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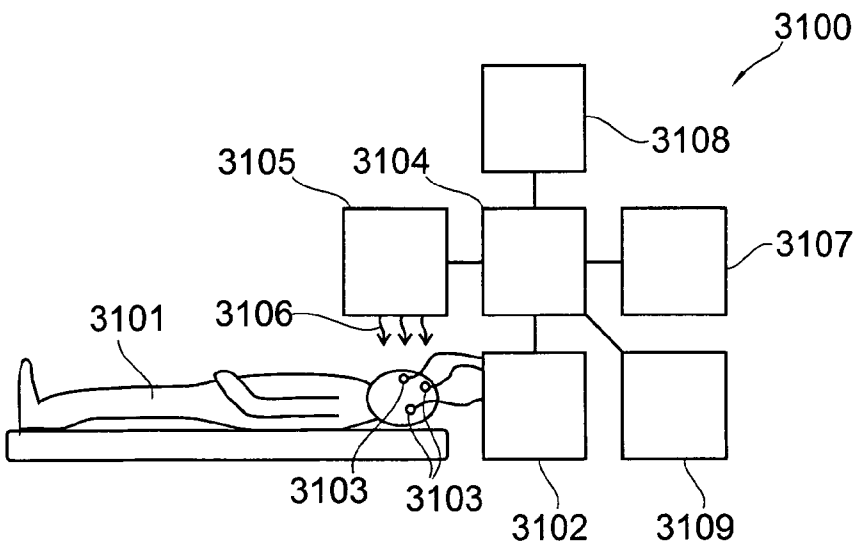
(54) **Title:** DEVICES FOR AND METHODS OF ANALYZING A PHYSIOLOGICAL CONDITION OF A PHYSIOLOGICAL SUBJECT BASED ON A WORKLOAD RELATED PROPERTY



(57) **Abstract:** A method of influencing a physiological condition of a physiological subject, the method comprising detecting a workload distribution / activity in a brain of the physiological subject, the workload distribution / activity being indicative of the physiological condition, and selectively modifying the workload distribution / activity in the brain of the physiological subject to thereby modify the physiological condition.

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Devices for and methods of analyzing a physiological condition of a physiological subject based on a workload related property

The present application claims the benefit of the filing date of United States Provisional Patent Application 60/784,366, filed March 21, 2006 and of European Patent Application 06 005 747.8, filed March 21, 2006, the disclosure of which is hereby incorporated herein by reference.

The invention relates to a device for and to a method of influencing a physiological condition of a physiological subject.

Beyond this, the invention relates to a device for and to a method of developing a substance for influencing a physiological condition of a physiological subject.

Moreover, the invention relates to a substance for influencing a physiological condition of a physiological subject.

Furthermore, the invention relates to a device for and to a method of characterizing a physiological condition of a physiological subject.

Moreover, the invention relates to a program element.

Further, the invention relates to a computer-readable medium.

The human brain may be denoted as a "biological neural network". Brain activities like learning and forgetting involves modifications of this biological neural network. A human mind is able to perform may tasks, for example to identify different sorts of objects, to speak fluently or to walk over all sorts of terrains. Thus, in many fields, a human brain has a significantly higher degree of performance that many high-tech machines.

"On Intelligence", Jeff Hawkins, Sandra Blakeslee, 2004, Times Books, Henry Holt and Company, ISBN 0-8050-7456-2, particularly pp. 106 to 176, discloses that the human brain works fundamentally different than a computer. Hawkins et al. introduce a framework on how the human brain might function.

Just, M. A. & Carpenter, P. A. (1992), A capacity theory of comprehension: Individual differences in working memory. Psychological Review, 99, 122-149, and

Fodor, J. A. (1983), The modularity of mind. Cambridge, MA, USA: Bradford Books, disclose models concerning the function of the brain.

An inefficient functioning or a malfunction of the human brain may cause severe diseases, particularly mental diseases.

It is an object of the invention to provide help in case of a possible malfunction of the brain.

In order to achieve the object defined above, a device for and a method of influencing a physiological condition of a physiological subject, a device for and a method of developing a substance for influencing a physiological condition of a physiological subject, a substance for influencing a physiological condition of a physiological subject, a device for and a method of characterizing a physiological condition of a physiological subject, a program element and a computer-readable medium according to the independent claims are provided.

According to an exemplary embodiment of the invention, a device for influencing a physiological condition of a physiological subject is provided, the device comprising a detection unit adapted for detecting a workload related property (like a workload distribution, workload activity, one or more capacity bottlenecks and so forth) in a brain of the physiological subject, the workload distribution, workload activity and/or one or more capacity bottlenecks being indicative of the physiological condition, and a modification unit adapted for selectively modifying the workload distribution and workload activity in the brain of the physiological subject to thereby modify the physiological condition, for example, taking a capacity bottleneck away.

According to a further exemplary embodiment of the invention, a method of influencing a physiological condition of a physiological subject is provided, the method comprising detecting a workload distribution, workload activity and/or one or more capacity bottlenecks in a brain of the physiological subject, the workload distribution, workload activity and/or one or more capacity bottlenecks being indicative of the physiological condition, and selectively modifying the workload

distribution and/or workload activity in the brain of the physiological subject to thereby modify the physiological condition, for example, taking a capacity bottleneck away.

According to another exemplary embodiment of the invention, a device for developing a substance for influencing a physiological condition of a physiological subject is provided, the device comprising a substance delivery unit adapted for delivering the substance to the physiological subject, and a detection unit adapted for detecting a workload distribution, workload activity and/or one or more capacity bottlenecks in a brain of the physiological subject in the presence and in the absence of the substance, the workload distribution, workload activity and/or one or more capacity bottlenecks being indicative of the physiological condition in the presence and in the absence of the substance.

According to yet another exemplary embodiment of the invention, a method of developing one or more substances for detecting and/or influencing a physiological condition of a physiological subject is provided, the method comprising delivering the substance to the physiological subject, detecting a workload distribution, workload activity and/or one or more capacity bottlenecks in a brain of the physiological subject in the presence and in the absence of the substance, the workload distribution, workload activity and/or one or more capacity bottlenecks being indicative of the physiological condition in the presence and in the absence of the substance, and accepting the delivered substance as an appropriate substance for influencing the physiological condition in case of detecting that the workload distribution or workload activity has been modified and/or one or more capacity bottlenecks reduced or disappeared in the presence of the substance as compared to the workload distribution, workload activity and/or one or more capacity bottlenecks in the absence of the substance in accordance with a predetermined criteria.

In this application the term "develop" may particularly denote any step or procedure

in the development of a substance or a manufacturing procedure to produce a substance.

According to still another exemplary embodiment of the invention, a substance for influencing a physiological condition of a physiological subject is provided, the substance having been developed by a developing method having the above-mentioned features.

According to another exemplary embodiment of the invention, a device for characterizing a physiological condition of a physiological subject is provided, the device comprising a detection unit adapted for detecting a workload distribution, workload activity and/or one or more capacity bottlenecks in a brain of the physiological subject, the workload distribution, workload activity, and/or one or more capacity bottlenecks being indicative of the physiological condition, and an evaluation unit adapted for evaluating the workload distribution, workload activity and/or one or more capacity bottlenecks in the brain of the physiological subject.

According to a further exemplary embodiment of the invention, a method of characterizing a physiological condition of a physiological subject is provided, the method comprising detecting a workload distribution, workload activity and/or one or more capacity bottlenecks in a brain of the physiological subject, the workload distribution, workload activity and/or one or more capacity bottlenecks being indicative of the physiological condition, and evaluating the workload distribution, workload activity and/or one or more capacity bottlenecks in the brain of the physiological subject.

According to other exemplary embodiments of the invention, program elements are provided, which, when being executed by a processor, are adapted to control or carry out one of the methods having the above-mentioned features.

According to yet another exemplary embodiment of the invention, a computer-readable medium (e.g. a CD, a DVD, a USB stick, a floppy disk or a harddisk) is provided, in which a computer program is stored which, when being

executed by a processor, is adapted to control or carry out one of the methods having the above-mentioned features.

The systems according to embodiments of the invention can be realized by a computer program, that is by software, or by using one or more special electronic, optical and/or optoelectronic optimization circuits, that is in hardware (for instance including one or more microprocessors), or in hybrid form, that is by means of software components and hardware components.

In the context of the invention, the term "workload related property" may particularly denote any characteristics which has to do with the workload of the brain. Particularly, this term may cover a workload distribution in the brain, i.e. at which positions of the brain which kind of processing burden is present. Particularly, this term may further cover an activity in the brain, i.e. at what happens in the brain and which amount of processing burden is present. The term "workload related property" may cover workload distribution, activity, capacity bottlenecks, strength between patterns / neurons, automation and/or lack of automation in a brain.

It is believed that one cause to a range of mental conditions, disorders, diseases and/or a general lack of mental fitness lies in the way the information management happens within the brain. More specifically, it is believed that one or more capacity bottlenecks, strength between patterns / neurons, automation of tasks, a lack of automation of tasks or related information management aspects can cause the conditions, disorders, diseases or a lack of general mental fitness. The cause my lie in one of these conditions or in any combination. Capacity bottlenecks, for example, may be caused be inefficient workload distribution or inefficient processing. In the context of this application, the term "malfunction" may include ineffective information management, for example, caused by a capacity bottleneck. It is believed that the invention can be used to bypass or reduce the impact of some malfunctions that are, for example, of a biological nature.

According to one aspect of the invention, a system for influencing a physiological condition of a physiological subject is provided. In such a system, the workload distribution and/or activity may be detected. After such

a detection, any stimulus may be applied as an attempt to modify the workload distribution and or activity and this may modify the physiological condition, if the stimulus is appropriate. For example, unwanted workload distribution, unwanted activity or lack of strength between patters of wanted behavior in a brain, which may be the origin of diseases or undesired behavior, may be selectively modified. Particularly, capacity bottlenecks may be localized and eliminated or reduced, for instance by redirecting processing from special parts of the brain to other parts. Moreover, associations with patterns of wanted behavior may be strengthened.

According to another aspect of the invention, a device is provided for developing or manufacturing a substance (like a medication) for influencing a physiological condition of a physiological object. In such a system, any substance which may be a candidate for influencing a physiological condition (for instance a substance which may serve as a medication for a particular disease) may be delivered to a person. Then, it may be detected whether the supply of this medication results in, for example, a desired re-distribution of workload or changed activity, reduction or elimination of one or more bottlenecks within the brain. In other words, it may be detected whether the medication has an influence on the workload distribution or workload activity in the brain, thus being able to, for example, eliminate capacity bottlenecks or lack of strength to patterns of wanted behavior / too much strength to patterns of unwanted behavior, which are believed to be an origin of diseases or unwanted behavior. Thus, by trial and error, medications may be developed, particularly in high throughput screening projects, by simply screening (essentially in real-time) whether the supply of a particular medication with a particular composition of ingredients influences the function of the brain in a desired manner or not. Alternatively, it may take, for example, 3 to 6 weeks until a difference will be seen. In this case, this time interval between two detection steps may be, for example, 3 to 6 weeks. Taking these measures may allow pharmaceutical companies to develop medications efficiently.

According to still another aspect of the invention, a system for characterizing a physiological condition of a physiological object is provided. In such a system, the workload distribution, workload activity, capacity bottlenecks, etc. in a brain may again be detected and may be subsequently evaluated. This may allow for an analysis of weak points or problems in the workload distribution in the brain, strength between patterns, ineffective processing and so forth, thus allowing to detect origins of diseases, unwanted behavior or a general lack of mental fitness. Such a system may thus assist a physician in gathering necessary information required for helping a patient.

One of the above-mentioned aspects is based on the assumption that the workload distribution and workload activity versus available capacity within and between different areas of the brain, may result, under undesired circumstance, in the generation of so-called "capacity bottlenecks". This term may denote portions of the brain which suffer from a higher processing burden as compared to a desired "normal" processing burden, and thus may equal to portions of the brain which are subject of an exaggerated amount of processing. The term may further denote portions of the brain in which associations between different neurons or neuron clusters is insufficient.

Another of the above-mentioned aspects is based on the assumption that strength between patterns of wanted associations is insufficient. Alternatively, strength between patterns of unwanted associations may be too high. With or without the NNSM, it is assumed that associations of highest strength are preferred choices. This implies that patterns with unwanted associations become preferred choices if they have a higher strength than patterns of wanted associations. It if further assumed that above a certain level of strength associations become automatic. This implies that it is very hard to impossible for the individual to overrule unwanted behavior by conscious thinking.

Yet another of the above-mentioned aspects is based on the assumption that inefficient "processing" implies more capacity is needed if,

for whatever reason, the effective processing, for example, the automatic processing per the NNSM, can't take place. As this part of the brain is "blocked", other processing, that can only happen in this area or between these areas can't take place. This may be of a short-term or long-term effect.

Yet another of the above-mentioned aspects is based on the recognition that, compared to computers, neurons can only reset themselves at relatively low speed. This limits the available capacity. Inefficient processing will run earlier into capacity issues than would be the case if the neurons would be faster. For example, in order to speak fluently and with a given speed, there is a limit to what can be processed, even with parallel processing in mind.

After having detected such weak points in the brain, measures may be taken to eliminate or suppress such capacity bottlenecks, to decrease strength of associations between patterns of unwanted behavior, to increase strength between patterns of associations of wanted behavior, to stimulate the development of more efficient processing / automation and so forth. This can be done, for instance by administering a medication or by training the brain in a specific manner.

As suggested by the below described neural network switching model (see particularly description referring to FIGURES 1 to 30 below) and based on the unmatched treatment results for ADHD (Attention Deficit Hyperactivity Disorder) and Dyslexia (against traditional therapies), it is believed that a whole range of mental conditions, mental disorders, mental diseases, and so forth and a lack of general mental fitness may be caused by one or more capacity bottlenecks, by insufficient strength / lack of automation between the patterns of wanted behavior, too much strength between patterns of unwanted behavior or inefficient processing within the brain. For an incomplete list of such physiological conditions, see Table 1.

Disorder / Condition	Supporting Information
ADD/ADHD (Attention Deficit Disorder / Attention Deficit Hyperactivity Disorder)	van Gemert attention, DDAT attention
Antisocial behavior	
Asperger's syndrome	DDAT attention
Autism	
Balance problems	DDAT focus
Bipolar disorder	
Comprehension	DDAT success claim
Concentration	DDAT success claim
Confidence	DDAT success claim
Conduct disorder	
DAMP (Dysfunction of Attention and Motor Perception)	
DBD (Disruptive Behavior Disorder)	
DCD (Development Coordination Disorder)	
Depression	DDAT conclusion
Development disorder	
Dizziness	van Gemert success claim
Dyscalculation	
Dyslexia	DDAT success claim, van Gemert success claim, Prof. Stein success claim
Dyspraxia	DDAT attention
EF (Executive Functions)	
Energy	DDAT success claim
Eye focusing problems	
Fatigue / tiredness	
Gilles de la Tourette	
General mental health	

Disorder / Condition	Supporting Information
Happiness	DDAT success claim
Headache	Van Gemert attention
Hyperactivity	
IQ	
Learning abilities	van Gemert attention
MCDD (Multiple Complex Development Disorder)	
ME (Myalgic Encephalomyelitis)	van Gemert attention
Memory	DDAT attention
Migraine	University of Applied Sciences, Heidelberg, Germany, success claim, Van Gemert attention
Obsessive behavior	
OCD (Obsessive Compulsive disorder)	
ODD (Oppositional Defiant Disorder)	
PDD (Pervasive developmental disorders)	
Post–traumatic stress disorder (PTSD)	Rapid eye movement therapy success claims
Sea sickness	
Self-esteem	DDAT success claim
Sports	DDAT success claim
Stereotypic movement disorder	
Tolerance	DDAT success claim
NLD (Non-verbal learning disabilities)	
Violence	
Whiplash	van Gemert success claim

TABLE 1

It is believed that through stimulating the creation of more efficient processing (that is per DDAT therapy and per van Gemert therapy), it may be

possible to take away problems that cause excessive processing needs and/or capacity bottlenecks and/or through rebalancing workload distribution (i.e. through switching the dominant eye, per van Gemert therapy), and thus it may be possible to achieve substantially better treatment than seen with conventional therapies. Furthermore, this includes treatment for aggressive, violent or crime behavior.

With this model, it may be possible to bring the therapies together that are partly effective already, and create more effective treatment from them. Additionally, it may be possible to develop new therapies. Whereas today, many of the therapies address symptoms, it may be possible to provide more therapies that lead to real cure (or close to cure).

According to an exemplary embodiment, a series of tests are run (for instance based on known therapies, brain scans, etc.) that identify the area as to where the capacity bottleneck or bottlenecks may be. In a second step, the capacity needs may be reduced in that area through taking away one or more problems causing the bottleneck. This can be per DDAT, van Gemert therapy, through an ancient therapy, an existing drug, a new therapy or through (new) drugs that, for example, disable the sense of smells for a while. In a third step, depending on the patients symptoms, the creation of wanted things may be activated (that is per van Gemert therapy, the lexicon of words for reading and writing). With such a procedure, therapies may be developed, for example for autism.

According to another aspect, in cases of unwanted behavior, such as violence, crime, etc., and, for example, per the neural network switching model, it may be possible to stimulate the creation of associations/circuits that lead to wanted behavior. This stimulation may try to create automatic pattern activation that lead to "alarm bell" patterns such as increased heartbeat, sweating, etc., when the person is approaching unwanted behavior (automation may be important in this exemplary aspect). Through, for

example, using the neural network switching model, it may be possible to achieve even better results than obtainable with conventional therapies.

According to an exemplary embodiment (particularly pharmaceutical and clinical) drugs may be provided, testing equipment, software (particularly modeling software and therapy software), and therapeutic systems. The various embodiments of the invention may or may not make use of the below described neural network switching model (NNSM).

Embodiments and recognitions of the invention are based on today's problems in medical science:

- It is unknown how the human brain works in detail.
- It is unknown how information is stored in the human brain in detail. Though, it is known that the brain stores patterns and that those are, somehow, associated with each other and that strength plays a role.
- It is unknown in detail how the information management in the human brain works.

The (root) causes too many conditions and disorders such as ADHD, Dyslexia, headache, migraine, violence/crime behavior, etc. are essentially unknown in detail.

The NNSM, in combination with successful treatment experiences around ADHD, Dyslexia, eye-focusing problems and associated headaches, concentration and memory, plus the therapy claims provides answers to the above-mentioned questions. On this basis, it is believed that the following assumptions are correct:

1. One cause to a whole range of mental conditions, disorders, diseases and a lack of general mental fitness is a capacity bottleneck. Depending on where it manifests itself, whether it is of a temporary nature, its form, size etc. depending whether it is only one or more bottlenecks, it can manifest itself in rather different mental conditions/disorders a lack of general mental fitness or a combination thereof. The list of potentially impacted conditions and

disorders from a capacity bottleneck includes, but is not limited to, Dyslexia, ADHD, eye-focusing problems, concentration, memory, headache/migraine, depression, fatigue, autism, Dyscalculation, obsessive behavior, whiplash, dizziness and a lack of general mental fitness.

2. Too much strength or lack of strength between patterns may cause conditions such as, but not limited to, the following:

a) Unwanted behavior towards other people. Examples for this are obsessive behavior, aggressive behavior, violence, crime, etc. One cause leading to the levels of obsessive behavior, aggressive behavior, violence, crime, etc., seen in today's society, lies in insufficient strength, respectively lack of automation, of associations leading from activated patterns (for example as they are activated through senses or thoughts) to "alarm bell" patterns such as "I don't like the sound of this", "I don't like the consequences of this", bad feeling, sweating, increased heartbeat, etc. and/or insufficient strength/lack of automation to objective patterns such as "I need to earn a living", "I want a comfortable life", etc. Consequently, patterns activated lead to other patterns. "Alarm bell" patterns may not be activated. This may or may not be in combination with an addiction (i.e. "an inner voice" of a serial killer).

b) Addictions (gambling, gaming, etc.). Emotions involved with gambling, gaming, etc. cause less desired (objective) patterns to become high strength associations, potentially automated associations. As emotions/feelings are repeated through repeated gambling, etc. and per NNSM, the strength builds up and can exceed the strength to other important (objective) patterns. Consequently, as related patterns are activated through the senses or thoughts, this leads to the less desired objective patterns, which drive to continued gambling, gaming, etc.

c) Drug addictions (legal and illegal drugs). Drug-based addiction may partially or fully be caused by (very) high strength associations or automation between unwanted patterns.

d) "Locked in" conditions such as seen with emotional traumatic experiences. In the case of emotional traumatic experiences and similar, it may only look like the traumatic experience is "looked in" ("looked in" is believed to be current scientific view). Per NNSM, because of very high emotions during the traumatic event, related patterns get very high strength. This makes them preferred associations. As unrelated patterns are activated later and the emotional event is rethought at that moment (related patterns are "on" or fire), emotions are high. This causes the unrelated patterns to associate with patterns of the emotional event. As emotions are (very) high, the strength of the associations becomes (very) high. Consequently, as unrelated patterns are activated later on, many of them have high strength (that is preferred) associations to patterns of the traumatic event.

The term "wire" may be used in the sense that, with one wire the "bunch of wires" per NNSM, may, for example, be referenced as fibers in brain literature. Though, this may not be an exact match.

The term "processing" as suggested by the NNSM and per Jeff Hawkins framework of the human brain, shall not be confused with the way computers work.

The term "interest/emotions" may be relevant for the strength built-up between patterns. There may be other things that have a similar effect. Hence, whenever mentioned, "emotions"/"interest" should only act as an example impacting strength.

In the following, it will be explained how to envision a capacity shortage or better, a capacity bottleneck.

FIGURE 34 is a simplified two-dimensional representation of a three-dimensional brain. Although things are more sophisticated, one bottleneck type in a brain can be imagined as one or more small balloons within the

brain. Inside the balloon or balloons, essentially all wires within a bunch of wires are in use. Consequently, new patterns which can only establish new (incoming) associations within the area of the balloon, cannot create new associations. But this balloon is not fixed. There are many things going on constantly. The balloon shrinks as forgetting takes place and widens as new patterns come in. Also, it can take all sorts of strange shapes. The balloon may be larger one day and smaller the other day. Different ways of thinking and different combinations of, for example, language, dialect, culture, etc. cause different sizes. Although it is expected that this balloon spreads over many pattern structures in an area of the "bunch of wires", it may be as small as one pattern structure unable to find one free wire within a bunch of wires. It is a rather dynamic structure that depends on many factors.

Bottlenecks can, for example, originate from:

- Inefficient processing, requiring additional capacity in terms of "number" of patterns and associations needed between those patterns, blocking wires and pattern structures for other things

- Inefficient circuits and patterns requiring unnecessary evaluation steps through "thinking" and objective patterns, blocking wires and pattern structures for needed things

- The limited speed at which neurons can reset themselves (for instance 200 times a second). As too many patterns/associations need to be evaluated, this may become to slow, for example, to speak fluently.

- Inefficient workload distribution, requiring an extensive number of (long) distance associations. Per NNSM, those wires are blocked for other use.

- Although the brain seems to be rather flexible in which areas it does what, it can be expected that physical connections, the different parts of the brain and evolutionary background limit the general flexibility. For example, information coming from the senses must be picked up at a certain place. Muscles must be activated through patterns and circuits that lead to the

specific muscles. Cells creating hormones must be connected to patterns that are related to those hormones. Different parts of the brain must be connected with each other. This may limit the ability to have any processing/wiring taking place in or between any part of the brain.

- The number of connectivity possibilities a neuron structure has to connect through the connecting "wires" (i.e. per "bunch of wires" in the NNSM) may be too limited.

- The number of connections an individual neuron can physically have may be too limited.

- The number of "distance" wires could be too limited (that is to say a bunch of wires in the NNSM).

- A type of neuron may allow for a varying number of connections. What may be sufficient for one pattern may prevent the creation of needed circuits in other areas.

- The wires to a central place (for example, to connect with thinking/decision making) could be too limited.

- Biological, for example a virus infection.

In the following, a variety of products will be explained which may be provided or developed according to exemplary embodiments of the invention on the basis of such recognitions.

First, diagnosis tools will be explained.

In such a context, a software may be provided that provides an improved or optimum distribution of workload. Subjective information from the different specialists may be entered (i.e. from eye doctor, balance, hearing, etc.). As available, information utilizing test apparatuses may be entered (brain scans, balance testing, eye measurements, etc.). A workload distribution model of the patient's brain may be provided. Suspicious areas may be highlighted. Treatment advice may be given.

In this context, equipment may be provided to see or measure inefficient behavior (can be around use of language, walking, balance, the way how individuals think, body language, tone, hearing, etc.).

In this context, also brain scans may be performed. This may be done to see the main activity areas. It may also be done to see the associations.

It is also possible to provide therapeutic software products. This may be a software product that stimulates/trains the creation of wanted patterns and associations.

Another product which may be provided based on the above recognitions, is the provision of (therapeutic or pharmaceutical) drugs. The term "drug" may include food additions, for instance to improve the body's general ability to fight sicknesses such as a cold / the flue.

So-called "reduction type" drugs may be one or multiple drugs that disable/reduce sensor input such as smell, touch, taste or muscle position information (temporary impact or for a longer period). The term "reduction type" drugs cover also one or more drugs that cause less or no chemistry creation of a certain kind (i.e. fewer/no hormones of a certain kind). In turn, lack of such chemistry or reduction of such chemistry causes fewer/different pattern activation in the brain. These drugs may be of a general nature or targeted to a specific chemistry. Such drugs may be also bacteria-based. The term "reduction type" drugs covers also one or more drugs that have a general claming down effect and hence cause fewer neurons to fire (i.e. Ritalin, used for ADHD treatment has such an effect, or adaptation of such drugs). One or more drugs may be covered by this term that have a specific claming down effect and hence cause fewer neurons, involved in a specific activity, to fire. One or more drugs that disable/reduce emotions and/or interests (for example, to avoid the creation of new but unwanted high strength associations) may be provided. One or more drugs that disable/reduce specific emotions and/or specific interests may be provided. One or more drugs that enhance

"forgetting" (reduced strength) may be provided. For example, the "forgetting" of three days then happens within one day.

However, it is also possible to provide or develop so-called "increase type" drugs. In the following, examples will be given which may be covered by this term. One or multiple drugs that enhance association of sensory input such as in smell, touch, taste or muscle position information (temporary impact or for a longer period) may be provided. For example, a "touch" becomes more intense. This may also be relevant to "overwrite" unwanted associations between patterns. One or more drugs that cause more chemistry creation of a certain kind (i.e. more hormones of a certain kind) may be provided. In turn, the increase of such chemistry causes more/different pattern activation in the brain. These drugs may be of a general nature or targeted to a specific chemistry. Such drugs may also be bacteria-based. One or more drugs that have a general activation/stress creating effect and hence cause more neurons to fire (for example, this may be relevant for "picking wires") may be provided; this would, for example, break unwanted associations. One or more drugs may be provided that have a specific activation/stress creating effect and hence cause more neurons, involved in the specific activities, to fire. One or more drugs that increase general interests/emotions may be provided. Per NNSM, this would, for example, cause higher strength between patterns, which in turn would ease learning at school, etc. One or more drugs that increase specific interest of a specific emotion may be provided: Per NNSM, this would, for example, cause higher strength between patterns, which in turn would ease learning at school, etc.

According to an exemplary embodiment, therapeutic training equipment may be provided to train wanted patterns and associations (for instance a wobble board, bean backs, etc.).

According to another exemplary embodiment, therapeutic support devices may be provided. For instance, adaptable glasses for the van Gemert therapy or equipment for better hearing may be provided.

According to another exemplary embodiment, techniques known as such ("ancient techniques") may be used in the context of such a therapeutic concept. Meditation, yoga, acupuncture, may be used to support the therapeutic goal of embodiments of the invention. Adaptations of ancient techniques may be carried out to specifically address the capacity bottlenecks and strength between patterns.

In the following, a therapeutic system according to an exemplary embodiment of the invention will be described in more detail.

This therapy involves the identification of bottlenecks, their reduction/elimination and, as appropriate, activation of wanted patterns/associations.

In a first step, it is possible to try to identify (potential) capacity bottlenecks. Examples for this will be given in the following.

A capacity bottleneck may come from an inefficiency that creates excessive processing needs in an area of the brain.

Per van Gemert therapy, the eye(s) may not be as good as eye tests make one believe (doctors may argue, for example, children can compensate). This however may create additional processing needs (it could be additional instructions to make the eye focused better; or an effect as seen similarly with digital zoom function of cameras, etc.). The eyes may be "out of balance", causing additional processing needs, so the information coming from both eyes may be brought together to create a single sharp picture.

Per DDAT therapy, this therapy circles around a lack of automation of routines related to "balance". It is believed that the lack of automation creates excessive processing needs. The further argument is that this creates processing needs in the neocortex while automated processing should happen through the cerebellum.

Furthermore, capacity bottlenecks may come from an inefficient distribution of workload, causing, for example, extensive connectivity needs over a distance (which blocks "wires"/fibers for other use) or processing in an

area that should, as things are automated, move to another area. For example, per van Gemert therapy, the wrong eye being the dominant eye suggests information must travel or connect between the two hemispheres. Per the NNSM, the argument is that an unnecessary large amount of "wires" between the two hemispheres are blocked for other use.

Per DDAT therapy, much of the processing around "balance" may take place in the neocortex while another part of the brain, the cerebellum, may be better suited.

Per Wil Missot, it is argued that greater learning problems occur when the dominant eye and the dominant ear are at the other side of each other.

In a second step, treatment options may be identified. Examples for this will be given in the following.

It is possible to map the symptoms, and to take an approach that is as wide as possible. Such symptoms may be headache, lack of reading ability, concentration problems, dizziness, etc.

It is also possible to use tests/test equipment for better identification of potential inefficiency areas. For example, eye measurements, both, traditional (reading letters) and "machine" type may be performed. Test apparatuses/software may be provided to measure for example the effectiveness of balance routines (per DDAT approach/DDAT equipment). Brain scans may be performed to establish where most processing needs to take place (brain scans may provide useful information with regard to brain activity).

In a next step, the treatment may be started. Examples for this will be given in the following.

It is possible to take away inefficiencies caused by factors that can be overcome through external means (i.e. per van Gemert therapy: glasses that match the actual sharpness of the eyes; prism glasses to re-establish balance between the two eyes and reduce processing needs for the creation of sharp

pictures; switching of the dominant eye for better workload distribution; per DDAT therapy: training/automation of balance routines).

Per yellow/blue filter therapy, it is possible to filter out a colour so fewer neurons fire and hence, less associated processing takes place.

Other treatment able to switch dominant areas may be provided, for example, to the other hemisphere. Or, treatment able to reduce excessive processing needs may be provided. Or, treatment able to prevent the creation of unwanted associations may be provided. This could, for example, be

- through a drug disabling/reducing a type of (sensory) information. For example, the senses of smell, touch, taste may be disabled.
- through a "reduction type" drug, disabling/reduction, for example, emotions.
- through an ancient technique such as Reiki, meditation, yoga, Tai Chi, acupuncture, etc.

As appropriate, in a next step, it is possible to wait for capacity to become available (i.e. as pattern associations are forgotten).

In a further step, as appropriate, it is possible to stimulate the creation of wanted patterns and pattern associations.

For example, in the case of Dyslexia, van Gemert stimulates reading/writing skills through spelling and writing exercises. DDAT stimulates balance "routines" through tailored balance exercises.

This may be supported by an "increase type" drug.

Through new training exercises/training equipment, suited to create more efficient processing, it may be possible to free up capacity.

In the following, a therapeutic system according to another exemplary embodiment of the invention will be explained.

This therapy involves decreasing the strength of associations between unwanted patterns and increasing the strength of associations between wanted patterns. As appropriate, per the NNSM and for wanted associations, the strength is brought to a high level or a very high level (at which execution of

wanted associations and patterns may become automatic). Very high strength/automation means that it becomes (very) hard to overrule the execution with contrast thinking. For example, as babies learn to walk and this is trained over the years, it becomes hard to make oneself fall.

In the following, a proactive therapy for the above-mentioned assumption will be presented that too much strength or a lack of strength between patterns causes conditions such as unwanted behavior towards other people. For instance, such a therapy may be applied if a child (or an adult) is at risk to develop unwanted behavior.

Techniques may be used as practiced today or enhanced techniques may be used utilizing the NNSM to locate the problem area (from simple questionnaire to medical/psychological assessment). If a risk for unwanted behavior is established, the therapy may be started.

It may be accessed whether a capacity bottleneck, inefficient processing, etc. may be involved. It is possible to follow that therapy first and combine with the following, as appropriate.

