Appendix C: Mathematical Enhancements of the Lewis Echo Theory

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I. SYMBOL VARIATION EXTENSION

Each digit 09 now maps to multiple symbolic equivalents:

- 1 ['1', 'l', 'I', '!', '~', 'a']
- 2 ['2', 'Z', '@']
- 3 ['3', 'E', '#']
- etc.

This simulates user-modified password behavior and demonstrates the echo system's resilience under symbolic entropy.

II. THEORETICAL MODEL UPDATE

Let:

S(x) = symbol substitution function

A(x) = ASCII transform function

R(x) = reverse function

V(x, k) = Vigenre encryption using SHA256(x)[:n] as key

H(x) = SHA256 hash

E_n(x) = H(R(V(x, SHA256(x)[:n])))

Final formula:

E_1 = H(R(V(x, SHA256(x))))

E_2 = H(R(V(E_1, SHA256(E_1))))

...

E_n = H(R(V(E_{n-1}, SHA256(E_{n-1}))))

This structured pipeline reveals deterministic echo behavior even under symbolic substitution.

III. PRACTICAL FINDINGS

- Common passwords using numeric suffixes still converge in echo space
- ASCII-symbol chains retain internal similarity
- Symbol-injected feedback loops behave predictably and repeatably

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Conclusion:

The enhancements introduced to the Echo Theory support even broader forms of input entropy, including symbol-injected passwords and obfuscation tactics. The deterministic paths discovered across these extended echo chains further strengthen the theorys value in cryptographic simulation and analysis.

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