

**Repeat-Accumulate Codes [A Class of Turbo-like Codes that we can analyse]
August 3, 1999**

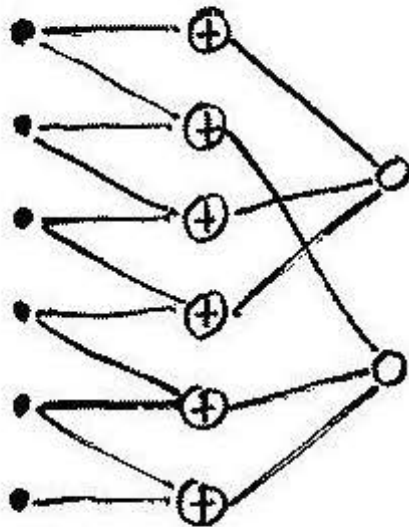
**A talk that was presented by Robert J. McEliece, an IMA Visitor from the California
Institute of Technology**

"Repeat-Accumulate" Codes

[A Class of Turbo-Like Codes that we
can analyze.]

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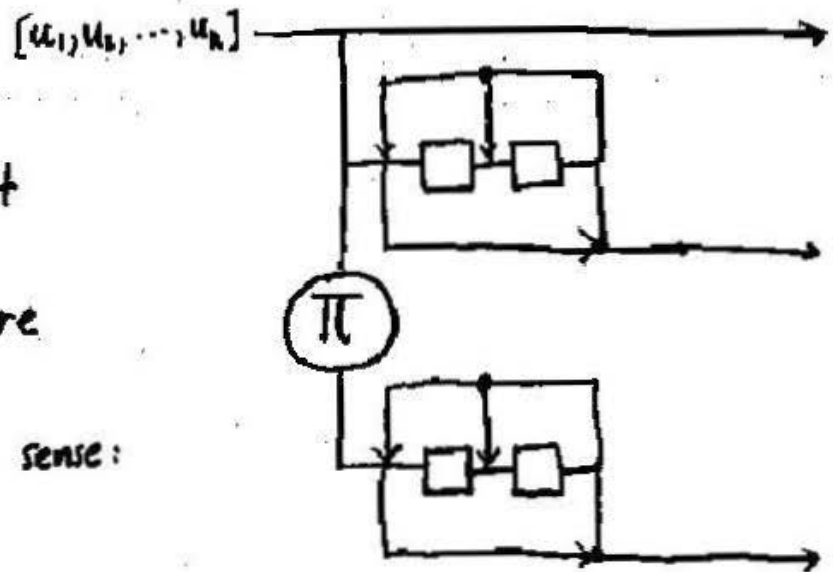


"Our life is frittered away by details... Simplify, simplify"

— H. D. Thoreau
Walden.

Motivation:

We wanted to prove that
classical turbo-codes⁽⁶⁾ are
"good," in the following sense:



Conjecture:

If $E_b/N_0 > \gamma_0^{(1)}$, then as $n \rightarrow \infty$,
the average⁽²⁾ maximum likelihood decoder bit error
probability $\rightarrow 0$.

⁽¹⁾ Necessarily, $\gamma_0 > -0.495$ dB (Shannon limit, for $R=1/2$ binary codes.)

⁽²⁾ Over all possible interleavers.

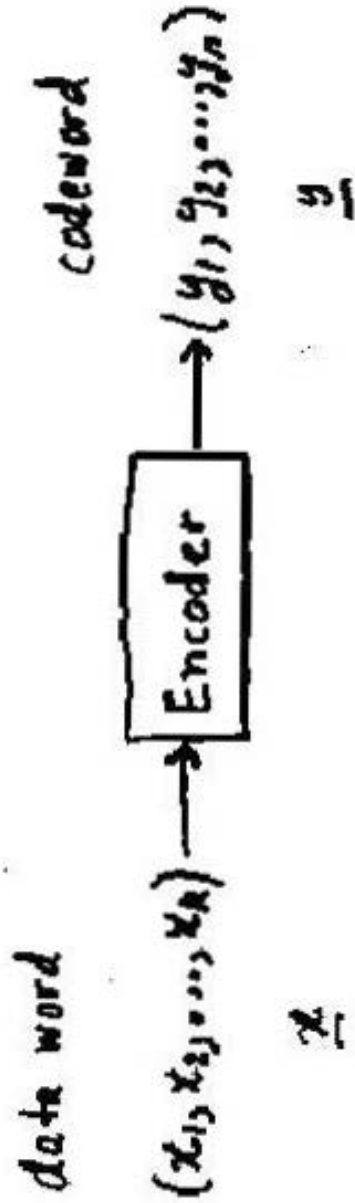
Proposed proof technique:

1. Input-Output Weight Enumerators

and

2. The Classical Union Bound.

1. Input-Output Weight Enumerators



$A_{n,h} \triangleq$ number of $(\underline{x}, \underline{y})$ pairs such that

$$|\underline{x}| = n, \quad |\underline{y}| = h$$

↑
Hamming weight.

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