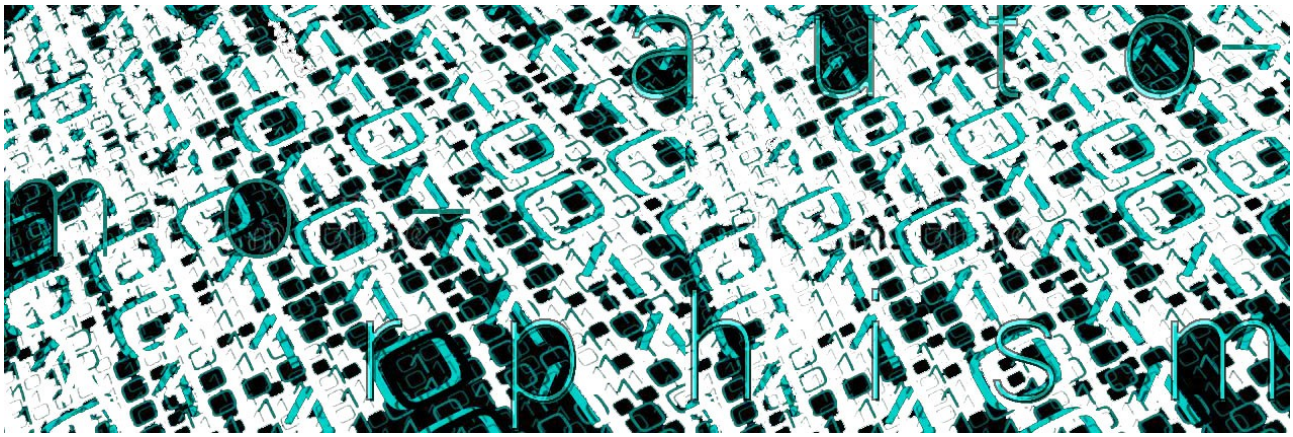

automorphism

Composition:

otémórfik

(Recollective Cognitive Retrieval)

sections: (1-32)

Composer:

Dimitri Voudouris

Composed:

[2021 - 2022]

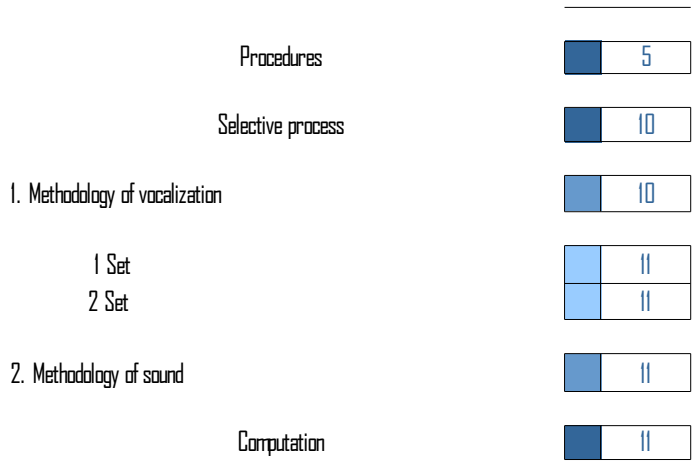
Duration:

40 min 06 sec

Voice Text
(five artificial voices)
Mbrola, Praat, modular and C++ granular synthesis
with computer-assisted processings

(Inscriptions, incomplete environments, recollected and retrieved)

In memory of my mother
Alexandra Voudouris
(1928-2022)


Procedures
5
Selective process
10
1. Methodology of vocalization
10
1 Set
11
2 Set
11
2. Methodology of sound
11
Computation
11

