Preface

Category theory and universal algebra have been closely related since Bill Lawvere wrote his Columbia PhD thesis in 1963. In his thesis, Lawvere abstracted the universal algebraic notion of clone. Universal alegebraists in turn characterised Lawvere theories as abstract clones. More recently, category theorists have developed coalgebra, while universal algebraists have developed coclones. Both category theory and universal algebra have been applied to topology.

In 2013, the Royal Society awarded the University of Bath, with its specialism in category theory, and the Technical University of Dresden, with its specialism in universal algebra, a travel grant to develop the relationship between the two bodies of work. The centre point of the interaction was a workshop held in Bath on 1 March 2013, on Algebra, Coalgebra and Topology. The workshop fitted into the Wessex Theory Seminar series, acting as the 20th such seminar. There were nine speakers and a total of 54 participants, a few of them by video-link. Several participants came from continental Europe, specifically from France, Germany and Italy. This is the proceedings of the workshop.

The focus of the workshop was on the Pol-Inv Galois connection between relational algebras and clones, the first three talks being devoted to it. So we start the proceedings with a brief overview of Pol-Inv in universal algebraic terms. Category theoretic techniques are central to the notion of coclone, which in turn has universal algebraic application, so we follow with an article on that.

One of the key bones of contention over several decades between category theorists and universal algebraists has been the role of nullary operations. Nullary operations are central to the body of work surrounding Lawvere theories but have traditionally not appeared in the universal algebraic literature. We proceed with an article that details exactly how the Pol-Inv Galois connection may be modified to allow for nullary operations, thus opening the way to a category theoretic treatment of the connection in terms of Lawvere theories.

After lunch, the workshop turned from Pol-Inv to category theoretic approaches to algebera and coalgebra. A substantial and growing application is to logic programming: a clash of commitments could not allow that to be presented at the meeting itself, but as it was intended, we include an article on it. We end the proceedings with further applications of algebra represented by participants at the

meeting.

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