

Attributes of Language Use explained by Activities of Neurons

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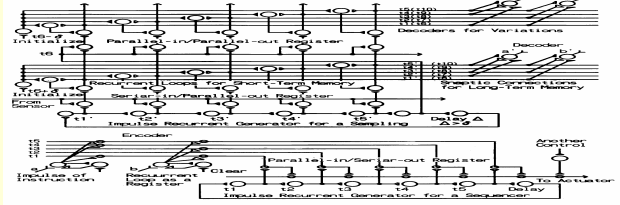
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Outline: Paradigm of activity for description of intelligence

1. Intelligence is considered as the activity of life.
2. Language represents the activity of brain.
3. Pattern recognition is an activity of a neuron.
4. Mind is activities of a brain.

A simple model of a nerve circuit (S.Karasawa, Technical Report of IEICENC98-123.)

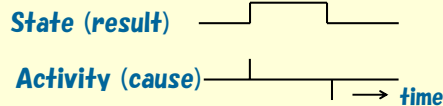


Impulse means functioning and the meaning depends on the element

Digital state is a result of activity

- A neuron carries out a rule of change.
- Meaning of reaction depends on the effects.

(An impulse changes digital state)



Attributes of activity on a neuron

- A reaction possesses a beginning and the end.
- The signal of an impulse indicates the timing on existence of operation. The meaning depends on the device.
- The operation of nerve system is a time-sharing operation. Only concurrent activities are able to interact with each other.



Linkage of activities breeds a life

- If every individual reaction in a group makes the action that is matching properly to demands of the group, the group behaves as a organized system.

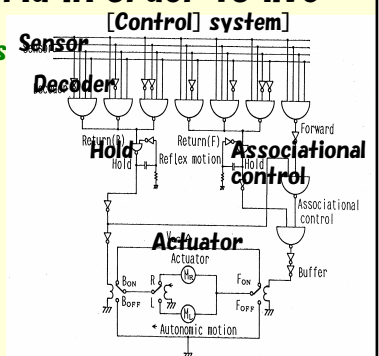
Combination of reactions



- A creature is existence of activity. It is different from physical material. It is always change.

A creature must interact with the outer world in order to live

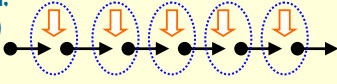
- An activity changes the circumstances, the change ignites another activity.
- Each unit of activity possesses generality and it can be discussed as a science.



Memory of reaction

- A transference of activity depends on a situation.

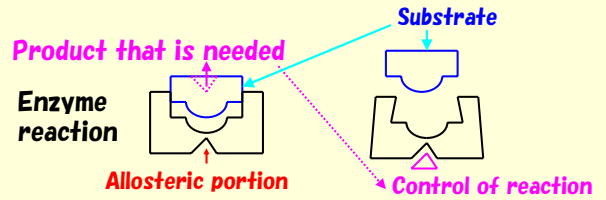
Agent (tool: subroutine)



- Each biochemical reaction returns to original state after the action, but the total system causes a little change by the experience.

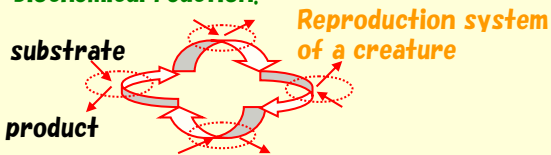
Activity depends on the situation

- A reaction affects a supply for demand.



Gene expression depends on the activity

- A gene is a tool for production of protein and enzyme those are used as tools for biochemical reaction.

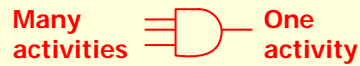


- Biochemical reactions of a cell or a neuron or a creature are not able to continue without interacting with surroundings.

Logic of activity : IF-THEN rule

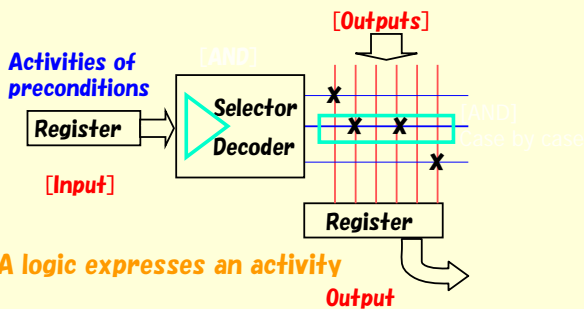
- A unification of activities is achieved by a neuron.
- A neuron transfers many activities to one activity.

A neuron operates as a decoder or a filter.



- A reaction operates an If-then rule i.e. a production rule.
- The data compression is a decoder or a filter.