Physiology of encoding information

The hippocampus is an area in the brain involved in storing and retrieving memory. An important process in encoding (sensory, short or working, long term – implicit, procedural memory which depends on semantic/automatic retrieval process once the cues and context taking a variety of forms on the task provided are in place) memory and the rate of retrieval. Visual and temporal areas are reactivated through the hippocampus which binds them together. The speed of memory retrieval depends on the activation of neural pathways described according to duration. The recollective process is described in three stages - **Free recall** of list order, **Cued recall** use of different hints and **Serial recall** in a sequence of occurrence.
Memory recall includes the retrieval of information from storage and inspecting the authenticity of the retrieved information. Encoding specificity is an advanced theory that explains memory retrieval by following the context situation in which memory was encoded and retrieved. Different types of memory retrieval include recall, recognition, recollection and relearning. Many areas of the brain are involved in memory retrievals such as the prefrontal cortex, areas of the temporal lobe and cerebellum. Some evidence does exist about the formation of false memories during the recall process. Hyperthymesia is a phenomenon that refers to the ability to remember minor details of events in life. Involuntary memory retrieval involves both autobiographical and semantic memories.

Computer memory information retrieval (the automatic retrieval component) is based on the way the information is represented once a cue (exactly what is specified by the user) is given, it is no longer under the control of the user. The strategic component permits users to provide additional information on what they want as they become clearer on the structure of the information. IR represents features used in the text in the latent semantic indexing to avoid some of the problems of being direct text objects instead representing higher-level text associations. This makes it analogous to representing higher-order features of information.

Similarities and differences between human and computer memory

Computer and human models use similar representations of information and similar methods of matching the information.
Computer retrieval does not have the rich encoding of information and does not use as much context for this encoding as do humans. This results in a much more impoverished representation of the information, providing fewer retrieval paths. Humans have a semantic feature while computers use a surface feature-based representation of the information. Computers would need to use good encoding strategies to determine what features of any piece of information should be stored as context. The retrieval systems retrieve only small amounts of the relevant information, in contrast to human memory which is fast in retrieving relevant information. Humans use strategies to store and retrieve information from their memory. Familiarity with the structure of the information stored and the cues that can be used to retrieve it since they did the initial encoding. The information retrieved from the computer directly depends on the information saved (a file saved when encoded correctly the same file will be retrieved) whereas from human memory fragments or complete information is retrieved.

Procedures:

Events that occurred three decades ago were recalled through various sound materials and inscription information data made from the same period. Part of this information was stored in physical memory and dispersed over several old computer hard drives, scattered in unfamiliar locations. Retrieving information from the computer the unfamiliar challenges faced is in the organization and availability of information. Specifying retrieval cues to the system is pointless since the names of the

folders/files were altered with an inability to judge the relevance of the retrieved information. Retrieval systems are term-based, the exact terms must be specified to get the desired information. Without any familiarity with the information stored, it is hard to know which terms should be used.

Dendrons consist of neuron bundles which branch out (dendrites) and cross signalling information. Encoding retrieved information from different sections of the brain following various metabolic processes. Since very little is known about the mechanism of recollection in biological systems we could speculate and presume that during the encoding process there are a few moments in assembling fragments.

Understanding the structure and functions of biological neurons led to the construction of modular neural circuits. Biological nerve endings are cross-sections for communication where information conducted can change the projected path, establishing partially or completely inhibited, buildup release points of neural information. Neural circuits or areas of transition are faced with altering the acoustic result in the non-linear path of continual events.

