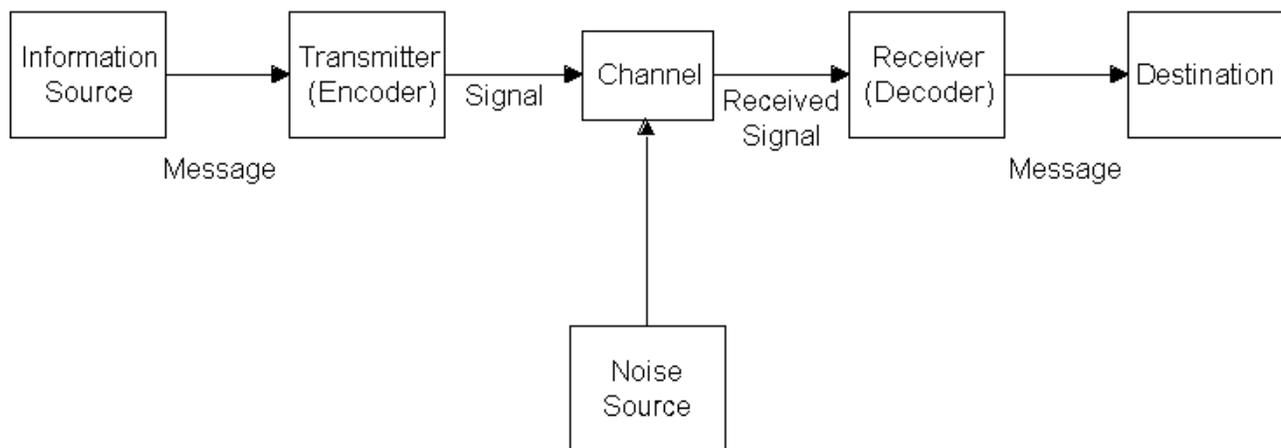


Shannon and Weaver model of Communication

In 1949 an engineer and researcher at Bell Laboratories, named Shannon, founded an information theory based on mathematical theories which was about signal transmission with maximum telephone line capacity and minimum distortion. For the first time, he introduced the qualitative and quantitative model of communication as a statistical process underlying information theory.

The aim of Shannon was signal transmission from source to destination through transmitter and receiver across the channel with minimal interference or error. The information theory initially developed to separate noise from the signals carrying the information. Later on Weaver extended and applied Shannon's information theory for different kinds of communication. While Shannon was focused on engineering aspect of his theory, Weaver developed the philosophical aspects of this theory related to human communication. Shannon and Weaver model of communication has 7 main elements which are:



- Information source chooses desired message among a set of possible messages which can be mixture of any form of written or spoken, image or sound.
- Transmitter changes the message into the signal, also known as encoder.
- Message is the thing which is sent and received and all communication is about.
- Channel is the path that message passes through from the transmitter to the receiver.
- Receiver is the reverse transmitter which changes the signal back into the message, also known as decoder.
- Destination is the target place of the transmitted message.
- Noise is any unwanted additions to the transmitted signal which cause distortion or error in transmission.

This model shows the communication process between source and destination. The source creates the message which can be discrete or continuous. Based on Shannon and Weaver description which is quoted by Lossy (1999), a discrete source produces “the message, symbol by symbol. It will choose successive symbols according to certain probabilities depending, in general, on preceding choices as

well as the particular symbols in question". Written English or integer data are examples of discrete sources. Non-discrete sources like music or speech called continuous, but sometimes they are encoded into a discrete sequence of numbers. The created message by the source is not transmitted but, it is transformed by transmitter to the signal and then transferred to the receiver. It is necessary that transmitter encodes the message in a form that can be transmitted through the medium which makes the channel. Then receiver converts the transformed message to its original one and gives it to the destination.

In this theory, the word information doesn't reflect its ordinary meaning but as Weaver (1949) indicates "information is a measure of one's freedom of choice when one selects a message". So in the situation that there are two alternatives which person must choose one of them, the information associated to this situation is unity. In other words, the concept of information isn't applied to the individual messages, but to the situation as a whole, and the unit information indicates the amount of freedom of choice when one must choose a message which is considered as unit amount.

To be more definite, the amount of information is measured by the logarithm of the amount of available choices. It is easy to use logarithms to the base two instead of base ten, so when there are only two options to choose, the information is proportional to the logarithm of two to the base two which is unity. In other words, the situation of two available alternatives is defined by information of unity. These two alternatives can be symbolized by two numbers of one and zero which are the only two digits in binary systems. So, binary digit or its abbreviation "bit" is considered as the unit of information. A message can be constructed freely by choosing the one out of several combination of bits arrangements.

Although different arrangements of bits can create different messages but in the context of English language all of these arrangements can not be valid or the probability of existence of one arrangement is less than the other. The probability of choice of the different discrete symbols at one stage depends on the previous choices.

