# Neural Networks 2.0
# Neurogenesis:

## Polymorphic, oligopoly, dynamically adaptive, neural impulse networks:

PODANI Networks


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| **Stand:** | **2023-10-27** |
| **Autor:** | Zoran Vranešević |
| **Contact:** | E-mail address |


## The project on the Internet:

https://github.com/Zoltan-X/Neurogenesis

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# Chapter 1: Introduction

## About the emergence of this project

This work started on 14 October 2018, with an incredible and gorgeous inspiration that led to the first two fundamental theorems of this elaboration. The GitHub account "Zoltan-X" was created on 17 October 2018.

## What PODANI Networks mean:

PODANI Networks means

**Polymorphic, Oligopoly, Dynamically Adaptive, Neural Impulses Networks.**

- **Polymorphic:** PODANINs are polymorphic, self-evolving neural networks. They have specially designed specifications for neural genesis behavior, defining when, where, and how axons and neurons are created or degenerated in the network. The network is always mutating and remains in an open learning mode.
- **Oligopolies:** The neurons are oligopoly nodes that control the flow of impulses. Depending on the number of independent types of information they process, they influence the flow of impulses at the nodes. Further details follow in Chapter 3.2 Multi-Asset Nodes.
- **Dynamically adaptive:** As open neural networks, they are always in a learning mode, continuously and dynamically adapting to new information. Structural polymorphism works dynamically, with structural changes representing an adaptive learning process of the information flows that form.
- **Neural impulse networks:** PODANINs use scalar signals (electrical potentials in the form of pulses) and dynamic flow control in neurons, among several other aspects that could mimic a real brain.

## Characteristics of PODANI Networks

1. 2 Fundamental Theorems of 4D-Impulse Algebra for Neuro-Genesis
2. Neural genesis concepts regarding logic and autonomic nodes and axons emergence.
3. Super Germ (Super Seeded) Design
4. Multi-asset nodes emerge and form
5. Automatic network maintenance: growth and decay
6. Self-influencing the networks "ways of switching, thinking, and acting."
7. Interaction of Neurons by each other nearby being active.
8. Independent and logical emergence of new signal processing nodes (Neurons) in the network
9. New nodes favor form informational associative content.
10. Works with different types of Neurons, which cause different interactions.
11. The network grows and learns automatically.
12. A free operating mode, without human control or intervention, should allow the network to evolve independently and logically through neuro-genesis.

# Chapter 2: The Foundations of the Original Ideas

## The two basic laws of this 4D-impulse algebra

### Precondition: Impulses in nodes activate them

if a node has at least one pulse, it is considered active. Only they emit the EM field of the pulses within them.

Neighbouring and simultaneously active nodes generate new axons that connect them. Furthermore, they interact with each other by mutual influence in choosing the further path through the network. Beyond the spatial dimensions, the 4th dimension in this context is time.

It follows from this that impulses must be present at the same time, in spatially close adjacent neurons, for a mutual interaction to occur in 2 forms:

### The 2 Fundamental Theorems from 4D Impulse Algebra

***1.*** (EM near field + brain liquor see: [CREB-1]() and [abstract on magnetic field affinity of CREB-1]() ).

***Nodes connect with new axons in different expressions.***

**2.** (Receptor and neural transmitter Logic)

***Impulses branch by mutual influence according to different defined cases.***

An Example of a minimalistic AI-FOE (Artificially Intelligent - Form of Existence) in the form of an Auto-Actor-Model

## Example of an Auto-Actor-Model:

1. a simple impulse transport along an axon "Axon 1" from a sensor "Sensor 1" to an action "Action 1" with exactly one node "Axon 1-node 1-type A".
2. impulses are continuously generated by the sensor 'Sensor 1' and transmitted via the 'Axon 1' line and the 'Axon 1 - Node 1 - Type A' node to 'Axon 1 - Action'.
3. the second axon appears. "Axon 2" is supplied with impulses by "Sensor 2". "Axon 2" also has a node "Axon 2-Node 1-Type B", which is close to "Axon 1-Node 1-Type A". The 'Axon 2' ends in 'Axon 2-Action 2'.
4. 'Sensor 1' and 'Sensor 2' continuously send impulses via the 'Axon 1' and 'Axon 2' lines to 'Axon 1-Action 1' and 'Axon 2-Action 2'.
5. This repeats until two impulses are simultaneously present at the 'Axon 1 - Node 1 - Type A' and 'Axon 2 - Node 1 - Type B' nodes, creating a bridging axon.
6. then the behavior changes so that the impulses in 'axon 1-node 1 type A' are conditionally redirected across the newly formed bridge to 'axon 2-node 1 type B' and from there to 'axon 2-action 2'.

This behaviour corresponds to the first two fundamental theorems, which accomplish the following behaviour:

<u>Legend:</u>

**A1** => Axon 1
**G1** => Node 1
**A1-G1-A** => ‘axon 1’ at ‘node 1’ with ‘type A’
**A1-S** => Transmitter, signal generator or pulse generator on axon 1
**A1-A** => Action on ‘axon 1’
**$I_{i,x}$ = ($t_j$, "A1-S")** => Impulse number i on axon x, here on the axon at a transmitter point at time tj.

The 1st fundamental theorem leads to the connection of "**A1-G1-A**" and "**A2-G1-B**" with a new axon, and the 2nd fundamental theorem consequently causes a redirection of the impulse flow from node type A to B.

In this case, **A => B** redirects when both nodes are active. So the nodes "**A1-G1-A**" and "**A2-G1-B**" redirect the pulses from the **A1** line to the **A2** line.

The impulses of "**A1-S**" are influenced in such a way that then applies:
from: "**A1-S**" **=>** "**A1-A**" and "**A2-S**" **=>** "**A2-A**"
follows: "**A1-S**" **=>** "**A2-A**" and "**A2-S**" **=>** "**A2-A**

