Communication Theory & Information Theory

Systems Analysis

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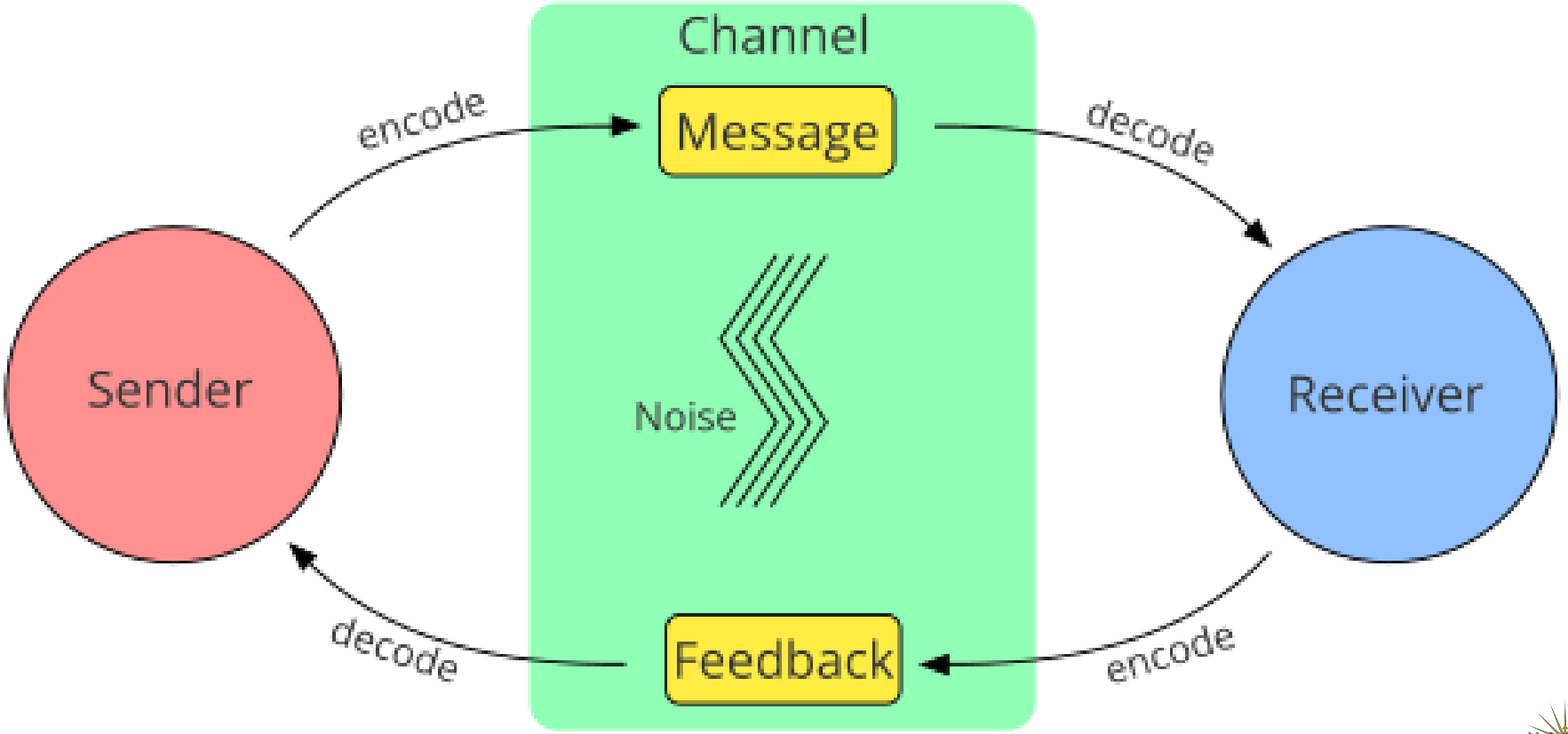
Communication Theory

Communication theory defines the amount of transmited information in terms of the conditional probabilities.



