

Poverty and polyphony: a connection between economics and music

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Thursday, May 8, 2008

007 Kemeny Hall, 4:00 pm
(Tea 3:30 pm 300 Kemeny Hall)

Abstract

Problems in applied mathematics often involve structures intermediate between topology and geometry. In these situations, we have some information about how to measure distances, but not enough to specify a particular metric. Examples include measuring income inequality in economics, measures of center and dispersion in statistics, and—perhaps surprisingly—modeling the distance between chords in polyphonic music. Each of these cases deals with multisets of points lying in a one-dimensional metric space. Here we investigate a general principle (submajorization) asserting that a minimal bijection between unordered multisets is order preserving in the underlying metric space. We provide a geometrical interpretation in which multisets are represented by points in an orbifold, and bijections between multisets by paths. Submajorization permits limited comparison of distances in the relevant orbifolds, thus endowing them with more-than-topological, but less-than-geometrical structure. (This represents joint work with Dmitri Tymoczko, Princeton University.)