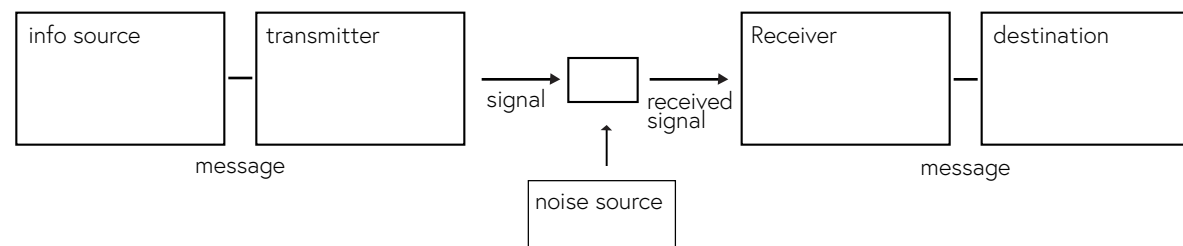


**Communication:**

all manners: music, tv, oral,  
 human behaviors

**Problems**



**ex) oral speech**

info source = brain  
 person listening = destination  
 speaker's vocal system transmitter  
 listener's ears/nerve = receiver

**Questions**

1. amount of info?
2. capacity of communication channel?
3. efficient coding process?
4. noise affect accuracy?
5. continuous signal affect problem?

measure

**Information**

measure of freedom of choice in sending message  
 applies to whole situation, not individualized

message option A: **0** closed circuit  
 message option B: **1** open circuit

**unit of info = "bit"**

ex) 16 messages to pick:  $16=2^4$   
 :  $\log_2 16=4$   
 : 4 bits of info

**Probabilities**

depend on preceding choices

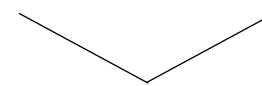
**stochastic process:** sequence of symbols according to probabilities



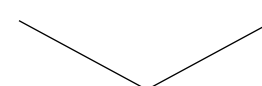
**Markoff process:** probabilities depend on prior events



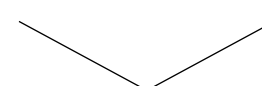
**egodic process:** sequence of symbols with statistical regularity



**Entropy:** getting to certain stages in process of forming messages and probability that there, certain symbols will come out



language must have at least 50% real freedom/relative entropy



characterizing statistical nature of all messages which given source can and will produce = info realized

**Capacity of channel**

info it transmits per second: bits per second as unit

**Coding**

best transmitter = codes messages so signal has optimum statistic and best suited to channel, maximizing signal entropy

**Noise**

no noise = no uncertainty of message with known signal  
 noise = info is uncertain after signal known

**Continuous messages**

continuous message comprised of simple harmonic elements NOT all frequencies