Information Concepts

INLS 500

Gary Marchionini

Information Senses

- Thing/object (what we handle, transmit, store—books, movies, bits)--noun
- Process (act of informing—forming the mind of another)--verb
- Mental state (unit of knowledge in the head)—state of being
- Proflection of self in cyberspace (a new sense)
  - Projections and exoinformation
  - Reflections created by people and machines

Communication senses

- Process involving:
  - Two or more (human) participants (sender/receiver, creator/audience, etc.)
  - Sender (initiator, creator, etc.) has intention
  - Receiver's mental state changes
  - Time ranges from 0+ to infinite
  - May be unidirectional
  - Medium
  - Message/Object (e.g., document)
    - Conceptual (the work)
    - Physical (the object, info thing)---coding scheme

Digital Representation Blur

- Digital representations have caused the boundaries between the senses of information and communication to blur.
  - Time (faster transfer)
  - Malleability (edits)
  - Replicability (easy to copy)
  - Behavior (programmable, conditional)
- One result is the rise of interactivity with non-animate objects and information

Interaction senses

- Process involving
  - Mutual (reciprocal) action (process)
  - Two or more objects (often we are concerned with one being human)
  - Either may initiate, may be unintentional/random
  - States of both objects change
  - Time ranges from 0+ to infinite (but most often concerned with small latencies)
  - Always bidirectional (feedback required, typically multiple cycles)

Related Concepts

- Signal (mass/energy)
- Data (ordered mass/energy)
- Information (data in a human)
- Knowledge (formalized information and skills—represented mentally and/or physically)
- Wisdom (the experience to know the differences)

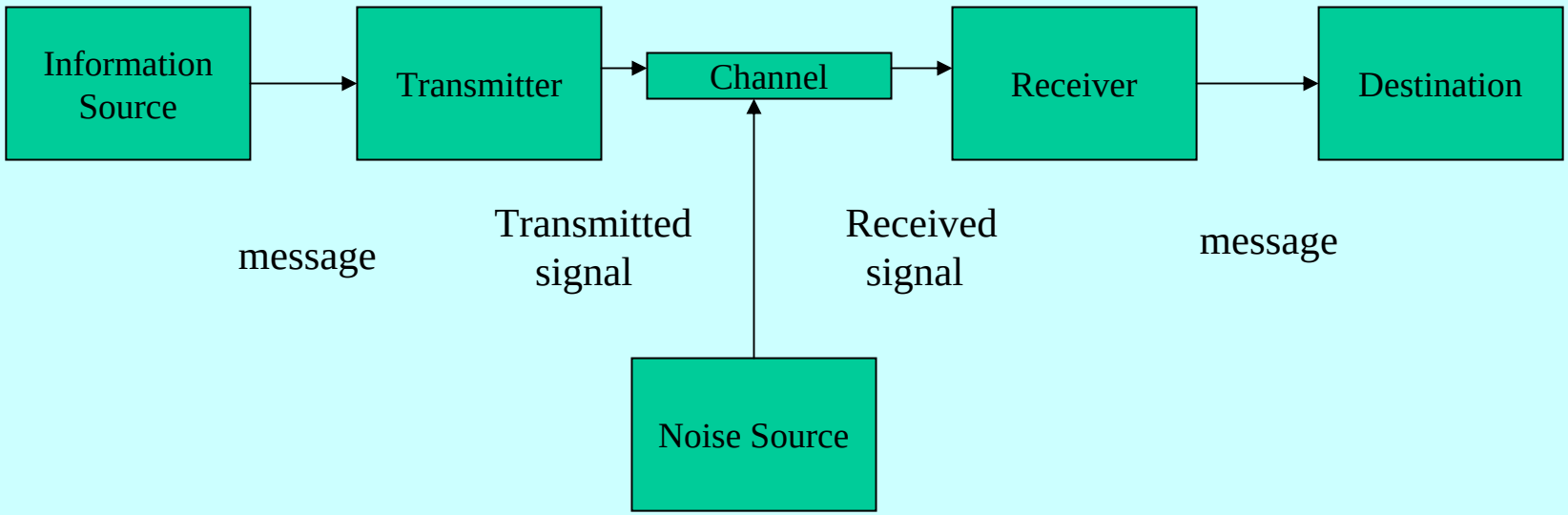
Media (Forms of Representation)

- Statistics—Text—image—sound—video—VR—AR—RL object
- Characteristics
  - Creation effort/requirements
  - Consumption effort/requirements
  - Expression/communication effort/requirements
  - Description alternatives (metadata and surrogates)

Information Theory: Shannon

- The technical (engineering) problem
- A problem solving strategy: simplify and model
- Unit of information is the bit (binary digit)—unit of choice or uncertainty
- Rate of information flow—(bits per second) also called the entropy (rate of reducing uncertainty)
- Channel capacity--bandwidth

Shannon Communication Model



Shannon assumes communication initiated by SELECTING a desired message from a set of possible messages

- Then, information is the amount of uncertainty in the SOURCE (not the message). This is the amount of entropy (randomness). "Information is a measure of one's freedom of choices when one selects a message." P. 9
- Weaver discussed three levels of communication problem
  - Accuracy of transmission (technical problem)
  - Degree of meaning (semantic problem)
  - Effect of transmission (effectiveness problem)
- Do not confuse information with meaning!!

Examples

- 1. RSVP yes or no?

  When you reply, you reduce my uncertainty by 1/2, requires only 1 bit to achieve—the minimal amount of information

2. A 32 icon language.

   When the destination receives/selects one, the uncertainty is reduced by 31/32, requires 5 bits ($\log 32_2 = 5$), five times as much information as the RSVP. So, selecting (or giving a command) a single character/icon in a 32 language reduces uncertainty (provides more information) than selecting a character in a 2 character language.

Assumes independence of each ‘choice’

For more typical settings, conditional probability arises (e.g., if the receiver has received a ‘Q’ in and English word message, the next letter carries 0 information since it does not reduce any uncertainty (we are sure it will be an ‘U.’ This gives rise to coding theory.

Personal Information Infrastructure

- A collection of interacting mental models for:
  - specific information systems;
  - events, experiences, and domains of knowledge;
  - general cognitive skills (e.g., inferencing, recognizing salience) and specific cognitive skills related to organizing and accessing information (e.g., filing rules, reading);
  - material resources such as information systems, money and time;
  - metacognitive resources for planning and monitoring thought and action; and
  - attitudes toward information seeking and knowledge acquisition.

Information & Library Science Sweet Spot

- Bridging the human aspects of information (personal information infrastructure, information seeking and interaction, sense making, surrogation) with the technical aspects of information (coding, transmitting, metadata). This class in human information interaction aims to define this sweet spot.