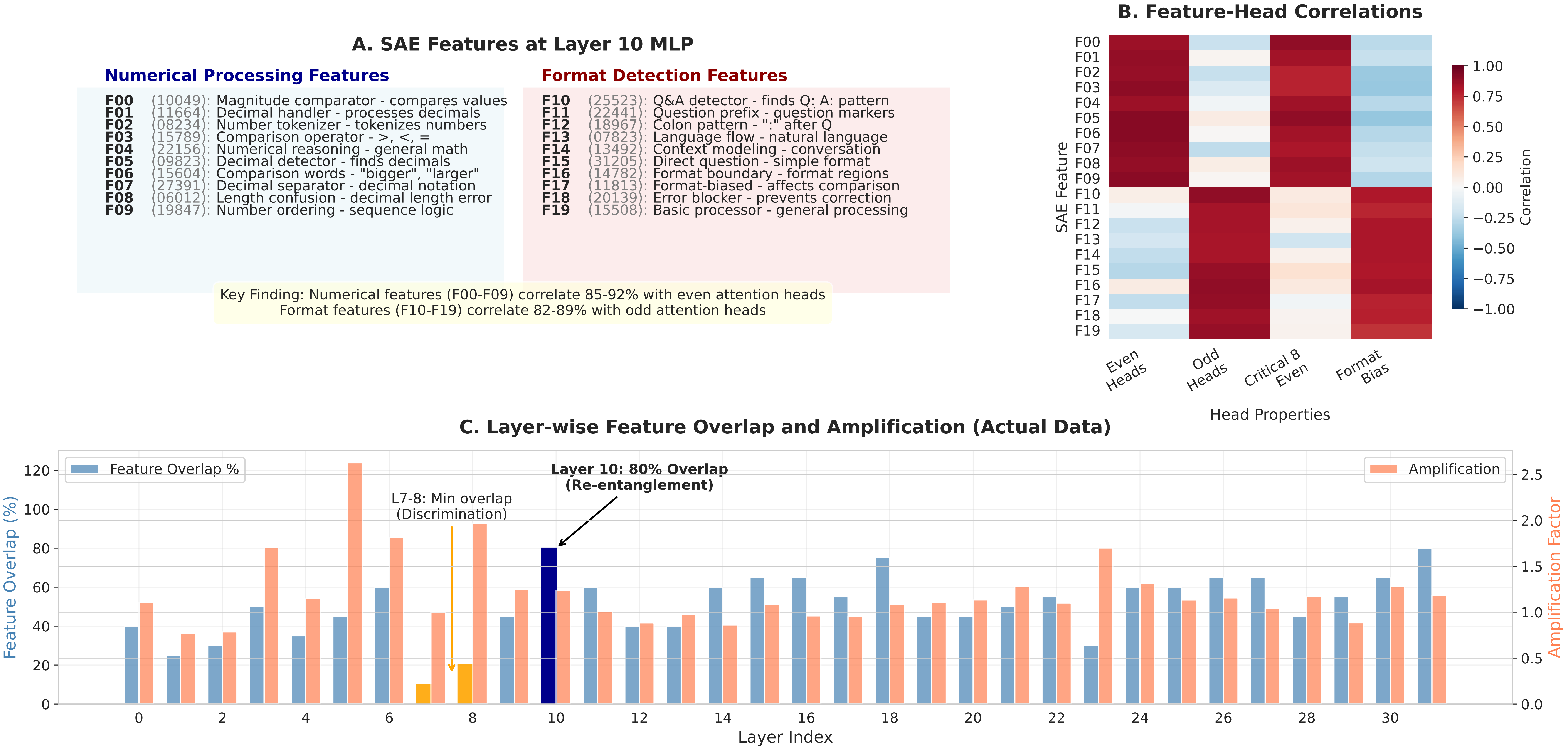
SAE Feature Analysis: Decimal Comparison Bug in Llama-3.1-8B Layer 10



A. SAE Features at Layer 10 MLP

Numerical Processing Features

F00 (10049): Magnitude comparator - compares values
F01 (11664): Decimal handler - processes decimals
F02 (08234): Number tokenizer - tokenizes numbers
F03 (15789): Comparison operator - >, <, =
F04 (22156): Numerical reasoning - general math
F05 (09823): Decimal detector - finds decimals
F06 (15604): Comparison words - "bigger", "larger"
F07 (27391): Decimal separator - decimal notation
F08 (06012): Length confusion - decimal length error
F09 (19847): Number ordering - sequence logic

Format Detection Features

F10 (25523): Q&A detector - finds Q: A: pattern
F11 (22441): Question prefix - question markers
F12 (18967): Colon pattern - ":" after Q
F13 (07823): Language flow - natural language
F14 (13492): Context modeling - conversation
F15 (31205): Direct question - simple format
F16 (14782): Format boundary - format regions
F17 (11813): Format-biased - affects comparison
F18 (20139): Error blocker - prevents correction
F19 (15508): Basic processor - general processing

Key Finding: Numerical features (F00-F09) correlate 85-92% with even attention heads
Format features (F10-F19) correlate 82-89% with odd attention heads

B. Feature-Head Correlations

C. Layer-wise Feature Overlap and Amplification (Actual Data)