It may be possible to stimulate the creation of associations/circles leading to "alarm bell patterns" such as "I don't like the sound of this", "I don't like the consequences of this", sweating, increased heartbeat, etc. This can happen through techniques taught in courses such as "difficult to handle children". For example, the punishment of sending a child to his/her room for the rest of the day does not appear to be effective. However, punishment of ten minutes, during which a child is put in a quiet area, plus five minutes intervals until wanted behavior is achieved, is known to be rather effective.

The therapy can be supported by, for example, a drug that increases, for example, emotions and interest, and hence, per NNSM creates wanted associations of higher strength.

As appropriate, other elements of therapy may be included.

In the following, a reactive therapy for the above-mentioned assumption that too much strength or a lack of strength between patterns

causes conditions such as unwanted behavior will be explained. After a person has demonstrated unwanted behavior and correction is wanted/required, such a therapy may be applied.

It is possible to use techniques as practiced today or enhanced techniques utilizing the NNSM to locate the problem area (from simple questionnaire to medical/psychological assessment).

It may be accessed whether a capacity bottleneck, excessive processing, etc. may be involved. It is possible to follow the therapy first and combine then with the following, as appropriate.

It may be tried to break (i.e. forget) or reduce strength of unwanted pattern associations (the success claims of the rapid eye movement therapy, applied for traumatic experiences, in combination with the NNSM, suggests that this is possible). This therapy part of the therapy may be supported by a drug, an ancient technique, etc., causing a reduction in strength between neurons.

Next, it is possible to stimulate the creation of associations with "alarm bell patterns" such as "I don't like the sound of this", "I don't like the consequences of this", sweating, increased heartbeat, etc. and/or objective patterns like "I want a comfortable life". Although techniques used per the proactive approach above may help, it is expected that stronger techniques, such as used in boot camps or during military training need to be applied. During the training, patients are kind of forced repeatedly to think about and experience the negative consequences of unwanted behavior and positive emotions with wanted behavior.

The previous step of the therapy should be supported by, for example, a drug that increases, for example, emotions and interests, and hence, per NNSM, creates wanted associations of higher strengths.

In the following, a therapeutic system for the above-mentioned assumptions that too much strength or lack of strength between patterns

causes conditions like addictions (gambling, gaming, legal and illegal drugs), will be provided.

It is possible to use techniques as practiced today or enhanced techniques utilizing the NNSM to locate the "problem" area (from simple questionnaire to medical/psychological assessment).

It is assessed whether a capacity bottleneck may be involved. The therapy is followed and may be combined with the following, as appropriate. It may prevent important associations from being established.

It may be possible to try to break (that is to say forget) or reduce strength of unwanted patterns associations (the success claims of the rapid eye movement therapy, applied for traumatic experiences, in combination with the NNSM, shows that this is possible). This part of the therapy may be supported by a "reduction type" drug, an ancient technique, etc., causing a reduction of strength between neurons/patterns.

To avoid falling back in old habits, the creation of associations with "alarm bell patterns" such as "I don't like the sound of this", "I don't like the consequences of this", sweating, increased heartbeat, etc. and/or objective patterns like "I want a comfortable life" is stimulated. Although techniques used per the proactive approach above may help, it is expected that stronger techniques, such as those used in boot camps or during military training need to be applied. During the training, patients are kind of forced repeatedly to think about and experience the negative consequences/emotions and positive emotions with wanted behavior.

The previous step of the therapy can/may be supported by, for example, a drug that increases, for example, emotions and interests, and hence, per NNSM, creates wanted associations of higher strength.

In the following, a therapy for the above-mentioned assumption that too much strength or lack of strength between patterns causes "locked in" conditions such as seen with emotional traumatic experiments will be explained.

It is possible to use techniques as practiced today or enhanced techniques utilizing the NNSM to locate the "problem" area (from simple questionnaire to medical/psychological assessment).

It is assessed whether a capacity bottleneck may be involved. This therapy may be followed and combined with the following, as appropriate. The bottleneck may prevent important associations from being established at higher strength.

It is attempted to break (that is to say to forget) or reduce strength of unwanted patterns associations (the success claims of the rapid eye movement therapy, applied for traumatic experiences, in combination with the NNSM, suggests that this is possible). This part of the therapy may be supported by a drug, an ancient technique, etc., causing a reduction of strength between neurons/patterns.

When the previous step is insufficient, it is attempted to stimulate the creation of high strength associations with other patterns. This may be through a carefully planned event or series of events, creating positive emotions. It may be supported by an "increased type" drug.

In the following, a list of potentially impacted conditions to be influenced or detected by exemplary embodiments of the invention will be explained. These are further examples of mental disorders / diseases for which exemplary embodiments of the invention could potentially have impact. An important argument is: All have something to do with information management, capacity management, workload placement, workload activity and/or strength between neurons/patterns. This may be a direct relationship or an indirect one. The indirect one can, for example, imply that through an information management, capacity management, workload placement or related approach, the "defect" may remain but the "processing" and the pattern associations are moved to another area. As the processing happens somewhere else, the symptoms are reduced or may go completely.

- Epilepsy - Under certain conditions, the therapy of blinding the dominate eye, i.e. to switch the dominate eye, can cause epilepsy attacks. What happens per the model according to exemplary embodiments of the invention is that the switch of the dominant eye causes some workload to be moved to another place within the brain. In this case, this is probably a move to the other hemisphere. This also causes different pathways (the horizontal wires in the model) to form. Those pathways may have connections to areas close by but also to areas in very different parts of the brain. Turning the argument around, for those suffering from epilepsy, it may be possible to treat epilepsy by changing the workload distribution in the human brain. The theory being that certain activity in a certain area creates epilepsy, for example, through some "defect" or, for example, an overload of processing needs. Reducing the activity in that area or freeing the area from activities may reduce or even stop epilepsy attacks. Please observe that workload movement / capacity management may be relatively simple in some cases (per van Gemert and DDAT therapies in connection with the below described NNSM model), challenging in other cases and impossible in yet other cases.
- Sexual problems
- Anxiety Disorders
- Panic Disorder
- Anorexia
- Schizoid Personality Disorder
- Schizophrenia
- Dementia / Alzheimer's Disease – It may become possible to reduce the impact of dementia by moving workload to other areas
- Down syndrome
- Narcolepsy

Next, further exemplary embodiments of the invention will be explained.

In the following, further exemplary embodiments of the device for influencing a physiological condition of a physiological subject will be explained. However, these embodiments also apply for the method of influencing a physiological condition of a physiological subject, to the program element and to the computer-readable medium, as well as to the system for manufacturing a substance for influencing a physiological condition of a physiological subject, and for the system for characterizing a physiological condition of a physiological subject.

The physiological condition may be for example one of the group consisting of a mental condition, a mental disorder/disease. Examples include: Headache, migraine, mental fitness, aggressive behavior, violence behavior, crime behavior, obsessive behavior, Dyslexia, ADHD, an eye-focusing problem, concentration, memory, depression, fatigue, autism, Dyscalculation, whiplash, dizziness, drug addiction, gambling addiction, and a traumatic condition. More generally, the term "physiological condition" may denote any property of a human being or of an animal which may cause, influence or describe its health state. Particularly, the term "physiological condition" may denote any property of body and/or soul of a human being or an animal which is in functional connection with the performance of the brain.

The term "physiological subject" may particularly denote a human being and an animal. In other words, the physiological object may be any living subject which has a brain and in which the function of the brain is essential for the existence of this physiological subject. Such a physiological subject may be a person, like a patient, an adult or a child.

The workload distribution may be evaluated, and a functional coupling of basic members of the brain as well as the functional coupling between different portions of the brain may be evaluated.

"Capacity bottlenecks" may particularly be portions of the brain with a workload which exceeds a physiologically reasonable threshold, but may also denote portions of the brain with a workload distribution which falls below another predetermined threshold value. Thus, capacity bottlenecks may also characterize unhealthy portions of the brain.

The detected capacity bottleneck(s) may be characterized regarding location in the brain, shape (3D or 2D projection), size (absolute or relative), temporal properties (for instance increase or decrease of the capacity bottleneck in dependence of the time), and number of capacity bottlenecks. Such properties of the capacity bottleneck(s) may allow to broaden the basis of information based on which the information may be derived as to how to suppress, reduce or eliminate capacity bottlenecks so as to improve the health state of the person.

The detection unit may detect a functional coupling between portions of the brain of the physiological subject. Thus, not only the workload when taking alone, but also the coupling between portions of the brain with other portions may be investigated in this context.

The modification unit may be adapted for selectively modifying the workload distribution in the brain of the physiological subject by taking at least one measure of the group consisting of supplying a drug to the physiological subject, supplying a perceivable stimulus to the physiological object, reducing the capacity in one or more selected portions of the brain of the physiological subject, increasing the capacity in one or more selected portions of the brain of the physiological subject, and temporarily disabling a sense of the physiological subject. Particularly, the chemical impact of a drug may influence the workload distribution over the brain. Furthermore, when applying an external stimulus like music, smells, heat, pain causing events, etc. to a human being, this perception may selectively modify the workload distribution in the brain. This in turn can reduce or remove capacity bottlenecks. The capacity may be increased in one or more selected portions

by promoting or accelerate "forgetting". It is also possible to selectively increase the capacity in special portions of the brain, for instance by a special learn training. Temporarily disabling a sense of the physiological subject (hearing, smelling and/or seeing, for instance) may reduce the capacity needs in different portions.

A repetition unit of the device may be adapted to cause the detection unit and the modification unit to repeat a cycle of detecting and modifying one or more times, i.e. a predetermined number of times. Thus, an iterative procedure may be performed including a cycle of detecting the workload distribution and selectively modifying the workload distribution. Thus, by a trial and error procedure, it may be ensured that the performed therapy goes into the right direction, so that a successive improvement of the treatment may be obtained.

The modification unit may be adapted for selectively modifying the workload distribution to thereby improve workload distribution over different portions of the brain and hence reducing / eliminating existing or potential bottlenecks. Thus, some kind of equilibration of the brain resources may be a goal of redistributing the capacity.

The device may comprise a database unit adapted for storing predetermined data indicative of the and/or of other physiological conditions of the and/or of other physiological subjects, the database unit being accessible by the modification unit to thereby include the data in determining the modification. Thus, the detection and modification procedure may be refined by including predetermined information with regard to the patient or with regard to other patients. Thus, by using the data stored in such a database, empiric knowledge about treating a disease may be taken into account.

The database may be adapted for storing, as the predetermined data, particularly eye data, balance data, hearing data, and brain scan data. However, this list is not limiting.

In the following, further exemplary embodiments of the device for manufacturing a substance for influencing a physiological condition of a physiological subject will be explained. However, these embodiments also apply for the method of manufacturing a substance for influencing a physiological condition of a physiological subject, to the substance, to the computer-readable medium and to program element. Furthermore, these embodiments also apply to the system for influencing a physiological condition of a physiological subject, and to the system of characterizing a physiological condition of a physiological subject.

The substance to be developed may be a drug or a food supplement. The term "drug" may particularly denote any substance used as or in a medicine. Also habit-forming substances and substances which affect the nervous system may fall under this term. The term "food supplement" may cover an "add-on" to food, like vitamin pills, or may include components added to or in food, particularly to actively impact on the body/brain.

The device may further comprise a modification unit adapted for modifying the substance to be delivered to the physiological subject and adapted for causing the substance delivery unit to supply the modified substance to the physiological subject. In such a scenario, a drug which is supplied to the patient may be modified (with respect to dosing, composition, formulation, etc.) and thus a scan may be performed in some kind of trial and error procedure, investigating which drug composition may be useful for influencing the patient in a desired manner. Particularly, a screening analysis may be performed for developing new medications. It is also possible to develop further indications of a known medication which is known for another indication. For instance, a drug which is known to be efficient for treating stomach may be used as a starting point for developing a drug to treat a mental disease.

The modification unit may particularly modify the substance by using another substance, or by modifying the composition of the already investigated substance.

The substance delivery unit may be adapted for supplying a drug to the physiological subject which is common for treating a physiological condition differing from the physiological condition to be influenced by the device. For instance, a device known to be efficient for another cure or indication, may also be implemented in another scenario, so that it may be possible to detect further indications of a medication.

In the following, further exemplary embodiments of the device for characterizing a physiological condition of a physiological subject will be explained. However, these embodiments also apply for the method of characterizing a physiological condition of a physiological subject, the program element and the computer-readable medium. Furthermore, these embodiments also apply to the system of influencing a physiological condition of a physiological subject, and to the system of manufacturing a substance for influencing a physiological condition of a physiological subject.

The device may comprise an indication unit adapted for indicating one or more portions of the physiological subject in which a suspicious capacity or activity property has been evaluated. Therefore, it may be visualized in an image which physical portions of the brain may cause problems, and may have the result that individual physiological conditions are out of desired or normal ranges. This may allow a physician to obtain a proper basis of information, on the basis of which further measures may be taken.

The device may comprise a proposal unit adapted to automatically make a proposal for modifying the workload distribution, the stimulation of more efficient processing, etc. so as to suppress the suspicious capacity or activity property. For instance, indications may be given like "provide medication ABC in the quantity XYZ". To derive such information, the

system may make use of database information, may use empiric medical data, may implement expert rules, may implement artificial intelligence like neural networks, or may be adapted as a self-leering system so as to propose a therapy.

It is also possible that the device comprises a stimulation unit adapted to automatically stimulate a modification of the workload distribution so as to suppress the suspicious capacity / activity property. Such a stimulation unit may apply impacts on the patient, like providing medications, optical stimulations, acoustical stimulations, etc. By taking this measure, the workload distribution and capacity needs in the brain may be significantly influenced.

The aspects defined above and further aspects of the invention are apparent from the examples of embodiment to be described hereinafter and are explained with reference to these examples of embodiment.

The invention will be described in more detail hereinafter with reference to examples of embodiment but to which the invention is not limited.

Fig. 1 shows a part of a main building block of a neural network according to an exemplary embodiment of the invention.

Fig. 2 shows another part of the main building block of the neural network according to the exemplary embodiment of the invention shown in Fig. 1.

Fig. 3 illustrates a hierarchically constituted neural network according to an exemplary embodiment of the invention.

Fig. 4 illustrates a first part of associating a sound pattern with a visual pattern according to an exemplary embodiment of the invention.

Fig. 5 illustrates a second part of associating a sound pattern with a visual pattern according to an exemplary embodiment of the invention.

Fig. 6 illustrates a first part of "learning" a computer mouse according to an exemplary embodiment of the invention.

Fig. 7 illustrates a second part of "learning" a computer mouse according to an exemplary embodiment of the invention.

Fig. 8 illustrates a third part of "learning" a computer mouse according to an exemplary embodiment of the invention.

Fig. 9 illustrates a forth part of "learning" a computer mouse according to an exemplary embodiment of the invention.

Fig. 10 illustrates a fifth part of "learning" a computer mouse according to an exemplary embodiment of the invention.

Fig. 11 illustrates a sixth part of "learning" a computer mouse according to an exemplary embodiment of the invention.

Fig. 12 illustrates a first part of remembering a computer mouse according to an exemplary embodiment of the invention.

Fig. 13 illustrates a second part of remembering a computer mouse according to an exemplary embodiment of the invention.

Fig. 14 illustrates a third part of remembering a computer mouse according to an exemplary embodiment of the invention.

Fig. 15 illustrates a forth part of remembering a computer mouse according to an exemplary embodiment of the invention.

Fig. 16 illustrates a first part of reading a "table" according to an exemplary embodiment of the invention.

Fig. 17 illustrates a second part of reading a "table" according to an exemplary embodiment of the invention.

Fig. 18 illustrates a third part of reading a "table" according to an exemplary embodiment of the invention.

Fig. 19 illustrates a forth part of reading a "table" according to an exemplary embodiment of the invention.

Fig. 20 illustrates reading "tandem" according to an exemplary embodiment of the invention.

Fig. 21 illustrates a first part of remembering according to an exemplary embodiment of the invention.

Fig. 22 illustrates a second part of remembering according to an exemplary embodiment of the invention.

Fig. 23 illustrates a third part of remembering according to an exemplary embodiment of the invention.

Fig. 24 illustrates a first part of how to say "table" according to an exemplary embodiment of the invention.

Fig. 25 illustrates a second part of how to say "table" according to an exemplary embodiment of the invention.

Fig. 26 illustrates a third part of how to say "table" according to an exemplary embodiment of the invention.

Fig. 27 illustrates a forth part of how to say "table".

Fig. 28A to Fig. 28K show parts of a file including information processed by a neural network according to an exemplary embodiment of the invention.

Fig. 29 shows a device for processing information according to an exemplary embodiment of the invention.

Fig. 30 shows a computer system on which a neural network according to an exemplary embodiment of the invention may be installed or operated.

Fig. 31 shows a device for influencing a physiological condition of a physiological subject according to an exemplary embodiment of the invention.

Fig. 32 shows a device for developing a substance for influencing a physiological condition of a physiological subject according to an exemplary embodiment of the invention.

Fig. 33 shows a device for characterizing a physiological condition of a physiological subject according to an exemplary embodiment of the invention.

Fig. 34 illustrates a model for capacity bottlenecks which may occur in a human brain.

The illustration in the drawing is schematically. In different drawings, similar or identical elements are provided with the same reference signs.

The structure of the following description is as follows. In a first section, exemplary embodiments of a neural network and a corresponding system for processing information will be explained referring to FIGURE 1 to FIGURE 30. This includes an explanation of the so-called Neural Network Switch Model (NNSM). In a second section (which can be combined or carried out using aspects of the first section), exemplary embodiments of a drug development system/therapy system will be explained referring to FIGURE 31 to FIGURE 34.

Next, the first aspect will be explained (which may also be denoted as a "Neural Network Switch Model").

According to an exemplary sub-aspect of the first aspect, a neural network is provided, comprising a plurality of neurons and a plurality of wires adapted for connecting the plurality of neurons, wherein at least a part of the plurality of wires comprises a plurality of input connections and exactly one output connection.

According to a further exemplary sub-aspect of the first aspect, a device for processing information is provided, the device comprising an input unit for perceiving information, a neural network having the above-mentioned features for processing the perceived information, and a decision taking unit (preferably located at a central position of the system) for taking a decision based on a result of the processing of the perceived information.

According to another exemplary sub-aspect of the first aspect, a method of operating a neural network is provided, the method comprising connecting a plurality of neurons by a plurality of wires, wherein at least a part of the plurality of wires comprises a plurality of input connections and exactly one output connection.

According to still another exemplary sub-aspect of the first aspect, a program element is provided, which, when being executed by a processor, is adapted to control or carry out a method having the above-mentioned features.

According to yet another exemplary sub-aspect of the first aspect, a computer-readable medium (e.g. a CD, a DVD, a USB stick, a floppy disk or a harddisk) is provided, in which a computer program is stored which, when being executed by a processor, is adapted to control or carry out a method having the above-mentioned features.

According to still another exemplary sub-aspect of the first aspect, a neural network is provided, comprising a plurality of neurons, and a plurality of wires adapted for connecting the plurality of neurons, wherein at least a part of the plurality of wires comprises exactly one input connection and a plurality of output connections.

The neural network according to sub-aspects of the first aspect can be realized by a computer program, that is by software, or by using one or more special electronic, optical and/or optoelectronic optimization circuits, that is in hardware (for instance including one or more microprocessors), or in hybrid form, that is by means of software components and hardware components.

According to an exemplary sub-aspect of the first aspect, a neural network is provided in which multiple nodes or neurons are connected to one another and may be further coupled with bunches of wires having a multitude of input connections but only one output connection. This fundamental structure is a proper basis for an adaptive system which may be capable to learn, in a human-similar manner, to derive information by processing input content.

In other words, a neural network having the above-mentioned features may be fed with information, and the interconnected neurons may adjust strength values of

their interconnections based on the learnt information so as to be able to recognize or remember or compare known patterns in the future, and to take decisions based on the learnt information. By means of the multiple input connections of the wires, even a complex structure may be mapped, wherein the single output connection allows the neural network to take reliable decisions and judge path along which information shall flow.

Alternatively, a proper function may also be obtained with a system having exactly one input connection and a plurality of output connections.

With a system according to an exemplary sub-aspect of the first aspect, sophisticated decision making or artificial intelligence may be made possible, and a system may be provided which works properly also in a complex environment. By means of parallel processing along different paths of the interconnected structures, it may be possible to take decisions in a reasonable number of steps (for instance with 100 or 200 steps) so as to derive information with reasonable computational burden and in a sufficiently fast manner.

This can be achieved by a combination of a strength management, that is a flexible adjustment of strength values for different connections between the neurons, by a special kind of learning, and by prioritizing tasks which have assigned a higher value of priority.

When information is input to the system, for instance visual, audible or olfactory information, then this information is recognized in form of patterns. For instance, when a camera of the system detects an image of a human being, such a pattern may help to identify the human being by name.

Thus, universal patterns may be recognized, wherein patterns of a lower level may be identified by groups of neurons supplied with input information (in the above example information obtained by sensors like the camera), and groups of neurons of a higher level may recognize, based on these low level patterns, patterns of a higher order of complexity or abstraction. By taking this measure, various input information items may be processed in a human-similar manner and may form the source for

deriving an abstract information which in turn can be used as a basis for taking a human-similar decision.

Areas in which the human mind is conventionally far more efficient than a computer might be interesting fields of applying sub-aspects of the first aspect. In this context, sub-aspects of the first aspect may provide a building block that should, together with additional building blocks, lead into substantial improvements with computers. Sub-aspects of the first aspect extend and further develop the above mentioned framework of Hawkins et al. to provide a method for the identification of higher-level patterns, association techniques and the management thereof.

According to an exemplary sub-aspect, a method and a system for the identification (or recognition) of patterns, associations of patterns and the management of patterns is provided.

At least one of the following elements may be included in a system according to an exemplary sub-aspect:

- Lower-level patterns (for example: points, lines, rectangles, colors, etc.)
- Higher-level patterns, created from lower-level patterns (for example: doors, cars, faces, words, muscle activation in humans, etc.)
- A switching area that connects the patterns with each other
- A central or software area that can take decisions
- The strength of the individual patterns
- The strength of the links in the switching area
- Neuron-similar functionality to establish circuits
- Circuits
- Large scale parallel activity

Supported by some software type of functionality, exemplary sub-aspects of the first aspect provide at least one of the following functionality items:

- The identification of new patterns from lower-level patterns and from higher-level patterns (the identification of lower-level patterns may or may not require additional/different functionality)

- The establishment of meaning through circuits connecting individual patterns

- The establishment of sequences through the order of the patterns within a circuit

- The establishment of preferred options through a strength management

- The freeing up of the patterns and circuits of least relevance

The following are advantages which may be achieved by exemplary sub-aspects of the first aspect:

- In the context of a hardware implementation of the first aspect, large scale parallel processing may become possible without the intervention of a central processor. Input patterns (i.e. from visual objects) can automatically lead to output pattern (i.e. a movement). Software can simulate or substitute the hardware implementation. In that case, interaction with a central processor may be required or advantageous. However, the decision making from input patterns to output patterns may be very similar to the hardware implementation.

- A human-similar learning may be possible

- Often, input patterns lead to output patterns within less than 100 steps involved (which is a fraction of what conventional computer programs with underlying microcode need); though, many things happen in parallel

-Sub-aspects of the first aspect provide a fundamental building block to make computers do things only humans do well up to today (i.e. walking over all sorts of terrain; natural language interface; catching a ball; etc.)

In the following, advantageous features of sub-aspects of the first aspect will be explained:

New, overarching patterns may be created from existing patterns (a learning mechanism for the creation of overarching patterns).

Patterns may be associated with each other, for example, to create meaning (a learning of meaning can be established).

"Multiple incoming connections" to a wire within the bunch of wires may be provided, but only "one outgoing connection" to only one pattern may provide the

functionality to associate varying patterns with a single object. The strength of these connections may provide the preferred choices.

Patterns and associations may be managed in a way such that, for example, the more relevant associations and/or patterns become preferred choices and the least relevant associations and/or patterns can be removed or eliminated to free up space for new patterns and circuits.

Multiple to a rather large number of activities can happen at the same time (parallel processing). Parallel processing can happen without intervention from a central place. Input criteria (i.e. patterns) can automatically lead to output, for example, the activation of something.

Input patterns can lead to output patterns within 100 or less steps, which is a fraction of the steps needed by computers with today's architecture to do the same task (parallel activity counts for one step). Though, for better decision making, as appropriate and with technology that works faster than the neurons of the human brain, exemplary applications may use a multitude of 100 steps.

A building block enabling the creation of natural language interfaces may be provided, providing robots capable to walk over a multitude of terrains, etc. (what humans do with ease but conventional computers/robots struggle with).

Sequences may be established through the order of patterns within a circuit.

Next, further exemplary sub-aspects of the first aspect will be described.

In the following, exemplary sub-aspects of the neural network will be described. However, these sub-aspects also apply for the device for processing information, for the method of processing audio data, for the program element and for the computer-readable medium.

The plurality of neurons may be grouped to at least two groups of neurons, wherein the groups of neurons may be arranged to define a hierarchic structure. By introducing a hierarchy in the grouped neurons, different levels of abstraction or pattern recognition can be distinguished and

can be connected in series/in parallel. Thus, a structured arrangement of the interconnected neurons may be obtained.

The plurality of wires may be grouped to at least two groups of wires (which may also be denoted as bunches of wires), wherein neurons of a respective group of neurons may be connected between two (adjacent) groups of wires. Thus, between different levels or hierarchical orders of neural clusters, bunches of wires may be interconnected. Hence, a sequence of alternating neuron portions and connecting portions may be formed, so that a group of wires may be a powerful interface between different groups of neurons or may provide a communication between groups of neurons (see FIGURE 2).

At least a part of the neurons of a respective group of neurons may be interconnected to one another. Thus, the neurons may be interconnected to one another by intra-neuronal connection lines and/or may be interconnected to wires.

A group of neurons of a lower hierarchic level may be adapted to recognize a pattern of information input to the neurons of this group which pattern is of a lower level compared to a pattern to be recognized by neurons of a group of neurons of a higher hierarchic level. For instance, a pattern of a lower level may be the extraction of a face from a person's image captured by a camera. In contrast to this, a pattern of a higher level may be the identification of the name of the person visible on the image. For instance, on such a higher level, the name of a person may be identified based on the detected image and based on a voice recognition system detecting a wife of the person calling the person "Jim". In combination with the detection that the person has red hair, blue eyes and wears a watch of a particular brand, the system may derive the higher-level pattern information that the person might be "Jim Smith".

In a further high level, it may be, for instance, identified that the identified person appears on the image in combination with other persons, for

instance with his family members. By this subsequent refinement of the pattern or information, a human-similar decision making may be accomplished which may allow for producing intelligent machines or the like. Thus, the information of the other people on the image may confirm that the person is in fact "Jim Smith".

A strength value may be associated with each connection between different neurons, wherein the strength value of a particular connection may be indicative of a probability that information input to the neurons propagates via the particular connection. In other words, the strength value assigned to a connection may define whether a particular piece of information or a signal is transmitted via this connection or via another connection having a different (higher) strength value. For instance, a propagation path may be activated and used which has, when taken alone or in combination with other connections, the highest strength value available.

The strength value of each connection may be modified based on a frequentness of propagation of information input to the neurons via the particular connection and/or may be modified based on a strength modification impulse. Thus, the frequency of occurrence of a propagation via a particular connection may be a criteria based on which the strength value is determined. For instance, frequent use of a connection may increase the strength value, and seldom use of a connection may have the consequence that the corresponding strength value remains low or is even reduced. By this flexibility of the strength value it may be ensured that the system learns from the information which is supplied to the system. The strength value of each connection may also be modified based on a strength modification impulse. For instance, a strength increase impulse may be generated. The strength of a connection may be increased through each re-activation of the circuit or through special impulses, which can be based on value patterns.

The strength value of each connection may decrease in case of absence of a propagation of information input to the neurons via the

particular connection for more than a predetermined time interval. In other words, when a connection has not been used for at least a predetermined time interval, then the corresponding strength value may be reduced automatically, since this connection has a high probability to be of lower relevance. Furthermore, for each use of a connection, the corresponding strength value may be increased. As an alternative to a step-wise ("digital") decrease of the strength value of connections of low relevance, a smooth (constant) decrease is possible (i.e. through something physical or biological).

The plurality of neurons may be adapted such that a signal to be sent by a neuron is sent via a connection of the neuron which connection has assigned the highest strength value as compared to the remaining connections of the neuron. According to this feature, the determination which of a plurality of connection will be used for sending a signal is performed on the basis of the fact which of the connections provides the highest strength value. This feature may improve the adaptive capabilities of the system.

The strength value of a connection may be maintained permanently at least at a predetermined value in case that the strength value reaches or exceeds the predetermined value. In other words, when the strength value has exceeded a certain level for a connection, then this connection might be of high relevance and should be prevented from being weakened or removed (for instance since this connection has not been used for a particular time interval). In order to avoid such an unwanted reduction or elimination of important key paths, very strong paths may be prevented from being weakened according to the described sub-aspect.

A particular connection may be interruptible in case that a frequentness of propagation of information input to the neurons via the particular connection falls below a threshold value. For instance, when the strength value becomes very small, such an obviously irrelevant connection may be deleted.

The previously described features, when taken alone or in combination, may enable to provide a high performance adaptive system in which reasonable assumptions are taken based on which connection strengths are modified.

The plurality of neurons may be connected in a manner to allow for a parallel processing of information by the neurons. Such a parallelization or decentralization of data processing may significantly improve the speed of the data processing, and may distribute the resources homogeneously.

Each of the neurons may comprise at least one incoming interface adapted to receive information. The neurons may also have a plurality of incoming interfaces via which an incoming signal or piece of information may be transported to the neuron.

Furthermore, each of the neurons may comprise at least one outgoing interface adapted to send information. Thus, a neuron can send, via one or more outgoing channels, information which shall be propagated to another neuron.

At least one of the plurality of neurons may be connected to at least one of the plurality of wires, wherein exactly one of these connections may be active at a time. Such a neuron may also be denoted as a single tree neuron having many connections into the bunch of wires but only one or at most one connection being active at any time.

At least one of the plurality of neurons may be connected to at least two of the plurality of wires, wherein more than one of these connections are active simultaneously. Such a neuron may also be denoted as a multiple tree neuron which can be active in parallel and can establish multiple circuits.

At least one of the plurality of neurons may be disabled by default and is to be enabled (only) upon receipt of an enabling signal. Such a neuron may also be denoted as a bridge neuron which is usually disabled and provides connectivity to an association area below. By a so-called "open" frequency,

the bridge neuron may be enabled, wherein the bridge neuron may, in the active state, fire, to activate a circuit it is part of.

At least one of the plurality of neurons may be adapted to detect an incoming information and to send the enabling signal upon receipt of the incoming information. Such a neuron may also be denoted as a frequency neuron which detects activity at its incoming wire and sends an "open" frequency signal.

At least one of the plurality of neurons may be enabled by default and is to be disabled (only) upon receipt of a disabling signal. Such an inhibition neuron being enabled by default may be disabled by a "no" frequency signal.

At least one of the plurality of neurons may be adapted to identify a pattern and to take a decision based on the received information. Such a (T)-neuron may connect to a central place for the purpose of identifying the pattern that is currently "on". This information can be used for decision making.

Referring to the previously described sub-aspects, the provision of different types of neurons may allow to have a powerful system in which each of the neurons is selectively adapted to fulfill its assigned functions and tasks. Thus, such a multi-neuron type system allows, with reasonable computational burden, to derive information in an efficient manner.

Different groups of neurons may be assigned to process information related to for instance different human senses. For instance, a first group of neurons may be provided and interconnected so as to evaluate visual information. Another group of neurons may be provided for processing audible information. A third group of neurons may be provided for analyzing olfactory information, for instance smells and tastes. The data related to the human senses may be detected, in the system of the first aspect, by means of respective sensors which may simulate corresponding human senses.

A "sense" in the meaning of this description may be any human physiological perception that responds to a specific kind of physical energy

and corresponds to a defined region or group of regions within the brain where the signals are received and interpreted. Human senses which may be simulated by the first aspect are particularly seeing, hearing, tasting, smelling, tactition, thermoception, nociception, equilibrioception and proprioception. Seeing or vision describes the ability to detect light. Hearing or audition is the sense of sound perception. Taste or gustation relates to the human tongue having receptors to detect tastes like sweet, salt, sour and bitter. Smell or olfaction relates to olfactory reception neurons. Tactition is the sense of pressure perception, generally in the skin. Thermoception is the sense of heat and cold, also by the skin. Nociception is the perception of pain. Equilibrioception is the perception of balance. Proprioception is the perception of body awareness. A plurality of these human senses in any combination may be used as input information for the neural network from which the artificial system of the first aspect may derive information and may take a "reasonable" decision. For each of the discussed senses, technical solutions are available to detect the respective perception. A "sense" in the meaning of this description may also be any non-human perception of a sensor device, for instance electricity, magnetism, radioactivity, computer input (also from one computer to another) or the like.

