RESEARCH STATEMENT

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As part of the inner model programme of S. Friedman, I am involved in finding internal consistency results for global properties. The properties that we consider are generalisations of cardinal characteristics such as the dominating and splitting numbers.

The bulk of my work is to classify certain relational structures using their combinatorial properties or through the universality programme, which heavily relies on combinatorial methods. I concentrate on three sub-projects to this line of research.

The first is to determine and find connections between universality spectra for non-elementary relational structures. A *universal model* at cardinality κ is one which embeds all other structures in the set of those members of the class which have size κ, where an *embedding* is an injective structure-preserving map. There is a strong programme in universality and much progress has been made on using this indicator to classify elementary structures in a model-theoretic way. However, non-elementary structures are not model-theoretically well-behaved and so we rely on set-theoretic methods (in particular, forcing and combinatorics) to decide these questions.

The second is to classify orders (linear and partial) which have generalised notions of dense and scattered. One may define a notion of κ-*dense* (for some infinite cardinal κ) to be such that in between every two points, there is a set of size κ or there is a stronger notion where in between every two sets of size $< \kappa$ there is a point (equivalently κ many). Then κ-*scattered* may be defined for both notions as the property of not embedding a κ-dense set. These classifications take the form of a constructive hierarchy. For scattered orders, these constructive hierarchies proved to be a very useful tool for proving structure and combinatorial theorems about such orders and I plan to extend these results to orders which are κ-scattered (in either sense).

The third is to find purely combinatorial classifications of Boolean algebras which carry finitely-additive measures with different properties. These classifications will also be used to obtain a structure theory for such Boolean algebras. For a survey about these problems see Mirna Džamonja's paper "Measure recognition problem", published in the Philisophical Transactions of the Royal Society, 2006.

For papers regarding these topics, see my website:
http://www.logic.univie.ac.at/∼thompson/pubs.html