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Scott Complexity and Finitely α-generated Structures

Every countable structure is $\aleph_0$-categorical in $L_{\omega_1\omega}$ and axiomatized by a single sentence called its *Scott Sentence*. A normal form exists for formulas of $L_{\omega_1\omega}$, so each formula is equivalent to a Π_α or Σ_α one for some α. A conjunction of a Σ_α and a Π_α sentence is d-Σ_α.

Every finitely generated structure A has a Σ_3 Scott sentence, but combining the results of [2] and [1] shows A has a d-Σ_2 Scott sentence iff A is self-reflective iff a generating tuple has a Π_1-definable automorphism orbit. In this talk, we show a structure with a $\Sigma_{\alpha+2}$ Scott sentence and no $\Pi_{\alpha+1}$ Scott sentence generalizes a finitely generated structure, and call such structures *finitely α-generated*. We show a finitely α-generated structure has a d-$\Sigma_{\alpha+1}$ Scott sentence iff it is α-reflective iff some α-generator has a Π_α-definable automorphism orbit.

Montalbán has suggested (recent folklore) that a structure A's complexity, in the sense intended by Scott rank, is measured by computing the least λ, Γ such that A has a Σ_λ Scott sentence and some tuple witnessing this fact has a Γ-definable automorphism orbit. Our result shows A's least complexity Scott sentence determines this information.

References

[1] Rachael Alvir, Julia Knight, and Charles McCoy, *Complexiy of Scott sentences*, **Forthcoming.**

[2] Matthew Harrison-Trainor and Meng-che Ho, *On optimal Scott sentences of finitely generated algebraic structures*, **Proceedings of the American mathematical society**, vol. 146 (2018), no. 10, pp. 4473–4485.