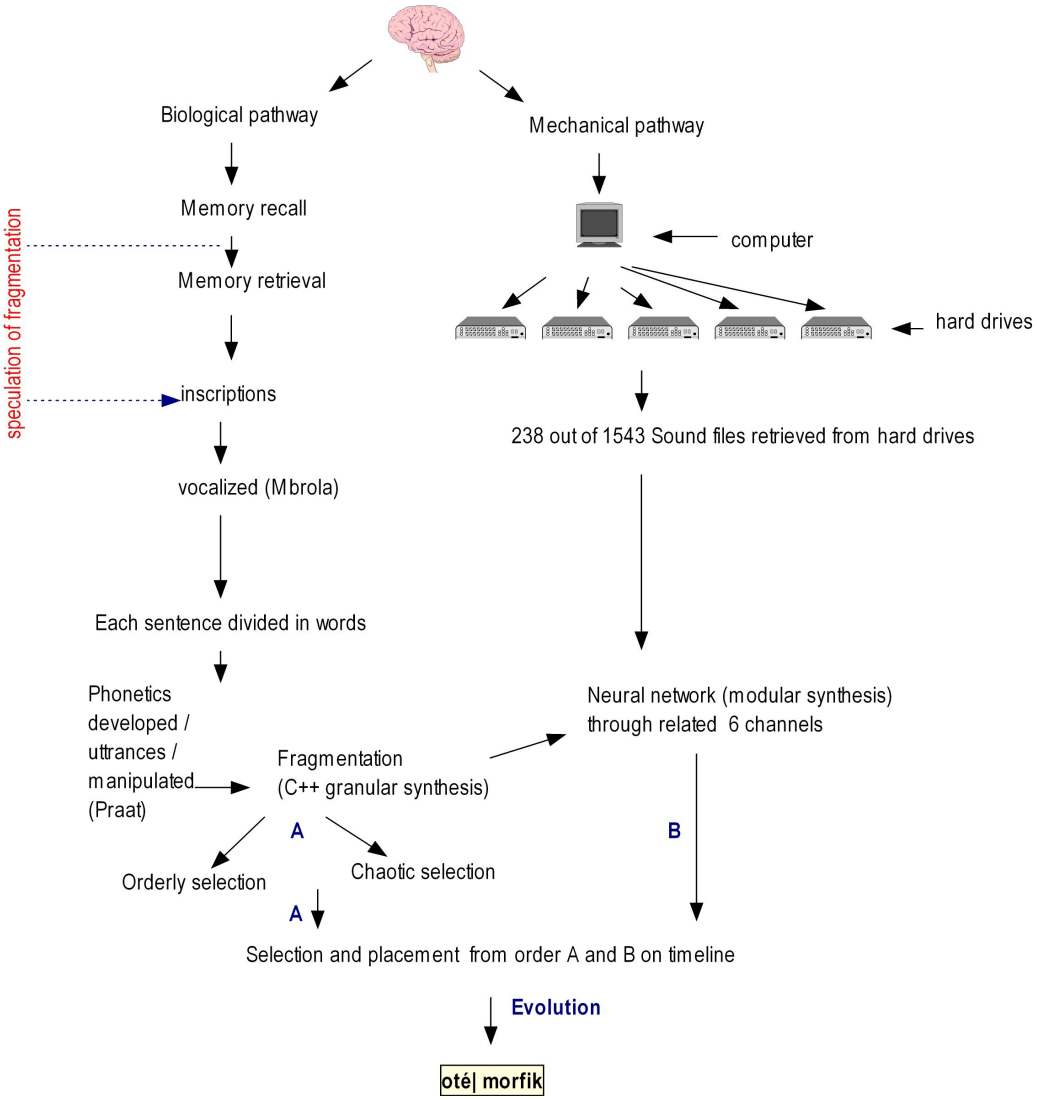


fig:1

The course in otémórfik is projected over six active speaker monitors. Assembling information non-collectively or collectively adheres to constructive guidelines of additive (according to Fourier's theory consists of multiple harmonic or inharmonic partials or overtones) and subtractive synthesis (partials of rich in harmonics audio signal are attenuated by a filter to alter

the timbre of the sound) in the composition network. Sound data retrieved from the computer was either a] Fully operational. b] Partially damaged (noise, digital clips, humming) that could not be restored. c] Completely damaged. The sound environments constructed were made up of phonons small granular fragments of sound. Initially, both processes sound environment, and vocalization seemed to develop independently (unrelated), in the neural process as cross paths develop allowing for cross-communication to occur between channels the relationship becomes ever more dependent. Neural networking is a mechanism by which the driving force created through circuits depends on the strength of the signal the impulse generated to activate or de-activate nodules of interneuronal paths.

The development of thought patterns involves recognizing its source with an alternative response. A development through hints, utterances, random activation of letters, formations of new, incomplete, existing words and phrases, the familiarity of sounds with new conceptual meanings extending the boundaries of written inscriptions, creating divergent thinking possibilities (cognitive shifting a mental process of consciously redirecting one's attention from one fixation to another, if unconsciously done is called task switching). Inscriptions are collections of information presented in sentences, mind-maps, observations, descriptions, commands, public presentations and communicative phrases. The vocalisation of the text was made with the use of **Mbrola** speech synthesis. **Praat** program for the analysis of speech in phonetics used to analyze, synthesize and manipulate speech, **C++ granular** synthesis software used in fragment speech focused on pre-linguistic utterances.

$$permutations: (nPr = n!/(n-r)!)$$
$$combinations: nCr = n!/(n-r!)$$

fig:2

inscription - eyes silenced thiNK, the- thinking thought. Proved to be cumbersome.

