

# Evolution of Intelligence in a Network of Chain Reactions

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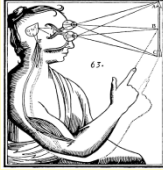
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## The reaction that controls the network of chain reaction is an additional reaction.

The reaction operates a function of decoder. It translates from a pattern of data to one output. Concurrent activation of molecules in liquid state are unified by the decoder.

The intelligence of annex activity controls the reaction in a network of chain reactions.

(The model of brain mechanism: [Cartesian Theatre])



## What is the first step for birth of life?

Original existence was not made from the replica. Metabolism and replication must coexist at birth of organism. Because, the birth of organism is a very small probability, but it increases via reproduction system accompanied with. That is the mechanism of Mutation.

## What is the origin of intelligence ?

Control of reaction in a network of chain reactions is the intelligence. If there are plural of candidates for an output at the junction, a decoder to select next reaction is necessary. The control of reaction is conducted by the other reaction. The annexed reaction make possible to replay of the same behavior at the same situation. It makes possible to construct the system of replication.

## Development of intelligence is one-way traffic.

The intelligence that was newly added reaction has priority in the network. The brain was added 5 hundred millions years ago. Every story is human's invention. The civilization is human's invention. Here, newly added intelligence has priority in the life.

## Activation of molecule is forwarded in a liquid state

An activation of molecule in liquid state is transmitted via thermal motion of molecules. The thermal motion is able to exchange neighboring atoms, and the electronic state is adapted to the surroundings.

## The central dogma (1956, F. Crick) is mechanism of one-way traffic.

Replication is controlled by the original system. The replicator was formed via try and error of the mechanism of mutation.

**DNA → RNA(temporary existence) → Protein**

## How had the first protein synthesized?

Although amino acid is soluble in water, side chain of the amino acid attaches to a membrane. Thermal motion of attached amino acids is suppressed by the attachment. The connections makes possible to synthesize the protein. Although tremendous kinds of protein are possible to generate, there is the natural selection.

## Replication takes place at the change of a generation.

Since intermolecular force is emphasized via the organization, almost all the molecular arrangement will decompose at collapse of the organization. Although most of chain reactions on the membrane will decompose at collapse of the membrane, some chain of reactions those are included on a part of membrane can be included in a renewed cell. The organization of molecules that includes with organized parts contributes to the evolution of the chain reaction.

## The system for replication of protein was formed by attached molecules in a network of chain reactions on the membrane.

Membrane becomes robust by the structural protein. The thread of protein with membrane will be produced with linking to the real world. The membrane with a series of amino acids is able to record the trace of reactions along a time progress.

## Serial data for a protein can be memorized in a linear polymer of nucleotides:

The nucleotide and amino acid are fairly different. Peptide bond and phosphodiester bond of nucleotide are also different. But the amino acid of a protein and an activated portion of the nucleotide chain are able to correspond along the same time progress. It makes possible to form the adapter from polymer of nucleotides to the amino acid.

**Three nucleotides → (adapter) → Amino acid.**

## Genetic code in DNA gene system

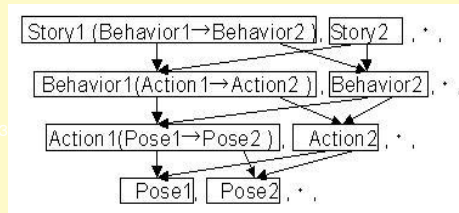
The code is a representation to be decoded. It is decoded by the corresponding reactions. A sequence of three nucleotides codes is used to specify an amino acid. 20 kinds of transfer RNA (t-RNA) exist corresponding to 20 kinds of amino acids.

## Start-codon and stop-codon in DNA gene system

These signals are used for the segmentation. Here, these signals are used to activate a series of representatives. It is available to suppress the other activation.

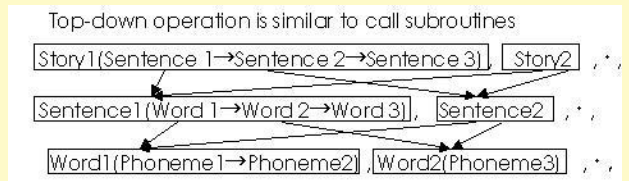
## A layered system of representatives corresponds a layered system of subroutines.

Forming of an intelligence is bottom-up and replay of the intelligence is top-down. In the top-down operation, the activity of representatives is overlapped similarly to call system of subroutines.



## Intelligence due to a network of neurons in a brain

Meaning of an impulse itself is activation of the neuron. The meaning of a sequence of voice sound depends on the experience of language use similarly to the bell for Pavlov's dog. Although eyes and ears are different, those concurrent excitations in a nerve system are able to decode by an annex neuron. The operation of annex neuron has priority in the network. The operation is similar to the system of computer that includes layered subroutines.



## Timing control of a layered representatives is similar to computer.

The basics of timing control is carried out through a line of reactions. Functioning of representative is assigned by the name of file on subroutine, where the reaction changes to the next program at end of subroutine.

## Conclusions

The concept of a network of representative of activities is useful to describe evolution of intelligence, and it will provide guidance to explore the organism in the universe.