**Research Progress Report: Audio Feature Analysis**

**Discovery Plot Generated**

Key discovery plot saved as 'h1\_key\_discovery.png'

**H2: Domain Transfer Hypothesis Setup**

**Research Question**

"Features with higher intra-domain performance will show better cross-domain generalization"

**H2 Prediction**

Based on H1 results, the following outcomes are predicted:

* MFCC (best overall) → Best performance on A07-A19
* CQT (second best) → Second best performance on A07-A19
* LPC (worst overall) → Worst performance on A07-A19

**Proposed Research Approach**

Testing each feature individually against A07-A19 (unknown attackers) directly examines H2 by analyzing the correlation between intra-domain and cross-domain performance.

**H2 Implementation Plan: Per-Attack Evaluation Analysis**

**Analysis Code Structure:**

1. Load evaluation set with A07-A19 labels
2. Test each feature model on unknown attacks
3. Analyze prediction patterns and confusion matrices
4. Correlate with H1 known-attack performance
5. Generate H2 research verdict

**H1 to H2 Transition Summary**

**H1 Completed - Major Discoveries:**

* LPC dramatically fails on A04 (voice conversion attacks)
* MFCC and CQT show robust performance across traditional attacks
* Clear attack-specific feature effectiveness proven
* 43.9% performance variation confirms H1 hypothesis

**H2 Ready to Test:**

* Proposed approach: Test features on A07-A19 individually
* Hypothesis: MFCC > CQT > LPC ranking will hold in cross-domain scenario
* Method: Analyze prediction patterns on unknown attacks
* Expected outcome: Strong performers on A01-A06 will perform better on A07-A19

**Research Momentum**

**Current Status:**

* H1 provided solid foundation with clear attack-specific insights
* H2 will test generalization theory systematically
* Results will guide feature selection for unknown attack scenarios
* Building toward publication-quality research findings

**Next Steps:**

Ready for H2 implementation. Testing each feature against unknown attackers represents the optimal approach for examining domain transfer hypothesis.

The research methodology is sound and the experimental design will provide valuable insights into feature generalization in anti-spoofing systems.