

**Meeting:** 1096, Baltimore, Maryland, MCP NOR C5, MAA Session on At the Intersection of Mathematics and the Arts

**William DeMeo\*** (williamdemeo@gmail.com). *What does a finite nonabelian group sound like?* Preliminary report.

Underlying many digital signal processing (dsp) algorithms, in particular those used for digital audio filters, is the convolution operation, which is a weighted sum of translations  $f(x - y)$ . Most classical results of dsp are easily and elegantly derived if we define our functions on  $\mathbb{Z}/n$ , the abelian group of integers modulo  $n$ . If we replace this underlying “index set” with a nonabelian group, then translation may be written  $f(xy^{-1})$ , and the resulting audio filters arising from convolution naturally produce different effects than those obtained with ordinary (abelian group) convolution.

In this preliminary report we explore the idea of using the underlying finite group (i.e., the index set) as an adjustable parameter of a digital audio filter. By listening to samples produced using various nonabelian groups, we try to get a sense of the “acoustical characters” of finite groups. (Received September 17, 2013)

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