Different groups of neurons may be assigned to process information related to different levels of patterns. A lower level pattern may include points, lines, rectangles, colors, etc. Higher level patterns may be created from lower level patterns. Examples for higher level patterns are doors, cars, faces, words, muscle activation in humans.

At least one of the plurality of neurons may be adapted to sense at least one of the signals of the group consisting of a signal to activate a circuit formed by at least two of the plurality of neurons, a signal to deactivate a circuit formed by at least two of the plurality of neurons, and a signal to connect different circuits each formed by at least two of the plurality of neurons.

In the following, further exemplary sub-aspects of the device for processing information will be described. However, these sub-aspects also apply for the neural network, the method of operating a neural network, the program element and the computer-readable medium.

The input unit of the device may be adapted for perceiving information related to one or a plurality of different human senses or non-human senses. For instance, the input unit may include a camera for detecting visual information, may include a microphone for detecting audible information, may comprise a gas sensor for detecting olfactory information, may comprise a pressure sensor for detecting tactile information, etc. These information items may be pre-processed, for instance by an image processing algorithm, a speech recognition algorithm, a gas separation identification unit (for instance a mass spectroscopy or the like), a pressure determining device or the like. This information may then be provided to the neural network for further processing and interpretation. "Non-human senses" may particularly denote senses which can be perceived by a sensor device, but not necessarily by a human being (for instance electricity or magnetism or radioactivity).

The decision taking unit (which may also be denoted as a central processing unit)may be adapted for taking the decision based on a result of a processing of perceived information related to one or a plurality of different human senses or non-human senses. For instance, similar like a human sense organ in combination with the human brain, the device for processing information may derive information and may take decisions based on the processing of the neural network.

Particularly, the decision taking unit may be adapted to take a human-similar decision based on a result of the processing of the perceived information.

The decision taking unit of the device may be adapted for taking the decision at a central place of the device or at a central place of the neural network.

The device may further comprise an output unit adapted to output a result (e.g. "the detected person is Mr. Brown") and/or to take a measure (e.g. "open the door for Mr. Brown") based on the decision.

An advantageous aspect of the first aspect is that patterns may be created from objects. For example, tiny points, representing the lowest level of visual objects are associated with each other to form lines and other lower-level objects. Instead of maintaining, for example, the complete data a visual object is made up of, patterns (only) contain information that identifies the object. At the lowest level, a pattern recognition mechanism identifies the lowest level patterns. Then, the low-level patterns are readily available.

FIGURE 1 and FIGURE 2 illustrate main building blocks according to an exemplary sub-aspect of the first aspect.

In the following, referring to FIGURE 1 and FIGURE 2, a neural network 100 according to an exemplary sub-aspect of the first aspect will be described.

The neural network 100 comprises a plurality of neurons 101 to 106. These neurons include pattern name neurons 101, tree neurons 102, bridge neurons 103 (disabled by default), inhibition neurons 104 (signal goes through by default), frequency neurons 105 (send "open" signal), T-neurons 106 (path to central place for decision making). T-neurons 106 may be dispensible at lower levels and for fully automated tasks.

As can be taken from FIGURE 2, a plurality of wires, namely a bunch of wires 109, is provided which is adapted for connecting the plurality of neurons 101 to 106. The bunch of wires 109 (providing connectivity) comprise wires having a plurality of input connections and exactly one output connection, or having exactly one input connection and a plurality of output connections.

Furthermore, first connections 107 and second connections 108 are provided to connect different neurons 101 to 106 to one another. The first

connections 107 describe a path which is available, but no signal. The second connections 108 illustrate a frequency path.

FIGURE 1 only illustrates a part of a neural network 100. An extended illustration of the neural network 100 is shown in FIGURE 2. As can be seen in FIGURE 2, the neural network 100 comprises a plurality of levels, wherein an x-level, ..., a second level, and a top level association area are shown exemplary. The same structure as shown for the top level association area can be repeated in the second level, ... and in the x-level.

The neurons 101 to 106 of one level (for instance of the top level in FIGURE 2) are grouped to corresponding groups, wherein this group of neurons is arranged to define a hierarchic structure. In other words, the different levels in FIGURE 2 relate to different hierarchic levels of the neural network.

As can be taken from FIGURE 2, the neurons 101 to 107 of the corresponding group, namely the top level, are connected between two adjacent bunches of wires 109.

Additionally, the neurons 101 to 106 are interconnected to one another by the connections 107, 108. A strength value is associated for one, some or each connection 107 to 109 between different neurons 101 to 106, wherein the strength value of a particular connection is indicative of a probability that information input to the neurons 101 to 106 propagates via the particular connection 107 to 109. More precisely, a strength is only needed for the touch points with 109, it could be used between 104 and 102; and could be used between 103 and 102. The strength value may be modified continuously by a strength adjustment unit (not shown) based on criteria like the information traffic per time between two neurons via the respective connection 107 to 109. The strength value of each connection 107 to 109 may be decreased when no signal propagates along such a path for more than a predetermined time interval. When a signal has to be sent from one neuron to

another one, the path with the highest strength value may be selected for this transmission.

When one path 107 to 109 turns out to be particularly important, since this path is used for conveying signals quite frequently, then the strength value of this path will not be reduced even after traffic-less expiry of a time interval, but will be maintained constantly at least at a predetermined value. However, it might be possible that the predetermined value may be exceeded when this path turns out to be used quite frequently also in the future.

When a path is no longer needed since it has not been used for a long time, then this particular connection may be interrupted forever or for a time period.

As can be taken from FIGURE 1 and FIGURE 2, the arrangement of the neurons 101 to 106 and the coupling by means of the connections 107 to 109 ensures that even a large amount of information may be processed in parallel.

The neurons 101 to 106 comprise incoming interfaces to receive a signal fired by another neuron 101 to 106 and can comprise one or more outgoing interfaces to send or fire a signal to another neuron 101 to 106.

The different neurons 101 to 106 relate to different kinds of neurons, as will be described below.

A main building block according to an exemplary sub-aspect of the first aspect is illustrated in FIGURE 1, and shows structures that relate to a single pattern.

By such a structure, a single pattern is identified from other patterns. Other connections 106 to 109 and other neurons 101 to 106 provide functionality to connect, for example, with other patterns.

A second building block, added to the one in FIGURE 1 and illustrated through FIGURE 2, provides the wires 109 that allow the structure of the individual pattern to connect with other patterns.

This is illustrated through the bunch of wires 109 above and another bunch of wires 109 below. The connectivity may be established in a vertical way whereby, for example, lower-level patterns lead to higher-level patterns, in a horizontal way or a combination thereof. Together, the system may act as a switching mechanism. As new patterns come in or patterns need to be connected with each other, connections may be made through the individual wires 109 within the bunch of wires 109.

Depending on a strength factor and available capacity, the connections may last for, for instance, parts of a second (or less) to years (or longer, essentially "forever"). Freed connections may be re-used for new patterns and new associations.

Following is an overview, listing functionality of elements of this structure:

A neuron 101 to 106	Neurons of the human brain have been used as template or model for what is referenced as "neuron" with exemplary sub-aspects of the first aspect. However, neurons according to exemplary sub-aspects of the first aspect may and will have functionality that differs from the neurons of the human brain. A neuron, in the context of exemplary sub-aspects of the first aspect, may be particularly able to fire impulses and/or to establish circuits with other neurons. A neuron may have an outgoing wire, which can split into many wires. They may connect with other neurons or within the bunch of wires above or below. A neuron may accept one or more incoming connections. Those connections may or may not be active.
Tree neurons 102	A single tree neuron 102 can have many connections into the bunch of wires 109. However, only one connection can be

active at any time.

Multiple tree neurons 102 can be active in parallel and may establish multiple circuits with the name pattern they represent.

Increased "firing" or an "extent"-frequency may drive tree neurons 102 to activate or find more circuits for the pattern

Bridge neuron 103	The bridge neuron 103, disabled by default, may provide connectivity to the association area below; an "open"-frequency may enable it and may make it fire to activate the circuit it is part of.
Inhibition neuron 104	The inhibition neuron 104 may be enabled by default; a "no"- frequency disables it
Frequency neuron 105	As the frequency neuron 105 detects activity at its incoming wire, it sends an "open"-frequency
(T): "T"-neuron 106	The (T) neuron 106 may connect to a central place for the purpose to identifying the pattern that is current "on". This information can be used for decision making

It may be only active for very brief moments of time. One possible implementation is that the central place handles only one active (T) neuron 106 at a time, which can be the one of the highest strength or focus at the moment.

As automation of a circuit takes place (i.e. a high strength), these neurons 106 can loose their ability to connect to the

central place.

Path types

There may be particularly two types of paths:
- "Normal" paths: They are for normal activity and to establish circuits. They can carry signals such as the "no"-frequency
- Frequency paths: They are specific for the transfer of signals

"Bunch of Wires" 109

There can be many incoming connections to individual wires 109 within the bunch of wires 109.

An individual wire 109 from within the bunch of wires 109 can have only one outgoing connection. It can only connect to one pattern. This may be established through one normal path and one or more frequency paths.

The bunch of wires 109 may allow for connectivity of all top-level patterns with each other. At the lower-level association areas, this connectivity may or may not be limited to an area, for example, the area of visual information. Further sub-sections are possible as well. Though, it may or may not be needed that the wires 109 span over the whole area.

Circuits

Through circuits, meaning between two or more patterns may be established.

There can be multiple active circuits from a single pattern.

A circuit can be established through passing through

	multiple patterns
Activation of an existing circuit	The initial firing of multiple tree neurons 102 (within a single pattern structure) may be such that, by default, only one previously established connection gets activated. Connections to other patterns that are active but do not fire to the circuit can be a proper choice. Subsequent circuits may be activated as other patterns, having circuits to this pattern, fire as well. High strength (i.e. automation) can automatically activate multiple neurons 101 to 106. Certain frequencies may activate circuits.
"No"-frequency	Disables a circuit
"Open"-frequency	Opens a blocked circuit.
"Extent"-frequency	Causes up-ward facing tree neurons 102 to activate more available but inactive circuits. May optionally cause down-ward facing tree neurons 102 to activate more available but inactive circuits
Strength	The strength may be established where the neurons 101 to 106 connect within the bunch of wires 109.

When a single tree neuron 102 has multiple established connections within the bunch of wires 109 and it fires, the connection with the highest strength (= least resistance) may be opened.

The strength of a connection is increased through each re-activation of the circuit or through special impulses, which can be based on value patterns.

The strength of the connections is automatically reduced to free up the least relevant connections.

Above a certain level of strength, the strength becomes permanent and is not reduced anymore. This level of strength may differ in different areas and level.

Sequence — The order in which patterns are activated or positioned in a circuit may establish a sequence.

A pattern — A pattern may be or include the information needed to identify an object without storing, for example, the detailed visual information of an object.

Pattern types	"Input patterns" may be automatically activated from sensory information such as visual or audio input.
	"Output patterns" may activate something. This may, for example, be a movement or the creation of a sound.
	"Value patterns" may be, for example, used to establish the strength of connections within circuits.
	"Objective patterns" are patterns that, for example, drive do go from place A to place B. They may be involved in decision making. They may hold the decision.
	"Imagination patterns" are other patterns, for example, new patterns created from existing patterns

As an alternative to the above example for an activation of the circuits, it is possible to generally maintain the architecture but to activate a circuit by a plurality of patterns (sequentially and/or simultaneously).

In the following, an exemplary hierarchy will be explained in which circuits are activated:

1. If two or more patterns of a previously established association/circuit fire, this takes preference over other criteria and activates the circuit.

2. If a pattern fires to a pattern that is active for another reason but that pattern does not fire at the moment, this activates the circuit or a part of the circuit.

3. If neither of the above criteria applies, the firing pattern fires through the path of highest strength. This activates the pattern at the other end of the path.

4. The "extend" frequency can activate additional paths to multiple patterns.

5. Subsequent circuits are activated as other patterns with circuits to this pattern also fire.

High strength (= automation) can automatically activate multiple neurons. It can also overrule some of the activation criteria.

To visualize how everything may work when many patterns go on, the example of lightning may be considered. Science has found that lightning involves "leaders," which become visible through high-speed cameras. Prior to the discharge taking place, many leaders face downward from the clouds. From the ground, there are also many upward-facing leaders. Typically, one downward-facing and one upward-facing leader connect. This is the path through which the actual lightning takes place, through which electricity flows.

In the brain, a large number of patterns are constantly going on. This means their name neurons are firing and activate linked patterns. Thinking about the firing as leaders, as two leaders connect, existing associations are activated. If two patterns have a previously established connection, this automatically becomes the preferred connection, because there is a higher strength, which means lower resistance for electricity to flow. If there is no existing association, a new association is created.

If only one of two connected patterns fires, it is like one leader trying to get from the clouds to the ground. Envision that the latter requires more "power" to reach the ground than would be the case if there were also an upward-facing leader. This way, a priority is established: Two connecting leaders become a preferred choice over one leader. Further, imagine there is a great deal of "lightning" taking place within the brain all the time.

This explains why it is not necessary to read words from the left to the right. And it explains why many people can read and understand the meaning of sentences that have the correct words, but the letters in each word are mixed up. For example: "Tsih boko exiaplns woh teh haumn bairn mya be precosisng inrfomtaino." At first, the letter combinations do not make sense. But as those combinations are disregarded, the highest-strength combinations of the activated letters surface. Even if, at first, the meaning of a word is incorrect in the wider context, the same

technique will disregard that meaning at sentence level, which lets the next option surface.

FIGURE 3 illustrates an example on how the building blocks can be brought together in a wider structure.

FIGURE 3 illustrates an exemplary sub-aspect of a hierarchical structure of a neural network according to an exemplary sub-aspect.

The hierarchical structure 300 includes an x-level 301, an x-1-level 302, ..., a third level 303, a second level 304 and a top level 305. In each of the levels 301 to 305, corresponding patterns 310 may be stored, processed or identified. Reference numeral 309 illustrates a bunch of wires 109.

As can be seen in FIGURE 3, a first block of the x-level 301 is fed with hearing information 306. A second block of the x-level 301 may be fed with visual information 307. A third block of the x-level 301 may be fed with "y-information", for instance olfactory information or other information related or not related to any of human senses.

According to the hierarchical structure of FIGURE 3, the x-level 301 identifies pattern in the information 306 to 308. These patterns may be found or processed by means of the neurons 309. This low level pattern information may be provided to the next higher level, in the case of FIGURE 3 the x-1-level 302. Thus, the pattern abstraction levels are increased from level to level 301 to 305, wherein at a top level 305 the information may be unified or brought together in order to take a decision based on the processed information.

Thus, FIGURE 3 illustrates one of many possible structures into which the building blocks of FIGURE 1 and FIGURE 2 can be brought together.

Patterns 310 typically connect directly above or below into the bunch of wires 109. The individual wires 109 within the bunch of wire 109 may or may not span the whole area or only a part of the area. All wires 109 within the bunch of wires 109 may or may not provide connectivity options for all patterns 310 with a level 301 to

305 and area. The number of patterns 310 and connectivity options within a level 301 to 305 and area may vary.

The detailed functioning according to exemplary sub-aspects of the first aspect will be illustrated through a couple of examples. The record numbers shown within the drawings (FIGURE 4 to FIGURE 27) correspond to record numbers, which will be discussed later on. As the functionality may relate to things humans conventionally do better than conventional computers, and as sub-aspects of the first aspect may improve - by modeling - computers in a way that comes closer to how humans do these things, the examples are related to human behavior. Together with other building blocks, it may be possible to have computers executing the examples similar to a human way.

EXAMPLE 1:

FIGURE 4 and FIGURE 5 illustrate an example how three higher-level patterns can be connected with each other.

Reference numeral 400 denotes a visual area. Reference numeral 401 denotes a hearing area. Reference numeral 402 denotes pattern details. Reference numeral 403 illustrates a pattern name neuron "on". Reference numeral 404 illustrates a pattern name neuron "off". Reference numeral 405 illustrates a tree neuron. Reference numeral 406 illustrates that a path is available, but no signal. Reference numeral 407 illustrates that a circuit is established. Reference numeral 408 illustrates top-level switching.

It is assumed that a person says: "There is a mouse on the table". A moment later a mouse is seen walking over the table. It is further assumed that the object of the sound "mouse" and the visual object of "mouse" have been seen before and associated with each other. As the sound for "mouse" is heard, the system automatically activates the sound pattern for "mouse" (see FIGURE 4). The name pattern fires, which make the tree neurons 405 fire.

Next, the path of least resistance or highest strength value is chosen and leads to the visual pattern of the "mouse" object (see FIGURE 5). As the path back to the hearing pattern is available from previous activations, the circuit is closed. Meaning is established. The visual object of a "mouse" is expected. As this object is seen a moment later, the visual pattern of the mouse is activated bottom up as well, which acts as confirmation. If the German sound for mouse, "Maus" were to be heard, it would have activated exactly the same pattern because the sound pattern is the same. If the Dutch word "muis" would have been heard, it would have activated a different pattern but would lead to the same pattern that represents the visual object of "mouse". It is the "multiple incoming connections" to a wire 109 within the bunch of wires 109 but "one outgoing connection" to only one pattern that makes this possible.

EXAMPLE 2:

FIGURE 6 to FIGURE 11 illustrate through an example how a new pattern is learned and connected with other patterns.

Reference numeral 600 denotes a bridge neuron (disabled by default). Reference numeral 601 denotes an inhibition neuron (signal goes through by default). Reference numeral 602 denotes a frequency neuron (sends "open"). Reference numeral 603 illustrates a path to a central place (decision making). Reference numeral 604 illustrates that a path is available, but no signal. Reference numeral 605 illustrates that a signal is fired. Reference numeral 606 illustrates that a circuit is established. Reference numeral 607 illustrates a frequency path. Reference numeral 608 illustrates a frequency active path.

In this example, a computer mouse is seen for the first time ever. Very soon thereafter, a person says again "There is a mouse on the table". Through the hierarchy illustrated in FIGURE 6, lower-level patterns are identified. They lead to the identification and automatic activation of the higher-level patterns "colour", "button" and "equipment" (see FIGURE 6).

As the word "mouse" is heard, this automatically activates the audio or hearing pattern of "mouse" (see FIGURE 7). This works the same as is shown for the visual pattern. In parallel, the visual objects of "colour", "buttons" and "equipment" find an unused pattern structure above and are able to establish circuits (in a real implementation more patterns may be needed). This establishes the new visual pattern of a computer mouse.

The audio pattern of "mouse" has, however, a connection to the visual pattern of the living object of "mouse". As circuits are activated bottom-up, the "mouse" name neuron fires and finds, through the path of least resistance, the old connection to the living animal "mouse" (see FIGURE 8). At this point, somewhere else, objective patterns go on and through the central place, a decision is taken: "Insufficient information". More detailed information about the object of a living mouse is needed. Because of the (T) connection to the central place and through the single wire within the bunch of wires connecting through the pattern of the living mouse, a circuit to the central place is available as well.

An objective pattern like "need more information about the pattern" now sends an "open"- frequency through the circuit (see FIGURE 9). This activates the circuits to the patterns that make up the living animal.

At this point and through other objective patterns a decision is made: The sound object and the visual object do not match. This causes a "no"-frequency to be sent from an objective pattern to the pattern of the living animal (see FIGURE 10). Again, the circuit through the (T) connection identifies the circuit to which this frequency is sent. This causes all circuits of the living animal to be inactivated.

Next, the sound pattern fires again, for example, because it is reactivated or an objective pattern sends an "extend"-frequency. As the sound pattern and the visual patterns fire about the same time, they find a new circuit (see FIGURE 11). Meaning is established. This connection is, however, weak and would fade away through automatic strength reduction. In order to a avoid this from happening, an objective pattern, in conjunction with a value pattern, sends an impulse through the circuit. This impulse establishes additional strength.

EXAMPLE 3:

FIGURE 12 to FIGURE 15 illustrate an example how patterns are remembered.

With regard to the symbols used in FIGURE 12 to FIGURE 15, reference is made to FIGURE 6.

It is assumed a few days after the previous example 2 happened, somebody uses the word "mouse". Now, the visual object of "mouse" needs to be recalled from the sound object of "mouse". Just like in the previous example, when the audio object of "mouse" is heard, the hearing pattern is activated bottom up and fires (see FIGURE 12). Because the connection to the living mouse has a higher strength, the circuit through the pattern of the living mouse is activated. Again, an objective pattern asks "Is this the right object?". As the conclusion is "no", the "no" frequency is sent. The circuit is broken (see FIGURE 13).

With the connection of the highest strength broken, the next connection opens. It links to the computer mouse. In order to think up how a mouse looks like, the "open" frequency is sent and the 2nd level patterns become available (FIGURE 14). If the more details to the buttons need to be remembered, another "open"-frequency is sent to the "button" pattern and additional information comes available (FIGURE 15).

EXAMPLE 4:

FIGURE 16 to FIGURE 20 illustrate through an example how reading can be done.

With regard to the symbols used in FIGURE 16 to FIGURE 20, reference is made to FIGURE 6.

This example shows how the word "table" is identified and meaning established. Through other text or audio patterns, it is most likely that a pattern, identifying the language as English, is on. Reading takes place from the left to the

right. This is illustrated in FIGURE 16. First, the "t" pattern is identified; next is the "a" pattern. Hence, they go on in quick succession.

Because this sequence happened many times before, it is strong and has a high strength connection to the next higher level (see FIGURE 17). On its way to the name pattern, the frequency neuron detects activity and immediately fires the "open"-frequency so the bridge neuron is opened. By the time the building circuit reaches the bridge neuron, it is open. The circuit can be activated. A "ta" pattern is identified from "t" and "a".

As this circuit is activated, tree neurons detect activity through their incoming connections and fire. It leads to the audio pattern of "ta" (see FIGURE 18). That circuit is activated as well. As the audio pattern is activated, its tree neurons fire and activate an existing link to "English". In other words, through the hearing pattern, "ta" is identified to belong to the English language.

Next are the letters "b", "l" and "e". Exactly the same happens here. Starting with the letter "b", FIGURE 19 provides an illustration. This time, the hearing patterns of "ta" and "ble" have a connection with table. A single circuit of three patterns is established. The two hearing patterns link to the visual pattern of "table", which establishes meaning.

However, the Dutch expression for "ta-ble" is "ta-fel". While the spelling of the first two letters is identical, the sound is different. If the Dutch language is in use for a moment and the strength of the connection is higher than with the English language, it leads to the Dutch sound of "ta". Because the English language is however "on", an objective patterns sends a "no" frequency to the Dutch hearing pattern, making the English link the preferred connection. What works for parts of a words also works for full words. In other words, if the first part of a word passes the test but the second or third part fail, "no" frequencies are send to the parts or the Dutch language pattern, and the whole word is read again. But this time the circuits to the English sounds are established. The same principle is applied when the word passes the test, but there is no link to a primary pattern (the visual pattern in this example).

There is, however, another possibility: When sentences are read and those are in English language, the "English" pattern is kind of permanently on. As long as it is on, it could have active circuits to the common sounds of the English language. They can be active but not have the attention at the moment. As English is "on" the circuits with the English language overrule those with the other languages and become preferred choices.

If the word is "tandem", one way of overcoming the mentioned aspect is the following. The first attempt may be "ta". As objective patterns, however, do not find something that makes sense, "ta" is disabled through a "no"-frequency. This opens the possibility for another link. As illustrated in FIGURE 20, "tan" of "tandem" is identified.

EXAMPLE 5:

FIGURE 21 to FIGURE 23 illustrate through an example how remembering or recalling can be done.

With regard to the symbols used in FIGURE 21 to FIGURE 23, reference is made to FIGURE 6.

This example illustrates how a sequence of events is recalled or, in human terms, remembered. As John and Mary walked into the restaurant, this event was stored through the creation of patterns and association of patterns as it happened. Through, for example, another pattern, a circuit with the "Going to restaurant" pattern is activated (see FIGURE 21). For example, through an "extend" frequency, circuits to John's and Mary's patterns are activated, meaning "going to the restaurant" was with John and Mary. If Mary's face shall be recalled, an "open" frequency is send to Mary's pattern and more patterns relevant to Mary's face become available.

Next, additional things of the event shall be recalled. One way of doing this is to send a "no"- frequency to John's pattern. This opens somewhat different circuits (see FIGURE 22). A next step might be another "no"-frequency to Mary's pattern.

With that, "going to restaurant" immediately leads to the patterns of a Greek restaurant and a name of Mykonos (see FIGURE 23).

EXAMPLE 6:

FIGURE 24 to FIGURE 27 illustrate an example how a patterns can lead to output and hence, the activation of something.

With regard to the symbols used in FIGURE 24 to FIGURE 27, reference is made to FIGURE 6.

Reference numeral 2400 denotes a muscle activation area.

This example illustrates the use of output patterns. A sound for the word "table" is created. Given things going on in the context, the English pattern is assumed to be "on". Next, objective patterns conclude that sound needs to be created. Through the objective pattern or from creating the sounds for multiple words, just before, the speaking pattern is "on". Those two patterns have connections and circuits with the patterns that are used to create the sounds for words. As a word is said, there are one or more circuits. Immediately thereafter, a new circuit is created to say the next word. On the other hand, the circuits of words for which sounds have been created fade away and may become inactive.

FIGURE 24 illustrates the situation just before the pattern of "table" gets the attention. The pattern for "English" is "on". It has circuits active and most likely more circuits than illustrated in the drawing.

As the pattern of a table gets attention, it becomes active. Through English and speaking patterns being part of the circle, it connects to the English language output patterns "ta" and "ble" (FIGURE 25).

One application is to not execute them quite yet but wait for an "open"-frequency from an objective pattern. As it is sent (see FIGURE 26), a sequence of patterns is activated, which in turn are connected to the mechanics that create the sound for "table". Quickly thereafter, the same happens for the second part of the word ("ble"; see FIGURE 27).

Exemplary sub-aspects of the first aspect can, for example, be realised through hardware, software or a combination thereof.

The following illustrates one of more possible applications on how an exemplary sub-aspect of the first aspect can be realized through software simulating the functionality outlined above.

An advantageous features of the software implementation is a file structure. It may consist of one large file (see FIGURE 28A to FIGURE 28K), or of a plurality of smaller files.

The one large file contains the higher-level patterns, the relationships between the patterns and the strength. FIGURE 28A to FIGURE 28K contain text as well. However, the text is for illustrative purposes only. No text needs to be stored in the file. If this is needed, it is in the form of patterns as illustrated beneath the pattern column. The first column lists the record number. Whenever a record number is listed in another column, it points to the first column. For example, when the word "mouse" is heard, the pattern at record number 11 is activated. If the language spoken is English, it points to records 9 and 10, which both contain a pattern for the word "mouse", plus links to related patterns (in this case, the sound for "mouse" in English is the same as the one in German; spelling is different).

It is assumed a "primary" pattern is created. In the example of a mobile phone, it can be the visual pattern of a mobile phone, the sound pattern "mobile phone", the sound pattern "GSM" or any another pattern that is most appealing to understand the meaning of what a mobile phone is. For example, as one looks around, other people are seen, day in day out. Also, eyes, mouths, noses, ears, hair and others, that are all associated with "face", are seen. As eyes, mouth, nose, ears and hair patterns are activated by simply looking around, "face" is activated from each of those patterns. Through the number of activations, which increase the strength, the association "face" automatically emerges as the overarching or "primary" pattern.

Assuming the visual pattern of a mobile phone, record 8 in FIGURE 28A to FIGURE 28K, has emerged as the primary pattern for a mobile phone, any time an

alternative (but already known) word is said, its association links to the pattern of record 8. It does not matter in which language it is said. If the Dutch word GSM is used, it links to record number 8. The same happens when an alternative word is used.

Similar arguments apply if the language is German and a sound of "mobile phone" phone needs to be created in English. This starts at record 8. As the "name neuron" is activated, the options of branch 1 become available. One of them is speaking. As this option is chosen, the next branch opens with three language options. English activates the following branch with options for the UK and the US. In the next branch, the UK option for "mobile phone" is chosen. As this happens, the links to the output patterns become available and can be executed.

Through this sub-aspect, it is possible to get things done within just a few steps. As the mobile phone gets attention, its pattern is activated, which activates the "name neuron". Inclusive this neuron, it takes only nine neurons (name neuron, 9844, 38, 37, 33, 9452, 6234 and 6345) to locate the first output pattern (6345) and only two more to locate the remaining output patterns (3423 and 3323). In terms of steps, the name neuron counts for one step and each branch means one more step. Since 9844, 38 and 37 are activated in parallel from the name neuron, this is one step. The same principle applies for subsequent branches. 37 activates 33, 34 and 35 in parallel, which counts for one more step. With that, the total number of steps involved to get to the first output pattern is five. In this case, only two more are needed to get to the final output pattern. This is not a precise match with what can be expected per illustrations through FIGURE 1 to FIGURE 27. However, it is a possible variation.

Software evaluates the options to be chosen. With objective patterns and strength available, this selection process is expected to be very simple. The fewer number of options to chose from are, the faster the selection process takes place. This means that, if there is only one option, the move to the next branch can happen with hardly any decision involved. In human terms and in the situation of intense heat, as the hand comes into contact with a flame, sensory information activates the patterns

"hand", "intense head". This automatically activates the sequence "activate retraction of arm". With that, the only thought/background processing needed is "execute". As the sequence (multiple branches) is executed, it activates the output patterns that involve the retraction of the arm. Requirement for this is that this had to be done once before so the sequence is available.

The previous provides the fundamental principle by which input leads to action, often with less then 100 steps and sometimes with nearly no decision making involved. Moreover, it means that, for as long as there is no option to choose from, parallel processing can happen with nearly no or no involvement of a central place involved. In human terms, it means heartbeat, breathing and many other things can happen without central coordination. As there are no options to choose from, input patterns automatically lead to output patterns. It is a high or very strength that makes the need for central decision making obsolete. Heartbeat, breathing and many other things happen so often that the strength factor must be very high.

The previous implies that, as different types of input patterns are activated by the senses, they automatically activate output patterns. All of this happens the same time. Hence, heartbeat, breathing and many more functions happen automatically. Different sensory patterns are associated with output patterns that make the heartbeat go up or down.

In order to assess the relevance of a pattern, every pattern and every link gets a strength factor. Each time a pattern or link is activated, the strength factor goes up. This can be realized through a function like:

$$\text{strength factor} = \text{Log}_{1.5}(x) + 1$$

wherein x is the number of times the pattern or link has been referenced.

Since the number of references is not stored, but only the strength factor, a detour is needed to increase the strength factor each time the pattern or link is referenced again. The following function recalculates to the number of references.

Adding one to it and running it through the previous function gives the strength factor for one additional reference.

$$x = 1.5^{\text{strength factor} - 1}$$

This however, is not sufficient. If this would be the way it works, the links within the same branch would always get the same increase in strength as the previous branch can activate all links in parallel. Links could not become more or less important. The most important could not turn up at the top and the least important could not turn up at the bottom. To overcome this conflict, the link that activates the next branch gets a small boost in strength. It gets a strength increase that is equal to two references. The same happens with the last link, provided it is executed and not just evaluated.

In FIGURE 28A to FIGURE 28K, record 8, the mobile phone, contains examples of strength factors. Through this mechanism, the links referenced and branched from more often, move up in the list. On the other hand, those rarely branched from move down the list. This may have particularly two advantages. First, it becomes more likely a relevant link is found quickly. The one with the highest strength is the best candidate. As a relevant link is found, there may be no need to further evaluate the branch. This saves valuable time. Secondly, those with a low strength factor can be removed to free up space for new and more relevant links.

In human terms, there are however other factors that influence how easy or difficult it is to recall/remember something: Interest and emotions. Records 163 to 186 contain values for interest and emotions. Those values represent references. As interest and emotions change over time and as this can happen rather quickly, it needs a loose connection rather a fixed one. Hence, it is assumed interest and emotional links are only associated when a pattern is actually activated. Thereafter, the connection is lost. On the other hand, while connected, it is used to boost the strength of the associated patterns and links. This requires an additional formula.

As the pattern is activated, its reference counter goes up by one. Moreover, the strength and/or emotion add a few "references" . In the example of record 8, there is a temporary association with record number 170. 170 gives a reference counter of 4. Hence, the strength factor of the mobile phone pattern is recalculated using 5 additional references. For the links, the same could be done. However, this would create too much of a boost and could create a conflict with the aging and cleanup process. The argument becomes that there should be a reduction in boost, the further the step or branch is away from the name neuron or pattern column. For this purpose, following is an example of a formula that could be used:

$$\text{Reference boost} = (1/[y+1]^{0.3} - 0.25) * z$$

wherein z is the interest or emotion value, and y is the branch number.

