

Irregular Turbo-Like Codes

Brendan J. Frey

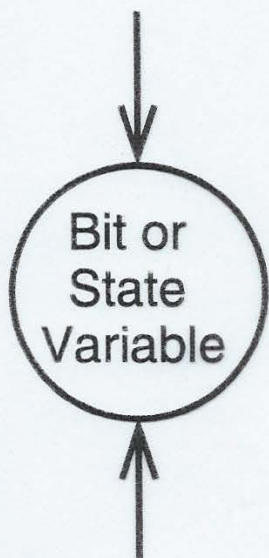
David J. C. MacKay

Suppose you are *told* the values of some bits^v in a transmitted codeword
(or states)

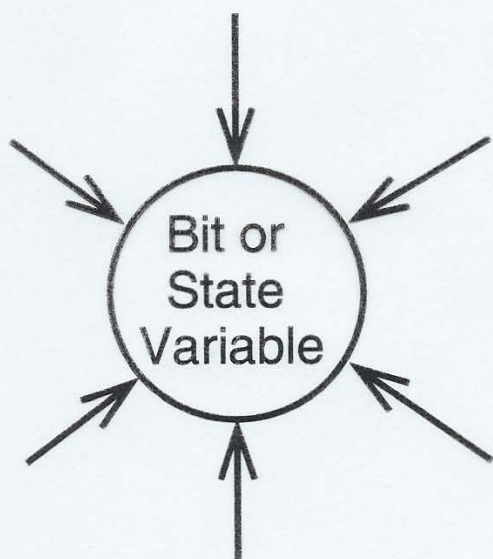
This effectively decreases the rate of the remaining code, making decoding easier

Can we get a free lunch
out of this?

Irregular codes: A free bite of lunch



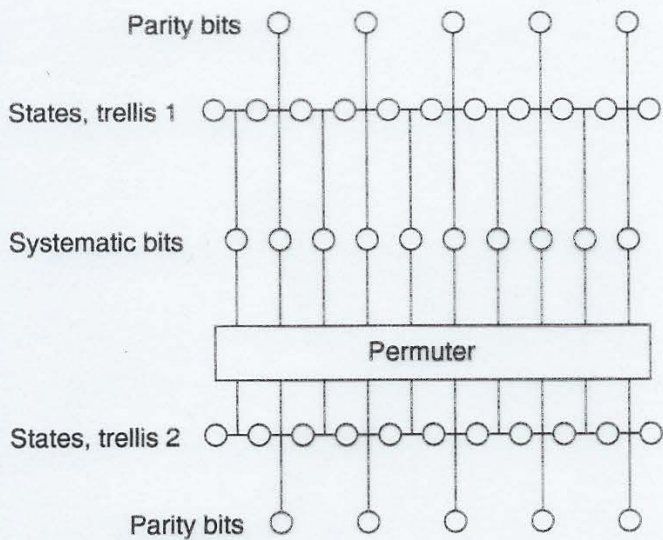
Pinned down SLOWLY



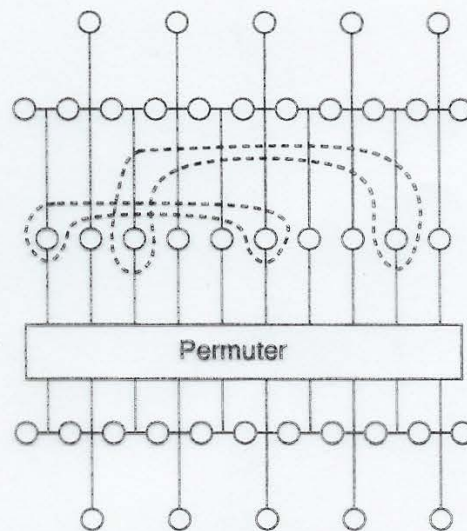
Pinned down QUICKLY!

"Irregularizing" a turbocode

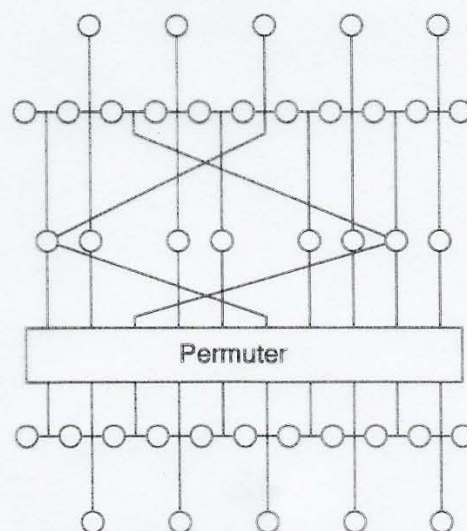
Regular turbocode $R=10/20$



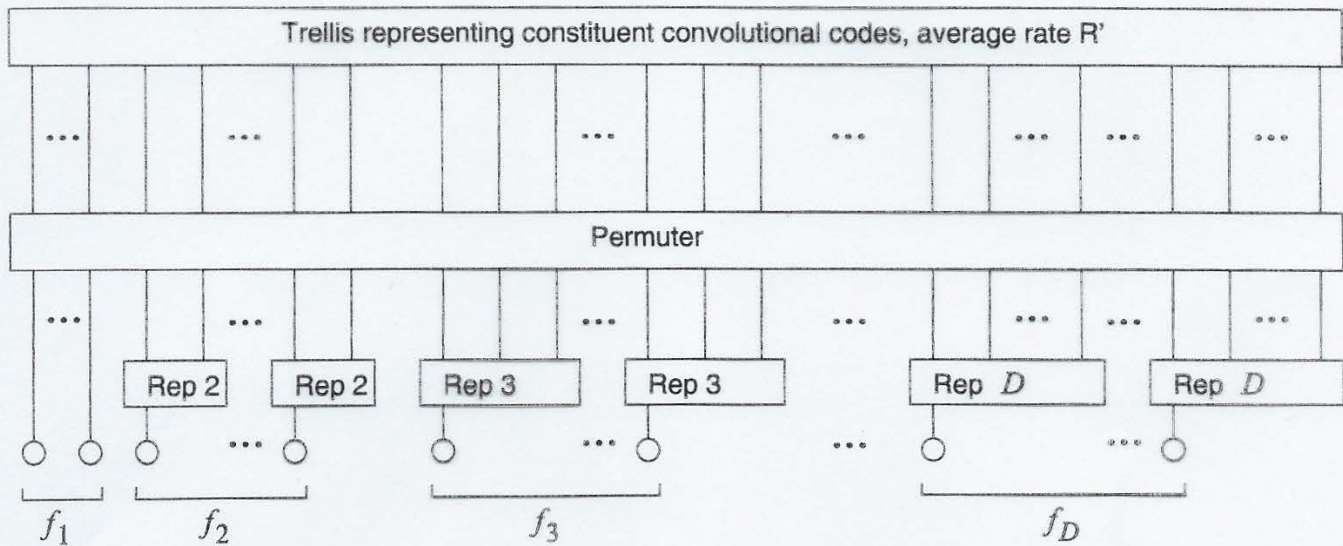
"Irregularization"



Irregular turbocode $R=8/18$



Rate-degree relations



\bar{d} = Avg degree of codeword bits

\bar{R} = Avg rate of convolutional codes

R = Rate of irregular turbo code

Avg # constraints per bit: $\bar{d}(1 - \bar{R})$

$$1 - R = \bar{d}(1 - \bar{R})$$

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