a day hike to a nearby waterfall.” He considers himself primarily as a geometer and has a long-held fondness for the beauty of classical Euclidean geometry, which ultimately led him to write a book on the subject (with William Barker; 2007). Starting in the 1990s, Howe has devoted increasing attention to mathematics education. His work in this direction has taken place in the context of professional societies, as well as in initiatives on the state and national level. In addition to this and other important service functions for the mathematical community, Howe has mentored and encouraged generations of younger researchers, including 21 PhD theses directed while at Yale.

Howe’s achievements have been recognized through many awards. He is a member of the American Academy of Arts and Sciences and of the National Academy of Sciences. He is a Fellow of the American Mathematical Society and a recipient of the Society’s Award for Distinguished Public Service. He is a member of the Connecticut Academy of Science and Engineering and a Fellow of the Japan Society for the Advancement of Science. For his expository writing, he received the Lester Ford Award of the Mathematical Association of America. Yale College awarded him the Dylan Hixon ’88 Prize for Teaching Excellence. He has also been a Visiting Fellow at the Institute for Advanced Study of the Hong Kong University of Science and Technology and a Fellow of the Texas A&M Institute for Advanced Study.

This volume is an outgrowth of the conference “Representation Theory, Number Theory and Invariant theory: on the occasion of Roger Howe’s 70th birthday” held at Yale University, June 1–5, 2015.¹ We would like to thank those that contributed to this volume, and especially those that performed the service of anonymous referee.

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It has been a great pleasure for us to put together this volume. Our hope is that it expresses the continued relevance and the fertility and richness of Roger Howe's ideas.

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Birthday

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