--- proved to be : **Words** and **homophones** -: probe, toe, be or bee (homophone), verb

---cumbersome: cum (origin), come, cumber (hamper or hinder), umber (natural pigment resembling but darker than ochre , a moth), sucumb *instead* of succumb (homophone), sercumb, somber, some, meos (acronym).

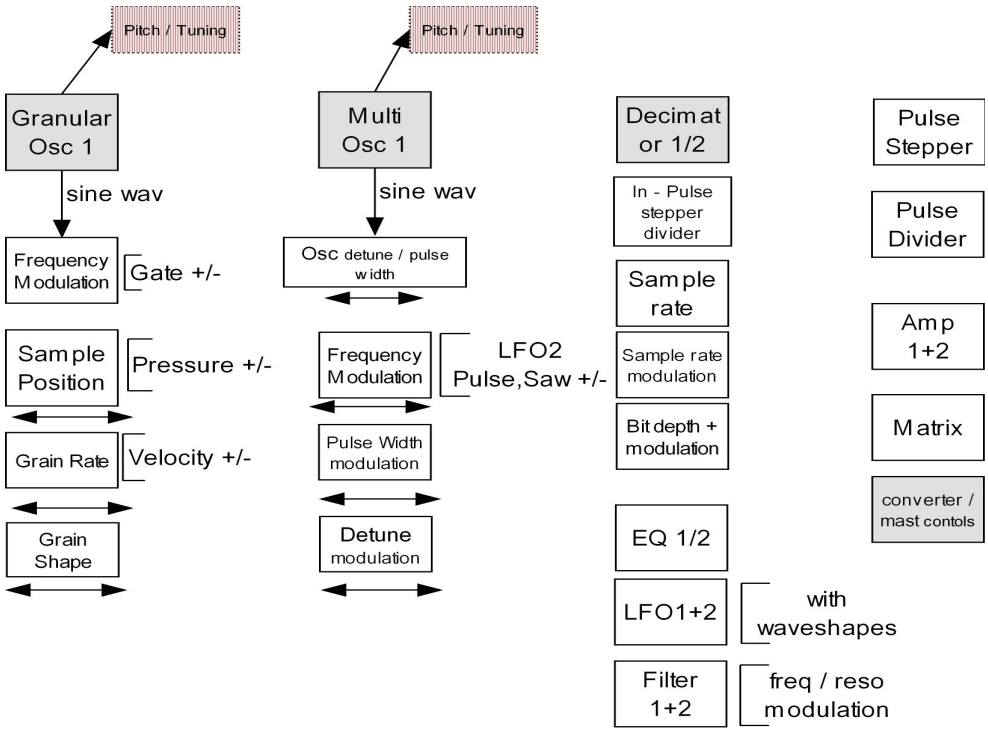
inscription - fingers. Fingered, clicked, restlessly driven -----

---- fingers. Fingered: - infringers, redefining, defensing, feigns – **words,** designer reffing - **anagram**

--- clicked restlessly: decisteres, discreetly, discretely, dyslectics – **words**

fig:3 Generation of new words, morphemes, homophones, anagrams, utterances and pronunciations from related inscriptions.

The fragmentation of vocal text in the neural network represented the initial encoding process in memory retrieval. The Neural process provided the formation of free and bound morphemes with a variety of affixes, prefixes, suffixes and infixes minimal building blocks of meaning, which function as the foundation of language and cannot be divided into further smaller units, they are nouns, adjectives, verbs, prepositions or adverbs morphemes carry most of the 'semantic content' of utterances. Words sounding the same but are different in meaning or spelling are characterized as homophones, anagrams transposed letters into new words and phrases squeezing two or more different readings into the same set of curves containing acronyms, initials and unusual punctuations helped in the formation of additional words providing organization and eliminating unnecessary information.