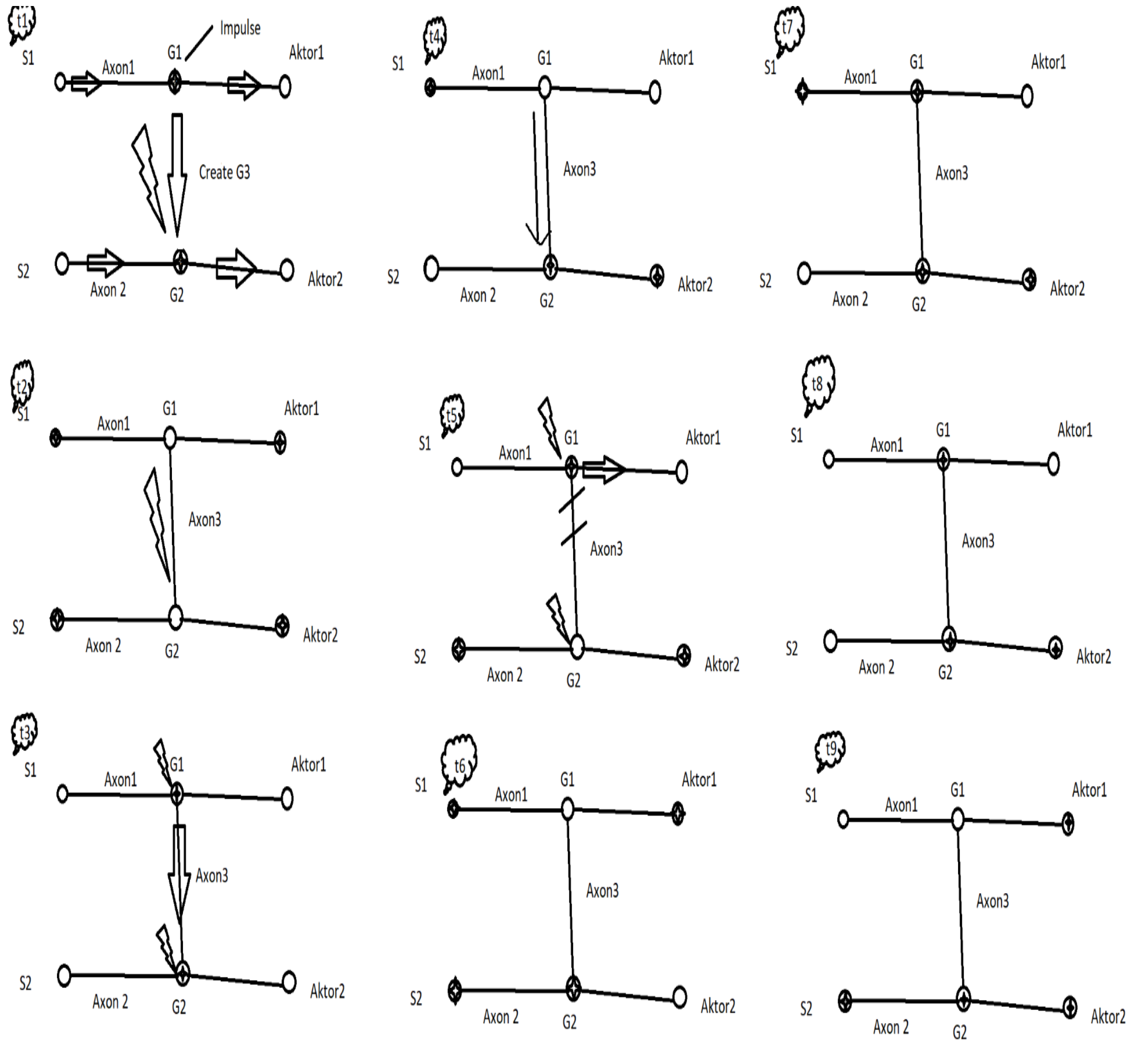
by **F(I1,1) (t1, "A1-S") && F(I1,2) (t1, "A2-S")**

with: **F(I1,1) (t2, "A1-G1-A") && F(I1,2) (t2, "A2-G1-B")**

follows: **Create(A3)** with **(A1-G1-A => A2-G1-B)**

And: **F(I1,1) (t3, "A2-G1-B") && F(I2,1) (t3, "A1-G1-A") &&**
**F(I1,2) (t3, "A2-A") && F(I2,2) (t3, "A2-G1-B") &&**

In a figurative comparison to an auto-actor model, this means
"**A1-S**" => sends pulses as a hungry signal.
"**A2-S**" => sends pulses as a digestion full signal.
"**A1-A**" => Food.
"**A2-A**" => Satisfaction.
"**A2-A**" => consumes a double pulse to end the saturation behavior, thus that it stops eating




## Super Seed (super germ or primordial germ).

Two parallel axons reside in the Super Seed Example above. Each of them has a node near the other. These nodes will later interact in a specific way. With only two lines, "A1" and "A2", we have obtained an evolution, by established connection, that implies to the auto-actuator model the planned behavior to eat until satiation. This neural algorithm evolved naturally. The design concept here was to define two independent processes, one of which refers to the other because it is a logically subordinate use case. Feeding leads to satiety, not the other way around.

# Chapter 3: Elements, structures, and Their Behaviors

## 1. Modes of Impulse Interactions

### Interaction forms of Impulses with different node types.

The distinction between nodes of different types and the resulting impulse interactions are covered here. Concepts involving nodes of more than one type follow in Chapter 2. Multi-asset nodes.

### Impulse Potentials Conversion of

- Impulse Potential addition
- Impulse Potential subtraction

### Enforcement of the transfer through a threshold-based gate

This can depend on:

- the individual Impulse potential
- the number of potentials accumulated in the node of
  - simultaneous Impulses
  - Impulses Series within a period.

### Differentiated potentials.

Explain how to create a differential from an impulse stream on one (or more) axon(s).

On an axon A1, in the spatial proximity of two successive nodes - A1-G1 and A1-G2, the differential can be defined, for example, by a connection of these two nodes to another axon A2, with a node A2-G1. Nodes A1-G1 and A1-G2 mirror their impulses to A2-G1 and are transformed into a differential by subtraction. The successive impulses in A1, transformed in A2-G1, are also differentiated as a stream of single values. Finally, the result of the subtractive accumulation of the impulses is a differential with an iteration size of dx=1.

**f'(x) = (dy/dx) * (y1-y2) / (x1-x2)**

and with the atomic granulation by dx=1 follows:

**f'(x) = (Impulse A - Impulse B) / (x - (x-1)) = (Impulse A - Impulse B) / 1 = Impulse A - Impulse B**

This means that a subtractive potential accumulation is a differentiation of two simultaneously active impulse streams. It is possible to differentiate without consuming the original impulses by mirroring them for the given operation. Subtracting needs more than two sources of impulses (axons at a node) with exactly two types of polarised impulse interpretations involved in this process. The two summed Potentials arise from two distinct Impulsetypes. Subtrahend and minuend form one or more pulses from two different types of transmitters (pulse). The subsequent subtraction process produces the differentiated potential stream.

### Quantization of Impulses: Summarized potentials.

The aggregated information is combining several pulses into one. The impulse potential, with the exact position in the network, contains the aggregated information. The network pattern at the merge position is susceptible to recovery by direction reversal. The needed countereffect is the quantization of pulses. The reversal of the condensed impulses would then be a form of information recovery. This information originated from any kind of input (pattern of impulses in a network) and can be more or less consciously assembled, addressed, and retrieved. The input effect is summarising, and the reverse effect is quantizing. The retrieval of a summarised set of information, a pulse pattern in a network, is initiated by a single impulse and results from the quantization process.