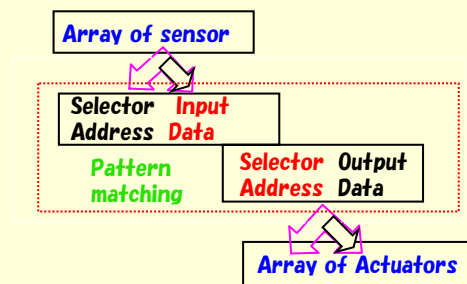
PLD operates function of a neuron



- A logic expresses an activity

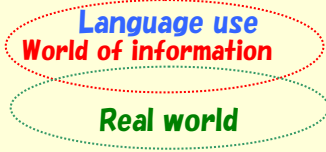
Memory of intelligence by Look-Up Table

Every memory functions as a dictionary.



Language use is a strategy of intelligent behavior

- Every activity in a creature is considered as a tool of life.



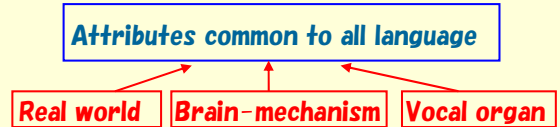
- Human has developed the world of activities in a brain by means of the language use.

Base of language faculty

- natural intelligence -

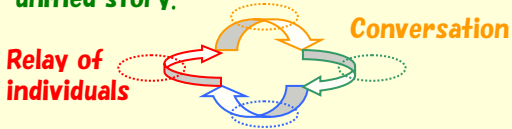
- The language use is acquired together with acquisition of natural intelligence

Universal grammar



Human brain that plays a drama without a scenario

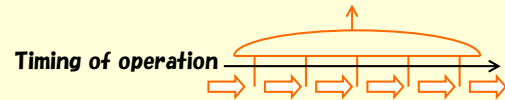
- If every speaker makes the speech that is adjusted to adapt the demands of its surroundings, the whole speech becomes a unified story.



- The audiences are able to experience a part of those activities.

Projection of activity from Time-domain to Space-domain

- A set of signals along time-axis is memorized by means of a line of delay elements.



- The serial-in/ parallel-out register is materialized by means of a series of delay elements.

Activity and circuit

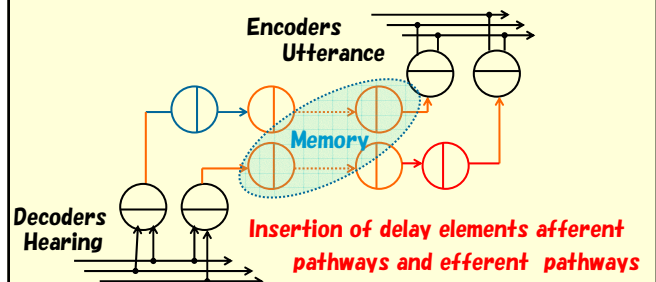
time domain

space domain

The speech is carried out serially through the activities of one vocal organ

Contents of speech are memorized in a nerve circuit where there are parallel connections.

From hearing to utterance



Encoders
Utterance

Memory

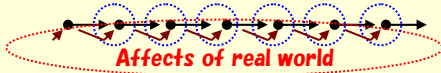
Decoders
Hearing

Insertion of delay elements afferent pathways and efferent pathways

Segmentation is inserted at end part of utterance.

Every thing is on the move

- The circumstance is changed by activity, and the activity must change in order to adapt new circumstance.

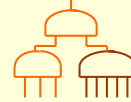


- Growth of intelligence in a nerve circuit is achieved by adding circuit to existing circuit.

Extension of intelligence

- The inclusion of plural ignitions is decoded by means of a decoder in the upper layer.

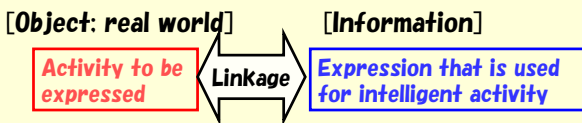
Tree structure of intelligence



- An affair is recognized finally by one neuron in a brain, because the behavior of body must be unified at every moment.

A word is used as an element of human intelligence

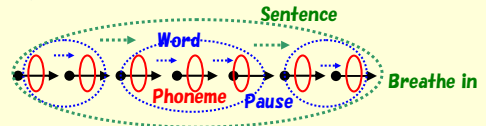
- The language is the representative of activities.



- Activity Model:** Layered subroutine call
- Digital model:** Finite state transition network

A segmentation of utterance represents an structural operation

- Sentence includes a verb in order to express an activity.
- The verb has the plural attributes due to the activity of real world.



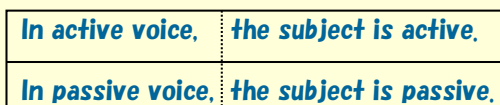
The linguistic structure is expressed by 3 kinds of intervals on operations for utterance.

A sentence is assigned by a subject.

Verb depends on the subject.



The voice of sentence depends on the subject.



Conclusion

- Generalities of the brain mechanism are explained from viewpoint of activities.
- The language is a symbol of integrated activities. It is not the real things nor real affairs.
- The paradigm of activity is a realism.
- The concept of activity makes clear the brain mechanism such as pattern recognition, mind and language use.