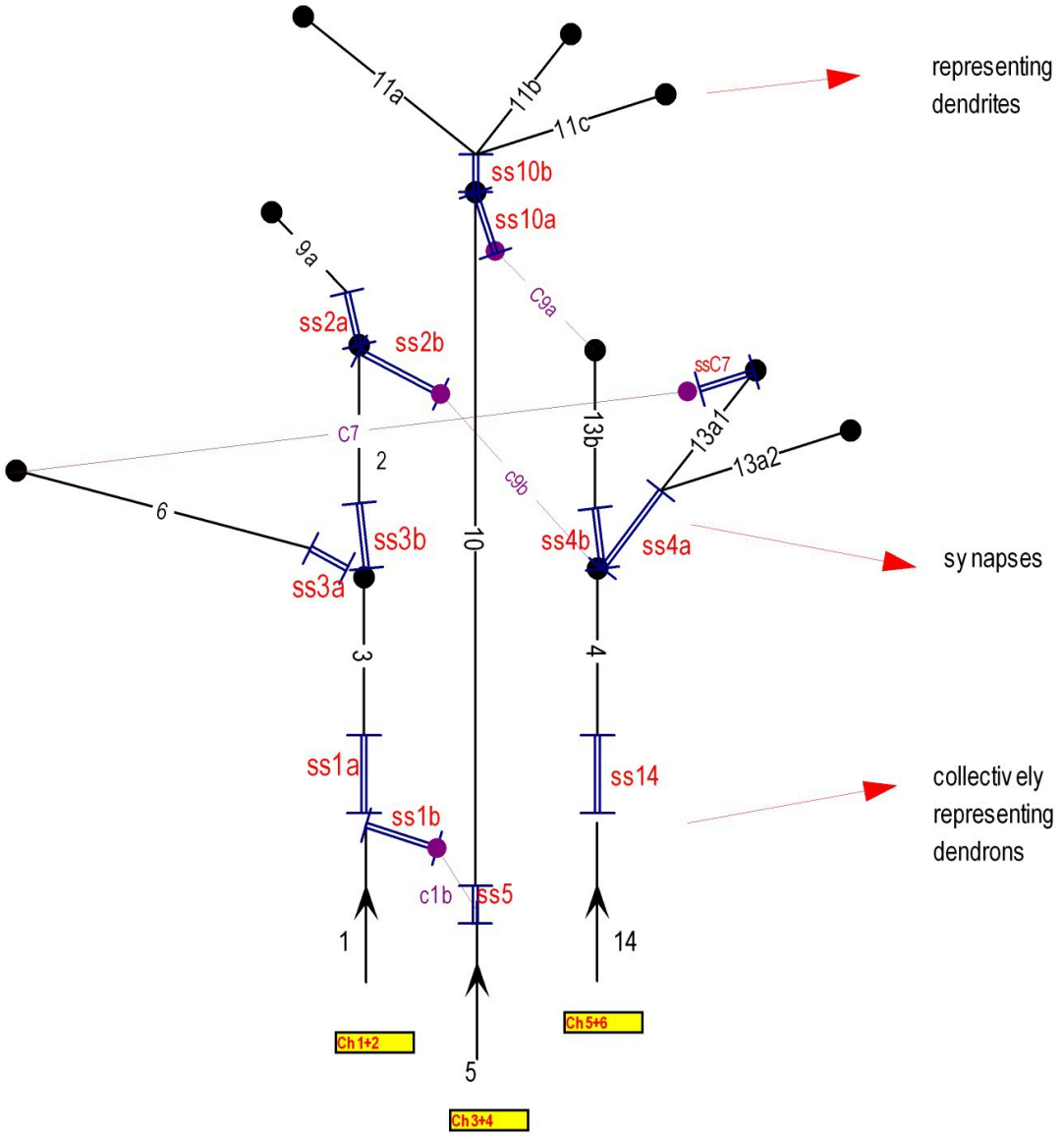


Patch *36.7* - *(Neural Synthesis)*

fig:4

Synapses in biological terms are areas in the neural network that change direction or are excited or inhibited regarding a particular action. In the electronic circuit, these synaptic areas act to transcend and alter the sound process. Patch 36.7 equipped with wave-selectable oscillators and modifiers, filters, and ADSR envelopes amongst others are applied to positions ss5, ss2b of fig 4.