**Quantizing:** From one incoming impulse at the node creating many outgoing.

### Reproduced and quantized Impulse potential

- Quantization is the decomposition into atomic (quant) pieces of information (Impulse), where several axons simultaneously receive their Impulses from a single node.
- It's implied here that mirroring means that impulse potentials are accurately transmitted.

### Polarization and common interactions of individual node types.

Several considered orientations:

- Influencing the Impulse flow
    - According to the EM-Field:
    - as a choice of the outgoing axon at the dendrite.
    - Increase or decrease of impulse potentials
    - Increase or decrease of a potential threshold
    - Attraction or rejection of neighboring Impulses
    - Only polarization to influence the surrounding Neurons
    - No effects on individual transmitter types (not susceptible to polarization)
- Influence on axon formation
    - Increased field strength and thus the range of axon formation
    - Change of electromagnetic field lines

It also requires a pulse potential intensity and a range of interactions and can be likened to the logic of different neurotransmitters in the human brain. And especially the subtypes. For Example, the attraction and repulsion of transmitters affect impulses by EM polarisation. Therefore, passband limitations in neurons could make the polarisation last longer or reduce the threshold for the signal transmission effect. The information is then selectively transmitted to another axon. Quantization would be an all-in, all-out construct in which all axons of a given transmitter type pass and mirror the impulse.

## 2. multi-asset nodes: active versatility of individual nodes.

### Multi-Asset-Nodes

However, the need to distinguish between nodes based on different receptors and transmitters, as well as their union, creates the need for multi-asset nodes. In these multi-asset nodes, oligopolistic logics of node types emerge under defined conditions. The formation of multiple origin links through axons has to be formed, therefore.

Here is a list of node logics to use:

### Differentiation of node types according to

- additive behavior
- subtractive (differentiating) behavior
- Culvert boundaries
  - temporally summarizing behavior (accumulating potentials)
  - Passage threshold for Impulses
  - muting behavior
- mirroring behavior
- merging and quantizing behavior

There remains the delineation of different control logics defined by variable node types, with variable receptor and transmitter logics and an isolating separation as it normally would happen through the meninge. Variable receptor and transmitter logics in this context mean the behavior inside a node, where incoming Impulses activate one or more specific transmitter types, causing a specific behavior of the node.

### Different ways of branching:

- A => B
- A <= B
- (A+B) => C
- (A&B) <= C

### Bridge building according to impulse interaction rule 1:

1. Node type X ⇔ Node type X:

2. A bridge is formed between two identical node types
3. Node type X ⇔ Node type Y:

4. A bridge forms between two distinct node types

For Impulse Transmission modes with a variety of types

- One Impulse Activates all node type-specific interactions given in the node together
- Node input to node output as node-specific behavior
  - $Input\!: \; nodeA(\; Impuls\; Types(\sum i, n \;|1 \leq i \leq n))\; with\; n \;=\; Count\; Types$
  - $Output\!: \; nodeA(\; Impuls\; Types(\sum i, n \;|1 \leq i \leq n))\; with\; n \;=\; Count\; Types$

**Premise:**
**Input Type <=> Output Type**

The area of entry of impulses from the axon into the neuron could, for simplicity, be defined as a circular area on a spherical surface. This view is necessary because it is also possible for the entry point of the transmitted input to partially overlap with existing axon entry points of other types. Thus, all types of neurotransmitters that overlap with the entry zone will be triggered. Even different types of neurotransmitters. Depending on the surface of the node, this takes place by overlapping areas of other axon entry points. The shape of a node, defined for simplicity as a sphere, reduces the number of operations to be processed: the axon entry zone at a node could simply be an area on a spherical surface. The surface consists of overlapping areas with possibly different types of neurotransmitters. On the inside are the different neurotransmitter types of a node, mapped as circular surface projections from the outside of the entry points. The inner areas may overlap with zones of different types. As the input angle activates an area of possibly different transmitter types, this node then transmits impulses of different types along corresponding axons away from the node. More on this in Chapter 7: Neural Genesis.

### Inner polarization of a multi-asset node

An internal polarization of a node generates outward EM fields, which could cause impulse flow interactions. These could cause a targeted change in the output axon. An Example:

A type 'A' impulse arrives at the multi-asset node 'G1' and by the nearby active node 'G2' polarized. The chosen axon changes by EM field strengths from nearby active (polarized) nodes. A change of the chosen outgoing axon from "G1 => G3" to "G1 => G4", for example, can take place when an impulse does not choose the standard axon due to the polarisation of nearby neighboring nodes. The transmission path could be affected by the EM field at this impulse-containing node. There may also be a mix of impulse types, with different impulse types emitted due to overlapping type areas in the input zone. By changing receptor types, subtypes of a transmitter, and overlapping types, further variations emerge.

## 3. transitive dependencies: Translation of information

### Explicit transitivity and pass-through controlled transitivity

- Explicit transitivity
- All kinds of Impulse potential transformations (additive, subtractive, reduced, amplifying, and possibly more)
- Controlled transitivity
- Here, impulses arriving simultaneously or successively in a short period, or accumulating with a time-dependent loss of potential, are combined to emit an aggregated impulse when a breakthrough potential, defined by node strength, is reached. Strong nodes imply, for example, high thresholds for impulse transduction to an outgoing axon.

Usability of Impulses-controlled passage levels

In various correlations, pulses with their transported potentials must disappear or be damped. A subtractive potential conversion alone could be overwhelming. Also, the derivation into actions might be able to do this only to a limited extent. Enrichment with quantized or amplified pulse patterns would result in more overdriven and interfering patterns. The transitive reduction with a passband threshold or direct impulse reduction could normalize this excess. The solution is to use transitive behavior. The potential scaling can:

A. Selectively reduce or eliminate excessive impulse potentials

B. Reinforce impulses to keep information actively stable.

These conditions control the amount of simultaneous pulse information. The necessary control of the impulse threshold (transitivity logic) and the impulse reinforcement describe the behavior above. Thus, transitive control can reduce or amplify output signals in a targeted and precise manner. By accumulating several pulses and translating them scalingly to amplify or reduce output signals.

## 4. neural range separation

### Demarcation of different dedicated areas

The demarcation of dedicated areas isolates the chaotic, complex interactions and allows meaningful processing in a demarcated network area. These demarcated areas prevent independent or unrelated facts (information) from being associated too early. They could be influenced in a mutually disturbing way by foreign impulse potentials in the vicinity. Thus, a closed or demarcated processing area offers a meaningful processing of information. That includes information processing of all kinds and at all levels.

## 5. vitality, strength, degeneration, and renewal

Taking into account a given vitality of axons and nodes with specific potentials of impulses, the effects on nodes and axons result in a regenerative, degenerative, or even damaging behavior. Different characteristics are possible:

- Immediate and sustained change in behavior and network due to pain and trauma constructs that result from excessively elevated intensities of impulse potentials with detrimental effects.
- Forgetfulness due to structural degeneration (caused by lack of renewal of structures)
- Reinforcement of information structures by repeated imprinting
- Increased transitive accumulation and passage threshold in strong nodes.