Freedom of choice which is the base of Shannon's theory, brings up the *entropy* concept which is the measure of uncertainty in a system. When the number of items which source can choose from to construct the message increases, the uncertainty or entropy increases with the same proportion. In contrast, when the situation is very organized and there is no much randomness or choice, information or entropy is low. In other words, when the destination knows about the probability of the messages, entropy or amount of information is low. The value of a specific bit of information depends on the probability of its occurring. Generally, if the probability of occurring an item in a message increases, the informative value of it decreases in the same proportion.

Structure of English language is in a way that decreases our free choice in writing or speaking to about fifty percents. It means that when we write or speak, only half of the words are our free choice and the other half is under statistical control of language. This fifty percents of the words in a message which are out of our free choice is unnecessary which add no new information and can be missed without disturbing the completeness of the message. For this reason we call them redundant and are the index of *redundancy*. Redundancy increases the degree of predictability for receiver in a way that can anticipate what items in a sequence come next. For increasing the efficiency, There must be a balance between unexpected and predictable items in a message.

Redundancy and increasing of it can be beneficial and restore efficiency when any additional signals interferes with the message. These additional signals which are not related to the message are known as *noise*. Noise can be produced within the transmission and reception system which has a physical nature or can be semantic which can be the result of mismatching encoder and decoder or

human interpretation.

Entropy, redundancy and physical noise are the concepts of this theory which are concerns of technical problems. These concepts are dealt to solve the problems like how accurately the symbols of communication can be transmitted which Weaver considered it as level A problem in communication. But in the context of human communication, there can be other problems which are the matter of concept and effectiveness. Weaver suggested these problems as level B and C in communication. Level B that is the semantic problem is about how precisely the transmitted symbols convey the desired meaning. In other words how much receiver's interpretation is close to the intended meaning of the sender. And level C which is the effectiveness problem is about how effectively the received meaning affects conduct in the desired way.

There are many argues in literature believe that although improving in level A can improves problems in levels B and C but Shannon and Weaver communication theory main focus is only on level A problems and cannot be applied for two other levels in the context of human communication.

One of the argues about this model is that it relies on transport metaphor. Message is considered as an object which can be carried from source to destination. This metaphor can be valid if we consider communication as transmitting symbols without considering semantics. However, in communication meaning cannot be transported but it constructed by receiver.

The other argue related to this model associates the deficiency of being one-way and linear, which is not satisfying human communication which is interactive. In this model sender has an active role which identifies the meaning of the message and receiver has a passive role which only consume information. There is no feedback system to allow sender to be adjusted to receiver's needs.

The other flaw of this model is ignoring meaning aspect of the communication. This model doesn't distinguish signal and message, or syntax and semantics and considering the content and meaning as a same thing. In other words, this model only deals with signifier, known as symbols, and doesn't take into account Saussure's signified concept, as Shannon which is quoted by Chandler (1994) indicates that "frequently the messages have *meaning*, that is they refer to or are correlated according to some system with certain physical or conceptual entities. These considerations are irrelevant to the engineering problem" and Weaver which is quoted by Chandler (1994) has emphasized this point that "the word information, in this theory, is used in a special sense that must not be confused with its ordinary usage. In particular information must not be confused with meaning. In fact, two messages, one of which is heavily loaded with meaning and the other of which is pure nonsense, can be exactly equivalent, from the present viewpoint, as regards information".

Another problem with this model is lack of attention to the context of creating and receiving the message. Meaning can be different in different contexts. There are different situational, social, institutional, political, cultural and historical contexts which can have influence on the interpretation of the message.

The other deficiency which can be assigned to this model is ignoring relationship between sender and receiver and the purposes of the communication. Social class, gender, age or profession can have effect on the value of the message and the meaning that induces. Authority and difference in power has no allowance to be revealed. Also, there is no room to show the purpose of the communication in this model. It's the only information that is transmitted not the purpose of it.

Dealing channel or medium as a neutral element in the communication process is another flaw of this model. Nature of medium can add meaning and connote the purpose of the sender. Each medium has different technological features which can be proper for special purpose.

Ignoring time and change of relationship and purposes between sender and receiver during time is another problem of this model.

Approaching communication as only a predetermined and intentional process which the aim of it is, as Carey indicates control of receiver, is another problem. There are many times that people have an unintentional communication which has been ignored in this model.

Summary:

As mentioned, Shannon and Weaver's theory of information is a transmissive model which its focus is on efficiency and accuracy of transmitting messages by smart coding and eliminating physical noise without enough stress on semantics and concepts which is the important aspects of human communication. This model is a linear model that has ignored the active and constructive role of receiver which is an important part of human communication. But the point is the criticism is not about the model which can have its application in the right field, the misusing of this model for human communication is the one which is criticized.

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