

# Irregular Turbo-Like Codes

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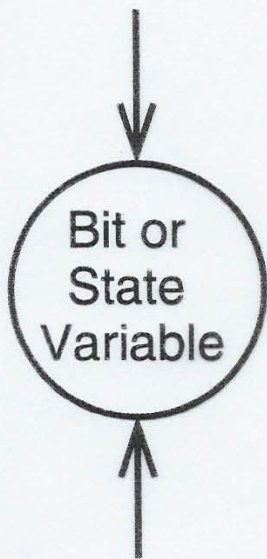
Apple 1013

Suppose you are *told* the values of some bits<sup>✓</sup> in a transmitted codeword  
(or states)

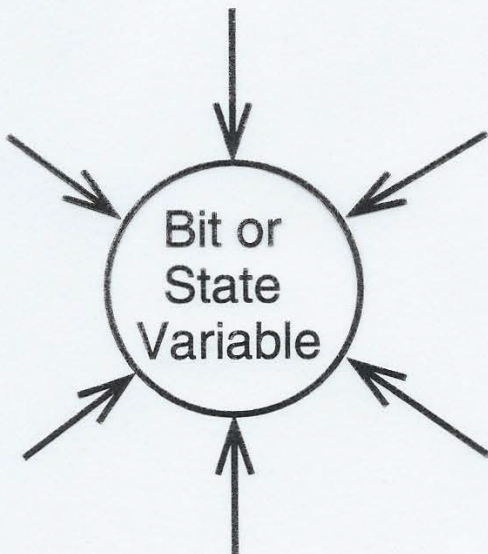
This effectively decreases the rate of the remaining code, making decoding easier

Can we get a free lunch  
out of this?

# Irregular codes: A free bite of lunch



Pinned down SLOWLY



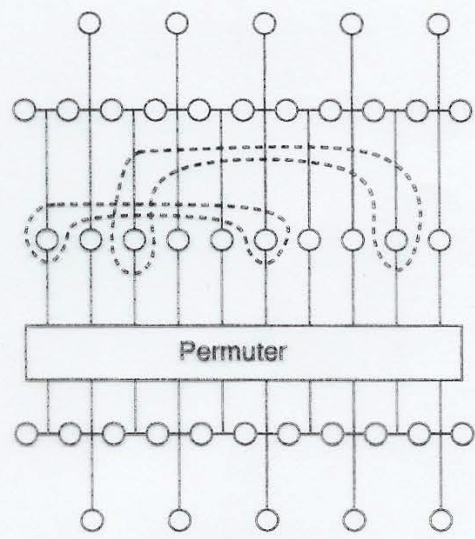
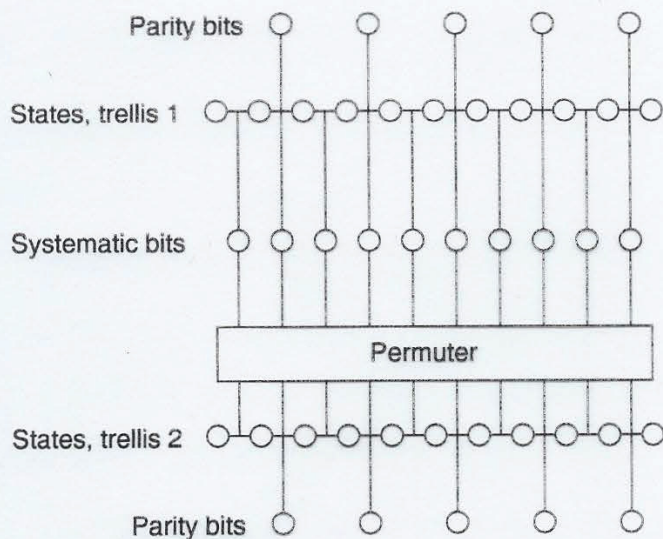
Pinned down QUICKLY!



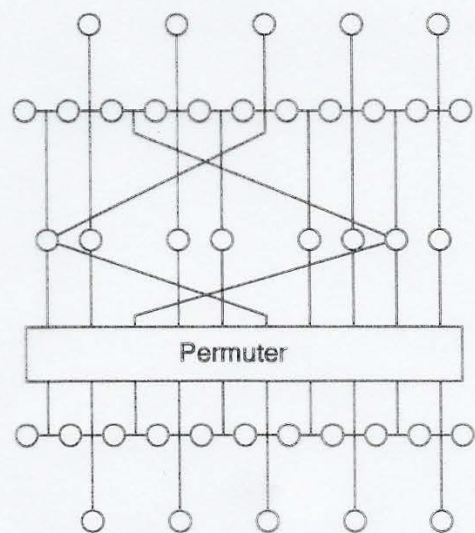
# "Irregularizing" a turbocode

Regular turbocode R=10/20

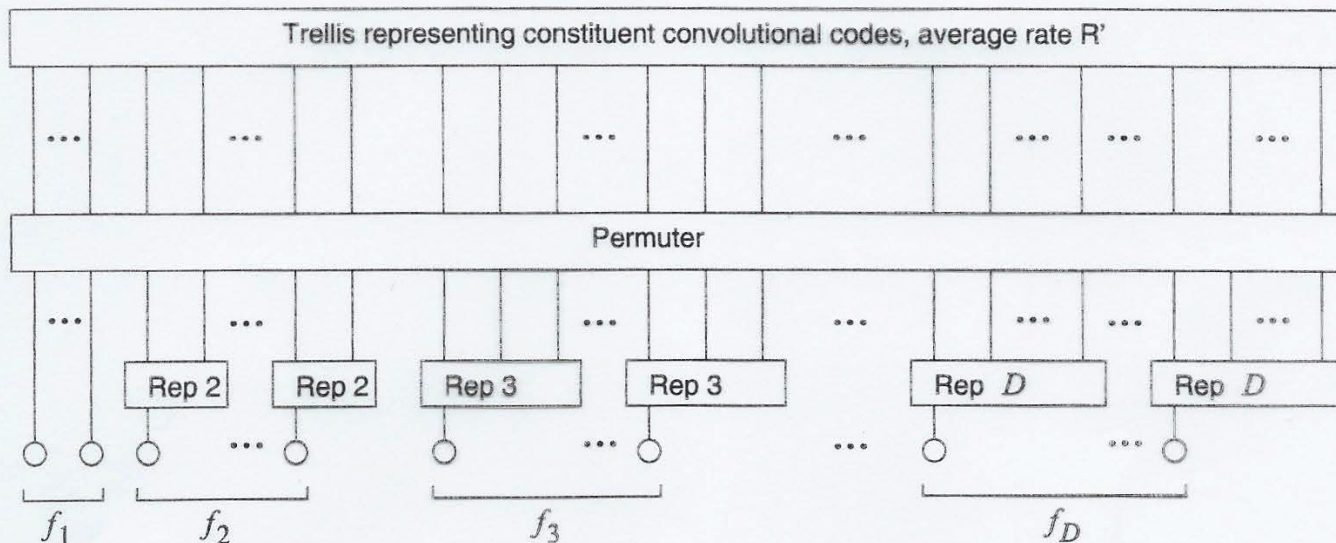
"Irregularization"



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 turbocode

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

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

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