# Chapter 4: Breaking the layer logics

## 1. Levels of Sensors

- Sensors outside the neural network can be considered real-world sensors
- Sensors within the neural network should be treated as part of the information flow control.

## 2. levels of Actors

- Actors inside the STN can be defined as impulse emitters.
- Actors outside the STN: Possible Actions of the Artificially Intelligent - Form of Existence.

## 3. layer concepts

From a given point of view, there are three layers:

1. Sensor Layer
2. Processing Layer
3. Action Layer

These 3 Layers act in the way of **<Input ->(Processing)-> Output>**, which means:

- Sensors act as input generators
- All handling in between Sensors and Actions has to be assumed as part of the processing layer
- Actions are about how the information is emitting as responsive output.

## 4. processing layer (inner layer)

Processing layers of information do not exist in neural networks as atomic elements, just the opposite. The Abstraction of the outside or the inside lets the inside STN look like a processing layer for the outer STN side. Thus, all structural abstractions defining a process layer, having the Sensors and Actors outside a defined processing area, commonly match this definition.

## 5. processing levels of Impulses

The Neuro-Genesis and the spatiotemporal impulse approach, with patterns of near-field effects of different node types, cannot be separated here. But we still have to distinguish the effects by

- Impulse flow direction interactions and type definitions about impulse flow control in nodes, considering near-field effects.
- Near-field effects in nodes generate axons, nodes, and interactions through nearby active nodes.

## 6. reconstruction of Impulses

For the reconstruction of information, we need to generate Impulses. That is related to the Impulse generation for the quantization from a single Impulse to the whole information. A reconstruction of summarized information (multiplied pulses from a single pulse at a node) is possible through quantizing or mirroring to generate additional pulses. On the other hand, transitive accumulating may also be affected, as Impulses are collected there.

# Chapter 5: Near field effects

## The CREB-1 dilemma

For the first fundamental theorem, a protein that orients itself towards electromagnetic fields is deduced. In this context, isolated CREB-1 proteins are relevant in various studies. Therefore, in the following, this effect is attributed to CREB-1 proteins as a proxy. For reasons of computational complexity, we avoid CREB-1 calculations, except for a possible fictitious growth measurement in the form of distance reached per time.

## The Dendrite Theory

The dendrite theory goes along with the approach of a genetic predisposition to the formation of tree-like branched structures. This is meaningful in the context of the germ growth, the Super Seed, but not in the context of the information storage in the learning process.

## The magic of concatenating closely spaced nodes

By chaining nodes with axons among each other, the structure for mapping information is defined, which can then be reactivated by Impulses. This effect must be limited so that not everything gets hopelessly chained. Luckily, the not-used structure degenerates again and counteracts it. According to the electrical potentials in the individual nodes, this dynamically determines the range of a possible concatenation. Thereby, proper scaling favors a magical behavior. The "magic" of a well-scaled connection range is the advantage of meaningful complex context that is connected, as thereby an accurate information mapping is managed. More detail in Chapter 7: Neuro-Genesis. With a badly designed scope for cross-linking of nodes among themselves, a total cross-linking would be as a natural limit defined. In contradiction to this and based on degeneration for no longer used axons and nodes, a releasing effect would take place and counteract reaching this limit, representing the Polymorphie of PODANI Networks.

### Limitation of the near-field effect

The spatial limitation of information that can be chained allows the reconstruction and delimitation of the patterns that caused established chaining. Thus, only small amounts of information are concatenated at once, which, however, can represent partial complex facts across several different zones. For a targeted information reconstruction across several zones, there is a need for an accurately scaled chaining range on the one hand and an overloading problem through too many associative connection structures on the other hand. Such overloaded associative connection structures won't chain up meaningfully and could make it even harder or impossible to recover meaningful enough information.

These overcharge problems are defined as follows:

- Too many simultaneous Impulses
- Too wide chaining restrictions

In connection with the algebraic necessities and the near-field effects, they lead to "Noise" - signal noise, which negatively influences finding an adequate solution. Therefore, it requires possibilities to modulate noise by

- Attenuating systems for less signal noise
- Generally regulating systems or logic

Reduced signal noise is necessary to delineate different areas. These should united using only a subset of the total active information. But they shouldn't be distorted by impulse and signal noise because their accurate reconstruction might be impossible. This effect is caused in humans by the shielding effect of the meninges but would be negligible in the context of emulated processing. As the separation can be pre-defined in the virtual domain, separate spatial mapping computations with an isolation layer are unnecessary. Still, adaptive transitions are required to make the whole network appear interconnected.

# Chapter 6: Retaining, remembering, and reconstructing information

## 1. Circular flows: Obtain information without changing the network

- Information can remain persistently active through circular impulse streams.
- By mirroring Impulses from the Stream of circulating Impulses or parts, Information is kept active, and Impulses diverge to trigger the start of further processes.

A further control effect of these circulating streams demands more than the other interaction rules.

## 2. Quantified information: Creating and restoring

Impulses that arise from a merged set need a reversal effect for restoration. To restore the information pattern from the merged impulses, It has to quantize (break down) a single impulse into many information quants (single impulses). For more information, see Chapter 3.1 Quantization of Pulse: Combined Potentials.

## 3. Short-term memory to long-term memory

In terms of human short-term memory and long-term retention, this is a phenomenon that PODANI Networks can take into account. It is a limited set of impulses that keep the information circulating in short-term memory so that it can appear in long-term memory. The speed depends on the intensity of the perception (size of the impulse potentials) and the associative diversity; Both aspects increase memorability. Here, long axon travels are a criterion for why we cannot internalize complex or complicated things immediately and at once. Otherwise, the CREB-1 dilemma applies and can mimic a brain to a limited extent by parameterizing concatenation ranges and growth rates.

# Chapter 7: The Neuro-Genesis

## 1. Neuro-Genesis (formation of neural nodes and axons)

Neurogenesis is the independent creation of new neural structures. Thus, new nodes and axons are automatically created or degenerated under certain conditions. The aim is to achieve a learning capability of the AI-FOE in free operating mode, which produces meaningful results through intelligent learning without human intervention. Also, the structural polymorphism by created, maintained, and degenerated structures through the Neuro-Genesis behavior is the subject of independent improvements of an AI-FOE.

### The formation of Axons

The first of the two Fundamental-Theorems describes the formation of new axons between two simultaneously activated nodes. Nodes are active by definition as long as they contain Impulses. Between two neighboring activated nodes, a connecting axon, if not present, arises immediately. However, this axon only arises up to a certain distance, which has to be scaled correctly and based on the intensity of the node's EM-field. A growth of axons is in the sense of a slow dendrite formation ignored here. Linking the range of formation of axon connections to the electrical potentials in the nodes seems to be sufficiently dynamic and convenient.

