

# Striking the Right Chord Between Reuse and Improvisation: Melody Learning as Resource-Rational Program Induction

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## Abstract

How do people balance the reuse of learned routines with the need to invent new solutions under cognitive limitations? Recent computational frameworks have begun to develop resource-rational approaches to program induction, with a common theme being the benefits of building a "library" of past solutions for creative reuse. Here, we study these mechanisms in an online experiment where participants learned real-world musical melodies. Our results reveal systematic error patterns during reconstruction and improvisation tasks, with participants repeating local patterns and displaying a behavioral bias consistent with simpler programs. To explain these findings, we developed a non-parametric Bayesian model using a hierarchical Pitman–Yor process to learn both a global library encoding domain-general primitives, and a local library capturing melody-specific motifs—both helping to constrain the hypothesis space. Our model makes testable predictions about human error distributions and adaptive behaviors that balance the trade-off between efficiency and creativity when resources are scarce.