The information retrieved from both computer and brain was incomplete and inconsistent. All information retrieved due to its nature was split into smaller more manageable sections and sub-sections, the relationship of the data included in the variety of sections would have a unique morphology collectively that would only match the rest of the features in work as density, pitch/frequency, timbre, duration the activities, however, would differ in the message and acoustic content portrayed, the 32 sections and subsections required the construction of neural circuits that would allow a communicative interaction to occur between the 2 sources in a continuous uninterrupted flow of information.



neuron circuit **74**

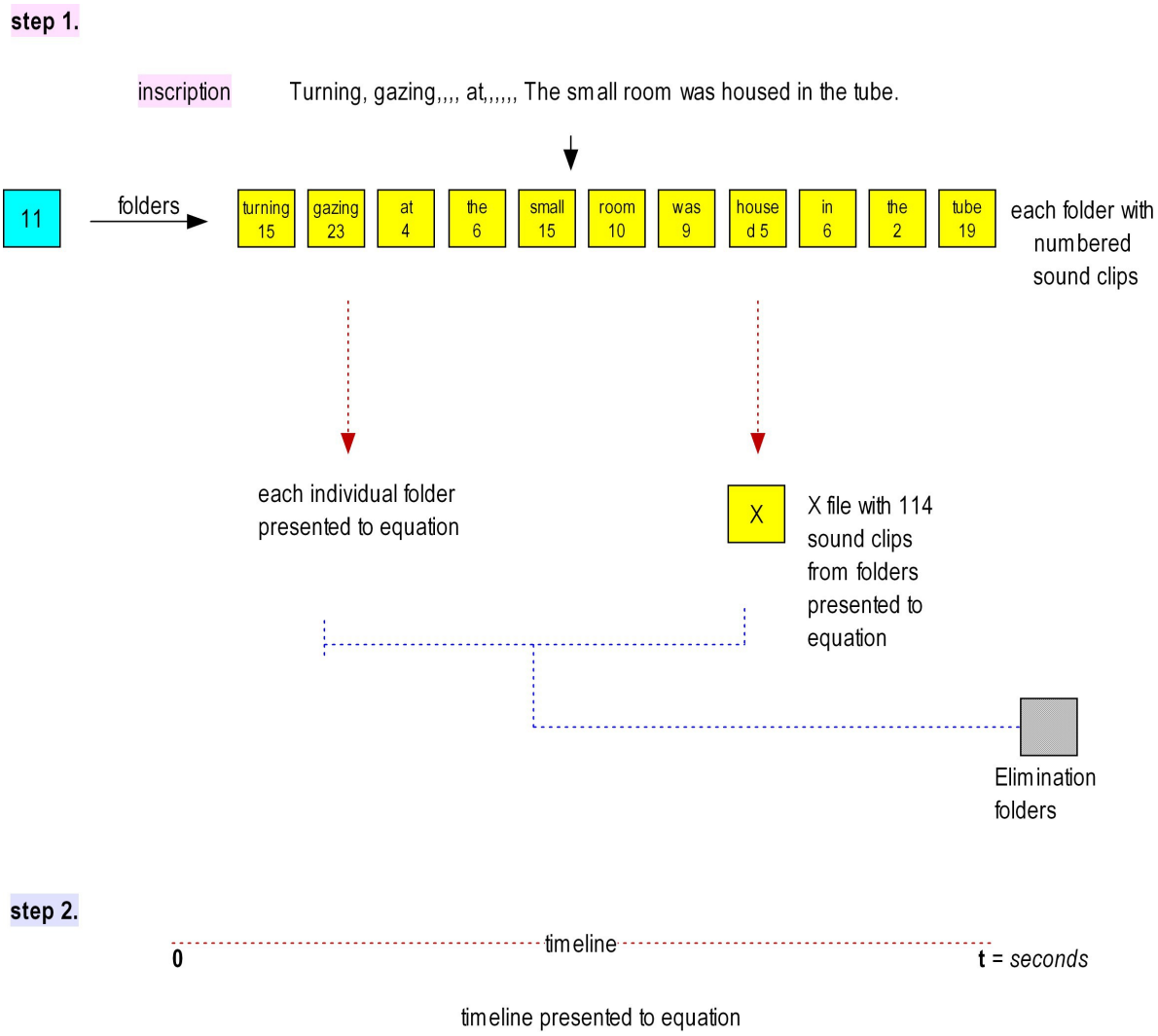
(28 min 35 sec to 30 min 07 sec)