### The formation of neuronal nodes

The position for the Origin of new neuronal nodes must be on an axon, or they will never receive Impulses. Beyond the super seed at the beginning, where nodes subdivide long axons, crossed axons (nodes of axons)  are the best place for new neuronal nodes. Therefore, we define new nodes at crossed axons. Because of simplicity, we calculate axons as a direct connection between 2 nodes, and we have to define a node that is not on the direct/straight connections.

### Axon grew between nodes

Directly or according to patterns of electromagnetic fields?

Electromagnetic fields would cause different axons to cross specifically and form a node at this point. As a virtualized mimic, this is very complex. In virtualized mimics, the reach of the Neuro-Genesis effect would be an easy approach to use. The neural genesis radius is the distance from a node to any other nodes with which axons can establish a connection. In a constant neural genesis radius, everything within this range is simultaneously active and will become connected through extra new axons. Furthermore, an accurately defined range can adapt to differences in dynamic impulse potential intensities. Just as a new node should best emerge in the middle between active nodes, it develops an instant meshing with the other neuronal nodes.

## 2. calculation for an appropriate site for originating a node

Using a spatial center between EM-Field potentials of the impulses distorts the space so that **$f(X_{Radius})$= potential/distance** defines a simplified calculated, specific location of a new node. The node is in the spatial center of all included nodes. It can also be defined as spatially offset for better location assignment, according to the potentials.

A short explanation, therefore:

By spatially distorting the target position according to the impulse potentials, these nodes then have better information content. Future connections can advance from the position selected more precisely. This exacter position contains a more precisely tuned information binding for subsequent information entities.

### Simple 3D Example calculation for the origin of a new node:

3 nodes A, B, and C with
A (X, Y, Z) = 0,
B (X, Y, Z) =
C (X, Y, Z) = 3,4,

3 potentials Au, Bu, and Cu with:
Au = 10V,
Bu = 50V,
Cu = 100V
and r as the distance between two nodes

| | | | |
|---|---|---|---|
| AB: | fx(A)=r*(Bu/Au+Bu) = 3* 50/ 60 = 2.5 | | => 2.5, 0.0, 0.0 |
| BA: | fx(B)=r*(Au/Au+Bu) = 3* 10/ 60 = 0.5 | | |
| AC: | fx(A)=r*(Cu/Au+Cu) = 5* 100/110 = 4.545 | sin/cos 60°/30° | => 2.7, 3.6, 0.0 |
| CA: | fx(C)=r*(Au/Au+Cu) = 5* 10/110 = 0.454 | | |
| BC: | fx(B)=r*(Cu/Bu+Cu) = 4* 100/150 = 2.666 | | => 3.0, 2.7, 00 |
| CB: | fx(C)=r*(Bu/Bu+Cu) = 4* 50/150 = 1.333 | | |

Now the center point is formed

| | |
|---|---|
| AB: | = 2.5, 0.0, 0 |
| BC: | = 3.0, 2.7 |
| AC: | = 2.7, 3.6 |

| | | |
|---|---|---|
| ABC: | = | f(x) (2,5+2,7+3,0) /3 = (2.7, ?.?, |
| | | f(y) (0,0+3,6+2,7) /3 = (2.7, 2.1, ?) |
| | | f(z) (0,0+0,0+0,0) /3 = (2.7, 2.1, 0.0) |

Node D is created at the coordinates: f(A, B, C) = (x=2.7, y=2.1, z=0.0)

## 3. further illumination of Neuro-Genesis:

Considering receptor and neurotransmitter selection, multi-asset node types will form, which process the transmitted information with selective choice, from input to output. The choice of receptors and neurotransmitters in a node could be determined by:

- The neuronal transmitter type equals the receptor type and vice versa.
- This results in local dependencies.
- Interactive dependencies, such as entry angles and interactions between the active multi-asset nodes with each other.
- Regulating interactions with other active nodes

Rules about auto-generating possible multi-asset behaviors are missing.

**Depending on the Impulse potential, areas emerge at the spherical entry points, which create overlaps of the transmitter-type logic in this area at the entry point.**

- Furthermore, Impulses in the axons are necessary to cause
- a regeneration or hardening of the axons
- induce node formation by crossed axons.

Therefore, the effect of CREB-1 protein should be thought of again in EM field-induced axon formations and dendrite growth. In this context, it would also lead to long concatenations on electromagnetic field lines.

# Chapter 8: Drive of AI-FOE Basics

This chapter is dedicated to the Motivation and Driving Principles that are driving the AI-FOE. These are principles that constantly activate an AI-FOE to bring it to life, while simultaneously slowing it down to avoid over-activation.

## 1. activating concepts

To wake the AI-FOE from a state of rest, signals are needed that result in activity. For this, a subset of the AI-FOE must remain active or receptive to detect the waking signals. Example: A motion sensor activates the AI-FOE.

- Trigger signals
  - on the sensor level which triggers processes. Here, signals are fed which start various primary processes.
  - Self-assessment provides signals from processing information that generates triggers for actions. This corresponds to a filtering of signals before an activity trigger results in a reflected action.
- Forms of waking signals
  - Motion sensor
  - Acoustic alarm
  - Optical alarm
  - Being that the AI-FOE activated by a switch
  - Signals from preprocessing
  - Time: Activity only at certain times

## 2. Deactivating concepts

For putting the AI-FOE into an idle state, triggering events are required that signal the AI-FOE to deactivate. In this case, the AI-FOE is either partially or completely shut down.

- Trigger signals
  - Missing activity triggers: If no tasks are pending, then the AI-FOE should deactivate itself
  - Time: Activity only at certain times
  - Low electrical: When self-observation of one's electrical reserves reveals a condition in need of treatment, in the sense of a renewing recharging process.
  - Through signals from sensors
  - Through signals from residual processing

## 3. Virtualization of pains:

Pain immediately changes our ways of acting and thinking (black pedagogy). Pain drives us, and our reflexive actions usually save us from harm. Thus, pain is a driving or nudging factor for becoming active and acting. It is conceptually indispensable to successful AI-FOE design. We emulate pain with exaggerated Impulses, and as a result, axons and nodes change. We need a scaling from when it triggers consequences. Regarding the calculation of static scaling, alternatively, the calculation can take place dynamically via the strength of the axons to impulse intensities.