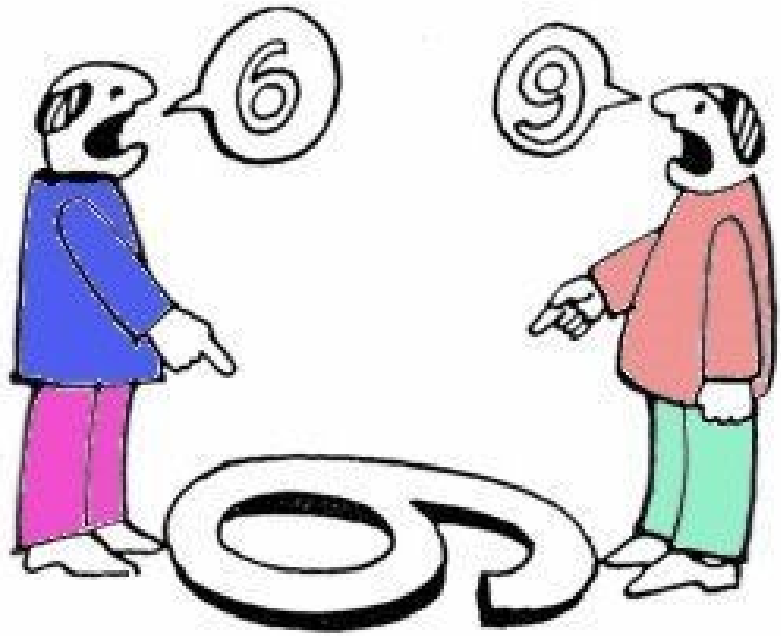
Communication Model

The **communication model** involves next elements:

- **Sender**: the source of the message.
- **Receiver**: the destination of the message.
- **Channel**: the medium used to transmit the message.
- **Message**: the information to be transmitted.
- **Noise**: the interference in the communication process.
- **Feedback**: the response from the receiver.
- **Context**: the situation where the communication occurs.
- **Code**: the language used to encode the message.

Misinformation

The **false information** is a problem due to the lack of verifications.

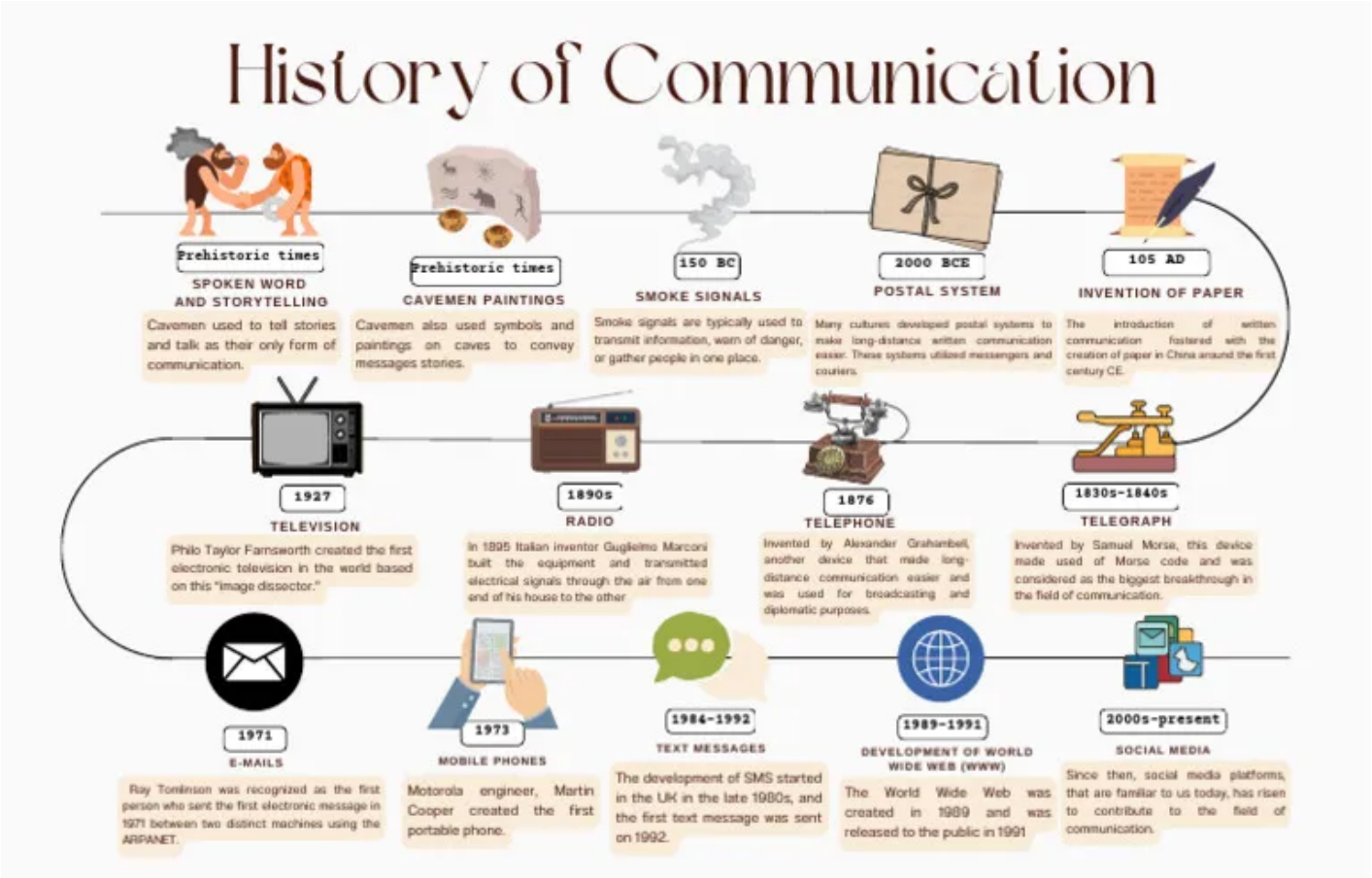


What if . . . ?