fig5:

Neuron circuit 74 - channels 5 + 6 the incoming sound wave (14) with rich harmonic content is exposed to subtractive synthesis, reaches the synaptic junction undergoes an attenuate filtration process to alter the timbre of the sound, it reaches position (4) which combines with sound exposed to additive synthesis C9b from Ch2+3, at the synaptic junctions ss4b, ss4a variation in output both in amplitude and frequency occurs exposing the waves to additional timbre possibilities, resulting in three distinctive sounds which are split into areas 13b, 13a1 and 13a2 respectively. Additive synthesis in area 13a1 combines the wave at synaptic junction ssc7. Patch selection was executed via probability distribution (in biological terms this means ideas are added or subtracted from selected memory in the process of evolution). As in particular the sound morphology evolves there is beneficial active communication irrespective of pressure, intensity, density, and pitch of each separate sound physiology. Position in the circuit having the morphology with different sound outcomes.

Selective process

1. Methodology of vocalization



figG:

a] The sentence from the inscription in *figG:* undergoes vocalization through the Mbrola software.
b] The vocalized sound clip is split into 11 words that are represented in eleven named folders each word of the sentence is introduced into the Praat program for the analysis of speech in phonetics and manipulated.
c] This procedure follows either physical fragmentation performed by the composer or by C++ granular synthesis. The word follows 2 different processes in granulation and is split into 2 folders.
d] The result is introduced to modular synthesis (not neural synthesis) to form a string of utterances, phonetics, and other formations.

Set 1: The sound clips generated from each word are divided into each folder the number of sound clips in each folder is noted by name and are numerically numbered. The sound clips each vary in density, duration, pitch and timbre but directly relate to the text that they were generated from.

1] To introduce each of the 11 folders (*Set 2* is to be applied to each) for ordered random number selection.
2] To create an (X) folder that contains all the 114 sound clips from the folders (*Set 2* is to be applied to (X) folder) for random number selection, this process produces a more chaotic random selection. The initial stages of information recollection and retrieval depend on a time frame, the longer the time frame the more difficult it is to retrieve thought patterns that seem to be scattered, introducing folder (X) is to address this initial encounter.

Set 2: The timeline is introduced to the same equation above to generate a number/s (sec).

Vocalization fragmented sound clips generated once selection and placement have occurred the compositional procedures need to follow certain rules: After placement on the timeline 1] Sound clips may be sorted in any possible way and split in multiple ways to achieve the result. 3] Timeline selected could fall into pre-existing vocalisation or sound environment areas. 4] A limited number of effects can be used per bundle of sound clips such as one not more than one of the following (GRM tool bundle, Natural verb, EQ). 4] Complete overlap of new files over pre-existing files on 1 to 1 basis is eliminated and placed in an elimination folder C. 5] Partial overlap of new files over pre-existing files is allowed. 6] Splitting environments to fit the incoming cell/s. 7] Allowing sound to inter disperse with the environment.

2. Methodology of sound

The 238 sound clips restored from the hard drives are introduced to the neural network as explained in fig4 and 5. The desired result from this process follows storage conditions of sound clips that are split into folders relating to pitch, density, timbre and duration, similar selective path and timeline placement procedures follow as previously presented in vocalization. Effects are not applied to neural sound clips generated from the neural synthesis pathway.