- nodes and axons change immediately, permanently, and seriously
  - Nodes
    - Transmission of impulse potentials is jammed (pass barrier or increased threshold passband)
    - Excessive impulse Potentials as a result of it
  - Axons
    - Provided axons are temporarily damaged and then avoided
    - excessive Impulse-Potentials of transitivity effects with harming surges
    - alternative behavior as a result of it
- Consequences of the surges
  - Causes Strong Signal Noise
  - induces further surges and causes possibly expanding harmful changes
  - causes strong polarization in reflexive reactions
  - Requires rapid spatially propagating attenuating action to keep subsequent damage development small,
    - comparable to an endorphin flood anesthetizing against neural trauma formation
- Restoration of the healthy state through
  - Neuro-Genesis: renewal and degenerating of existing structure
  - Restoring an environment close balance of the impulse potentials
  - Derivation of the tensions across the action levels

# Chapter 9: PODANIN in free Operations mode

## 4D Impulse Algebra and Neuro-Genesis in Free Operation

### 1. Flow structures in growing networks

- Are determined by a spatial limitation and a super germ flow direction in a specific area
- Different areas mean a mutually independent way of processing and should be connected or crossed with the other areas in time for the unity of the whole.

### 2. control of the Impulse flows

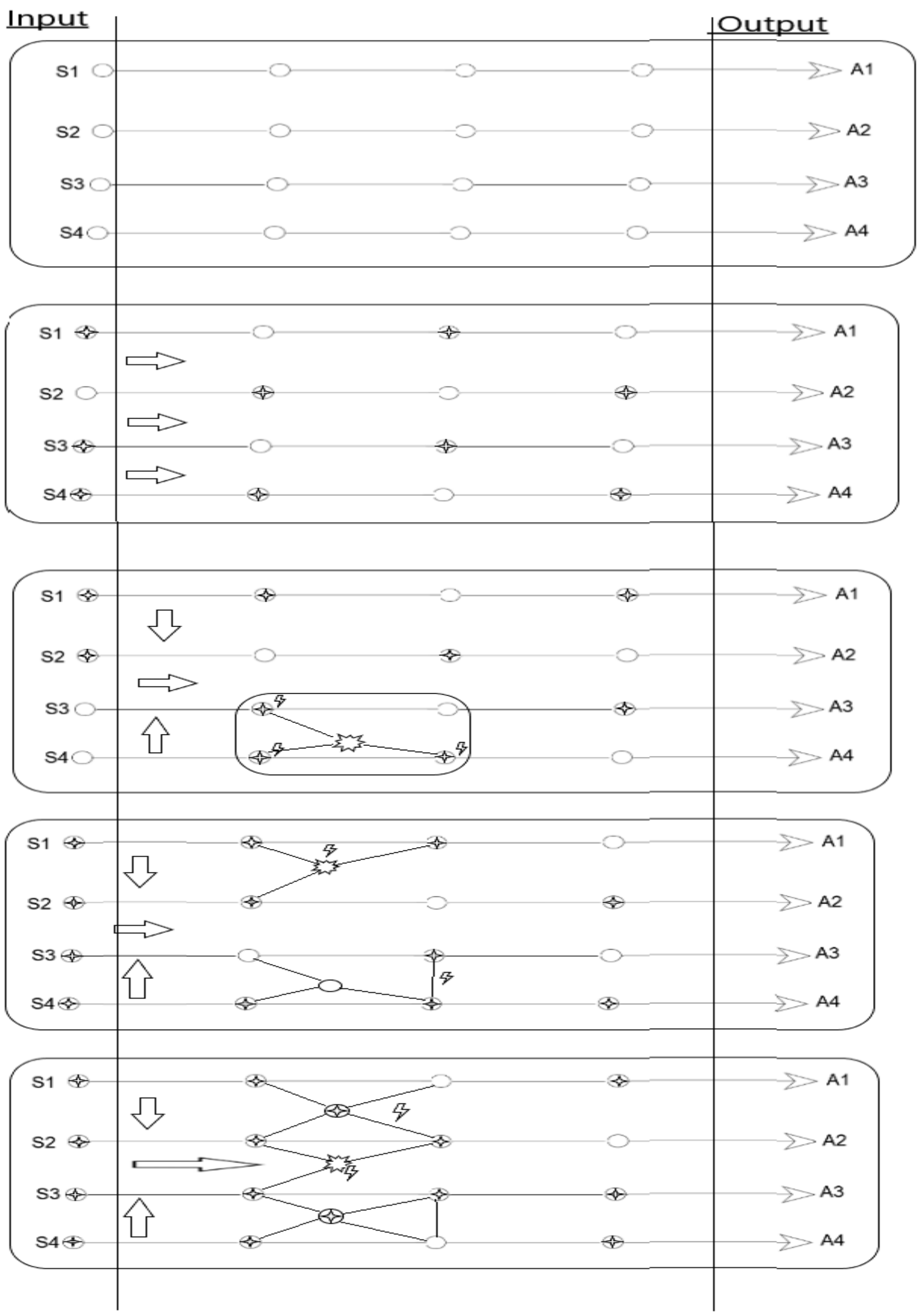
- Sensory input
- Preparation levels with refinements of the grown structure
- Processing layer
  - Various preparation levels with refinements of the grown structure
  - Intermediate output levels and tapping of results from processing
- Transition layer between the areas
- Output to the continuing (action) layer