The **probability** of failures is pretty tricky.

History

S.F. Scudder proposed **Communication Theory** in 1980. The main idea is: *all living beings existing on the planet communicate*.



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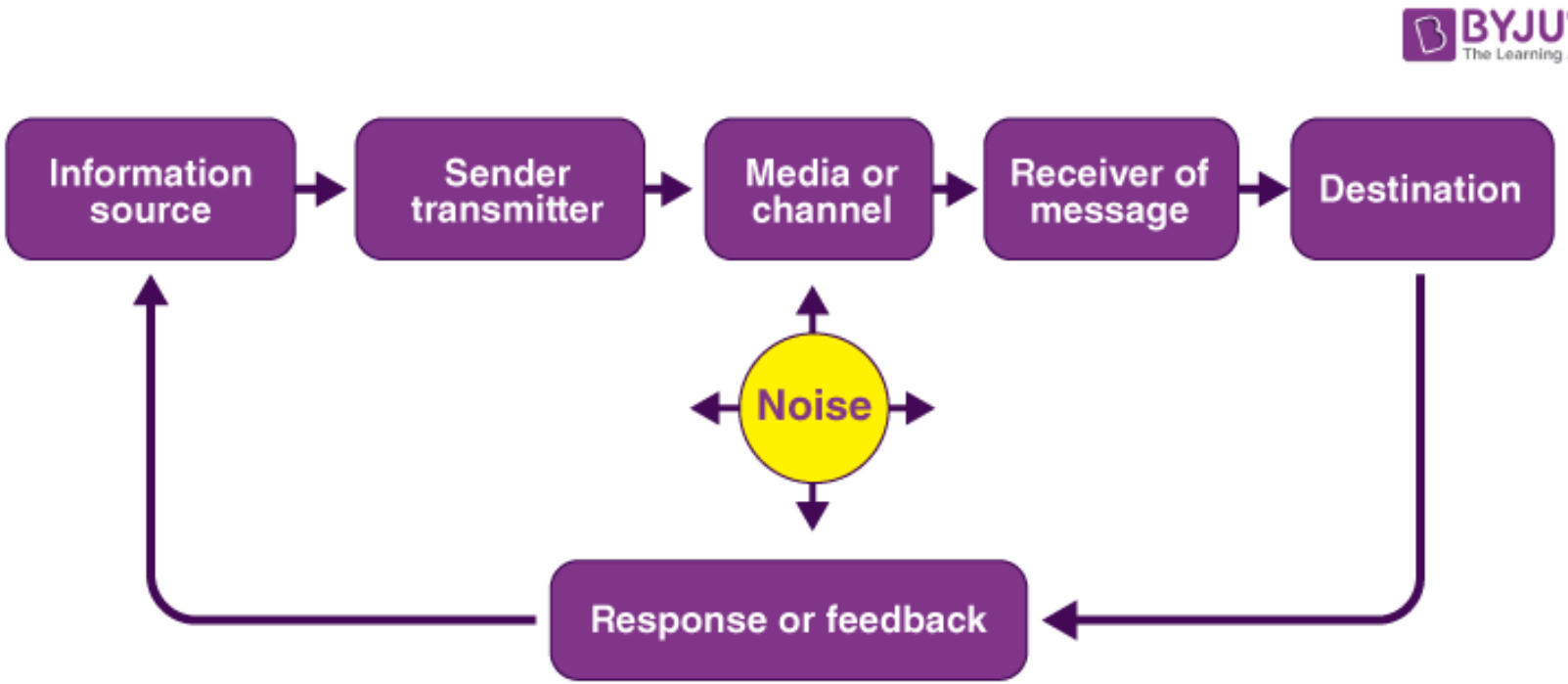
Definition

Information theory is a mathematical point of view related to quantification, storage, and transmission of information. It supports the **communication theory**.



Entropy

- **Entropy** is the measure of the uncertainty of a random variable.
- It is the average amount of information produced by a random variable.
- It is the **measure** of the disorder of a system.

Use Cases of Entropy in Information Theory

- **Data Compression**: the entropy is used to compress data efficiently without losing information.
- **Cryptography**: the entropy is used to generate secure keys for encryption.
- **Machine Learning**: the entropy is used to measure the uncertainty of a model.
- **Signal Processing**: the entropy is used to measure the information in a signal.

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Thanks!

Questions?

Repo: *https://github.com/EngAndres/ud-public/tree/main/courses/systems-analysis*

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