RESEARCH STATEMENT

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My main research interest in the last few years has been in descriptive set theory, and in particular in the structure of the Wadge hierarchy — which in essence is the general theory of boldface pointclasses, i.e., collections of sets of reals closed under continuous preimages. The axiom of determinacy imposes a detailed structure on these pointclasses, but in fact it seems that most of the properties follow from a seemingly weaker principle, the so-called semi-linear ordering principle (SLO): for any pair of sets of reals A and B,

$$A \leq_{\mathrm{W}} B \ \vee \ \neg B \leq_{\mathrm{W}} A$$

where $\leq_{\mathrm{W}}$ is the relation of continuous preimage. Solovay has conjectured that SLO is equivalent to AD, at least if $V = L(\mathbb{R})$. If instead of considering *continuous* preimages we use other kind of functions (e.g.: Borel) we obtain a coarser comparability relation, which are of interest in their own right. A curious phenomenon that occurs under AD is that there are more $\boldsymbol{\Sigma}^0_\beta$ than $\boldsymbol{\Sigma}^0_\alpha$ when $\alpha < \beta$. The detailed analysis of the Wadge hierarchy has been used recently to pin-down the exact places at which a similar phenomenon occurs, by characterizing the pointclasses $\boldsymbol{\Gamma}$ which have a cardinality larger than any $\boldsymbol{\Lambda}$ contained in $\boldsymbol{\Gamma}$. Finally, I should point out that the Wadge hierarchy, besides being interesting per se, is important for constructing models of AD.