

HISTORICAL PAPER

The Genesis of Differential Games in Light of Isaacs' Contributions^{1,2}

M. H. BREITNER³

Communicated by L. D. Berkovitz

Abstract. Rufus P. Isaacs joined the RAND Corporation⁴, Santa Monica, California in 1948 and started to develop the theory of dynamic games in the early 1950s. Until winter 1954/55, when Isaacs left the RAND Corporation, he investigated two player, zero-sum dynamic games of the classic pursuit-evasion type. Prior to 1965, Isaacs published his theory only in internal RAND papers and research memoranda. In his first RAND paper (Ref. 1), Isaacs sketched the basic ideas of zero-sum dynamic game theory. The ideas already included rudimentary precursors of the maximum principle, dynamic programming, and backward analysis. At the end of 1954 and the beginning of 1955, Isaacs summarized his research in four research memoranda (Refs. 3–6), which ten years later formed the basis of his famous book on Differential Games (Ref. 7). This paper

¹This paper is dedicated to the memory of Professor Rufus Philip Isaacs on the occasion of the 50th birthday of differential game theory. Isaacs, the acknowledged father of differential game theory (today called mainly theory of dynamic games), finished his first working paper at the RAND Corporation on November 17, 1951 (Ref. 1).

²The author thanks Isaacs' widow Rose B. Isaacs of Towson, Maryland, Leonard D. Berkovitz (Purdue University), Wendell H. Fleming (Brown University), George Leitmann (University of California, Berkeley), Valerii S. Patsko (Urals Branch of the Russian Academy of Sciences, Ekaterinburg), Leon A. Petrosyan (St. Petersburg University), and Varvara L. Turova (Center of Advanced European Studies and Research, Bonn) for very helpful information. Special thanks go to Katja Steinborn of Klein-Körös/Berlin for the careful translation of Russian sources.

³Professor for Business Administration and Information Systems Research, Institut für Wirtschaftsinformatik, Universität Hannover, Hannover, Germany.

⁴RAND is the acronym for Research and New Development. A common joke is that it stands for Research and *No* Development; see Ref. 2. Today, the RAND Corporation considers itself as a nonprofit institution that helps improve policy and decisionmaking through research and analysis; see www.rand.org.