This reference boost is then added to the references that are used to calculate the strength factor of the links branched from and the last one that is executed. In the case of the mobile phone, the interest boost is 4 references. For branch 1, this means the reference boost calculates to

$$(1/[1+1]^{0.3} - 0.25) * 4 = 2.25$$

With this formula, the 2nd branch gets a boost of 1.88 and the 3rd branch 1.64. That is of course only for those options that connect to an option in the next branch and for the last one that is executed.

Up to now, only input, output and value pattern have been discussed. But, there needs to be something that drives for actions. That may be something to achieve within the next 30 minutes, the next week or in the years to come. This is where objective patterns come in. They lead to action. Many of them are kind of constantly active. For example, "read sentence until finished" (record number 134 with its links) with a secondary objective of "read word until finished (record number 135 with its links) are needed so a sentence is read.

Ageing and cleanup is done through reducing the strength. For all strength values that have not exceeded the high strength level that makes the strength permanent, a formula can be used to reduce the strength, for example, each day. It could, for example, involve a formula that causes a stronger reduction in strength the further the connection is away from branch 1. In certain cases, a technique that overwrites existing patterns and links with new ones is imaginable as well. Through examples, the principles of the software approach will be outlined.

This sensory memory needs a somewhat different approach. Sensory information, coming from the eyes, ears and so forth is always "on". However, this is not the case for the eyes while a person sleeps but it is for other senses. Rather than having a strength reduction technique, it makes sense to have new information "simply" overwrite old information. The only other requirement is that, as a neuron becomes inactive, the links behind it become inactive as well. In the meantime however, patterns are identified from the sensory information. And, it are those patterns that become the basis for short and long term memory. For those patterns and their links, the decreasing strength technique is applied.

It is possible that links of low strength are not freed but overwritten by new links that have a higher strength. This would mean an even more efficient use of resources.

Architects dream up new buildings and a tennis player can give a ball a different twist, a twist that has not been tried before. If this would take place from stored patterns and links, it is not imaginable that new buildings can be dreamed up or a tennis player could use a new twist. Concluding, something is needed to take decisions, and it must be able to do a few other things (decision making). It is possible that this is comparable with a computer program. However, experiences with the system according to the first aspect suggest this decision making is far away from the complexity of computer programs. It probably involves some rather simple routines.

For the reference model, decision making might be the following:

- Objective pattern driven decision making when multiple options are provided within a branch

- Going through and evaluating patterns and links without executing them; this includes recalling existing patterns and links

- The decision to "execute" output patterns

- The combining of existing patterns and links for the creation of new patterns and links.

The previous implies some sort of central processor may be needed. It may be needed to coordinate the decision making and other tasks. Though, compared to the processor and programming known from computers, it must be simple. It does not need to be complex because the possible answers for many decisions are readily available through the links and patterns. Because of a "100 step rule", i.e. the goal to obtain a result within 100 computational steps, it would not be surprising if it is extremely simple and very different to what we know as computer processors and programs.

Whatever the processor in the human brain is, it still needs to know which patterns, branches and links are active. Actually, the following functions are needed:

- Somehow, the active but not automated patterns must be made known to the processor

- The processor must be able to send a few very simple instructions such as "inhibit link" or "execute" to the name neuron and to the link neurons

- The processor must be able to identify the links behind a pattern so it does not mix up links of different patterns and branches.

Fully automated tasks are those that do not need any thought, for example, heartbeat, breathing and so forth. Semi automated tasks are those that need an "execute" command to the name neuron or link neuron. This starts the automatic execution of the links behind it. It starts a sequence. For example, in order to move a leg forward, the semi automated task must be started. Once this is done, the rest, like activating additional muscle to stay in balance, happens automatically.

As before, if every active pattern and link would be made known to the processor, the amount of data would be massive. Hence, there needs to be a mechanism that prevents feeding the processor if no decision is needed. Therefore, a high strength and no option to choose from, disables the sending of information to the processor. A (very) high strength also means execution of output patterns is automatic, without any intervention from the processor.

EXAMPLE 7:

There are many types of restaurants (record 19 in FIGURE 28A to FIGURE 28K); Greek, Chinese, fast food. Record 19 in FIGURE 28A to FIGURE 28K lists some basic criteria for restaurant, establishing what a restaurant is. From there, links to, for example, the Greek restaurant (record 20), provide more specific patterns, identifying what a Greek restaurant is. In this case, it contains some additional information because the appointment with John and Mary is at a Greek restaurant in Amsterdam. It is called Myconos.

The moment John and Mary are seen for the appointment, many patterns and links are activated and new links established. They provide more detail as to how John (records 13 and 140) and Mary look like. Much of it may only be perception. If not picked up by an objective pattern and strengthened, the links fade away quickly. So do unique patterns. Record 137 (going to the restaurant) records things that got some attention during the walk to the restaurant. There was some interest causing their strength to be at such a level that it can be recalled later.

John, however, is not seen constantly during the walk and in the restaurant. The eyes move to Mary and to other things around. This means patterns and links identifying John are deactivated and activated repeatedly. As they are reactivated, they are referenced and their strength goes up. More details can be recalled later. Record 13 contains such information and record 32 contains information about the Myconos restaurant. But, it are not just the fixed things that are recorded. The same happens with the moving things and conversations.

FIGURE 28A to FIGURE 28K illustrate an example with a file structure if the corresponding sub-aspect of the first aspect is implemented in part or completely through software. Record numbers above 1,000 are for illustrative purposes only. Record numbers below 1,000 relate to an existing record in the table.

To go back one more step: What is it that drives to make an appointment with John and Mary in the first place? This is where objective patterns come in. In this case, it may be an pattern of "let's have a good time". It is probably an objective pattern of "having something to eat" that makes us find a job so we can buy food. And, it is probably a pattern of "drive to work" that makes us drive to work (record 23) each day.

EXAMPLE 8:

A tennis game starts with a service. The opponent returns the ball. It is said that the speed of the ball, flying from one side of the court to the other side, is faster than a human is able to calculate the trajectory, identify the response, re-evaluate the trajectory multiple times as the ball comes closer and activate the right muscle sequences so the ball is returned. Indeed, with the 100 step rule, doing all the calculations necessary is a non-starter. Even with a fast computer, this is a rather difficult thing to do and, it is believed that no robot has mastered it yet. Here is how the reference model solves the problem.

First and foremost, there are a number of objective patterns, records 141 and 143 to 148. Those not only tell what to go for (return ball, win point, ... win match) but they also drive for action. Return tennis serve (record 147) tells to go to a specific place, wait for the serve and return it. For anyone to return a tennis serve of high speed, lots of practice is needed. This means many patterns and sequences of patterns are readily available from earlier practice. When it comes to returning the serve (or any other activity within the game), the stored patterns and links only need to be activated and executed. In this case, the service return starts with tennis serve T4 (record 149).

Just before the serve is done, the position of the body parts, the arm movement and even the expression of the opponent's face contain information as to what can be expected. In this case, the pattern of tennis service T4 is activated. As this happens, it provides three trajectory options through which the ball can be expected. As the ball comes closer, trajectory T87 (record 150) is confirmed through pattern recognition. As soon as this happens, execute commands are given to go into branch 2 and 3 of record 149. This makes the arm move to the back and the body to move one step to the right.

It is that a little spin and the ground can change the ball's path. Hence, it is important to have a few sub-trajectories readily available. In the example, sub-trajectory ST8 (record 153), which is already an option, gets confirmed very soon after the ball hits the ground. This execution activates a few options that the ball can take. In this case, the ball has a spin I-7 effect (record 155). This pattern contains a short sequence for the activation of arm muscles. Its first entry is a pattern that establishes at which distance from the ball the muscles need to be activated. As soon as this distance is reached, the execute command is given and the muscles activated. The arm is moved forward per arm muscles O3 (record 157) and, in parallel, the hand muscles O2 (record 158) are activated to turn the racket to the exact angle needed.

Both muscle activations contain a sequence. This is to activate different muscles during the movement. It gives the movement and hitting the ball precise control. Instead of simply hitting the ball and giving it a direction back over the net, it becomes possible to give it a specific direction, inclusive a spin effect.

For top-level players, practice in combination with the ability to give the patterns and links strength through interest and control, is what creates optimum patterns and links. The clearer they are, the fewer options. Few, preferably no option, means little to decide on, no waste of time and very fast execution. Execution can become semi automatic, possibly fully automatic for certain brief parts. Even if a pattern isn't readily available, this doesn't cause too much of a hassle because the central place or software can predict new patterns and links from existing ones and

execute them. With lots of patterns available, only little changes are needed, which causes little risk for execution. If a pattern or sequence is not efficient, it can be tried with a little change at the next opportunity.

Tennis is a game of surprises, and here is one. It is not only the tennis serve that is extremely fast. From a certain speed onwards and a little bit depending on where one is on the court, it takes too much time to get to the right spot. With that, it is impossible to return the ball. Waiting for the ball's trajectory to predict where the ball will hit the ground is simply too slow. One technique to overcome this problem is to take chances and move to left, right, back or forth in the hope that's where the next ball will be. It is that, if good players play against opponents of a lower class, the good ones are almost always at the right spot, even if the opponent plays very fast balls. Surely, they do not use chance for this.

Just like is the case with the tennis serve, the good players use the opponent's position on the court, his or her leg, arm and head position; the racket's position, its angle and a few other things. This is stored as patterns. It includes potential trajectories. With many, many such patterns available, possible trajectories are known before the opponent hits the ball. This provides just sufficient information and time to be at the right place the right time. Tennis players know this as anticipation. The tricky part is this: What creates those pattern?

At a relatively low playing level, waiting for the ball to leave the opponent's racket, is sufficient to get to the right spot on time. Hence, there is no need to anticipate. Then, as the playing level improves, it may be understood that something is missing. Movements are too slow, the ball is missed too often and the movements require too much effort. This means too many trajectory patterns start after the ball leaves the opponent's racket. This is bad news, because those patterns are of high strength. It requires quite some practice to build sufficient anticipation patterns that have clear options before the ball leaves the racket. Moreover, there are many unnecessary options to choose from. This decision process takes time when very fast decisions are needed. It will take lots of practicing and a long time until inefficient patterns fade away and the more efficient patterns and links are semi automated.

This example contains three types of patterns, input, output and objective patterns. Input and output patterns are only "on" for brief periods of time. Objective patterns, however, are "on" for as long as needed. "Win match" (record 141) is on for as long as the match lasts and probably also while watching tennis. These objective patterns are kind of at the back of the mind. They drive the action. Whether there is a conscious thought involving such a patterns depends on the moment and the interest at that moment. Obviously, the interest level of "win point", "win game" and "win match" are high during the heat of the match. Though, there are lots of variations during a match. As variations come in, concentration weakens. It is then a matter of getting sufficient interest into the objective patterns. This in turn makes it easier to think up trajectory and other patterns early on, which improves the game.

During a game of tennis, there is of course a lot more going on than listed above. For example, during any move, balance is lost if not corrected. This is where the balance objective (record 39) and automatic corrections come in if some out-of-balance situation is detected. Of course, the muscle activations during a game of tennis will have balance incorporated because they have been practiced many times before. It is that some new situations can emerge for which no pattern is available. In those cases, the balance objective is of very high interest. Let's explore this not on the tennis court, but with a boat trip over the ocean.

EXAMPLE 9:

For anyone not used to waves, the ups and downs easily cause sea sickness. But what is it that causes sea sickness? Today it is well understood that the inner ear provides sensory information about the vertical position. But it is not just the inner ear that provides data. The current muscle position is equally important. It would not make sense to move a leg if it is in the right position already. Hence, the current position must be known. Moreover, the eyes provide data as well. The latter was nicely demonstrated in a documentary in which artists created a human triangle. They stood on each others shoulders and there were multiple rows of people on top of each other until only one was at the top. What worked well was quite different

when the light was switched off. The human triangle was not able to stay in balance. It broke apart. It was established that horizontal lines are important to balance. Scientists argued that the changing horizontal lines confuse balance and cause sea sickness.

In the following, this will be discussed in the context of the reference model.

With the lights on, everybody in the human triangle was trained (had patterns and links) to compensate when somebody moved and an out of balance situation was about to occur. With lights switched off, the same patterns and links were still available. However, the eye patterns did not get activated. Record 40 provides an example with lights switched on. The inner ear (or a sensor simulating or fulfilling the performance of the inner ear) provides the current vertical position. Muscle data (which may be captured by a suitable sensor) provides information about the muscle positions. In normal situations, this is sufficient and one can walk with the eyes closed without falling. However, in more challenging situations like playing tennis or with the human triangle, this data is insufficient. Eye data is used as well.

Branch 2 of record 40 contains links to patterns created from eye data. Lights switched off means those patterns are inactive but one option has to be chosen to get to the patterns that activate the proper muscles. Obviously, with lights switched off, this is a lottery. Soon an inadequate option is chosen and the wrong muscle is activated. This brings the human triangle closer to an out of balance situation. Others in the triangle try to correct but run into the same problem. The triangle has to break apart.

It appears, sea sickness is created in a similar way. As eye-balance data is created from fixed surfaces, it is always built form fixed horizontal lines. On the ocean however, with some waves, there is no fixed horizontal line. The inner ear patterns, the muscle patterns and the eye patterns do not match anymore. The options needed in branch 2 of record 40 are not available or lead to incorrect muscle activation, which needs to be corrected over and over again. Somehow, this expresses itself in sea sickness. And, it probably lasts until sufficient new patterns and links are established.

Survival patterns and parent to child transfer of patterns and links will be discussed in the following. Somehow certain patterns and links must be transferred from parent to child. Without it, the patterns and links, necessary for the functioning of the body, could not be available at birth. Accepted, many patterns and links can develop while the embryo growths. However, there are also those tasks that cannot be trained during this time. But, they are available after birth and, without practicing.

Just born babies can swim. In the animal kingdom, wilder beasts and antelopes can walk, even run, just an hour after birth. After hatching, turtles immediately walk to the ocean. There are many more examples. What takes weeks, months, even years of practicing with children is readily available with many off-springs in the animal kingdom. This can only work if the information needed is transferred from parent to off-spring. Hence, some sort of "survival patterns" and "parent to child transfer" is needed for the reference model. That said, there are certain questions: How are survival patterns and their links identified? What is it that ensures they are transferred?

In answering the first question, "strength" is used to identify survival patterns. With the strength argument, it are those patterns and links with the highest strength that get transferred through the DNA. For many of the body functions, this very high strength is automatically established. Surely, 70 heartbeats a minute and related sensory information automatically creates a very high strength. Records 191 to 203 show a couple of examples. On the other hand, there are survival patterns that do not have a high repeat rate.

This will be explored through assuming there was a time when antelopes did not have enemies and new born took weeks to develop walking and running skills. It is further assumed that then came lions. What surly happens in such a situation is that newborns are lost to lions. Applying the reference model, it means emotions would be created; emotions of the strongest kind. With the herd running away from the lions, run-away patterns and extreme emotions are "on" (i.e. record 204) with each animal. Just like is the case with other interest and emotional values, these values get

used for the strength of associated patterns and links; in this case the run-away patterns and links. As those are repeated during the chase, probably "thought of" as the animal has spotted something dangerous but does not run yet, and as the herd is confronted with lions repeatedly over the months and years, the strength builds up over time.

At some point, this strength reaches a threshold that makes the run-away pattern survival pattern. Through the DNA they are transferred to the off-spring. For capacity reasons, this may be at the expense of other patterns and links, which may not qualify as survival patterns anymore. As, in this example, the herd experiences rather similar emotions, its not just one antelope through which it happens, but it are many. The newborn equipped with the run-away patterns are in a much better survival position than those without. At this point, natural selection takes its cause. Lions will find it easy to kill new born that cannot run.

In the following, referring to FIGURE 29, a device 2900 for processing information according to an exemplary sub-aspect will be described.

The device 2900 comprises an input unit 2901 for perceiving information. Furthermore, the device 2900 comprises a recognition unit 2902 for recognizing elementary patterns based on the information perceived in the input unit 2901. Furthermore, the device 2900 comprises a neural network 2903 which can be designed as described above. The neural network 2900 is adapted for processing the perceived information or, the information recognized by the recognizing unit 2902.

Furthermore, a decision taking unit 2914 is provided which may, at a central place, take a decision based on a result of the processing of the perceived information by the blocks 2901 to 2903.

An output unit 2904 connected to the neural network 2903 (and optionally to the decision taking unit 2914) is adapted to output a result and/or to perform an action based on the decision taken by the decision taking unit 2914.

In more detail, the input unit 2901 comprises a video camera 2905 for capturing image information of an environment of the device 2900. Furthermore, the input unit 2900 comprises a microphone 2906 to capture audio information, particularly voice information, from the environment. Beyond this, a gas sensor 2907 is provided within the input unit 2901 which detects olfactory information, that is smells or tastes which are transported by gas in the environment.

The fundamental raw data captured by the devices 2905 to 2907 are provided to corresponding recognition blocks 2908 to 2910. More particularly, the output data of the camera 2905 are provided to an image recognition unit 2908 which is adapted to perform image processing with the captured data. For instance, a face of a person may be detected by the image recognition unit 2908 by image data processing. Furthermore, a sound or voice recognition unit 2909 may be provided which may be capable of transferring speech detected by the microphone 2906 into a text. In a similar manner, an olfactory recognition unit 2910 derives the olfactory information of the environment as captured by the gas sensor 2907. For example, the olfactory recognition unit 2910 may detect the perfume used by the person which is shown on the image captured by the camera 2905 and which speaks so that the microphone 2906 may detect the voice of this person.

Thus, the first level recognition by the recognition unit 2902 may transfer the detected data of the components 2905 to 2907 into low level pattern information, using, if desired, methods and apparatuses known from the prior art.

This low level pattern input information is provided to the neural network 2903 which has a hierarchical structure of a second level recognition unit 2911, a third level recognition unit 2912 and, if desired, further level recognition units (corresponding to units 301 to 305 of FIGURE 3) which are not shown in FIGURE 29. Finally, an end level recognition 2913 is provided. From level to level, the recognized patterns become of a higher order and

include increasingly abstract or accumulated or combined information. After having passed the end level recognition unit 2913, the derived information items are provided to the decision taking unit 2914 which takes a decision based on a result of the processing of the perceived information by the previous stages. The decision taking unit 2914 is engaged when a decision is needed. However, in many cases, no decision is needed. Input patterns can lead directly to output patterns (and cause an activation through the output unit).

The output unit 2904 then activates, for instance a sound and/or an image.

Thus, the system 2900 is capable of working as a system realizing functionality similar to a human brain. For instance, after having processed the data concerning the image, the speech and the smell of the person, the output unit 2904 may, for instance, welcome the person by emitting a sound "Good morning Mr. Brown". Or, the output unit 2904 may recognize that it has been detected that the person is Mr. Brown, who likes cookies for breakfast. Consequently, the output unit 2904 may prepare a breakfast for Mr. Brown based on his known preferences. Or, the output unit 2904 may recognize that Mr. Brown is wearing a suit and a tie and may determine from this information that it is very likely that Mr. Brown now goes to work. Thus, the system 2900 can function as some kind of robot.

In the following, referring to FIGURE 30, a computer system 3000 will be explained on which a neural network according to an exemplary sub-aspect of the first aspect may be installed or operated.

FIGURE 30 depicts an exemplary sub-aspect of a data processing device 3000 according to the present first aspect for executing an exemplary sub-aspect of a method in accordance with the present first aspect. The data processing device 3000 depicted in FIGURE 30 comprises a central processing unit (CPU) or image processor 3001 connected to a memory 3002 for storing data, such as data remembered during the learning procedure of the neural network. The data processor

3001 may be connected to a plurality of input/output devices, such as sensors for detecting optical, audible, olfactory or other data or a user interface via which a human user may control or regulate the entire system 3000. The data processor 3001 may furthermore be connected to a display device 3004, for example a computer monitor, for displaying information or a decision taken in the data processor 3001. An operator or user may interact with the data processor 3001 via a keyboard 3005 and/or other output devices, which are not depicted in FIGURE 30. Furthermore, via the bus system 3003, it is also possible to connect the processor 3001 to connected apparatuses.

Next, the second aspect of the invention will be explained. Each of the below-described individual sub-aspects of this second aspect may be implemented in the context of any one of the above-described sub-aspects of the first aspect. However, it is also possible that any one of the individual sub-aspects of the second aspect may be implemented completely or partly independent of the context of any one of the above-described sub-aspects of the first aspect.

In the following, referring to FIGURE 31, a device 3100 for influencing a mental disease of a patient 3101 according to an exemplary embodiment of the invention will be explained.

The device 3100 comprises a detection unit 3102 for detecting a workload distribution / activity in a brain of the human patient 3101. The workload distribution / activity is indicative of the mental disease. For this purpose, a brain scan may be performed, for instance using electrodes 3103.

The device 3100 works under the control of a central processing unit (CPU) or control unit 3104. The CPU 3104, which may be a computer, controls the detection unit 3102 so as to derive the information whether there are capacity bottlenecks in specific portions of the brain of the human patient 3101. The CPU 3104 is further coupled to a modification unit 3105 for selectively modifying the workload distribution / activity in the brain of the human patient 3101 to thereby reduce or eliminate the mental disease. Although this may be possible, it may also be possible that this happens in multiple sessions, and in sessions without the equipment

involved. In the embodiment shown in FIGURE 31, acoustic sound signals 3106 are provided so as to selectively stimulate portions of the brain of the human patient 3101 in which, for example, presently essentially no processing occurs. In contrast to this, processing in other portions of the brain, which are overloaded with processing burden, become obsolete by this modification.

Furthermore, the CPU 3104 is coupled to an input/output unit 3107 via which a human operator, for instance a physician, may control the performance of the system 3100. Particularly, the input/output device 3107 may include input elements like a keypad, a joystick, a trackball, a touch screen or may even be the microphone of a voice recognition system. Results of the detection and the modification, which may be performed iteratively, may be displayed on a display unit 3108. The display unit 3108 may be a liquid crystal display, a cathode ray tube, a plasma device, or the like.

It is also possible that, at the LCD 3108, location, shape, size, temporal properties and/or number of capacity bottlenecks may be displayed, for instance in a colour scheme. "Red" portions of a brain image may indicate a high local workload, "blue" portions of the brain image may indicate a low local workload. Such an image may then be monitored by a human operator. By monitoring the time dependence of the capacity bottleneck distribution, it may be recognized whether the modification performed by the modification unit 3105 is successful or not. This allows, in a trial and error procedure, to derive meaningful information to take into account to heal the mental disease.

Although not shown in FIGURE 31, the modification unit 3105 may also provide drugs, reduce or increase the capacity in different portions of the brain, or temporarily disable or emphasize special senses of a physiological subject 3101 so as to modify the workload distribution of the brain of the human being 3101.

The CPU 3104 may also initiate a repetition of the cycles of detecting and modifying, so that with an iterative procedure, the capacity bottlenecks and the workload distribution within the brain of the human 3101 may be improved step for step.

FIGURE 31 further shows a storage unit including a database 3109 which is coupled to the CPU 3104 and which is adapted for storing predetermined data indicative of the patient 3101, like eye data, balance data, hearing data and brain scan data obtained from previous examinations of the patient 3101. Taking into account the entire physiological state of the patient 3101 may improve the efficiency of the modification.

In the following, referring to FIGURE 32, a device 3200 for manufacturing a medication for influencing a mental disease of the human patient 3101 will be explained.

The device 3200 comprises a medication delivery unit 3201 for administering a medication to the patient 3101. Furthermore, a detection unit 3102 is adapted for detecting a workload distribution in a brain of the human patient 3101 in the presence and in the absence of the administered substance. The workload distribution / activity is indicative of the mental disease in the presence and in the absence of the medication.

As can be taken from FIGURE 32, the medication delivery unit 3201 is connected to an arm of the patient 3101 so as to inject medication of a predeterminable concentration and quantity into the body of the patient 3101. Alternatively, tablets or another manner of administering drugs may be used. It may then be detected whether the supply of the medication influences the capacity bottleneck distribution over the brain of the patient 3101 or not. By taking this measure, it is possible to develop new medications for treating any kind of physiological conditions, like the mental disease of the patient 3101.

The cycle of trial and error may be repeated a number of times. In other words, different kinds and different concentrations or different formulations of medications may be provided to the patient. It may then be distinguished between "successful" medications, and "non-successful" medications. In this manner, the development of new drugs in a pharmaceutical company or in a university may be significantly improved.

In the following, referring to FIGURE 33, a device 3300 for characterizing a mental disease of a patient 3101 according to an exemplary embodiment of the invention will be explained.

Again, a detection unit 3102 is provided for detecting a workload distribution / activity in a brain of the patient 3101, the workload distribution / activity being indicative of the physiological condition. Furthermore, an evaluation unit 3301 (for instance a CPU) may be provided for evaluating the workload distribution in the brain of the patient 3101. An indication unit, namely a LCD 3108, may be provided for indicating one or more portions in the brain of the human patient 3101 in which a suspicious capacity or activity property has been evaluated. For instance, a colour distribution image of a brain illustrated on an LCD 3108 may show portions which suffer from heavy workload, and portions which have very low workload.

At the LCD 3108, it is also possible to provide proposals for modifying the workload distribution / activity so as to suppress the suspicious workload / activity property. When a physician operating the system 3300 agrees to such an automatically output proposal, the stimulation unit 3105 (which may also be denoted as a modification unit) may stimulate a modification of the workload distribution / activity so as to suppress the suspicious capacity / activity property. For instance, the acoustic waves 3106 may be provided to the patient 3101, a medication may be provided, etc.

FIGURE 34 illustrates a hierarchical structure of the brain schematically showing capacity bottlenecks 3400.

The diagram of FIGURE 34 shows a top level 303, a second level 302 and a third level 301, to which hearing 306, visual 307 and touch 308 stimuli are supplied.

With regard to the capacity bottlenecks 3400, if a new pattern cannot find a free wire in this area that is long enough to reach needed areas (which may be in other parts of the brain), it cannot establish new associations. For example, reading skills cannot develop. However, there are more things that could cause a capacity problem within a human brain. Next to capacity reasons, the model provides other reasons that could cause, for example, obsessive behavior.

Next, some further examples will be presented with respect to the function of embodiments of the invention.

EXAMPLE 1

Boot camps may "treat" people with, for example, obsessive/aggressive behavior and convicted criminals. Through applying, for example, military style training methods, it is believed that those successfully finishing the boot camps are less likely to repeat the unwanted behavior. For example, the crime rate shall be lower.

In order to increase the effectiveness of the boot camp "training" and/or to make the "training" less military style, a drug may be developed and applied which creates or enhances certain emotions/feelings. This can be emotions/feelings the person dislikes (i.e. just a bad feeling related to punishment; fear; etc.). Through bringing the person towards unwanted behavior, eventually punishment and, at the same time, the activation/enhancement of a bad feeling/emotion through the drug, circuits/associations involved will get a boost in strength (per the NNSM model, emotions and interest patterns send a "frequency/impulse" through the involved circuits. The frequency/impulse increases the strength of the circuits; highest strength means preferred association. It is believed to remember reading somewhere that emotions and interest do indeed have effect on remembering and strength between neurons). As this is repeated, the strength of those circuits/associations will further increase. At some point, it may even reach such a level that the associations become automated (automation meaning it becomes very difficult to overrule by conscious thinking: Increased heartbeat, sweating, etc. happen automatically). This implies further that it becomes difficult for the person to cross the line to the unwanted behavior. The drug would get this learning process going by creating the emotions/feelings. The same or another drug may enhance the emotions/feelings. This may speed up the treatment.

Alternatively or in combination with the previous, a drug may be developed that activates or increases positive emotions/feelings and/or interest. It may work the

same way but may need to be used in combination with reward based training and hence positive emotions/feelings.

EXAMPLE 2

When experiencing a headache building up, it becomes more and more difficult to think clearly. After taking paracetamol (a drug against headache), not only the headache disappears but thinking may become clearer and productivity improves (i.e. work can be done quicker that requires "thinking"). This clearer thinking may go beyond a normal situation with a clear mind. Moreover, this drug may create some positive emotions or enhances interest (not much but noticeable).

This drug may work for headache because it may have a relaxing impact. This means fewer neurons fire. Moreover, it is possible that certain sensors pick up a substance of the drug. As this implies input, and per the NNMS model, there will be some processing. That processing may lead to output. The output could be a (slightly) different feeling/emotion. This in turn would activate other patterns and create a (slightly) different active workload. Again, the patterns that cannot make a connection may stop firing as they are not triggered anymore.

EXAMPLE 3

Illegal drugs such as cocaine, opium, etc. appear to create a good mood. If they are adapted and used for the creation of emotions/feelings or interest and the side effects removed.

EXAMPLE 4

Through increase type of therapy/drugs, it may eventually become possible to activate and stimulate the body's healing functions. This could explain why homeopathic drugs appear to have effect.

It should be noted that the term "comprising" does not exclude other elements or features and the "a" or "an" does not exclude a plurality. Also elements described in association with different embodiments may be combined.

It should also be noted that reference signs in the claims shall not be construed as limiting the scope of the claims.

Implementation of the invention is not limited to the preferred embodiments shown in the figures and described above. Instead, a multiplicity of variants are possible which use the solutions shown and the principle according to the invention even in the case of fundamentally different embodiments.

Claims

1. A device for influencing a physiological condition of a physiological subject, the device comprising

a detection unit adapted for detecting a workload related property in a brain of the physiological subject, the workload related property being indicative of the physiological condition;

a modification unit adapted for selectively modifying the workload related property in the brain of the physiological subject to thereby modify the physiological condition.

2. The device of claim 1,

adapted for influencing, as the physiological condition, at least one of the group consisting of a mental condition, a mental disorder, a mental disease, headache, migraine, mental fitness, aggressive behavior, violence behavior, crime behavior, obsessive behavior, Dyslexia, ADHD, an eye-focusing problem, concentration, memory, depression, fatigue, autism, Dyscalculation, whiplash, dizziness, drug addiction, gambling addiction, and a trauma.

3. The device of claim 1 or 2,

adapted for influencing a physiological condition of, as the physiological subject, at least one of the group consisting of a human being and an animal.

4. The device of any one of claims 1 to 3,

wherein the detection unit is adapted for detecting one or more capacity bottlenecks in the brain of the physiological subject.

5. The device of claim 4,

wherein the detection unit is adapted for detecting at least one of the group consisting of a location, a shape, a size, a temporal property, and a number of the one or more capacity bottlenecks.

6. The device of any one of claims 1 to 5,
wherein the detection unit is adapted for detecting a functional coupling between portions of the brain of the physiological subject.

7. The device of any one of claims 1 to 6,
wherein the modification unit is adapted for selectively modifying the workload related property in the brain of the physiological subject by taking at least one measure of the group consisting of supplying a medication to the physiological subject, supplying a perceivable stimulus to the physiological subject, reducing the activity in one or more selected portions of the brain of the physiological subject, increasing the activity in one or more selected portions of the brain of the physiological subject, and temporarily disabling a sense of the physiological subject.

8. The device of any one of claims 1 to 7,
comprising a repetition unit adapted to cause the detection unit and the modification unit to repeat a cycle of detecting and modifying one or more times.

9. The device of any one of claims 1 to 8,
wherein the modification unit is adapted for selectively modifying the workload related property to thereby balancing a workload distribution over different portions of the brain.

10. The device of any one of claims 1 to 9,

comprising a database unit adapted for storing predetermined data indicative of the physiological conditions and/or of other physiological conditions of the physiological subject and/or of other physiological subjects, the database unit being accessible by the modification unit for using the data in determining the modification.

11. The device of claim 10,
wherein the database unit is adapted for storing, as the predetermined data, at least one of the group consisting of eye data, balance data, hearing data, and brain scan data.

12. The device of any one of claims 1 to 11,
wherein the workload related property comprises at least one of the group consisting of a workload distribution and an activity.

13. The device of any one of claims 1 to 12,
wherein the modification unit is adapted for selectively modifying the workload related property so as to promote wanted behavior and/or so as to suppress unwanted behavior.

14. A method of influencing a physiological condition of a physiological subject, the method comprising

detecting a workload related property in a brain of the physiological subject, the workload related property being indicative of the physiological condition;

selectively modifying the workload related property in the brain of the physiological subject to thereby modify the physiological condition.

15. A program element, which, when being executed by a processor, is adapted to control or carry out a method of influencing a physiological condition of a physiological subject, the method comprising:

detecting a workload related property in a brain of the physiological subject, the workload related property being indicative of the physiological condition;

selectively modifying the workload related property in the brain of the physiological subject to thereby modify the physiological condition.