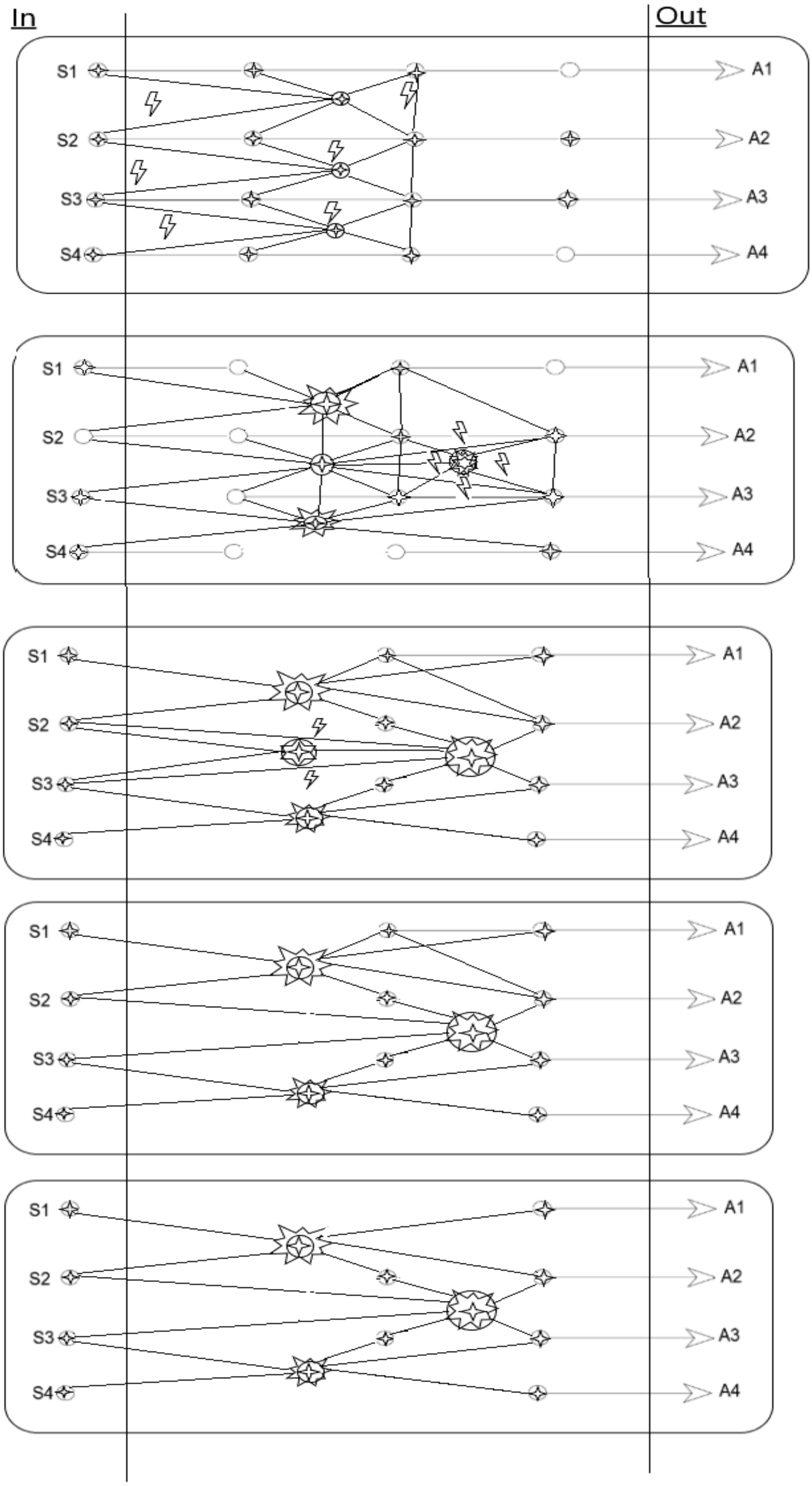
### 3. Uncontrolled neuro-genesis effects

- Axons
  - Thanks to subtypes (comparable to neural transmitter types), neural or nodule flow control is continuously guided to the next level by polarization as designed in the super germ.
  - However, if the super germ infrastructure is already in a structurally changed evolved state, even predetermined flow directions are no longer guaranteed.
- nodes
  - Multiple active nodes in an information-mapping area favor the refinement of polarizations and thus the interconnectedness of closely neighboring nodes in terms of associative binding and bridging
    - This process deforms the structural framework from the super germ
    - reduction of unused and orphaned axons and neural nodes

## A Diffuse Example of an Automatic Network Transformation

This section presents a diffuse Example of the network transformation that PODANINs create with Neuro-Genesis concepts automatically. The following Example is just for a demonstration of a possible transformation process. This process has various not specified or determined behavior of the nodes. Therefore, it is to accept that whether everything develops meaningfully or not, this Example's purpose only presents the automatic Neuro-Genesis effects, not a logically fully functional working AI-FOE Example as presented in [Chapter 2 - Example of an Auto Actor Model](#).




In
Out
S1
S2
S3
S4
A1
A2
A3
A4

**t0:**

The first image shows the Super Seed defined for this example. It consists of 4 independent processes, none of which are already meshed. Each of these processes could also represent a neural network. This abstraction behaves as if it were congruent with the structure shown in the Super Seed. These branches in the Super-Seed are identical axons, or cable lines, and connect with straight direct axons between nodes from the sensor side (input) to the actor side (output). Thus, these independent use cases are each drawn as straight axons parallel to the other use cases. It's divided through 3 subsequent organized nodes.

**t1:**

The first shown Impulses in the original Super Seed structure in the accompanying diagram are as 4-sided stars in the center of the node pictogram. The connections of the nodes are in the pictogram as straight and continuous lines for the axons. There is no near-field neurogenesis effect in this image. The initial pulse pattern prevented the nodes from activating. There weren't any nodes containing impulses, and being sufficiently close to the electrical energy potential of the impulses entering the nodes to emerge a neuro-genesis effect up to that point. The main directions of the flow of impulses are in this diagram as bold arrows indicating the main direction of flow.

**t2:**

The progression of the impulse streams in the neural network has changed the pattern. Now activated nodes in sufficient proximity start a neuro-genesis process. Axon formation occurs between active nodes. Crossed axons form out as a new node. The crossed axon will immediately or soon become a fully functional node. The Neuro-Genesis effects are indicated in the pictogram by lightning icons.

**t3:**

The crossed axon emerges as the first new node, and further Neuro-Genesis effects evolve.

**t4:**

More and more axons emerge as bridges between nodes. Some close and active nodes are producing crossed axons, so nodes are also starting to emerge. The amount of change is already huge at this point. An intermediate network of all related independent processes is developing.

**t5:**

The high activity causes many new axons to form, and some of the new centralized nodes are strengthened by, as part of another Neuro-Genesis effect.

**t6:**

Unused Axons start to degenerate and vanish. The missing structural renewal from missing impulse transports causes this. New and significantly bigger nodes appear, caused by the upcoming traffic amount. The Impulse potentials cause enriched EM-Field effects.

**t7:**

A fundamental network transformation process is now clearly recognized in the associated picture. It is already well advanced but has not yet the approximately expected final structure pattern formed.

**t8:**

The structural network continued to develop as the transformation process progressed, with strong knots forming and unused axons degenerating completely. Subsequently, some nodes lost all axons and were eliminated immediately from the network. It is not necessary to simulate the process of node degeneration because lost nodes can never receive impulses to activate them. So they can never connect to a network again. Nodes are eliminated as useless or dead parts of the transformation by immediate deletion when they reach a state where all axon connections are lost.

**t9:**

In the final image, a seriously changed neural network remains. It has evolved automatically through the Neuro-Genesis concepts. The original structure of the Super Seed has become unrecognizable here, as it has undergone major changes as the changes have evolved. The number of neural elements changed from t0, with 16 partial axons and 12 nodes, to 18 partial axons and nine nodes in t9. Also, the independent processes are now meshed together. Perhaps the t9 mesh looks a little unoptimized with the two single-axon dividing nodes, but these could be points of active information in a future transformation.

