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 $(g_1, \dots, g_n)$ of elements of a t.d.l.c. Polish group G such that $\langle g_1, \dots, g_n \rangle$ 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.

Second, I argue that there is a close connection between dynamic epistemic logic and logical geometry. The latter is the systematic investigation of extensions and variants of the well-known Aristotelian square of opposition. I show that dynamic epistemic logics give rise to some very interesting Aristotelian diagrams (squares of opposition, but also many other, more complex diagrams). As a further illustration of the philosophical significance of logical geometry, I also develop a theoretical account of the information levels of the Aristotelian relations and diagrams. This account can then be applied to the Aristotelian diagrams for dynamic epistemic logic that were mentioned above.

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RAFAEL ZAMORA, ***Separation Problems of Analytic Relations* (*Problèmes de séparation des relations analytiques*)**, Université Pierre et Marie Curie, France, 2015. Supervised by Dominique Lecomte. MSC: Primary 03E15, Secondary 26A21, 54H05. Keywords: Borel class, Wadge class, separation, product space.

Abstract

This thesis is about descriptive set theory. One of the main problems in this area is related to the complexity of subsets of a Polish space, with respect to several hierarchies. Two of the main hierarchies studied are the Borel and the Wadge hierarchies.

A more general way to see the problem of the complexity of a set is to ask the question: "Given two analytic subsets A, B of a Polish space X, when can you find a third subset C in a class Γ, such that $A \subseteq C$ and $C \cap B = \emptyset$?". This was first answered by Lusin, taking Γ as the class of Borel sets.

For the Borel classes Louveau and Saint-Raymond solved it, expanding on work by Hurewicz. They found a minimal example, under a certain quasi-order, in the class of pairs of analytics subsets of a Polish set that cannot be separated by a set in $\mathbf{\Sigma}^0_\xi$. Finding small basis, i.e., antichain basis, is a powerful characterization which has been looked for in several contexts.

If we consider analytics subsets A, B of $X \times Y$ for X, Y Polish spaces, we can consider a lot more classes. There are also several notions of comparison for which knowing an antichain basis is interesting.

In the first part of this thesis, we consider the question for the class $\Gamma \times \Gamma'$ of subsets of the form $C \times D$ for $C \in \Gamma, D \in \Gamma'$. Again, for a certain quasi-order, we find small antichain basis in the class of pairs of sets that are not separable by a set in $\Gamma \times \Gamma'$ for Γ, Γ' of small Borel complexity.

In the second part, we consider the classes of subsets of the form $\text{Pot}(\Gamma)$. This class was defined by Louveau and consists of the subsets A of a product space that can be made in Γ by refining the topology, allowing only products of Polish topologies (so, for example, the diagonal of an uncountable Polish space is not potentially open).

A minimum example in the class of pairs of sets that are not separable by a $\text{Pot}(\Gamma)$ set was previously found by Lecomte for all Wadge classes of Borel sets. In this thesis, we focused on classes of small Wadge rank. For several of those, we find conditions under which there are small antichain basis, for a stronger quasi-order involving injectivity.

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ATHAR ABDUL-QUADER, ***Interstructure Lattices and Types of Peano Arithmetic***, The Graduate Center, City University of New York, USA, 2017. Supervised by Roman Kossak. MSC: 03C62, 03H15. Keywords: Enayat models, interstructure lattices, coded sets.