16. A computer-readable medium, in which a computer program is stored which, when being executed by a processor, is adapted to control or carry out a method of influencing a physiological condition of a physiological subject, the method comprising:

detecting a workload related property in a brain of the physiological subject, the workload related property being indicative of the physiological condition;

selectively modifying the workload related property in the brain of the physiological subject to thereby modify the physiological condition.

17. A device for developing a substance for influencing a physiological condition of a physiological subject, the device comprising

a substance delivery unit adapted for delivering the substance to the physiological subject;

a detection unit adapted for detecting a workload related property in a brain of the physiological subject in the presence and in the absence of the substance, the workload related property being indicative of the physiological condition in the presence and in the absence of the substance.

18. The device of claim 17,

comprising a modification unit adapted for modifying the substance to be delivered to the physiological subject and adapted for causing the substance delivery unit to supply the modified substance to the physiological subject.

19. The device of claim 18,
wherein the modification unit is adapted for modifying the substance by taking at least one measure of the group consisting of supplying another substance, modifying a dosing of the substance and modifying a composition of the substance.

20. The device of claim 18 or 19,
wherein the substance delivery unit is adapted for supplying a medication to the physiological subject which is known for treating a physiological condition differing from the physiological condition to be influenced by the device.

21. The device of any one of claims 17 to 20,
adapted for influencing, as the physiological condition, at least one of the group consisting of a mental condition, a mental disorder, a mental disease, headache, migraine, mental fitness, aggressive behavior, violence behavior, crime behavior, obsessive behavior, Dyslexia, ADHD, an eye-focusing problem, concentration, memory, depression, fatigue, autism, Dyscalculation, whiplash, dizziness, drug addiction, gambling addiction, and a trauma.

22. The device of any one of claims 17 to 21,
adapted for influencing a physiological condition of, as the physiological subject, at least one of the group consisting of a human being and an animal.

23. The device of any one of claims 17 to 22,

wherein the detection unit is adapted for detecting one or more capacity bottlenecks in the brain of the physiological subject.

24. The device of claim 23,
wherein the detection unit is adapted for detecting at least one of the group consisting of a location, a shape, a size, a temporal property, and a number of the one or more capacity bottlenecks.

25. The device of any one of claims 17 to 24,
wherein the detection unit is adapted for detecting a functional coupling between portions of the brain of the physiological subject.

26. The device of any one of claims 17 to 25,
comprising a repetition unit adapted to cause the detection unit and the substance delivery unit to repeat a cycle of detecting and modifying one or more times.

27. The device of any one of claims 17 to 26,
wherein the workload related property comprises at least one of the group consisting of a workload distribution and an activity.

28. A method of developing a substance for influencing a physiological condition of a physiological subject, the method comprising

delivering the substance to the physiological subject;

detecting a workload related property in a brain of the physiological subject in the presence and in the absence of the substance, the workload related property being indicative of the physiological condition in the presence and in the absence of the substance;

accepting the delivered substance as an appropriate substance for influencing the physiological condition in case of detecting that the workload

related property has been modified in the presence of the substance as compared to the workload related property in the absence of the substance in accordance with a predetermined criteria.

29. A substance for influencing a physiological condition of a physiological subject,

the substance having been developed by a developing method of claim 28.

30. The substance of claim 29,
wherein the substance is at least one of the group consisting of a drug and a food supplement.

31. A program element, which, when being executed by a processor, is adapted to control or carry out a method of manufacturing a substance for influencing a physiological condition of a physiological subject, the method comprising:

delivering the substance to the physiological subject;

detecting a workload related property in a brain of the physiological subject in the presence and in the absence of the substance, the workload related property being indicative of the physiological condition in the presence and in the absence of the substance;

accepting the delivered substance as an appropriate substance for influencing the physiological condition in case of detecting that the workload related property has been modified in the presence of the substance as compared to the workload related property in the absence of the substance in accordance with a predetermined criteria.

32. A computer-readable medium, in which a computer program is stored which, when being executed by a processor, is adapted to control or carry out

a method of manufacturing a substance for influencing a physiological condition of a physiological subject, the method comprising:

delivering the substance to the physiological subject;

detecting a workload related property in a brain of the physiological subject in the presence and in the absence of the substance, the workload related property being indicative of the physiological condition in the presence and in the absence of the substance;

accepting the delivered substance as an appropriate substance for influencing the physiological condition in case of detecting that the workload related property has been modified in the presence of the substance as compared to the workload related property in the absence of the substance in accordance with a predetermined criteria.

33. A device for characterizing a physiological condition of a physiological subject, the device comprising

a detection unit adapted for detecting a workload related property in a brain of the physiological subject, the workload related property being indicative of the physiological condition;

an evaluation unit adapted for evaluating the workload related property in the brain of the physiological subject.

34. The device of claim 33,
comprising an indication unit adapted for indicating, particularly for visualizing, one or more portions in the brain of the physiological subject in which a workload related property has been evaluated which is classified to be suspicious in accordance with a predefined criteria.

35. The device of claim 34,

comprising a proposal unit adapted to make a proposal for modifying the workload related property in a manner to suppress the workload related property classified as suspicious.

36. The device of claim 34 or 35,
comprising a stimulation unit adapted to stimulate a modification of the workload related property in a manner to suppress the workload related property classified as suspicious.

37. The device of any one of claims 33 to 36,
adapted for characterizing, as the physiological condition, at least one of the group consisting of a mental condition, a mental disorder, a mental disease, headache, migraine, mental fitness, aggressive behavior, violence behavior, crime behavior, obsessive behavior, Dyslexia, ADHD, an eye-focusing problem, concentration, memory, depression, fatigue, autism, Dyscalculation, whiplash, dizziness, drug addiction, gambling addiction, and a trauma.

38. The device of any one of claims 33 to 37,
adapted for characterizing a physiological condition of, as the physiological subject, at least one of the group consisting of a human being and an animal.

39. The device of any one of claims 33 to 38,
wherein the detection unit is adapted for detecting one or more capacity bottlenecks in the brain of the physiological subject.

40. The device of claim 39,
wherein the detection unit is adapted for detecting at least one of the group consisting of a location, a shape, a size, a temporal property, and a number of the one or more capacity bottlenecks.

41. The device of any one of claims 34 to 40,
wherein the detection unit is adapted for detecting a functional coupling between portions of the brain of the physiological subject.

42. The device of any one of claims 33 to 40,
wherein the workload related property comprises at least one of the group consisting of a workload distribution and an activity.

43. A method of characterizing a physiological condition of a physiological subject, the method comprising

detecting a workload related property in a brain of the physiological subject, the workload related property being indicative of the physiological condition;

evaluating the workload related property in the brain of the physiological subject.

44. A program element, which, when being executed by a processor, is adapted to control or carry out a method of characterizing a physiological condition of a physiological subject, the method comprising:

detecting a workload related property in a brain of the physiological subject, the workload related property being indicative of the physiological condition;

evaluating the workload related property in the brain of the physiological subject.

45. A computer-readable medium, in which a computer program is stored which, when being executed by a processor, is adapted to control or carry out a method of characterizing a physiological condition of a physiological subject, the method comprising:

detecting a workload related property in a brain of the physiological subject, the workload related property being indicative of the physiological condition;

evaluating the workload related property in the brain of the physiological subject

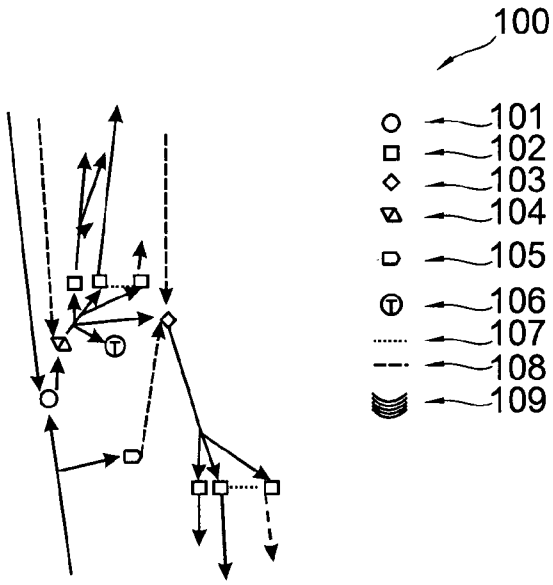

100
101
102
103
104
105
106
107
108
109

Fig. 1

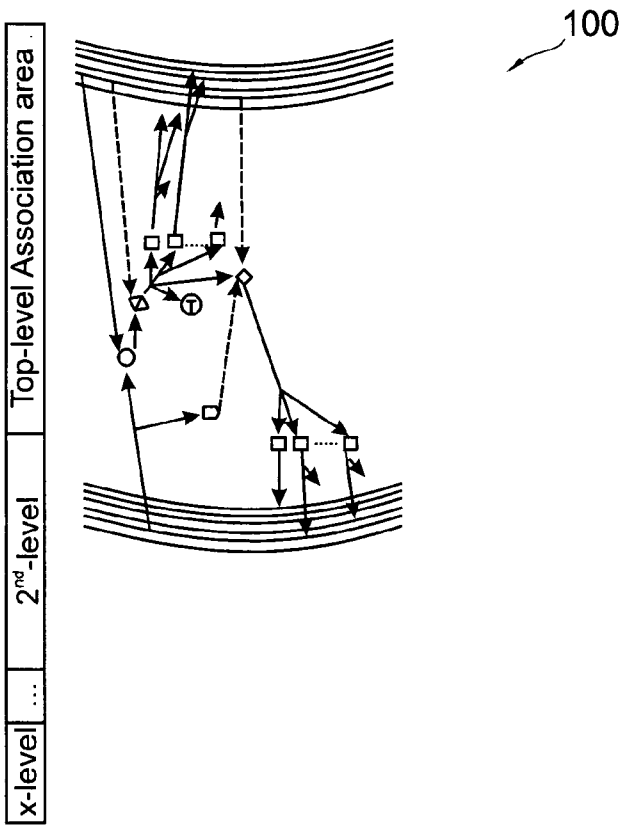
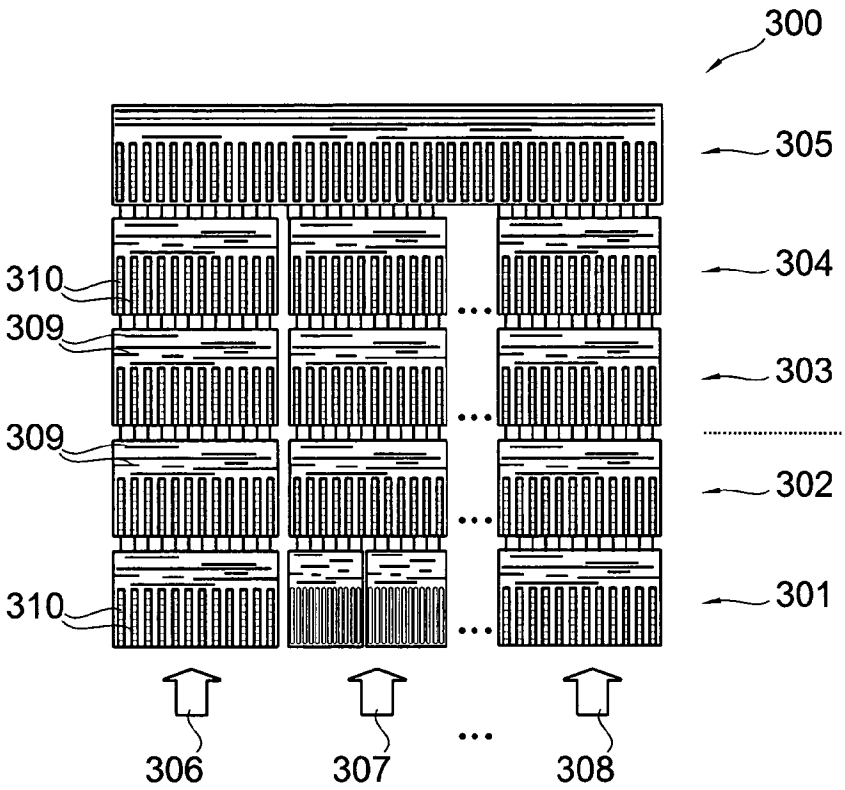

100
Top-level Association area
2nd-level
....
x-level

Fig. 2


300
305
304
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302
301
310
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309
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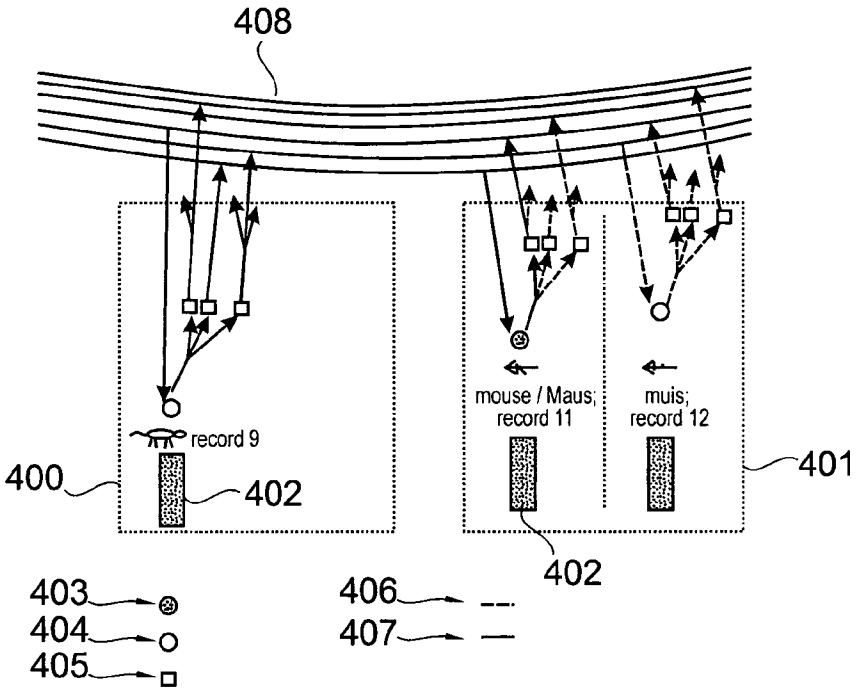
306
307
308

Fig. 3


408
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mouse / Maus;
record 11
muis;
record 12
400
402
401
402
403
404
405
406
407

Fig. 4

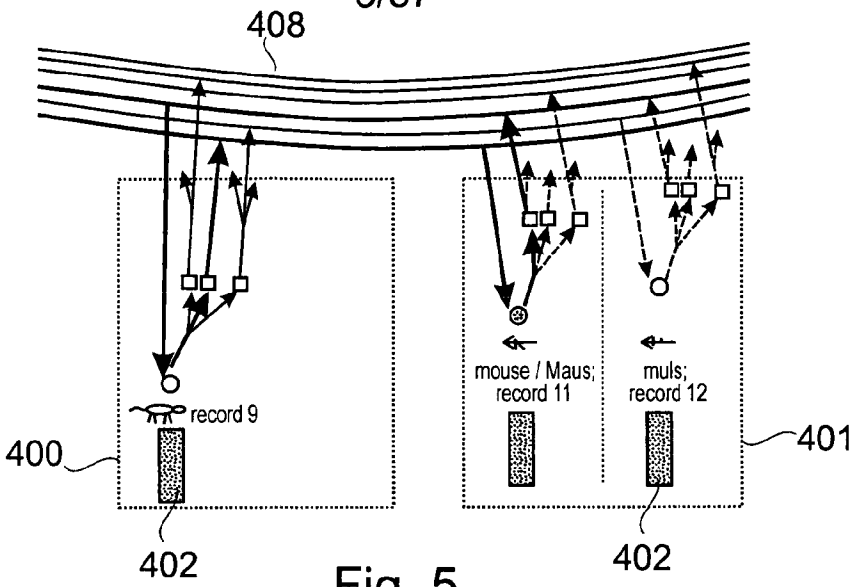

408
record 9
mouse / Maus; record 11
muls; record 12
400
401
402
402

Fig. 5

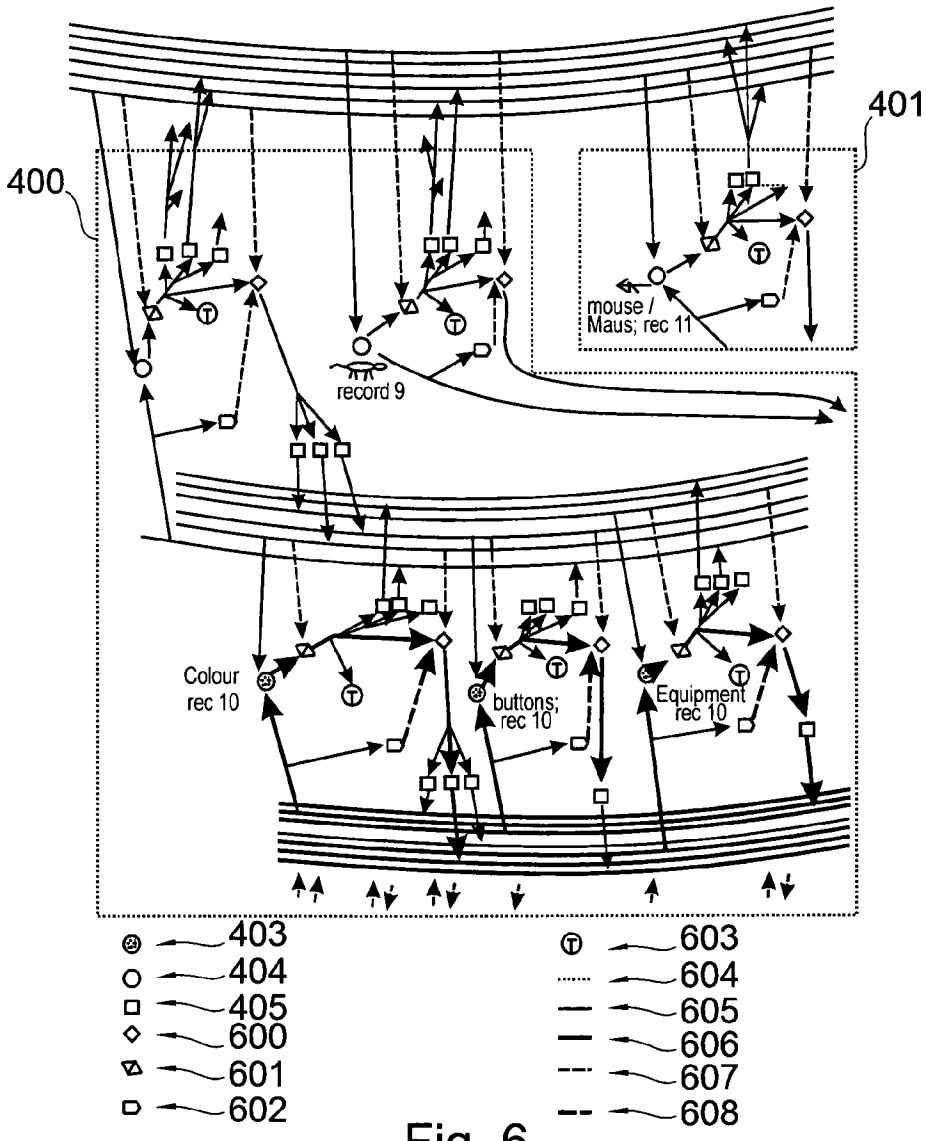
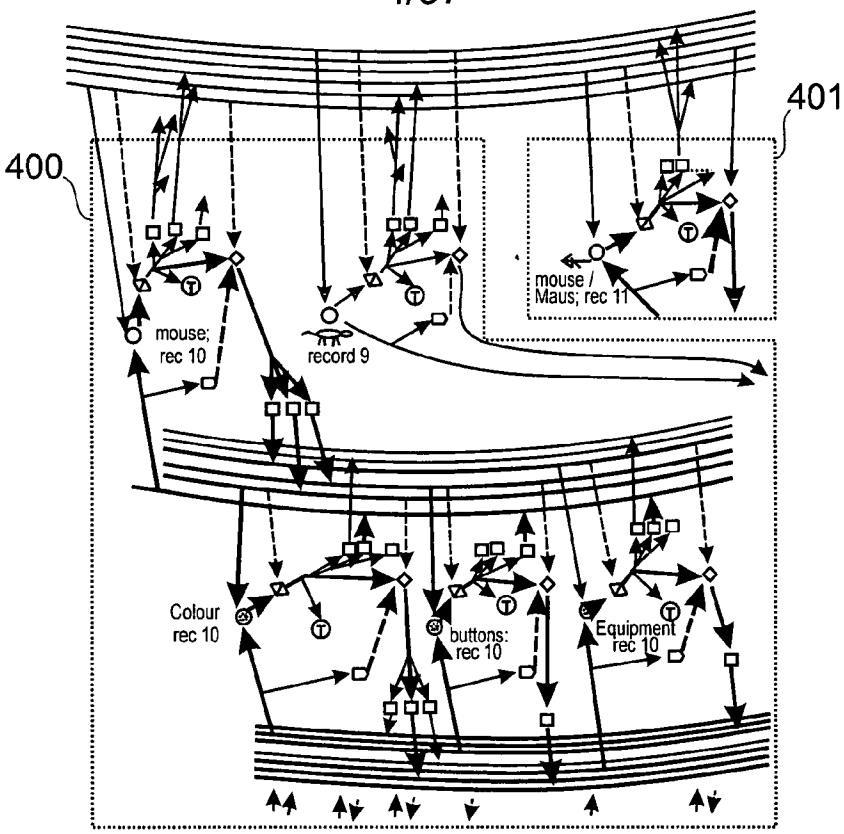

400
401
record 9
mouse / Maus; rec 11
Colour rec 10
buttons; rec 10
Equipment rec 10
403
404
405
600
601
602
603
604
605
606
607
608

Fig. 6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401
mouse;
rec 10
record 9
mouse /
Maus; rec 11
Colour
rec 10
buttons;
rec 10
Equipment
rec 10

Fig. 7

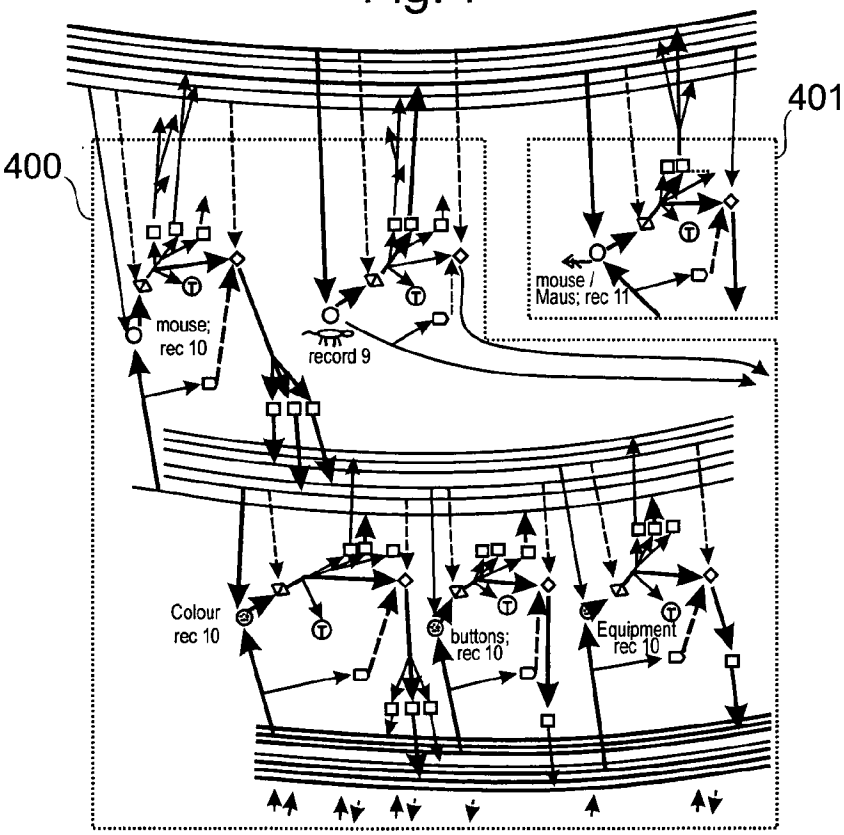
400
401
mouse;
rec 10
record 9
mouse /
Maus; rec 11
Colour
rec 10
buttons;
rec 10
Equipment
rec 10

Fig. 8

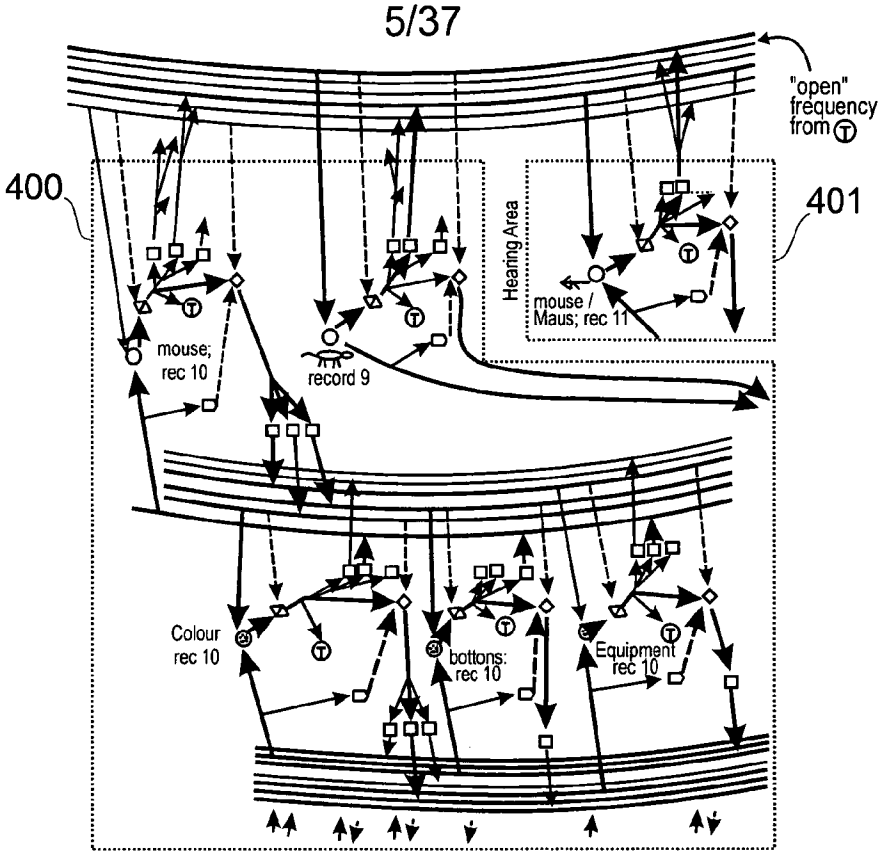
"open" frequency from T
400
401
Hearing Area
mouse / Maus; rec 11
mouse; rec 10
record 9
Colour rec 10
bottons; rec 10
Equipment rec 10

Fig. 9

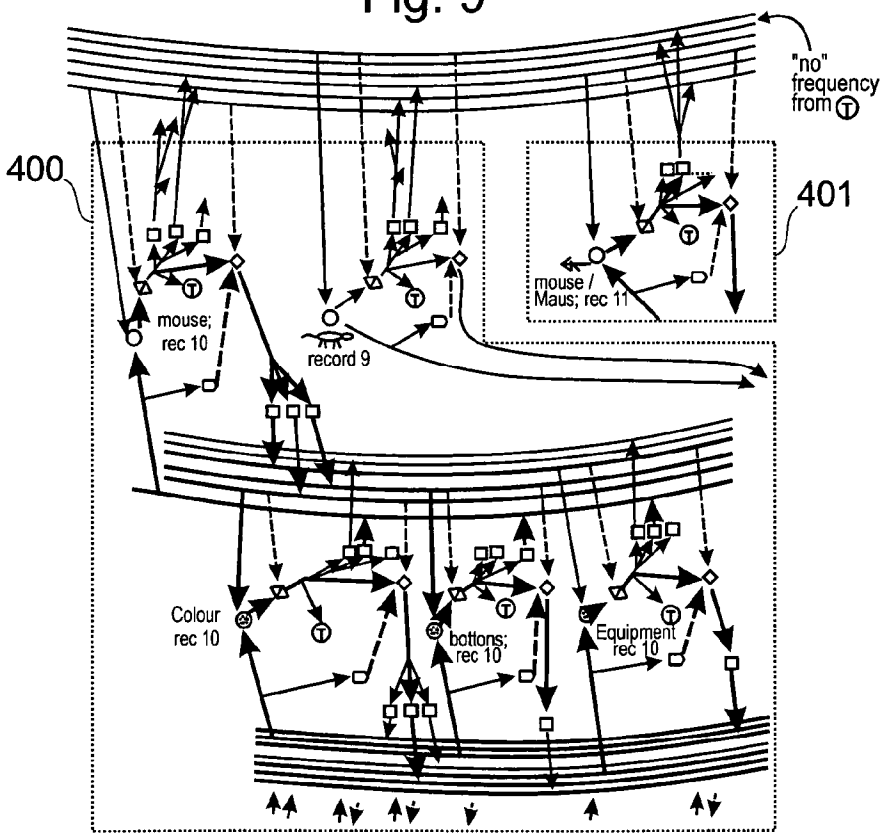
"no" frequency from T
400
401
mouse / Maus; rec 11
mouse; rec 10
record 9
Colour rec 10
bottons; rec 10
Equipment rec 10

Fig. 10

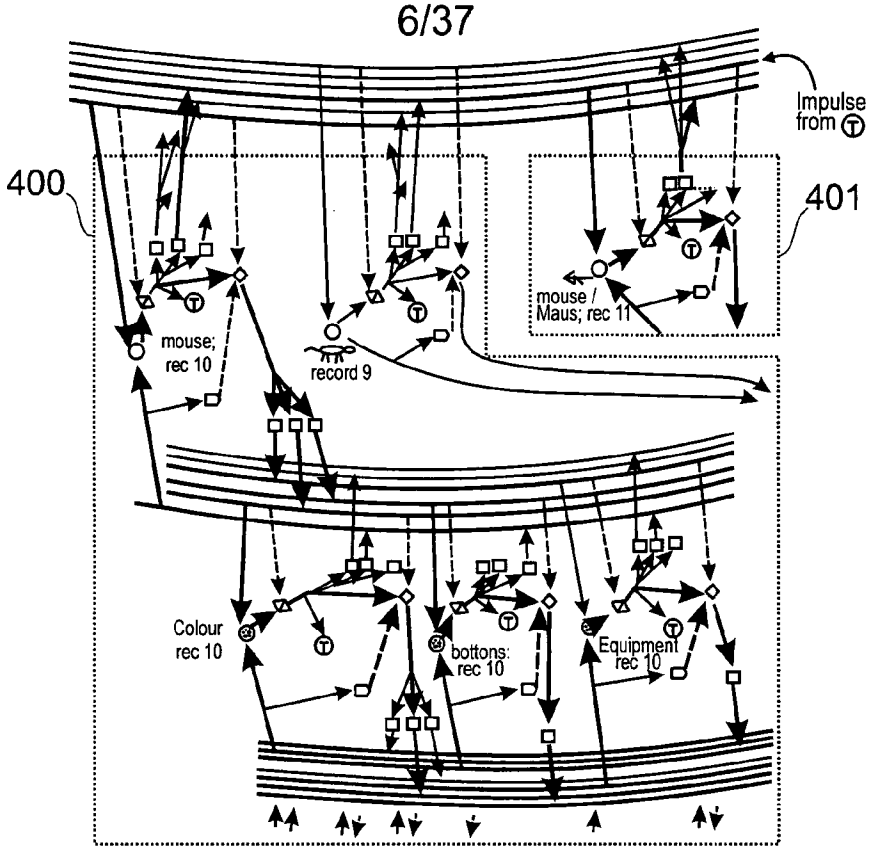
Impulse from
400
401
mouse / Maus; rec 11
mouse; rec 10
record 9
Colour rec 10
bottons: rec 10
Equipment rec 10

