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Dissertation Title: The Fourier Qualia Space: Interaction, Ambiguity, and Hierarchy in Music Harmony

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Abstract or Public Summary: Music theory has long recognised harmonic qualities and developed tools for their analytical identification, yet existing frameworks provide no unified method for measuring their relative proportions, representing them within ambiguous passages, or comparing their deployment across distinct repertoires that currently demand separate methodologies. These limitations manifest differently across analytical traditions. Tonal analysis captures functional relationships effectively, yet falters when triads or diatonic collections appear without the progressions that would render them functional. Set theory provides rigorous measurement through interval vectors and set-class membership, yet fails to explain why two sonorities sound different whilst sharing identical interval vectors. What unites these shortcomings is a common conceptual gap: none of these frameworks treats ambiguity—passages where multiple harmonic qualities coexist—as a compositional resource. To address these limitations, this thesis developed the Fourier Qualia Space, a geometrical framework that reconceptualises harmonic qualities as measurable qualia relationships within mathematically determined space. The discrete Fourier transform converts pitch-class sets into coefficients capturing specific harmonic qualities, which dimensional reduction then projects into a hexagonal space where proximity signals qualia resemblance and centrality denotes ambiguity. This geometric representation enables analysis at multiple scales, ranging from phrase-level examination of Schoenberg's Op. 19/1, through hierarchical wandscape constructions for Bach, Debussy, and Webern, to diachronic corpus analysis spanning 1548–1968. Applying this methodology across four centuries of Western music confirmed progressive dissolution of traditional tonal structures and provided novel quantitative evidence for how alternative organisational principles emerged: qualia sequences converged progressively towards Zipfian distributions characteristic of efficient communication systems. Among composers whose distributions most closely approximate this pattern, Debussy emerged as a paradigmatic case: statistical analysis of his harmonic practice identified three systematic roles governing qualia deployment, demonstrating that his music operates through identifiable organisational principles. Most significantly for the conceptual reframing proposed at the outset, qualia ambiguity functions not as analytical indeterminacy but as a compositional resource deployed strategically across the

repertoires examined. These findings carry broader implications. The identification of language-like patterns in Debussy's deployment of harmonic qualia exemplifies what the Fourier Qualia Space makes possible: if one composer working without tonal syntax constraints nonetheless deployed harmonic qualities according to measurable principles, others may have done likewise—a hypothesis the framework can now test across stylistic boundaries that previously demanded entirely separate methodologies.

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