Computation:

The study of a population of sound samples drawn from the population has been used in the estimation of unknown population quantities or parameters (population mean, variance, whether differences are due by chance or are significant). In statistical interference, for it to be valid samples must be chosen to be representative of a population. A random sampling method is chosen in which each member of the population has an equal chance of being included in the sample/s. This can be achieved by assigning numbers to each member of the population before the collection of samples undergoes a drawing process. If we draw and the same number comes up more than once, we can eliminate the number and not use it or select the number over the other numbers selected to represent the selective choice however this is a process of sampling without replacement.

$$(1)\ Means : \sigma_{\bar{X}} = \frac{\sigma}{\sqrt{N}}$$
$$(2)\ Proportions : \sigma_p = \sqrt{\frac{p\,(1-p)}{N}} = \sqrt{\frac{pq}{N}}$$
$$(3)\ Standard\ \ Deviation : \sigma_8 = \frac{\sqrt{\sigma}}{2\mathrm{N}}$$
$$(4)\ Medians : \sigma_{median} = \sigma\ \sqrt{\frac{\pi}{2\mathrm{N}}} = \frac{1.2533\sigma}{\sqrt{N}}$$
$$(5)\ Random\ \ number\ \ selection : Xn = (aXn - 1 + b)\ mod\ \ m$$

fig7:

The following order of calculations in fig7 needs to be followed to establish the random number selection of numerical samples from each population.

The computer as an assistant composer selected files presented to it by equating probability functions of pitch, density, duration, timbre, splitting and positioning the files in the composition module, the composer was free to either agree/disagree with the maladaptive or adaptive reasoning of these suggestions and make the appropriate changes.

The exercise demonstrates the procedures followed in a speculative order to recall and retrieve information in both organic and mechanical memory. The computer's aims was to re-produce a fine constructive order of events occurring through fragmentation. Original words and sound undergo a deconstructive and reconstructive process generated through neural synthesis and fragmented vocalization formations of various meanings continually attempting to re-construct, re-structure formations to their original formative order.

References:

Batterman.R & White.H (1996) " Chaos and Algorythmic complexity" *Foundation of physics,*26, pp. 307-336.

Bjork, R. A. (1970). Positive forgetting: The noninterference of items intentionally forgotten. *Journal of Verbal Learning and Verbal Behavior, 9,* 255-268.

Bjork, R. A., & Woodward, A. E. (1973). Directed forgetting of individual words in free recall. *Journal of Experimental Psychology, 99,* 22-27.

Bower, G. H., & Reitman, J. S. Mnemonic elaboration in multilist learning. *Journal of Verbal LeQrning and Verbal Behavior,* 1972, 11,478-485.

Cicchetii, D. V. Extension of multiple-range tests to interaction tables in the analysis of variance: A rapid approximate solution. *Psychological Bulletin,* 1972, 77, 405-408.

Gardiner JM, Gregg VH, & Karayianni I (2006) Recognition memory and awareness: Occurrence of perceptual effects in remembering or in knowing depends on conscious resources at encoding but not at retrieval. Mem Cognit 34: 227–239. PMID: 16752587

Roediger, H. L. I., Weldon, M. S., & Challis, B. H. (1989). Explaining dissociations between implicit and explicit measures of retention: A processing account. In H. L. I. Roediger & F. I. M. Craik (Eds.), Varieties of memory and consciousness (pp. 3–41). Hillsdale, NJ: Erlbaum.

Rugg, M. D., & Wilding, E. L. (2000). Retrieval processing and episodic memory. Trends in Cognitive Neurosciences, 4,108–115.

Stuart, G. P., and Hulme, C. (2009). "Lexical and semantic influences on immediate serial recall: a role for redintegration," in Interactions Between Short-Term and Long-Term Memory in the Verbal Domain, eds A. Thorne and M. Page (New York, NY: Psychology Press), 157–176.

Szewczyk, J. M., Marecka, M., Chiat, S., and Wodniecka, Z. (2018). Nonword repetition depends on the frequency of sublexical representations at different grain sizes: evidence from a multi-factorial analysis. Cognition 179, 23–36. doi: 10.1016/j.cognition.2018.06.002

Tulving, E., & Thomson, D. M. Encoding specificity and retrieval processes in episodic memory. *Psychological Review,* 1973,80,352-373.