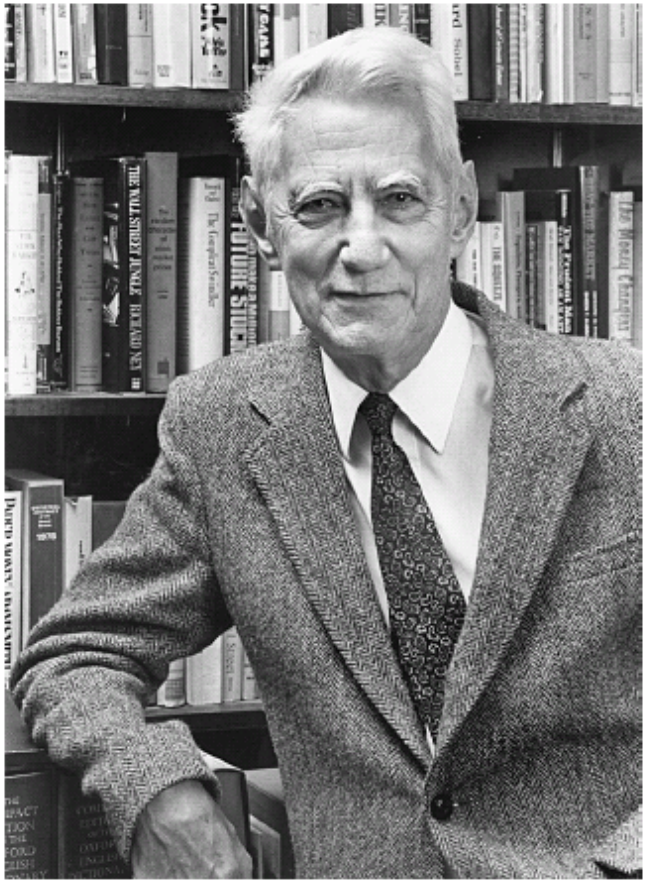
Shannon Information / Entropy



Claude Shannon, 1916-2001

What were his motivations for defining/studying information?

What is a “message source”?

Boltzmann Entropy

$$S(state) = k \ln W$$

Measured in units defined by *k* (often "Joules per Kelvin")

Shannon Information

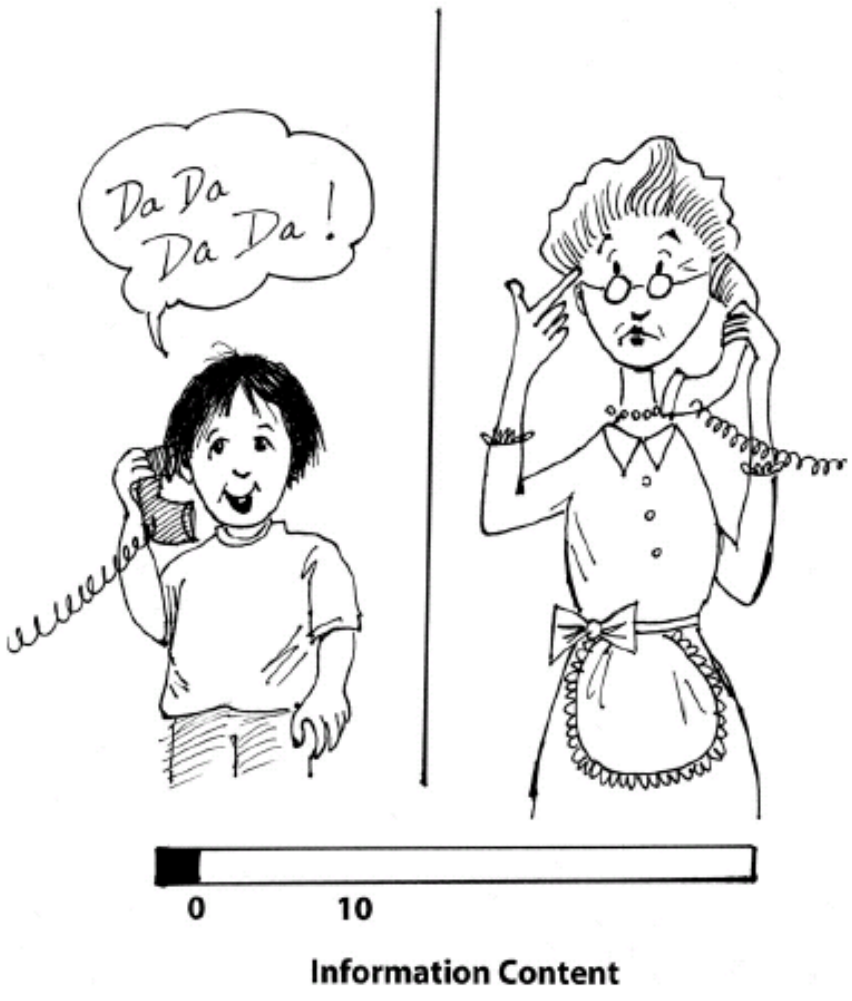
$$H(message\ source) = -\sum_{i=1}^{N} p_i \log_2 p_i$$

Measured in "bits"

Message source has *N* "miscrostates" (or "messages", e.g., words).

p_i is the probability of message *i*.

Messages: {Da}



$$H(Nicky) = -\sum_i p_i \log_2 p_i$$

Messages: {300 words}

$$H(Jake) = -\sum_i p_i \log_2 p_i$$