Fig. 11

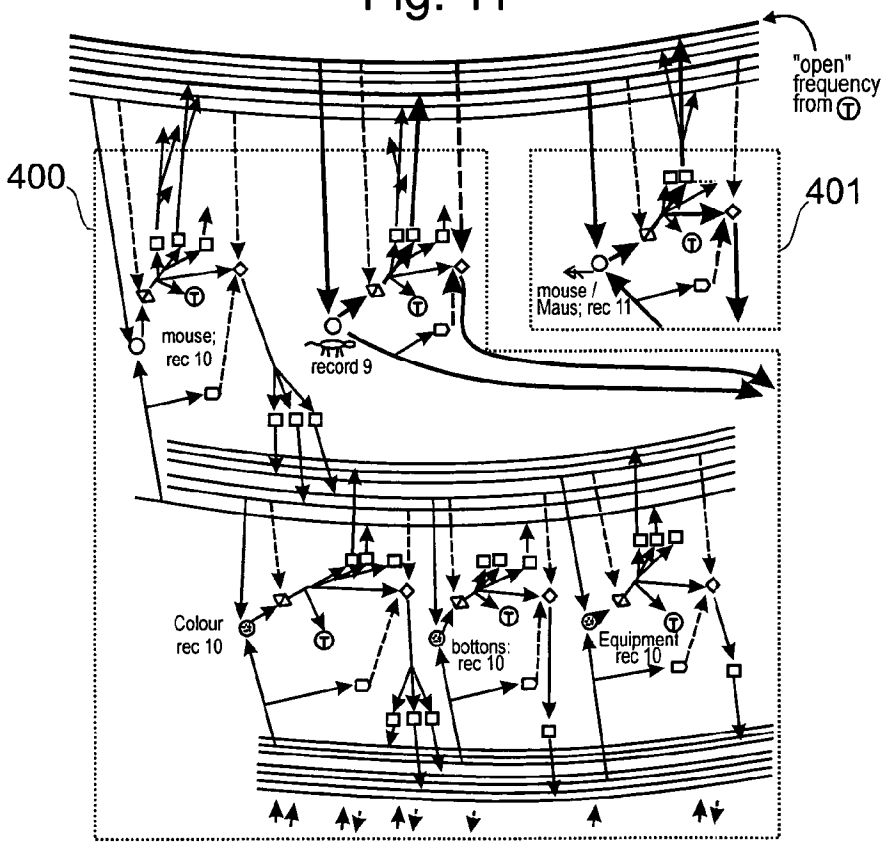
"open" frequency from
400
401
mouse / Maus; rec 11
mouse; rec 10
record 9
Colour rec 10
bottons: rec 10
Equipment rec 10

Fig. 12

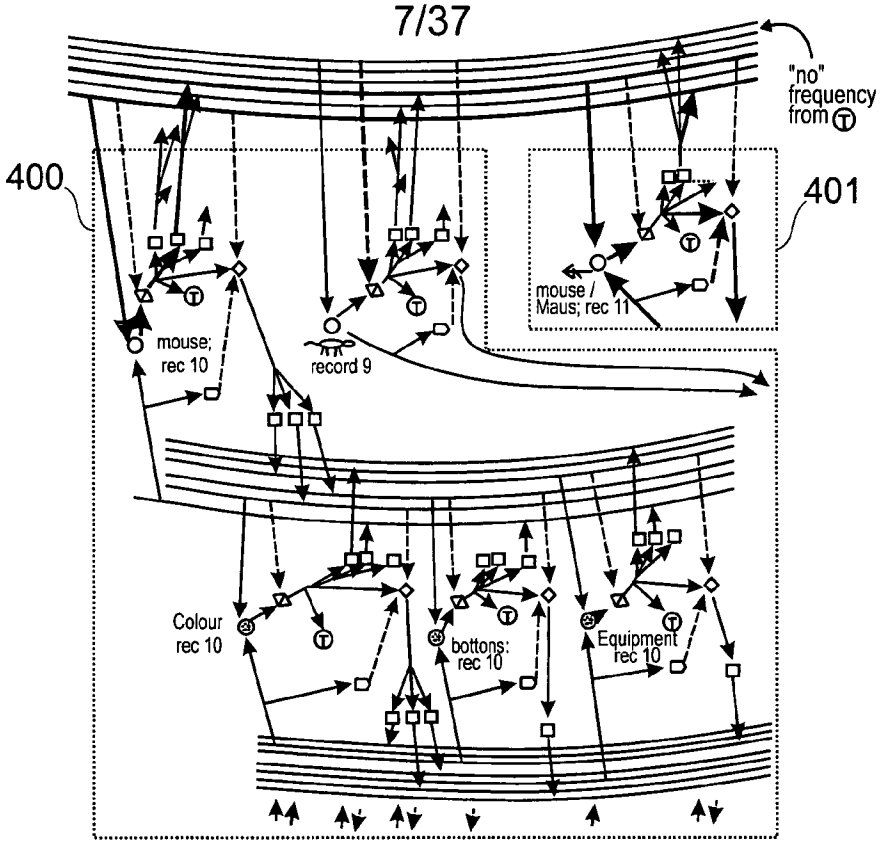
"no" frequency from T
400
401
mouse / Maus; rec 11
mouse; rec 10
record 9
Colour rec 10
bottons; rec 10
Equipment rec 10

Fig. 13

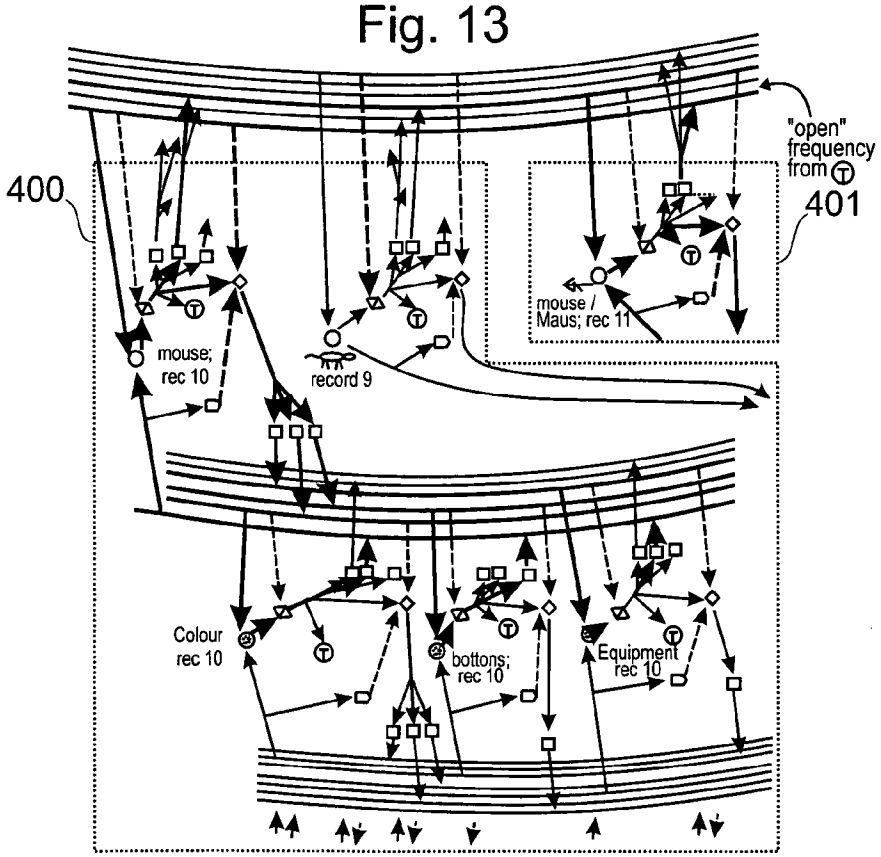
"open" frequency from T
400
401
mouse / Maus; rec 11
mouse; rec 10
record 9
Colour rec 10
bottons; rec 10
Equipment rec 10

Fig. 14

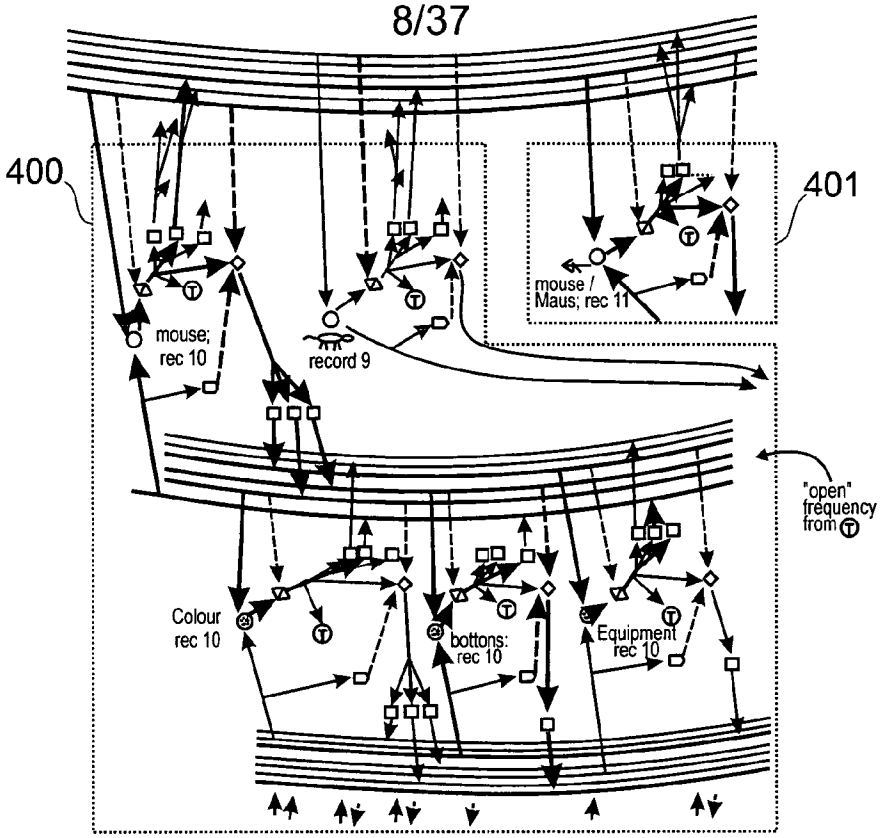
400
401
mouse;
rec 10
record 9
mouse /
Maus; rec 11
"open"
frequency
from
Colour
rec 10
bottons:
rec 10
Equipment
rec 10

Fig. 15

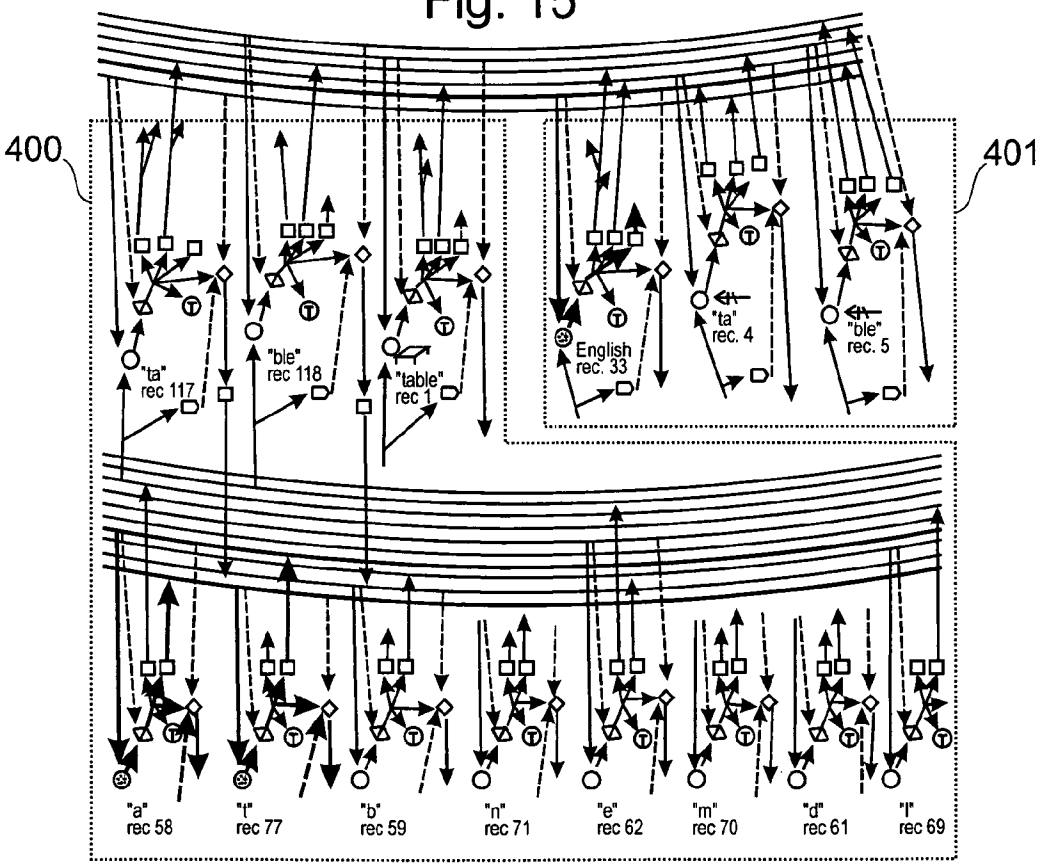
400
401
"ta"
rec 117
"ble"
rec 118
"table"
rec 1
English
rec. 33
"ta"
rec. 4
"ble"
rec. 5
"a"
rec 58
"t"
rec 77
"b"
rec 59
"n"
rec 71
"e"
rec 62
"m"
rec 70
"d"
rec 61
"l"
rec 69

Fig. 16

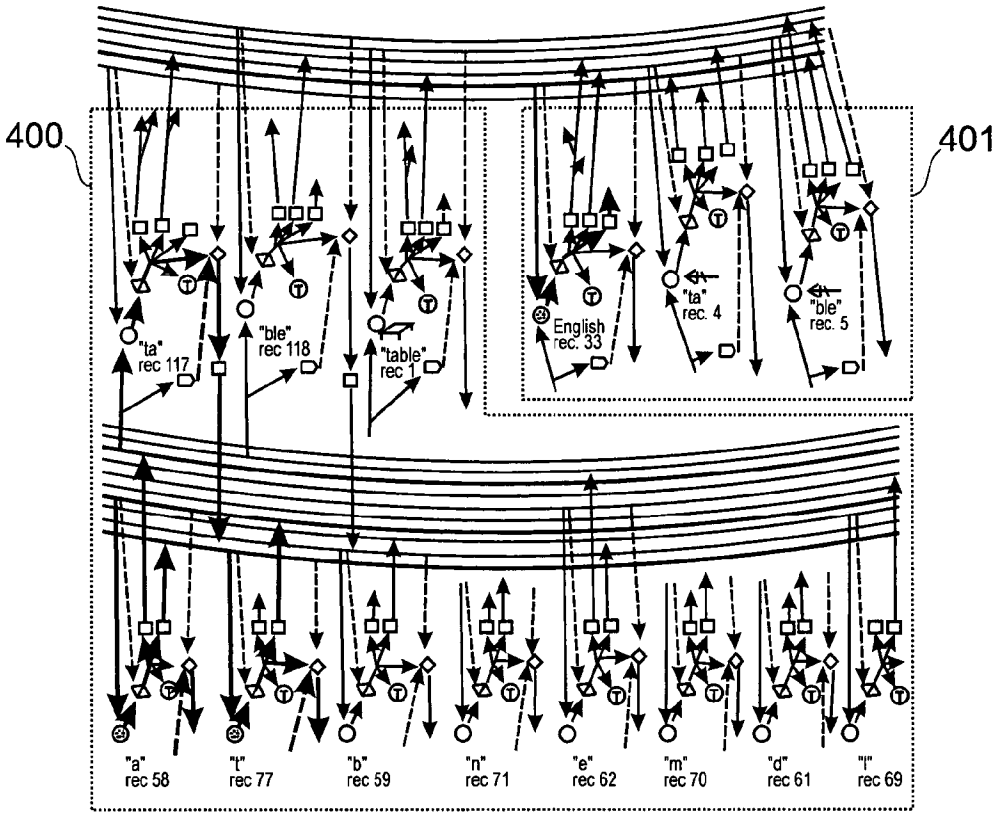
400
401
"ta" rec 117
"ble" rec 118
"table" rec 1
English rec. 33
"ta" rec. 4
"ble" rec. 5
"a" rec 58
"t" rec 77
"b" rec 59
"n" rec 71
"e" rec 62
"m" rec 70
"d" rec 61
"l" rec 69

Fig. 17

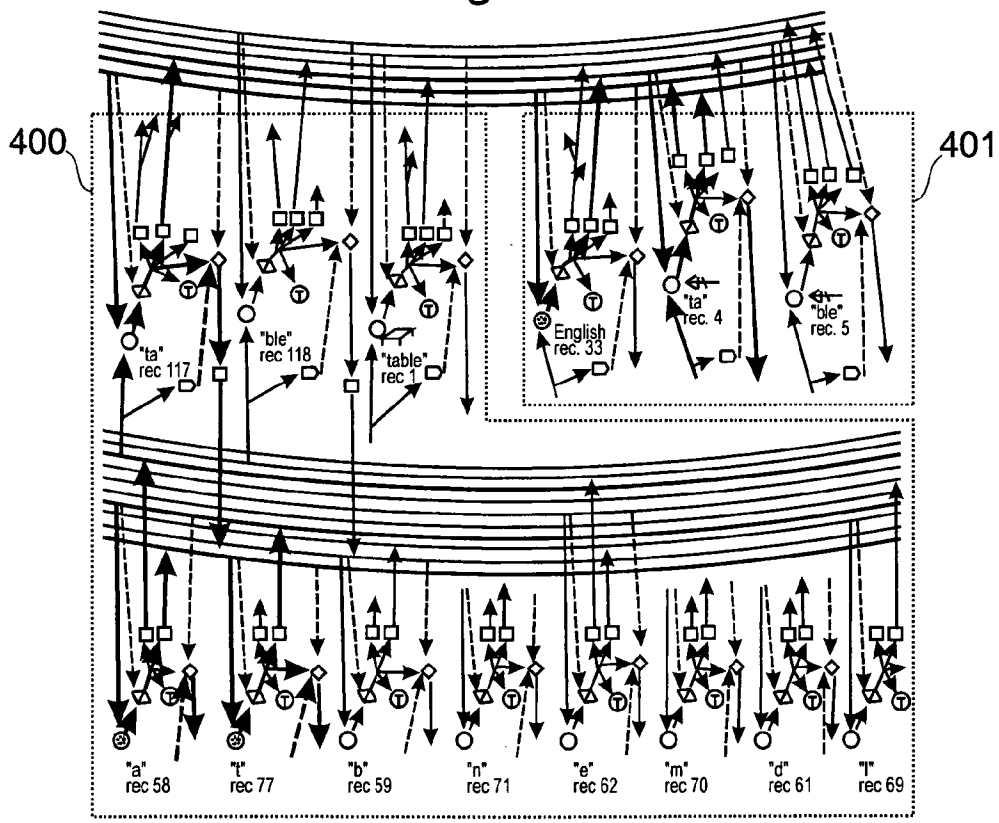
400
401
"ta" rec 117
"ble" rec 118
"table" rec 1
English rec. 33
"ta" rec. 4
"ble" rec. 5
"a" rec 58
"t" rec 77
"b" rec 59
"n" rec 71
"e" rec 62
"m" rec 70
"d" rec 61
"l" rec 69

Fig. 18

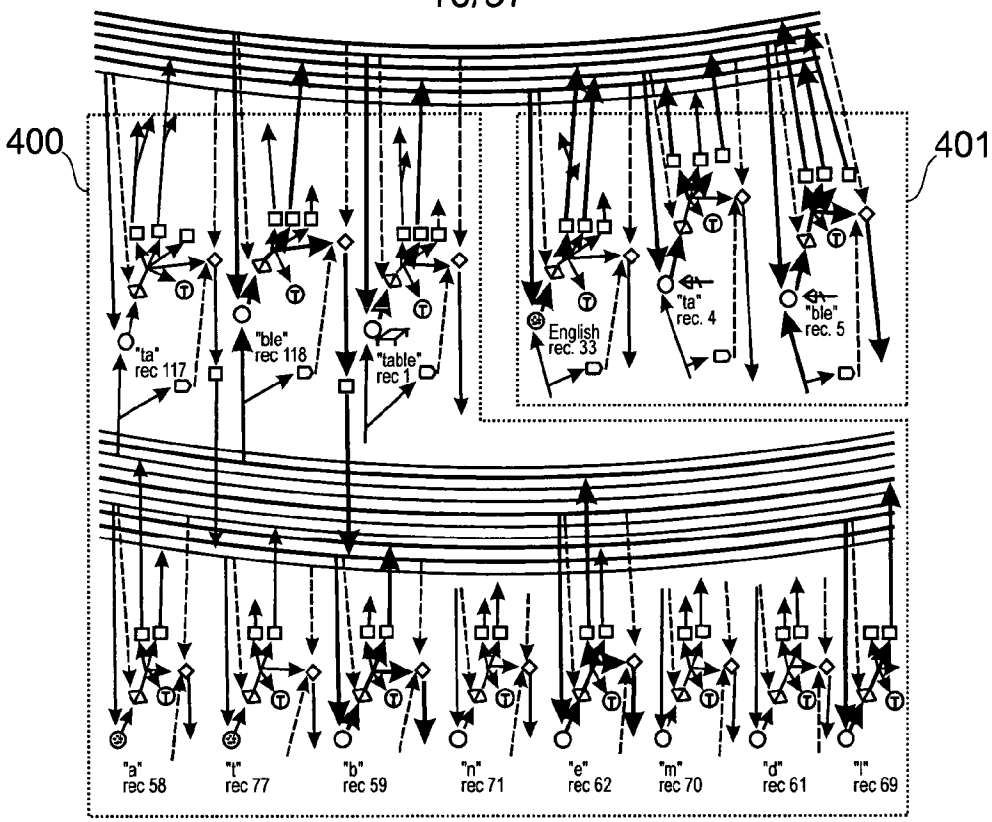
400
401
"ta" rec 117
"ble" rec 118
"table" rec 1
English rec. 33
"ta" rec. 4
"ble" rec. 5
"a" rec 58
"t" rec 77
"b" rec 59
"n" rec 71
"e" rec 62
"m" rec 70
"d" rec 61
"l" rec 69

Fig. 19

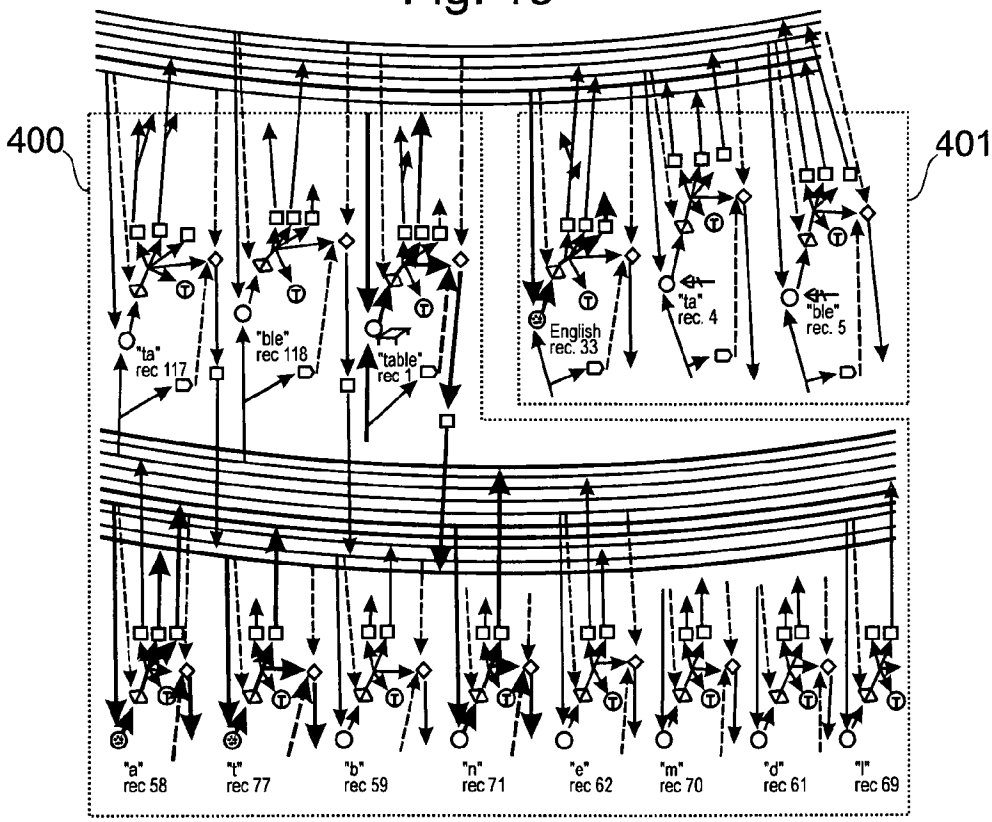
400
401
"ta" rec 117
"ble" rec 118
"table" rec 1
English rec. 33
"ta" rec. 4
"ble" rec. 5
"a" rec 58
"t" rec 77
"b" rec 59
"n" rec 71
"e" rec 62
"m" rec 70
"d" rec 61
"l" rec 69

Fig. 20

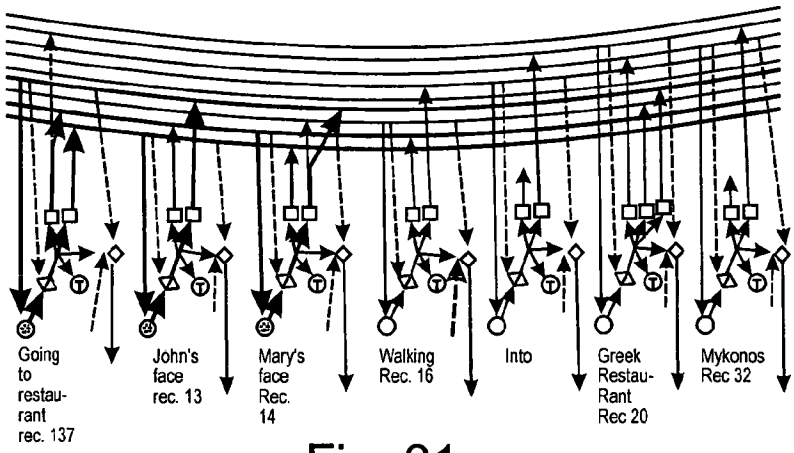

Fig. 21

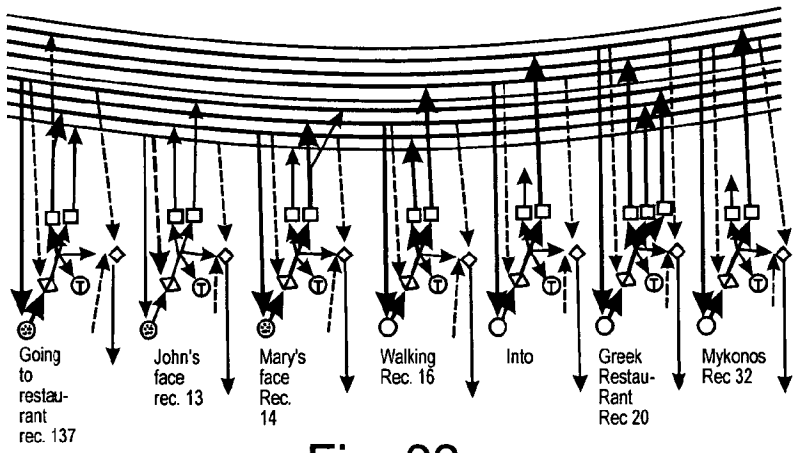

Fig. 22

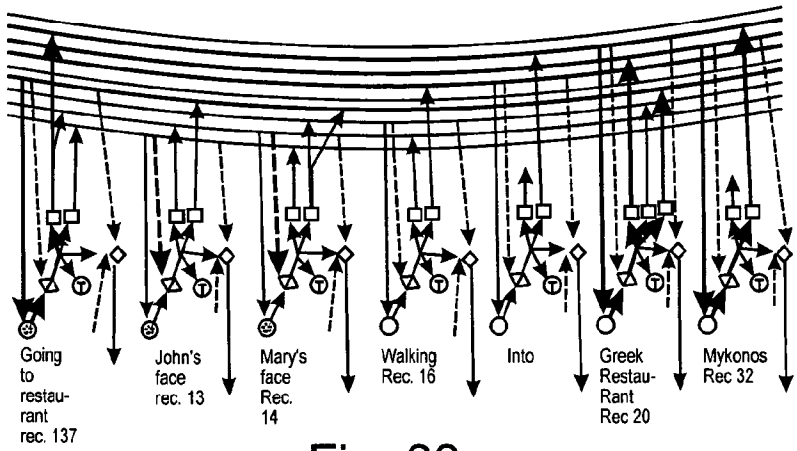

Fig. 23

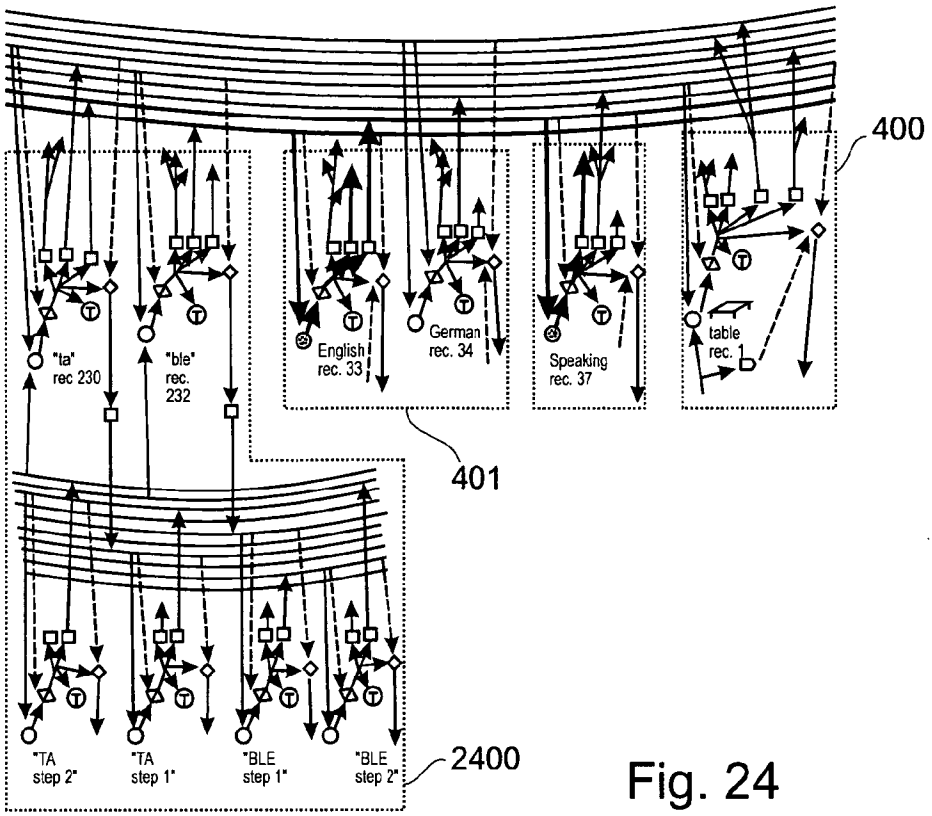
400
"ta" rec 230
"ble" rec. 232
English rec. 33
German rec. 34
Speaking rec. 37
table rec. b
401
"TA step 2"
"TA step 1"
"BLE step 1"
"BLE step 2"
2400

Fig. 24

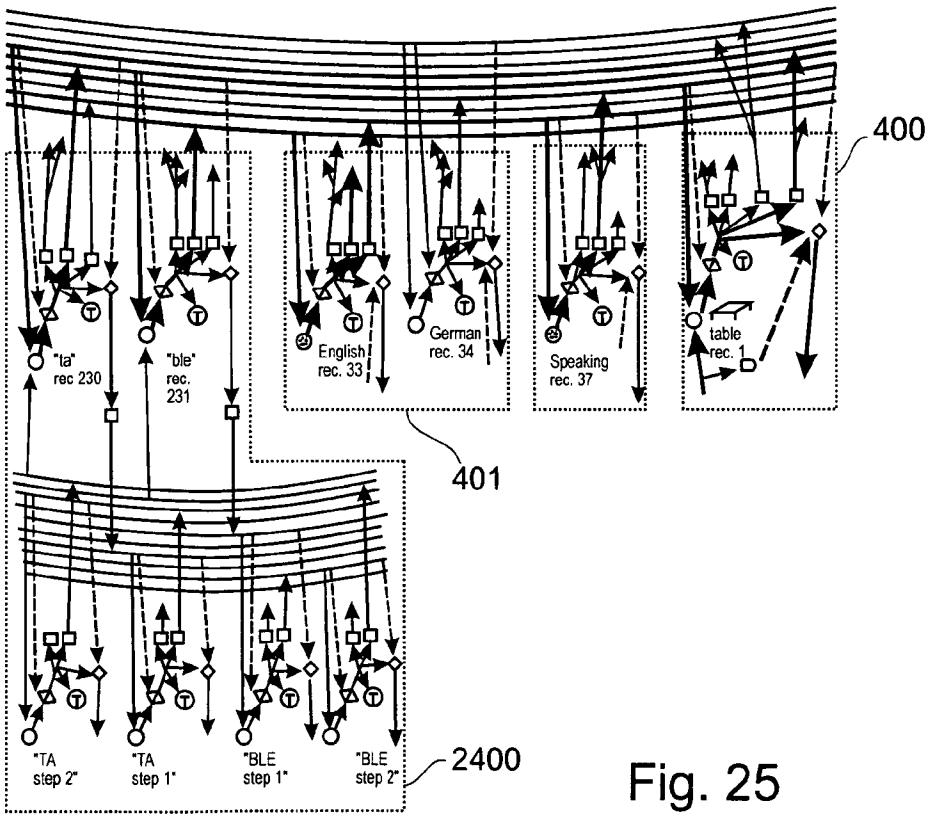
400
"ta" rec 230
"ble" rec. 231
English rec. 33
German rec. 34
Speaking rec. 37
table rec. 1
401
"TA step 2"
"TA step 1"
"BLE step 1"
"BLE step 2"
2400

