Chapter four is mostly devoted to the investigation of uniformly regular measures and charges (on both Boolean algebras and topological spaces). We show how the properties of a charge on a Boolean algebra can be transferred to the induced measure on its Stone space. We give a different proof to a result by Mercourakis. In 2013, Borodulin-Nadzieja and Džamonja proved the countable version of Maharam Theorem for charges using uniform regularity. We show that this result can be proved under weaker assumption and further extended.

The final Chapter is concerned with the higher versions of uniform regularity which are called uniform κ-regularity. We study these types of measures and obtained several results and characterizations. The major contribution to this work is that we show we cannot hope for a higher analogue of Maharam Theorem for charges using uniform κ-regularity. We prove that a higher version of analogue of Maharam Theorem can be proved only for charges on free algebras on κ many generators (resp. measures on a product of compact metric spaces). We also generalize a result proved by Grekas and Mercourakis for Jordan algebras.

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MICHEAL PAWLIUK, ***Amenability and Unique Ergodicity of the Automorphism Groups of all Countable Homogeneous Directed Graphs***, University of Toronto, Canada, 2015. Supervised by Vladimir Pestov and Stevo Todorcevic. MSC: 43A07, 05C55, 54H20, 05C20. Keywords: amenable groups, directed graphs, tournaments, Fraïssé classes.

Abstract

We establish the amenability, unique ergodicity, and nonamenability of various automorphism groups from Cherlin's classification of countable homogeneous directed graphs. This marks a complete understanding of the amenability of the automorphism groups from this list, and except for the Semigeneric graph case, marks a complete understanding of the unique ergodicity of these groups.

Along the way we establish that a certain product of Fraïssé classes preserves amenability, unique ergodicity, and the Hrushovski property. We also establish the unique ergodicity of various other automorphism groups of Fraïssé structures that do not appear in this classification.

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PHILLIP WESOLEK, ***The Global Structure of Totally Disconnected Locally Compact Polish Groups***, The University of Illinois at Chicago, USA, 2014. Supervised by Christian Rosendal. MSC: 54H05. Keywords: totally disconnected locally compact groups, Polish groups.

Abstract

This thesis considers the class of totally disconnected locally compact (t.d.l.c.) Polish groups. These groups appear throughout mathematics, and moreover, they are particularly amenable to study via descriptive-set-theoretic methods. This work consists of two main threads of research. The first isolates and explores a natural dividing line in the class of t.d.l.c. Polish groups. The second is more group-theoretic in nature and considers the structure of t.d.l.c. Polish groups.

The elementary groups are first isolated; this class is motivated by a desire to capture the groups "built by hand" from profinite Polish groups and countable discrete groups. The class of elementary groups can be defined as the smallest class of t.d.l.c. Polish groups that contains the profinite Polish groups and the countable discrete groups and that is closed under taking closed subgroups, Hausdorff quotients, group extensions, and countable unions of open

subgroups. A variety of properties of the class are deduced, suggesting that it is natural and robust and that it captures the groups that are intuitively "built by hand." In particular, the requirements that the class be closed under taking closed subgroups and Hausdorff quotients are proven to be superfluous, and the class is shown to admit a countable ordinal valued rank.

The class of elementary groups gives a dividing line which allows one to pose a new type of structural question: *Are t.d.l.c. Polish groups with a given property elementary*? Several questions of this form are answered. For instance, every t.d.l.c. Polish group admitting an open solvable subgroup is shown to be an elementary group.

The work next considers the collection of n-tuples $(g_1, \ldots, g_n)$ of elements of a t.d.l.c. Polish group G such that $\langle g_1, \ldots, g_n \rangle$ is relatively compact; this set is denoted by $P_n(G)$. In the setting of nonlocally compact Polish groups, this set need not be closed. However, $P_n(G)$ is here proven to be closed for all elementary groups.

Lastly, a question due to A. Kechris and C. Rosendal is answered. Kechris-Rosendal ask if a nontrivial t.d.l.c. Polish group can admit a comeagre conjugacy class. The negative answer is here demonstrated: there is no nontrivial t.d.l.c. Polish group admitting a comeagre or co-Haar-null conjugacy class. This result is again a departure from the setting of nonlocally compact Polish groups, in which there are many groups with a comeagre conjugacy class.

Many of the results of this thesis have since appeared in publication, in a much more polished form. This thesis additionally raises a variety of open questions. Several have since been answered, but many remain open, as of this writing.

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LORENZ DEMEY, ***Believing in Logic and Philosophy***, KU Leuven, Belgium, 2014. Supervised by Stefaan Cuypers. MSC: 03B42, 03B48, 68T27. Keywords: dynamic epistemic logic, probability and logic, logical geometry.

Abstract

In my Ph.D. thesis I argue for the philosophical relevance of the dynamic turn in epistemic logic. This area of logic is concerned with formally describing the logical behavior of epistemic notions such as knowledge, belief, (subjective) probability, etc. Its foundations were laid in the 1960s and were explicitly motivated by philosophical concerns. Later on, more and more work in epistemic logic was motivated by concerns in economics and computer science (game theory, multi-agent systems, cryptography, etc.). Very often, this work focused not on knowledge at a single point in time, but rather on the dynamics of knowledge (how does a person's knowledge change over time?); it is therefore referred to as the *dynamic turn in epistemic logic*. I argue that despite its nonphilosophical origins, the dynamic turn can also be very useful from a philosophical perspective.

First of all, I argue that dynamic epistemic logic is useful not only for analyzing issues that are explicitly dynamic in nature but also for dealing with issues that might look completely static at first sight. After all, upon closer inspection, these *prima facie* static problems often turn out to contain several hidden layers of dynamics. Dynamic epistemic logics can help us to make this hidden dynamics explicit, and thereby obtain more fine-grained conceptual analyses. I present three illustrations of this argument: Aumann's agreeing to disagree theorem, the Lockean thesis about the relation between belief and degrees of belief, and the cognitive and epistemic aspects of surprise. For example, with respect to the agreeing to disagree theorem, I first argue that Aumann's original formulation fails to fully capture the dynamics behind the agreement theorem (both in its formulation and in its semantic setup); I then show how a more natural formulation of the theorem can be obtained in a system of probabilistic dynamic epistemic logic; finally, I discuss how explicitly representing the dynamics behind the agreement theorem leads to a significant conceptual elucidation concerning the role of common knowledge in this theorem.