# Chapter 10: AI-FOE Design Concepts

## 1. Structural recommendations

- To the outer side delineated areas
  - Separation of independent information types
  - For closed areas of distinct information topics, this would make concatenation only through Associative features within this information type to similarities available.
- Merging regions
  - Unification of different types of information
  - Transitions in the information
  - Unification of partial information
- Controlling regions
  - Processing according to the EVA principle
  - evaluation
  - influenced action from polarization in closer proximity to the process itself
- Circular structures
  - Short-term memory
  - Circular Process Flow of closed topic areas in the whole network system
- Derived structures
  - Actions
  - muting logic
    - loops for reducing the noise of Impulse Potentials
    - spatially spread of attenuation for throttling the node's functions
  - derivation of impulse streams
    - Into grounding
    - to accumulate charge

## 2. paradigms of a self-assessment

- Implicit control behavior
- Super Seeded evaluation logics; see Auto-Actor-Model
- Ambivalent polarization for self-assessment
- Mutual interactions of active nodes with in consequence:
  - Impulse redirection
  - Neuro-Genesis: nodes and axon formation
- Emotional structure: Automatic, Super Seeded Evaluation Mechanisms.
- Learned assessments should cross spatially associative
- pedagogy of AI-FOEs drive
  - Evolve a comparing (differentiate) the quant- and qualities, ability.
  - aligning the individual AI-FOE drive to needs and desires.
  - Damage prevention; risk assessments
  - Triggering of "pain" must lead to an immediate change in behavior
  - Pain avoidance As a result of pain experiences.

# Chapter 11: Multi-Asset Nodes - structures, patterns, and designs

## 1. Type A => B Impulse redirections

Logically related, independent information and processes can have common subsequent actions. They behave like independent Networks and are subsequently processed. As in the example of the auto-actor model earlier in this document, the impulse of the eating process became redirected to the network of evaluating a feeling of satiety. That means No eating, no satiety! Eating stops as intended by the satiety signals that indicate satiety and cause an impulse redirection.

Switching between related, subsequent, and independent information meshes:

**A => B Impulse redirection**

## 2. Different types of merging and quantizing information.

Multiple nodes could handle quantization in this way, and this creation and recovery requires a specific neurotransmitter. Thus, various transmitter types from even more axons could interact independently. We define that the transmitter is equal to the receiver neurotransmitter and that there are logics where one neurotransmitter influences the behavior of the others or does a quantization with only one type of transmitter.

## 3. Self-Optimizing through circular flow

Learning processes can be established through circular flows.

The cyclic flow could be divided into subsequent sections of processing as follows:

... -> Sensor -> Decision -> Action -> Evaluation -> Repeat -> Sensor

Explanation of different sections and their cyclic interacting behavior:

- **Sensor:** This is where the external input redirected into the neural network. This input area initiates all further processing.
- **Preprocess Action:** The Sensor Input is processed to choose the action to reach the desired result.
- **Action:** The flow of impulses that originates here serves to control and assign everything from a single action to a whole complex of actions. To keep the circular flow intact, we need to branch off Impulses by mirroring or generating through quantizing these extra Impulses
- **Evaluation:** The Evaluation process is the differentiation of given results and comparisons with past experiences. This section then starts sending impulses into the preprocessing section to thereby possibly influence the selected action.
  This section then induces evaluated impulses as part of the Sensor and Preprocessing Input to influence this cyclic flow.
  The changed Impulse patterns are part of the self-optimization process through comparing results and self-changing their further acting.
- **Repeat:** At this point, we start over at the Sensor and Preprocess sections.

## Chapter 12: Recapitulation / Formulary

### 1. Fundamental Theorems of 4D-Impulse Algebra and Neuro-Genesis

The data type of the information - an Impulses - can be described best as a signal representing a dynamic scalar- or boolean blob.

#### Impulse Interactions Rules

1. Nodes connect with new axons in different expressions.
2. Impulses branch by mutual influence according to different defined cases.

#### Neuro-Genesis Rules

**1.** Axons arise as bridges between nearby neighboring nodes, which are simultaneously active.
**2.** The axon pathways originate on the EM field lines that bring about the Impulses.
**3.** Axons are not necessarily one-way streets.
**4.** Nodes subdivide axons into meaningful lengths.
**5.** nodes arise at crossing axons.
**6.** nodes are formed either
**7.** a. immediately,
**8.** b. with a period of formation,
**9.** c. during periods of rest,
**10.** d. by gating with Impulses
**11.** Axons between the different node types define themselves automatically, according to the principle: origin type = target type
**12.** Depending on the typing in multi-asset nodes, type changes of the Impulses in the nodes occur due to internal polarization, passage limitations, and overlapping of transmitter and receptor types (subtypes)
**13.** Passage limitations can be reduced or increased by EM sensitivity
**14.** Depending on the Impulse potential, radial surfaces emerge at the spherical entry points. They scale as potentials related to their radius. These generate superpositions of the transmitter-type logic in the sphere, as a circle, at the entry point.
**15.** Node type conditional polarization: According to different criteria for joint interaction.
**16.** The vitality, strength, and conservation influencing node properties
a. Immediate and sustained changing of the network operations.
b. Pain and trauma
c. Forgetting due to structural degeneration caused by lack of stress in the area.
d. Strengthening neural information structures by repeated renewal of the structure by impulse transport streams.
e. Transitive behavior, nodes strength to Impulse potentials

## 2. Axons, Nodes, Impulses, and EM fields

### Axons

- transports Impulses
- arise between 2 active nodes on electromagnetic field lines
- Axons become stronger and more resilient through renewal which emerges from usage as Impulse cable lines.
- Axons would constantly degenerate in strength, thus resilience
- if they wouldn't experience structure renewal through recurring use
- Nodes form at crossing axons
- Axons are not necessarily unidirectional

### Nodes

- nodes arise on axons
- Nodes subdivide axons into meaningful lengths
- New nodes arise at crossing axons
- Multi-asset nodes harbor different transmitter types in their inner
- Accumulating, limiting, and scaling Potentials of Impulses
- The transmitter types are on the inner side of the sphere surface representing the node.
- They follow the premise: "input transmitter = output transmitter".
- Additionally, overlaps in input zones always mean that the transmissions of all transmitter types in the input zone of this axon take place.
- The transmissions will consist of their transmitter types as well as of the foreign types. By overlapping zones from other axon entry points, all in this zone given transmitter types trigger with an at exactly this entry point arriving impulse.
- Nodes are activated when an impulse arrives
- Active nodes influence each other
- The impulse paths are influenced by internal and external EM fields.
- Input Neuro-Transmitters types equal (always) also output Neuro-Transmitters types.

### Impulses

- are transporting an electrical potential
- polarize and activate nodes when they arrive there
- influence and shape the EM field
- affect maintaining, strengthening, and growing axons and nodes.

### EM fields

- Impulses generate the EM fields
- The meninges shield the individual EM fields from each other and strongly attenuate them.
- EM fields polarise the nodes so that they control the trajectory of the impulse.
- EM fields determine the formation of new axons
- EM fields influence the neurotransmitter actions in nodes and change impulse flows as they attract or repel neurotransmitters.
- The EM field lines establish the spatial formation of axons away from the shortest connection and allow axons to cross each other