Fig. 25

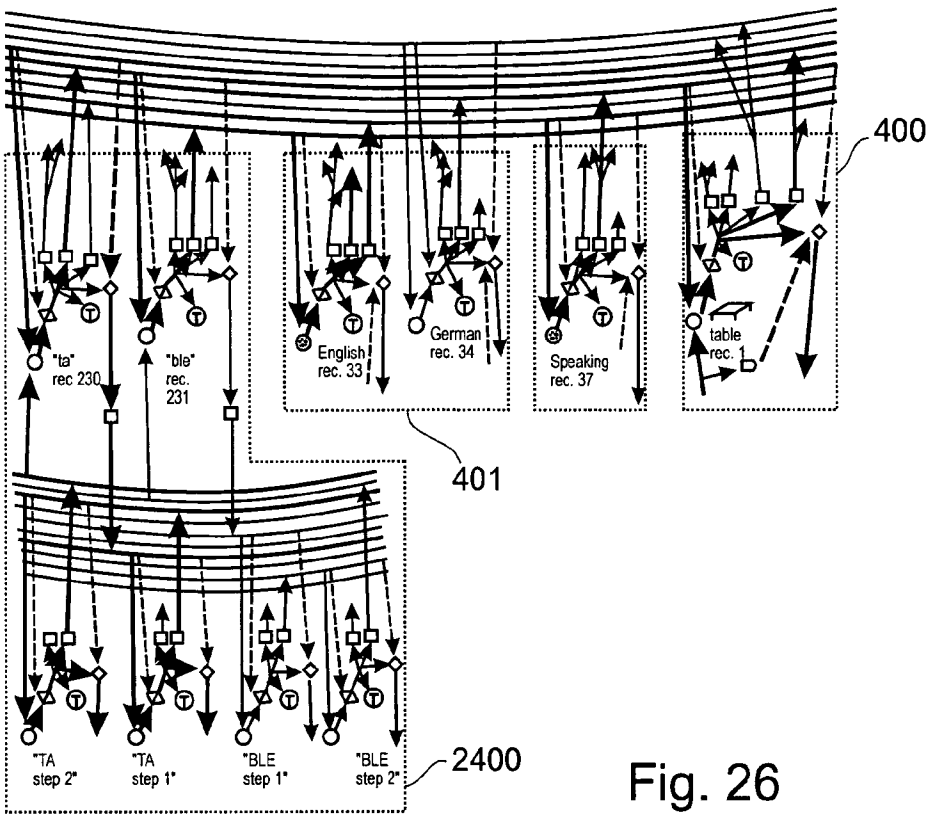
400
"ta" rec 230
"ble" rec. 231
English rec. 33
German rec. 34
Speaking rec. 37
table rec. 1
401
"TA step 2"
"TA step 1"
"BLE step 1"
"BLE step 2"
2400

Fig. 26

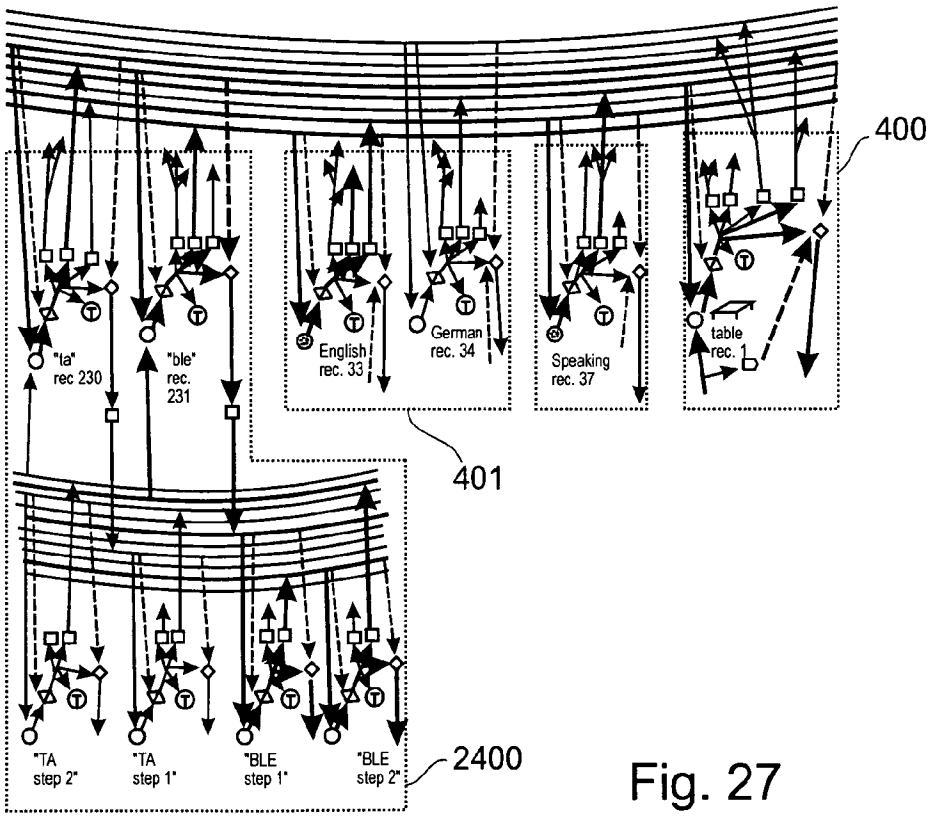
400
"ta" rec 230
"ble" rec. 231
English rec. 33
German rec. 34
Speaking rec. 37
table rec. 1
401
"TA step 2"
"TA step 1"
"BLE step 1"
"BLE step 2"
2400

Fig. 27

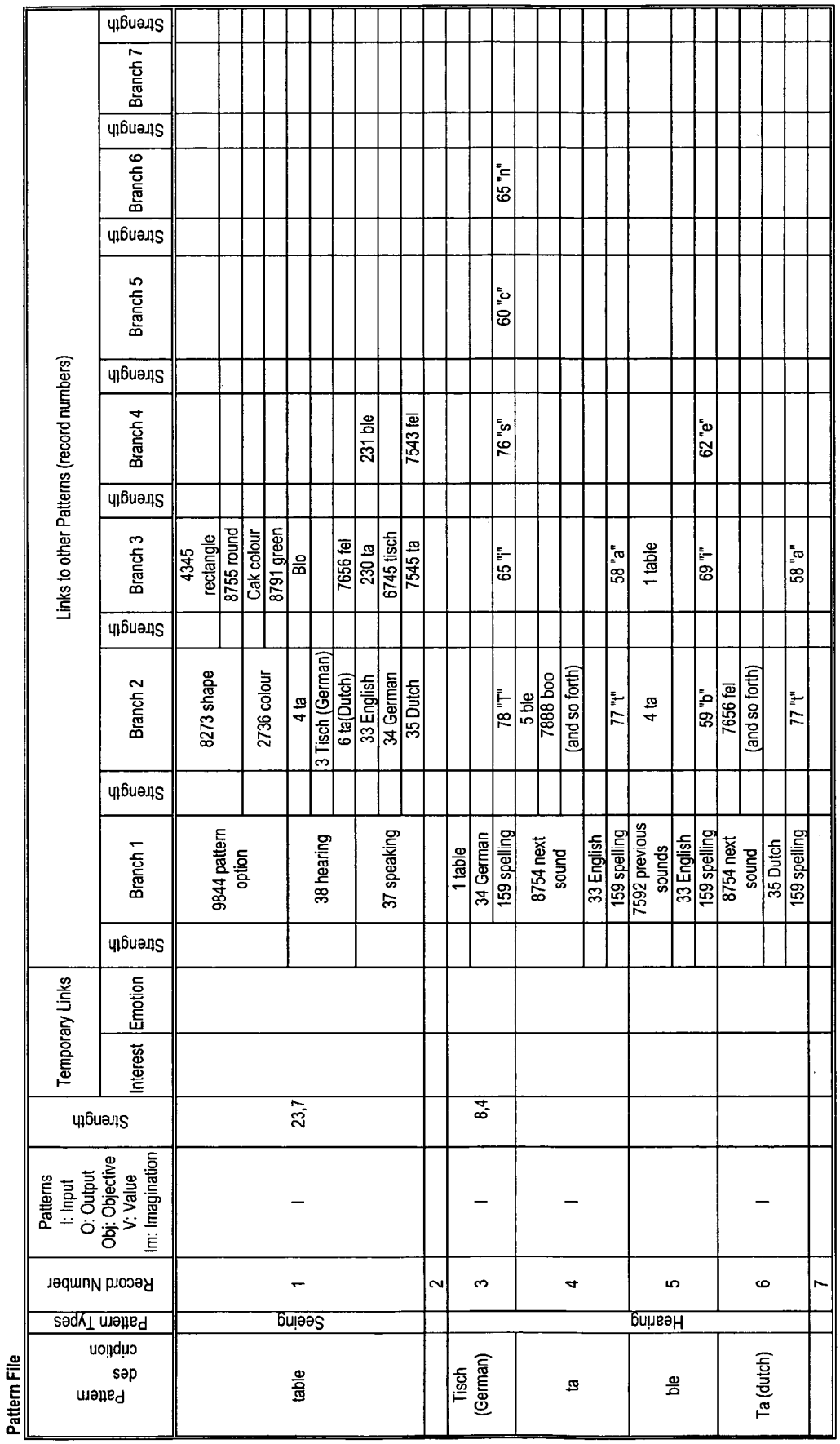
Pattern File
Pattern des cription
Pattern Types
Record Number
Patterns I: Input O: Output Obj: Objective V: Value Im: Imagination
Strength
Temporary Links
Interest
Emotion
Strength
Links to other Patterns (record numbers)
Branch 1
Strength
Branch 2
Strength
Branch 3
Strength
Branch 4
Strength
Branch 5
Strength
Branch 6
Strength
Branch 7
Strength
table
Seeing
1
I
23,7
9844 pattern option
8273 shape
4345 rectangle
8755 round
2736 colour
Cak colour
8791 green
38 hearing
4 ta
Blo
3 Tisch (German)
6 te(Dutch)
7656 fel
37 speaking
33 English
230 ta
231 ble
34 German
6745 tisch
35 Dutch
7545 ta
7543 fel
2
Tisch (German)
3
I
8,4
1 table
34 German
159 spelling
78 "T"
65 "i"
76 "s"
60 "c"
65 "n"
ta
4
I
8754 next sound
5 ble
7888 boo
(and so forth)
33 English
159 spelling
77 "t"
58 "a"
Hearing
ble
5
I
7592 previous sounds
4 ta
1 table
33 English
159 spelling
59 "b"
69 "i"
62 "e"
Ta (dutch)
6
I
8754 next sound
7656 fel
(and so forth)
35 Dutch
159 spelling
77 "t"
58 "a"
7
I

Fig. 28A

Pattern File

Pattern description	Pattern Types	Record Number	Patterns I: Input O: Output Obj: Objective V: Value Im: Imagination	Strength	Temporary Links: Interest	Temporary Links: Emotion	Strength	Branch 1	Strength	Branch 2	Strength	Branch 3	Strength	Branch 4	Strength	Branch 5	Strength	Branch 6	Strength	Branch 7	Strength
mobile phone	Seeing	8	I	16,1	170		14,1	9844 pattern options	8,1	8273 shape	7,5	9383 rectangle									
									5,6	6776 display											
									5,5	9977 keys											
									3,8	8763 antenna											
									3,5	9843 microphone											
									2,0	9534 speaker											
							12,0	38 hearing	11,1	222 cell		223 phone		9452 US							
									6,5	225 mo		226 bile		223 phone							
									5,3	224 GSM		33 English									
									3,4	227 han		228 dy		34 German							
									3,1	6567 GSM		34 German									
									2,1	4985 GSM		35 Dutch									
							9,1	37 speaking	7,4	33 English	6,5	9452 US	5,5	3245 coll	5,5	7665 phone					
													2,1	3429 G	2,1	3234 S	2,1	7634 M	2,1	9875 phone	
											2,1	6234 UK	1,7	6345 mo-	1,7	3423 blle	1,7	3323 phone			
													1,2	3429 G	1,2	3234 S	1,2	7634 M			
									4,1	34 German	3,4	9102 han-	3,4	3425 dy							
											3,1	8273 G	3,1	3432 S	3,1	8765 M					
									1,7	35 Dutch	1,5	8956 G	1,5	3432 S	1,5	8765 M					
											1,4	9535 mo-	1,4	2343 blle							
mouse	Seeing	9	I	12,9				9844 pattern options		4884 colour		3902 brown									
										4854 legs											
										4875 alive											
								38 hearing		11 mouse /											
										12 muls (Dutch)											
								37 speaking		33 English		51 mouse									
										34 German		52 maus									

Fig. 28A / Fig. 28B

Pattern File

Pattern description	Pattern Types	Record Number	Patterns I: Input O: Output Obj: Objective V: Value Im: Imagination	Strength	Temporary Links: Interest	Temporary Links: Emotion	Strength	Branch 1	Strength	Branch 2	Strength	Branch 3	Strength	Branch 4	Strength	Branch 5	Strength	Branch 6	Strength	Branch 7	Strength
										35 Dutch		53 muls									
mouse	Seeing	10	I	12,9				9544 pattern options		4325 colour											
										9345 buttons											
										4375 equipment											
										8373 connects to computer											
								38 hearing		11 mouse/ Maus											
										12 mufs (Deutch)											
								37 speaking		33 English		7875 mouse									
										34 German		1870 maus									
										35 Dutch		5346 muls									
mouse /Maus	Hearing	11	I	17,5			6,1	9 mouse		33 English											
										34 German											
							4,2	10 mouse		33 English											
										34 German											
							1,0	159 spelling		33 English		70 "m"		72 "o"		79 "u"		76 "s"		62 "e"	
										34 German		8775 "M"		58 "a"		79 "u"		76 "s"			
mufs (Dutch)		12		6,7				9 mouse		35 Dutch											
								10 mouse		35 Dutch											
								159 spelling		(and so forth)											
John's face	Seeing	13		15,4	167			9844 pattern options		2456 western European type											
								2647 skin type man		8748 skin type A											
										9295 beand		4569 moustache		7665 smail							
														6536 black		(and so forth)					

Fig. 28B

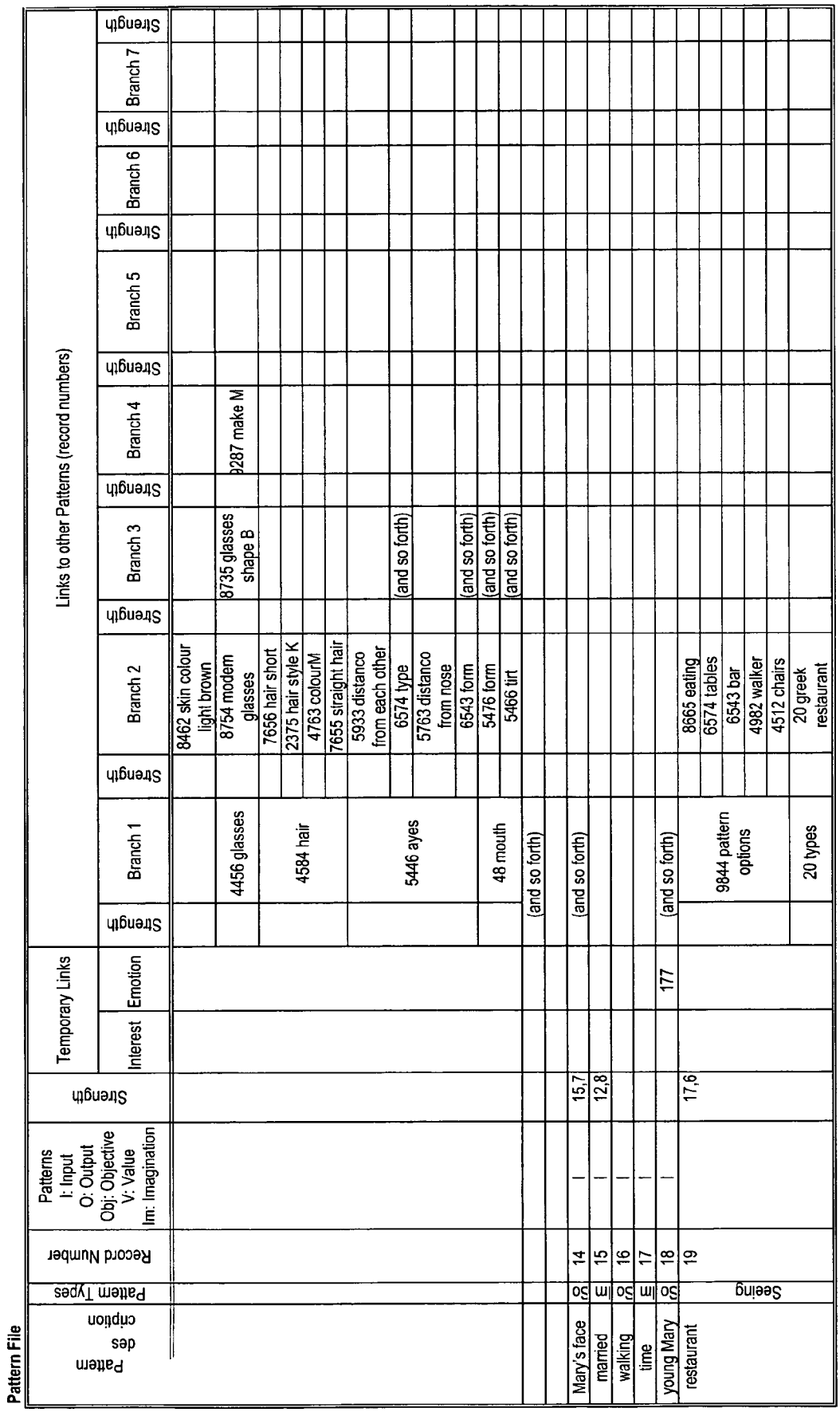

Fig. 28B / Fig. 28C

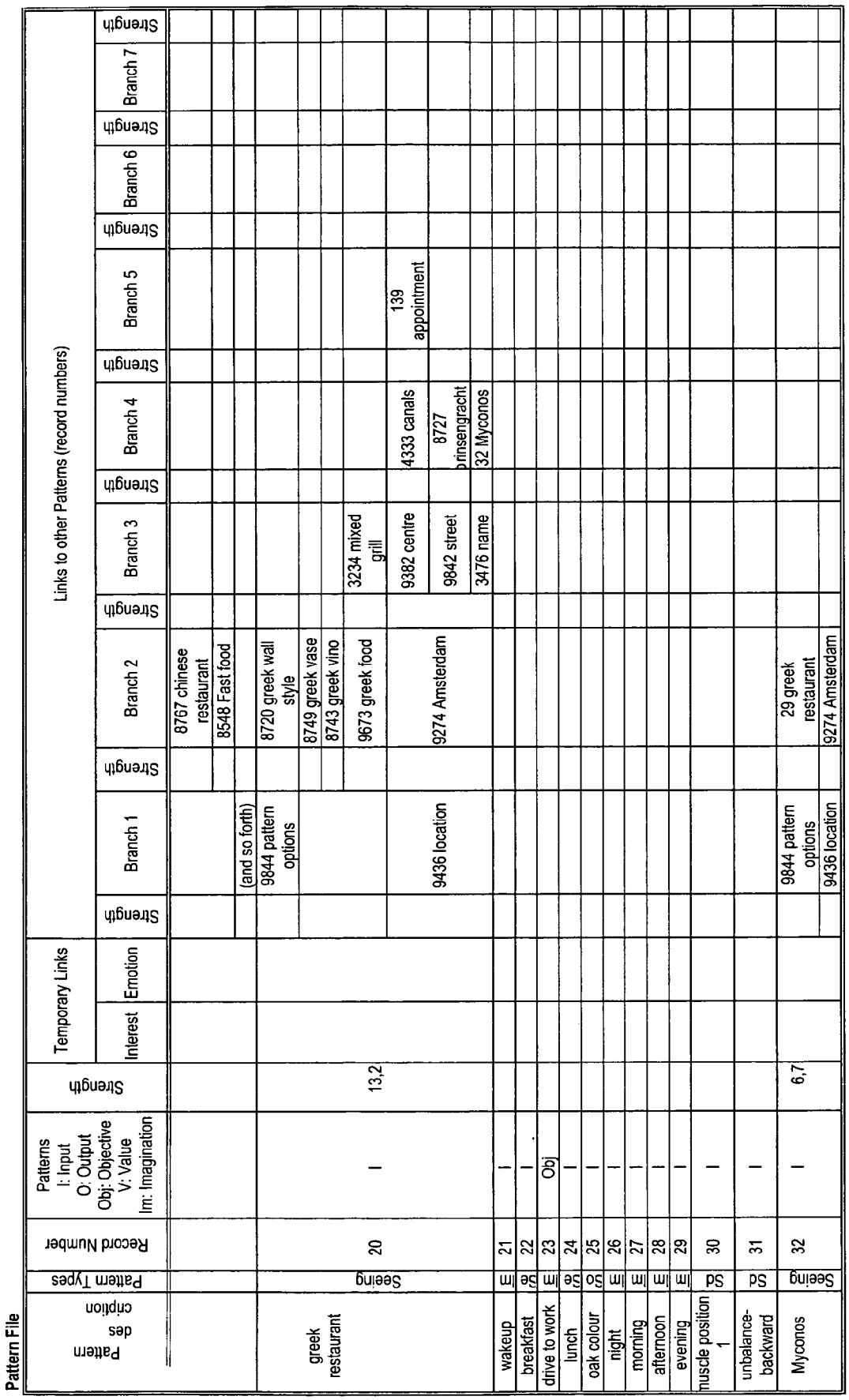
Pattern File
Pattern des cription
Pattern Types
Record Number
Patterns I: Input O: Output Obj: Objective V: Value Im: Imagination
Strength
Temporary Links
Interest
Emotion
Links to other Patterns (record numbers)
Strength
Branch 1
Strength
Branch 2
Strength
Branch 3
Strength
Branch 4
Strength
Branch 5
Strength
Branch 6
Strength
Branch 7
Strength
greek restaurant
Seeing
20
I
13,2
(and so forth)
9844 pattern options
9436 location
8767 chinese restaurant
8548 Fast food
8720 greek wall style
8749 greek vase
8743 greek vino
9673 greek food
9274 Amsterdam
9382 centre
9842 street
3476 name
3234 mixed grill
4333 canals
8727 prinsengracht
32 Myconos
139 appointment
wakeup
breakfast
drive to work
lunch
oak colour
night
morning
afternoon
evening
muscle position 1
unbalance-backward
Myconos
Seeing
Sd
31
I
Sd
32
I
6,7
9844 pattern options
9436 location
29 greek restaurant
9274 Amsterdam

Fig. 28C

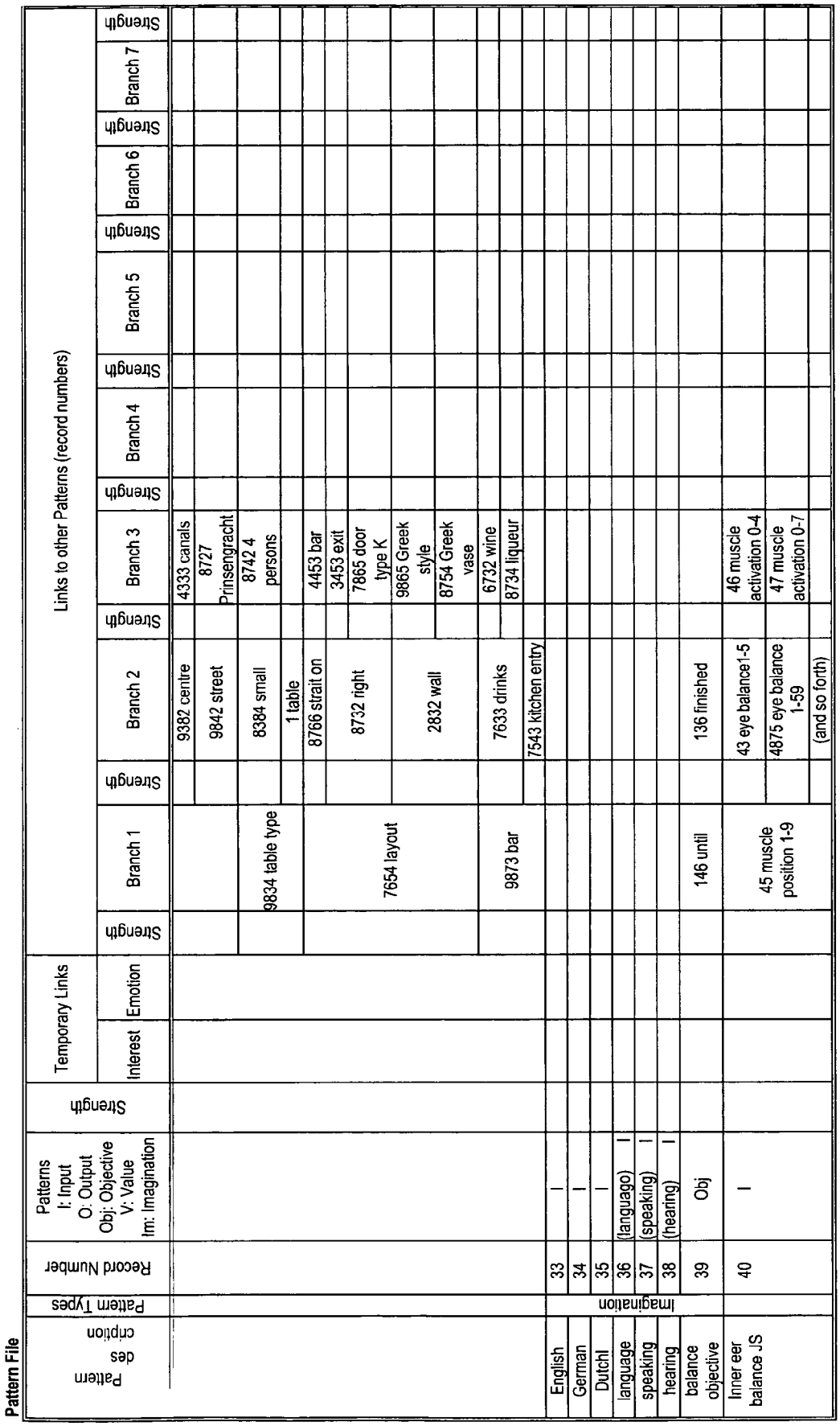
Pattern File
Pattern des cription
Pattern Types
Record Number
Patterns I: Input O: Output Obj: Objective V: Value Im: Imagination
Strength
Temporary Links
Interest
Emotion
Strength
Links to other Patterns (record numbers)
Branch 1
Strength
Branch 2
Strength
Branch 3
Strength
Branch 4
Strength
Branch 5
Strength
Branch 6
Strength
Branch 7
Strength
9382 centre
4333 canals
9842 street
8727 Prinsengracht
9834 table type
8384 small
8742 4 persons
1 table
8766 strait on
4453 bar
3453 exit
7654 layout
8732 right
7865 door type K
2832 wall
9865 Greek style
8754 Greek vase
9873 bar
7633 drinks
6732 wine
8734 liqueur
7543 kitchen entry
English
German
Dutch
language
speaking
hearing
balance objective
Inner eer balance JS
Imagination
33
34
35
36 (language) I
37 (speaking) I
38 (hearing) I
39 Obj
40 I
146 until
45 muscle position 1-9
136 finished
43 eye balance1-5
4875 eye balance 1-59
(and so forth)
46 muscle activation 0-4
47 muscle activation 0-7

Fig. 28D

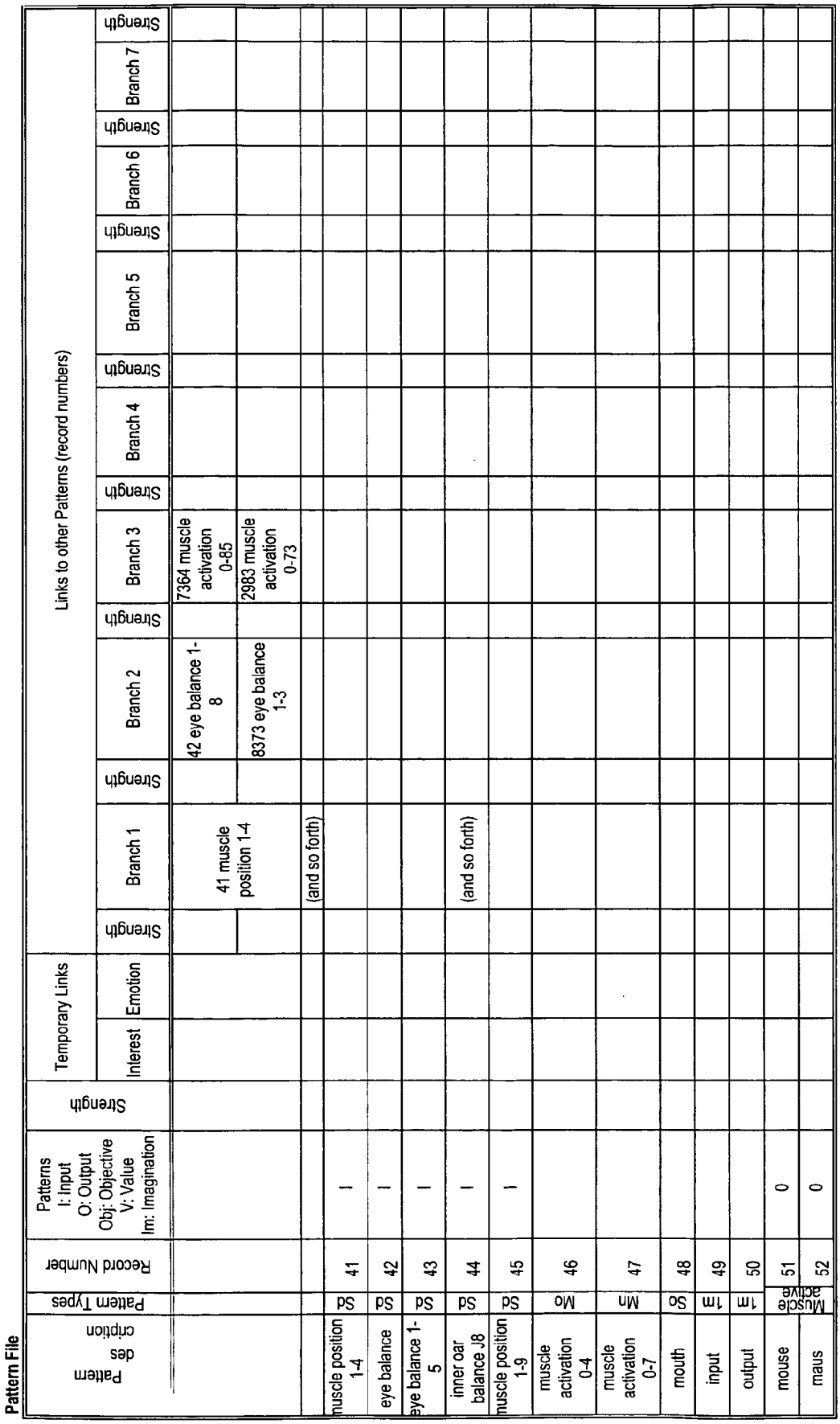
Pattern File
Pattern des cription
Pattern Types
Record Number
Patterns I: Input O: Output Obj: Objective V: Value Im: Imagination
Strength
Temporary Links
Interest
Emotion
Strength
Links to other Patterns (record numbers)
Branch 1
Strength
Branch 2
Strength
Branch 3
Strength
Branch 4
Strength
Branch 5
Strength
Branch 6
Strength
Branch 7
Strength
41 muscle position 1-4
(and so forth)
42 eye balance 1-8
8373 eye balance 1-3
7364 muscle activation 0-85
2983 muscle activation 0-73
muscle position 1-4
eye balance
eye balance 1-5
inner oar balance J8
muscle position 1-9
muscle activation 0-4
muscle activation 0-7
mouth
input
output
mouse
maus
Sd
Mo
Mn
So
Im
Im
Muscle active
41
42
43
44
45
46
47
48
49
50
51
52
I
I
I
I
I
I
0
0

