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If a sequence of chords is sounded by several voices, our ears track the motion of individual voices from one chord to the next. This association is called voice leading. Voice leadings in which each voice moves as short a distance as possible are considered the most efficient. Furthermore, in Western music, voices typically move along non-intersecting paths. Tymoczko (2006) developed requirements—the so-called distribution constraint—that every method of comparing voice leadings respecting these two principles must satisfy. We show that the distribution constraint is equivalent to the submajorization ordering, defined by Hardy, Littlewood, and Polya (1934). We further show how to use the submajorization order to measure distances in the orbifolds \mathbb{T}^{n-1}/S_n , which represent the geometrical space of “chord types.” We show that submajorization determines a unique ordering of three-note chords from most uneven to most even, and explain how to generalize this ordering to chords with more notes. (Received September 26, 2006)