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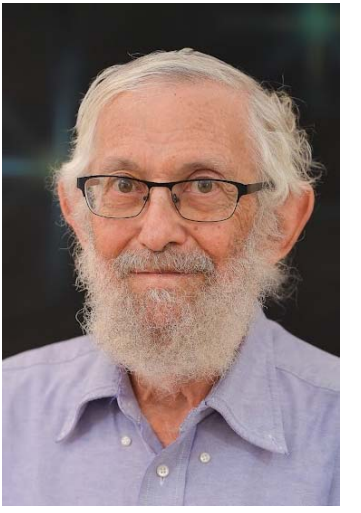
FOREWORD

The present issue of the Israel Journal of Mathematics is intended as a tribute to Benjamin Weiss in recognition of his many-sided contributions to ergodic theory and related disciplines. The papers included in this issue cover a wide range of topics reflecting the breadth of Weiss's interests and impact.



A short and selective survey of some of the highlights of Weiss's work will put in evidence its seminal nature, and its impact on the field as a whole. The early paper by Weiss and Adler on toral automorphisms is justly regarded as one of the most influential papers to appear in dynamical theory. It set the tone for the frequent subsequent use of Markov partitions, enabling coding of broad classes of dynamical systems to subshifts of "finite type". This led Weiss to study factors of shifts of finite type for which he coined the term "sofic", demonstrating, among other properties, the "intrinsic ergodicity" of such systems. These ideas apply to diffeomorphisms of differentiable manifolds; in particular to the much studied Axiom A diffeomorphisms, each of which has at its core a sofic dynamical system.

Running through much of Weiss's work is the notion of entropy of Kolmogorov and Sinai, whose relevance for the isomorphism theory in measurable dynamics was known. To extend this theory beyond one parameter group actions, one would have to extend the notion of entropy, and Weiss together with Ornstein succeeded in doing this for the class of amenable groups. A still larger class of groups, introduced by Gromov in a broader sense and elaborated by Weiss in the context of dynamical systems, are the "sofic groups", a particular dynamic property of which ("surjunctivity") was observed by Weiss. Thanks to the work of Lewis Bowen, one can now speak of "sophic entropy", underlying a further extension of the isomorphism theory to this category of groups.

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The seminal works, of Ornstein and Weiss, where the authors show that an arbitrary action of an amenable group is orbit equivalent to a $\mathbb{Z}$-action, and of Connes, Feldman and Weiss, where it is shown that an amenable equivalence relation is generated by a single transformation, are perhaps the most useful statements today in the theory of orbit equivalence. More recently, the monumental series of works, joint with Rudolph and Foreman, on the conjugacy problem in ergodic theory, demonstrates well the deep connections that were discovered in the last two decades between dynamics and descriptive set theory.

On a more mundane level, the profound study of entropy by Weiss and Ornstein for $\mathbb{Z}$-actions was found to have implications for the important issue of data compression. Weiss has played a role in the contemporary application of dynamics to combinatorial number theory. Patterns of "recurrence" in dynamical systems underlie these applications, and among the tools for determining such patterns, are various "nonconventional ergodic theorems", as well as the introduction of so-called IP-systems of transformations that act on the spaces in question. The study of the latter was taken up by Weiss and Furstenberg, as well as the identification of "characteristic factors" for arbitrary ergodic systems, which are at the heart of the non-conventional ergodic theorems.

Alongside ergodic theory, various topics in topological dynamics always played a central role in Weiss's work. Collaborating with Furstenberg, Katznelson, Glasner, Aaronson, Lindenstrauss and other colleagues, he wrote a large number of important and influential papers on various aspects of topological dynamics. In particular his work has had a great impact on the study of the interplay between measurable and topological dynamics, and the relation between the algebraic properties of groups and the nature of their actions on compact spaces. To mention a few examples, we recall his work (with various collaborators) on the existence of strictly ergodic models for ergodic free amenable group actions, on a dynamical characterization of Kazhdan's property T groups, and the pioneering work on the theory of "mean dimension" of large dynamical systems and on metrizable "universal minimal dynamical systems" of Polish groups.

Weiss's work has been directly or indirectly the inspiration for much of what appears in the contemporary mathematical landscape, and the present collection of papers attests to our indebtedness to Benjamin Weiss.

Hillel Furstenberg, Eli Glasner, Mike Hochman and Elon Lindenstrauss