Fig. 28D

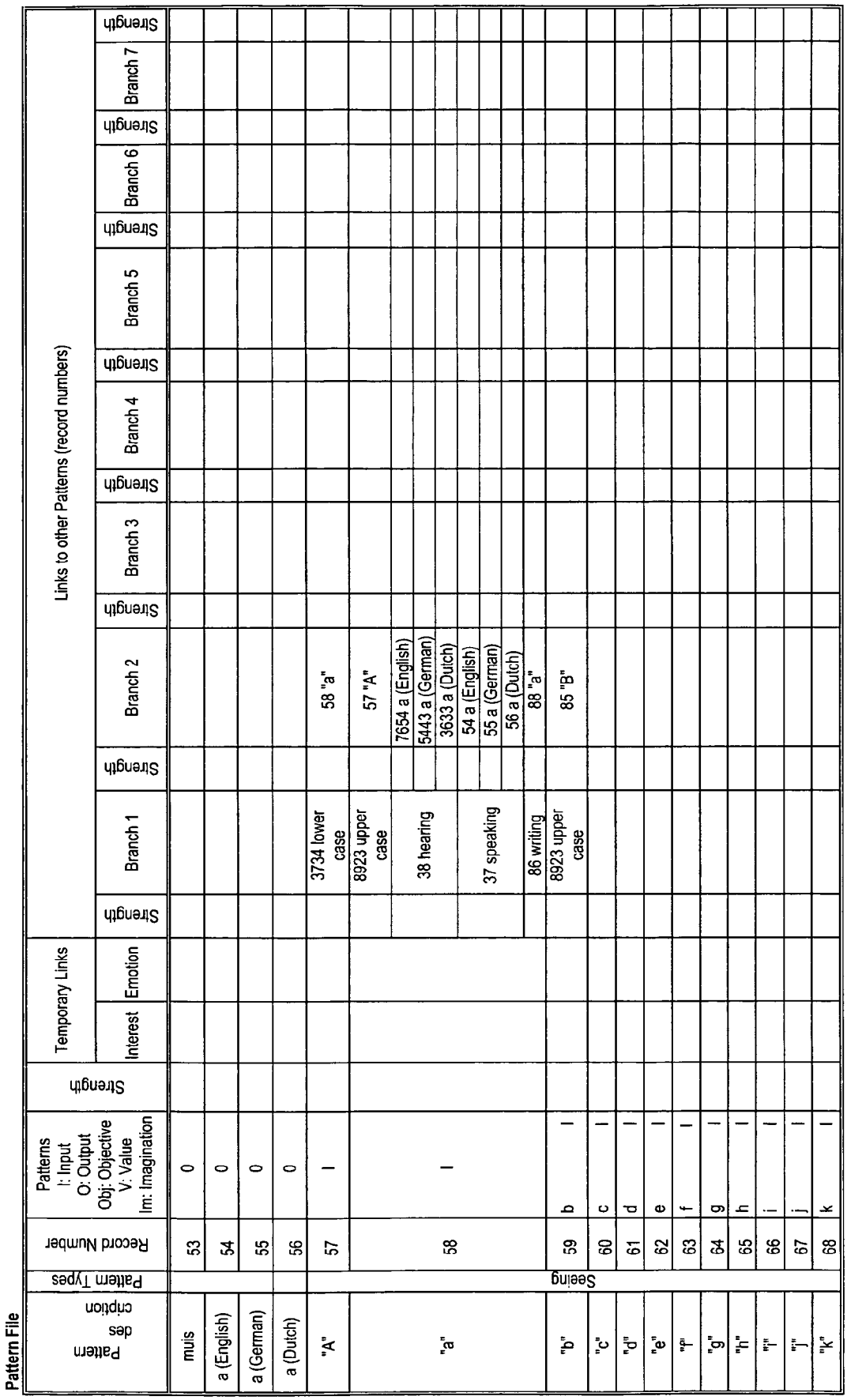
Pattern File
Pattern des cription
Pattern Types
Record Number
Patterns I: Input O: Output Obj: Objective V: Value Im: Imagination
Strength
Temporary Links
Interest
Emotion
Strength
Links to other Patterns (record numbers)
Branch 1
Strength
Branch 2
Strength
Branch 3
Strength
Branch 4
Strength
Branch 5
Strength
Branch 6
Strength
Branch 7
Strength
muis 53 0
a (English) 54 0
a (German) 55 0
a (Dutch) 56 0
"A" 57 I 3734 lower case 58 "a"
"a" 58 I 8923 upper case 57 "A"
38 hearing 7654 a (English) 5443 a (German) 3633 a (Dutch)
37 speaking 54 a (English) 55 a (German) 56 a (Dutch)
86 writing 88 "a"
Seeing
"b" 59 b I 8923 upper case 85 "B"
"c" 60 c I
"d" 61 d I
"e" 62 e I
"f" 63 f I
"g" 64 g I
"h" 65 h I
"i" 66 i I
"j" 67 j I
"k" 68 k I

Fig. 28E

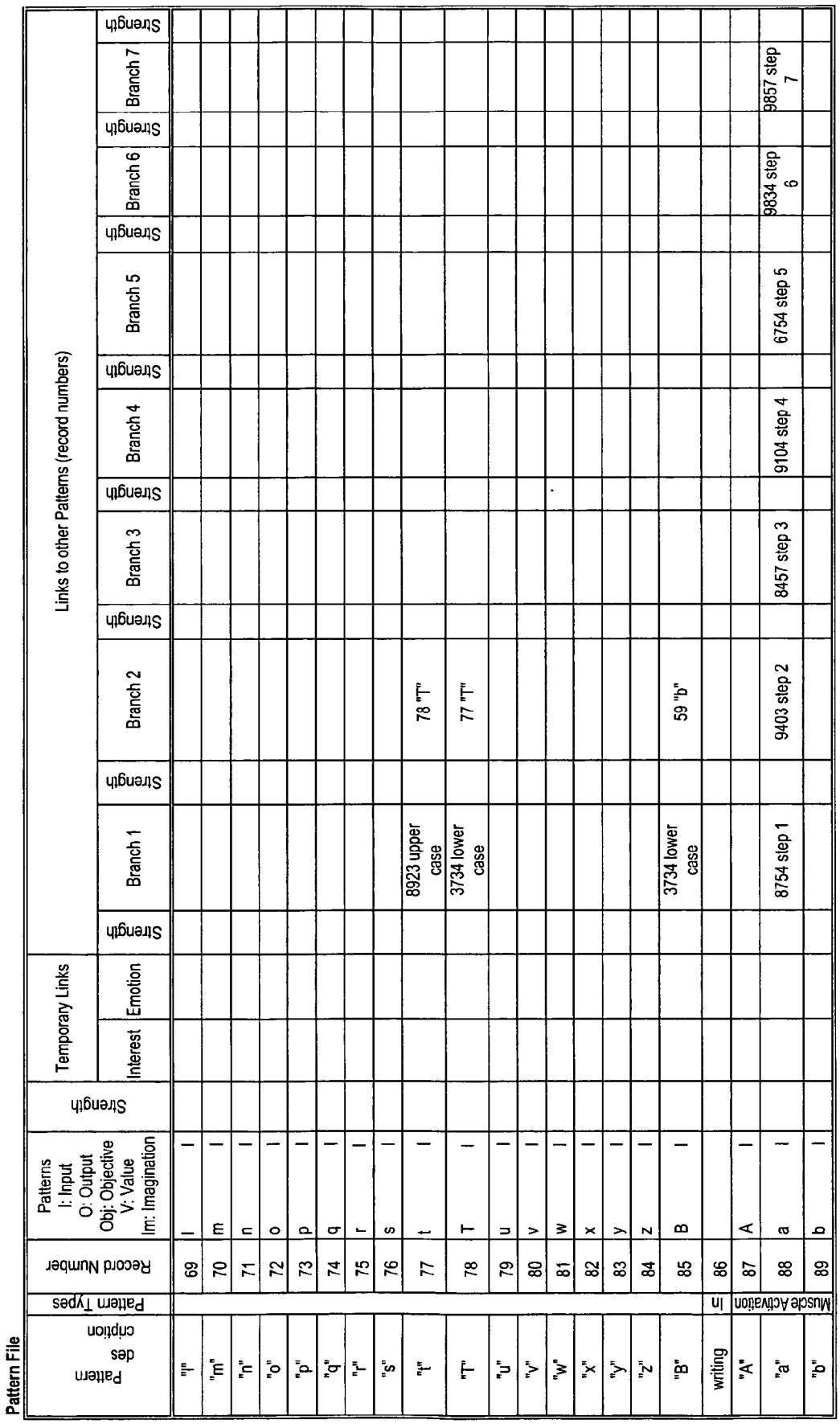
Pattern File
Pattern Types
Record Number
Patterns
I: Input
O: Output
Obj: Objective
V: Value
Im: Imagination
Strength
Temporary Links
Interest
Emotion
Strength
Links to other Patterns (record numbers)
Branch 1
Strength
Branch 2
Strength
Branch 3
Strength
Branch 4
Strength
Branch 5
Strength
Branch 6
Strength
Branch 7
Strength
Pattern description
"l" 69 l l
"m" 70 m l
"n" 71 n l
"o" 72 o l
"p" 73 p l
"q" 74 q l
"r" 75 r l
"s" 76 s l
"t" 77 t l 8923 upper case 78 "T"
"T" 78 T l 3734 lower case 77 "T"
"u" 79 u l
"v" 80 v l
"w" 81 w l
"x" 82 x l
"y" 83 y l
"z" 84 z l
"B" 85 B l 3734 lower case 59 "b"
writing 86 In
"A" 87 A l
"a" 88 a l 8754 step 1 9403 step 2 8457 step 3 9104 step 4 6754 step 5 9834 step 6 9857 step 7
"b" 89 b l
Muscle Activation

Fig. 28E

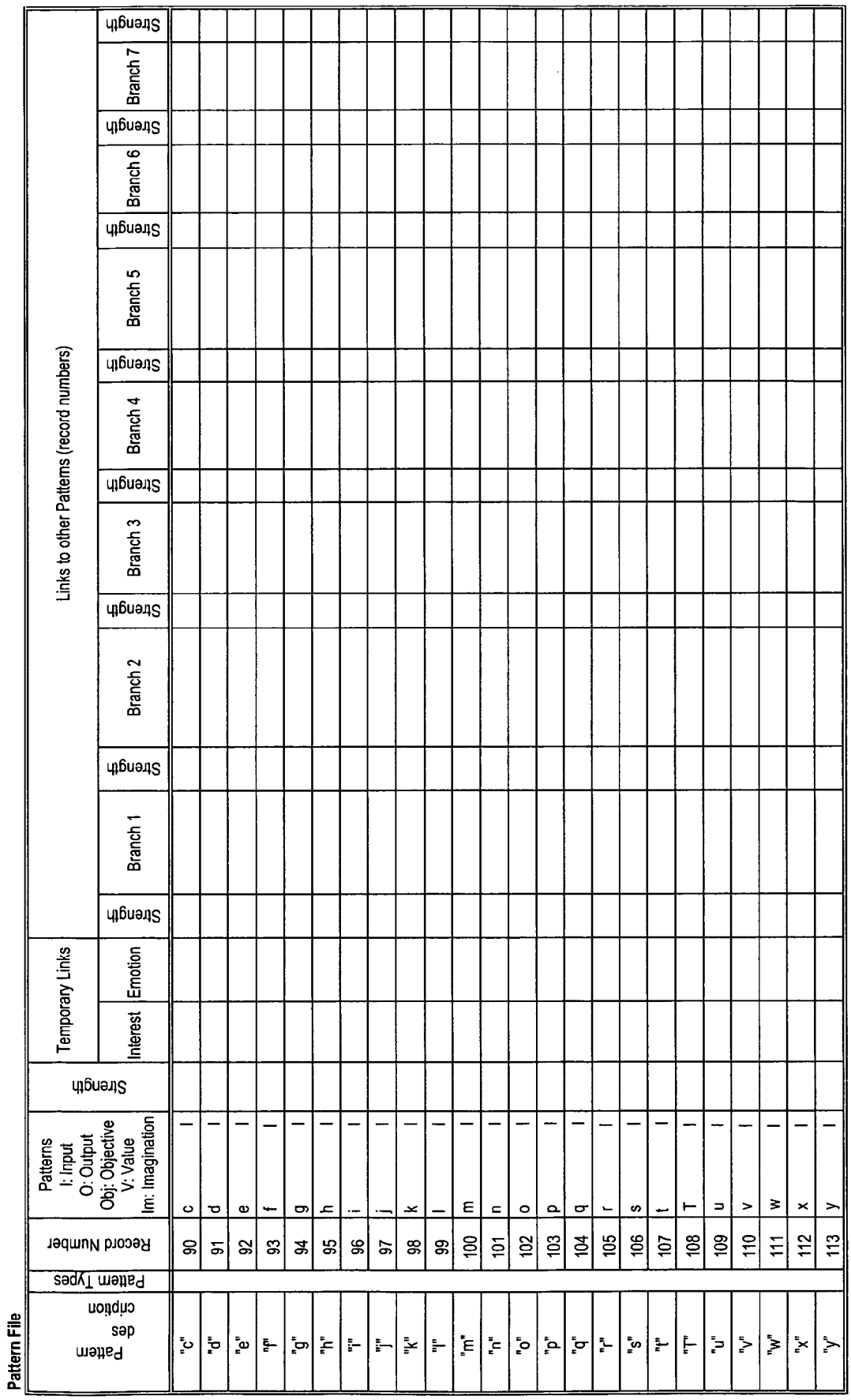

Fig. 28E / Fig. 28F

Pattern File

Pattern description	Pattern Types	Record Number	Patterns I: Input O: Output Obj: Objective V: Value Im: Imagination	Strength	Temporary Links		Links to other Patterns (record numbers)													
					Interest	Emotion	Strength	Branch 1	Strength	Branch 2	Strength	Branch 3	Strength	Branch 4	Strength	Branch 5	Strength	Branch 6	Strength	Branch 7	Strength
"z"		114	z 1																		
"B"		115	B I																		
write word		116	Obj																		
"ta"	Se	117	"ta" I					4 ta													
"ble"		118	"ble" I					5 ble													
space		119																			
		120																			
		121																			
han-		122						33 English													
dy	Hearing	123						33 English													
G		124						33 English													
G		125						34 German													
G		126						35 Dutch													
S		127						33 English		34 German		35 Dutch									
M		128						33 English		34 German		35 Dutch									
cye	Se	129	1																		
nose	Se	130	I																		
word	Se	131	1																		
nose	Mo	132	O																		
read text	Im	133	Obj					148 until		136 finished											
read sentence	Im	134	Obj					148 until		136 finished											
read word	Im	135	Obj					148 until		136 finished											
finished	Im	136	Obj																		

Fig. 28F

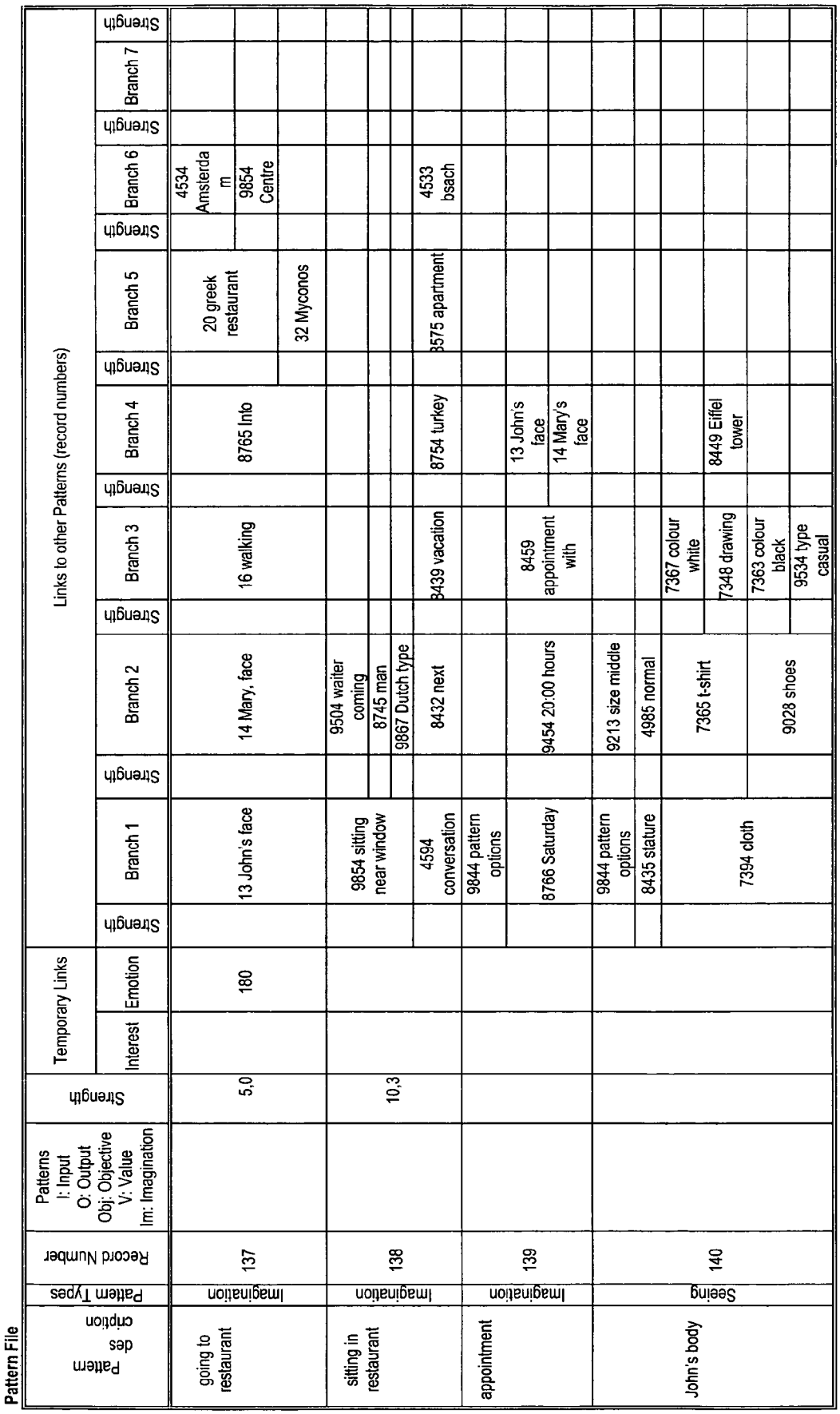

Fig. 28F / Fig. 28G

Pattern File

Pattern description	Pattern Types	Record Number	Patterns I: Input O: Output Obj: Objective V: Value Im: Imagination	Strength	Temporary Links		Links to other Patterns (record numbers)													
					Interest	Emotion	Strength	Branch 1	Strength	Branch 2	Strength	Branch 3	Strength	Branch 4	Strength	Branch 5	Strength	Branch 6	Strength	Branch 7	Strength
win match		141	Obj					143 win set		146 until		9392 game rule reached									
match wan		142	I			176															
win set		143	Obj					144 win game		148 until		8798 set rule reached									
win game		144	Obj					145 win point		148 until		8474 game rule reached									
win point		145	Obj					148 return ball		148 until		4344 rule violation									
return ball		146	Obj					144 win game		148 until		8443 meci win rule									
return tennis serve		147	Obj					4958 move to baseline		4323 wait for ball		145 return ball									
until		148	Obj																		
ennis serve T4		149	I					150 trajectory T87		6549 right arm back		7689 One step to the right									
								151 trajectory T87		6549 right arm back											
								152 trajectory T87		4385 right am to the left											
trajectory T87		150	I					153 sub-trajectory ST8													
								154 sub-trajectory ST7													
trajectory T89		151	I					6549 sub-trajectory ST11													

Fig. 28G

Pattern File

Pattern description	Pattern Types	Record Number	Patterns I: Input O: Output Obj: Objective V: Value Im: Imagination	Strength	Temporary Links: Interest	Temporary Links: Emotion	Strength	Branch 1	Strength	Branch 2	Strength	Branch 3	Strength	Branch 4	Strength	Branch 5	Strength	Branch 6	Strength	Branch 7	Strength
trajectory T34		152	I					7643 sub-trajectory ST11													
sub-trajectory STE		153	I					155 spin 1-7													
								8734 spin 1-4													
								6543 spin 1-9													
								3754 straight I-8													
sub-trajectory ST7		154	I					156 straight I3													
								155 spin 1-7													
spin 1-7		155						8475 distance hd3		157 arm muscles O3		153 hand muscles O2									
straight I3		156	I					8475 hit distance hd3		9725 arm muscles O9		1298 hand muscles hm 8									
arm muscles O3		157	O					7734 am muscles		3432 am muscles stop 2		158 hand muscles O2		8459 am muscles step 3		(and so forth)					
hand muscles O2		158	O					3501 hand muscles step		3793 hand muscles step 2		5876 hand muscles step 3		(and so forth)							
Spelling	Im	159																			
reading	Im	160																			
today	Interest type	161						23 drive to work													
								10 mouse													
								141 win match													
yesterday	Interest type	162						65 night													
								13 John's face		Mary's face											
										18 young Mary											

Fig. 28G / Fig. 28H

Pattern File

Pattern des cription	Pattern Types	Record Number	Patterns I: Input O: Output Obj: Objective V: Value Im: Imagination	Strength	Temporary Links		Links to other Patterns (record numbers)															
					Interest	Emotion	Strength	Branch 1	Strength	Branch 2	Strength	Branch 3	Strength	Branch 4	Strength	Branch 5	Strength	Branch 6	Strength	Branch 7	Strength	
								137 going to restaurant		20 greek restaurant												
								8 mobile phone														
interest-A		163	20 V					8765 Life objective														
interest-B		164	18 V					8767 Hobby														
								7695 work objective medium term														
interest-C		165	15 V					8473 Work objective long term														
interest-D		166	12 V					6743 work objective short term														
								(and so forth)														
interest-E		167	10 V					5454 Objective 9														
interest-F		168	8 V					2587 Objective 4														
interest-G		169	6 V					3423 Next vacation														
interest-H		170	4 V					8476 Objective 1														
interest-I		171	2 V					3489 Objective 2														
interest-J		172	1 V					4333 Objective 7														
intense love		173	120 V					8754 intense love feeling														

Fig. 28H / Fig. 28I

Pattern File

Pattern description	Pattern Types	Record Number	Patterns I: Input O: Output Obj: Objective V: Value Im: Imagination	Strength	Temporary Links		Links to other Patterns (record numbers)														
					Interest	Emotion	Strength	Branch 1	Strength	Branch 2	Strength	Branch 3	Strength	Branch 4	Strength	Branch 5	Strength	Branch 6	Strength	Branch 7	Strength
love	Emotion type (most positive to most negative)	174	90 V					9303 love feeling													
Success-High (i.e. University finished)		175	80 V					8743 Feeling +7													
Success: brief but intense		176	50 V					8744 Feeling +8													
Very pleasant		177	50 V					212 Feeling +9													
some success		178	25 V					8746 Feeling +4													
recognition by boss		179	10 V					8747 Feeling +5													
"that was nice"		180	5 V					8748 Feeling +2													
minimum positive		181	1 V					8749 Feeling +1													
minimum negative		182	1 V					6578 Just a negative feeling													
"just" unpleasant		183	6 V					187 unpleasant feeling													
unpleasant		184	15 V					188 rather unpleasant feeling													
very unpleasant		185	45 V					189 some "alarm bells"													
extreme "alarm bells"		186	75 V					190 "alarm bells"													
unpleasant feeling	Feeling	187	O					6557 negative feeling NFD													
Rather unpleasant feeling		188	O					4983 negative feeling NF1		8575 blood pressure up		7665 "stomach feeling"		(and so forth)							

Fig. 28I

Pattern File

Pattern description	Pattern Types	Record Number	Patterns I: Input O: Output Obj: Objective V: Value Im: Imagination	Strength	Temporary Links		Links to other Patterns (record numbers)															
					Interest	Emotion	Strength	Branch 1	Strength	Branch 2	Strength	Branch 3	Strength	Branch 4	Strength	Branch 5	Strength	Branch 6	Strength	Branch 7	Strength	
Some "alarm bells"		189	O					4984 negative feeling NF2		6109 sweat		8575 blood pressure up		(and so forth)								
"alarm bells"		190	O					4985 negative feeling NF2		9865 sweat		(and so forth)										
hunger	Sensory data	191	9999 I	23,7				8754 hunger feeling														
thirst		192	9999 I	23,7				7439 thirst feeling														
normal energy demand levels		193	999999	35,1				196 heart rate normal		201 breathing minimal		(and so forth)										
energy demand level x1		194	87659 I	29,1				197 heart up		202 breathing rale up		(and so forth)										
energy demand level x4		195	98754 I	29,4				199 heart rate down		203 breathing rate down		(and so forth)										
heart rate normal	Muscle activation	196	99999 O	29,4																		
heart up		197	5688 O	22,3																		
heart rate minimum		198	7899 O	23,1																		
heart rate down		199	67889 O	28,4																		
breathing normal		200	76544 O	26,7																		
breathing minimal		201	7695 O	23,1																		
breathing rate up		202	999999 O	35,1																		
breathing rate down		203	87666 O	29,1																		
Survival – very high		204	999999 V	35,1																		

Fig. 28I / Fig. 28J

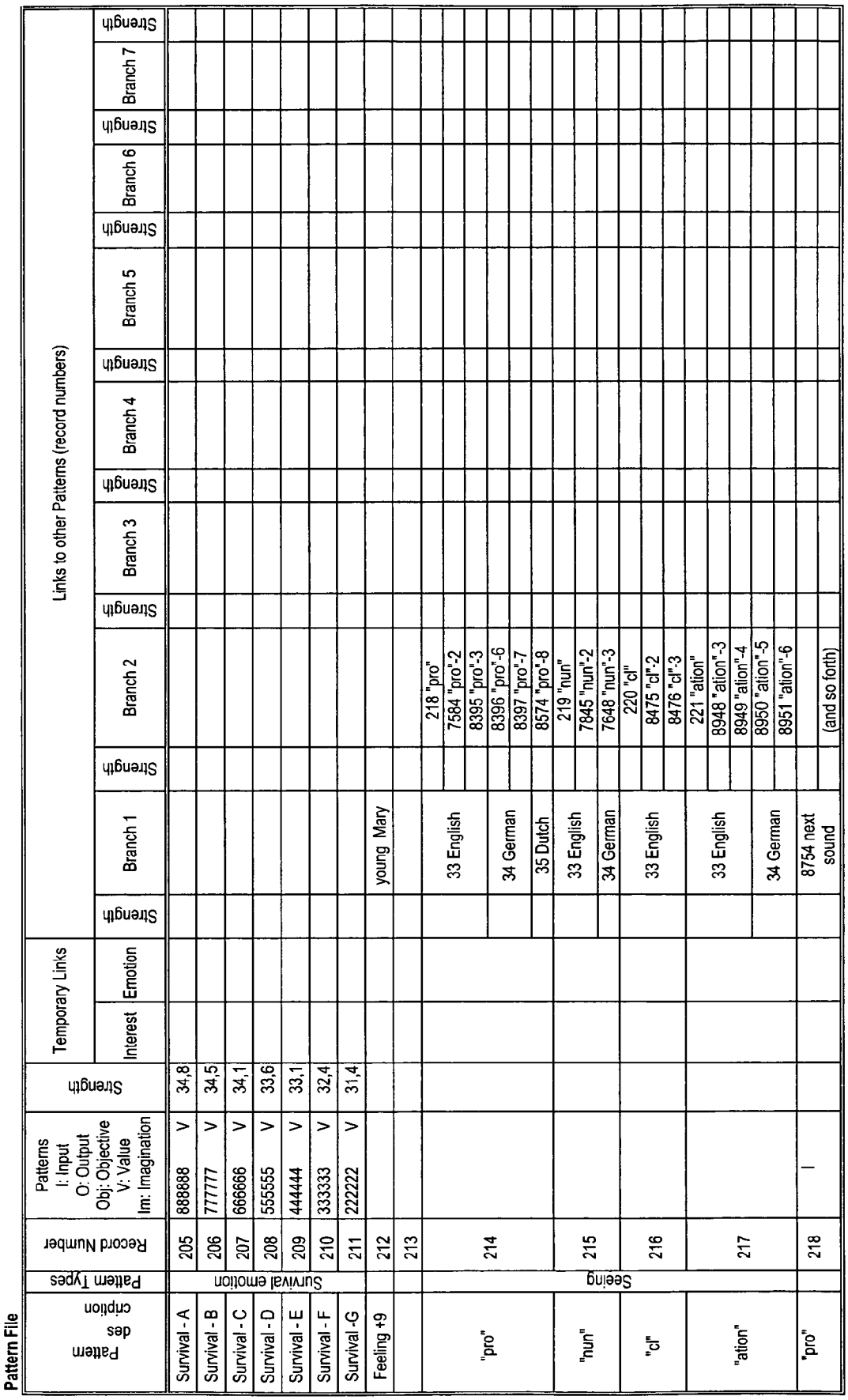
Pattern File
Pattern des cription
Pattern Types
Record Number
Patterns I: Input O: Output Obj: Objective V: Value Im: Imagination
Strength
Temporary Links
Interest
Emotion
Strength
Links to other Patterns (record numbers)
Branch 1
Strength
Branch 2
Strength
Branch 3
Strength
Branch 4
Strength
Branch 5
Strength
Branch 6
Strength
Branch 7
Strength
Survival - A 205 888888 V 34,8
Survival - B 206 777777 V 34,5
Survival - C 207 666666 V 34,1
Survival - D 208 555555 V 33,6
Survival - E 209 444444 V 33,1
Survival - F 210 333333 V 32,4
Survival -G 211 222222 V 31,4
Survival emotion
Feeling +9 212
213
"pro" 214
33 English
218 "pro"
7584 "pro"-2
8395 "pro"-3
34 German
8396 "pro"-6
8397 "pro"-7
35 Dutch
8574 "pro"-8
"nun" 215
young Mary
33 English
219 "nun"
7845 "nun"-2
34 German
7648 "nun"-3
"cl" 216
33 English
220 "cl"
8475 "cl"-2
8476 "cl"-3
"ation" 217
33 English
221 "ation"
8948 "ation"-3
8949 "ation"-4
34 German
8950 "ation"-5
8951 "ation"-6
"pro" 218 I
8754 next sound
(and so forth)
Seeing

Fig. 28J

Pattern File

Pattern description	Pattern Types	Record Number	Patterns I: Input O: Output Obj: Objective V: Value Im: Imagination	Strength	Temporary Links		Links to other Patterns (record numbers)													
					Interest	Emotion	Strength	Branch 1	Strength	Branch 2	Strength	Branch 3	Strength	Branch 4	Strength	Branch 5	Strength	Branch 6	Strength	Branch 7	Strength
"nun"	Hearing	219	I					33 English		73 "o"		75 "i"		72 "o"							
								159 spelling		220 "ci"											
								8754 next sound		(and so forth)											
								7592 previous sounds		218 "pro"											
										(and so forth)											
								33 English													
								159 spelling		71 "n"		79 "u"		71 "n"							
"ci"		220	I					8754 next sound		221 "ation"											
										(and so forth)											
								7592 previous sounds		219 "nun"											
										(and so forth)											
								33 English				66 "i"									
								159 spelling		60 "c"											
"ation"		221	I					7592 previous sounds		220 "ci"		219 "nun"		218 "pro"		7123 pronunciation					
										(and so forth)											
								33 English													
								159 spelling		58 "a"		77 "i"		66 "i"		72 "o"		71 "n"			
cell		222	I					8754 next sound		223 phone											
								33 English													
								159 spelling		60 "c"		62 "e"		69 "i"		69 "T"					
phone		223	I					7592 previous sounds		222 call		8 mobile phone									
										226 bile		225 mo		8 mobile phone							
								33 English													
								159 spelling		73 "p"		65 "n"		72 "o"		71 "n"		62 "e"			
GSM			I					8 mobile phone													

Fig. 28J / Fig. 28K

Pattern File

Pattern description	Pattern Types	Record Number	Patterns I: Input O: Output Obj: Objective V: Value Im: Imagination	Strength	Temporary Links		Links to other Patterns (record numbers)													
					Interest	Emotion	Strength	Branch 1	Strength	Branch 2	Strength	Branch 3	Strength	Branch 4	Strength	Branch 5	Strength	Branch 6	Strength	Branch 7	Strength
		224						159 spelling		9855 "G"		4534 "S"		5435 "M"							
mo		225	I					8754 next sound		226 bille											
								33 English		(and so forth)											
								159 spelling		(and so forth)											
bile		226	I					5754 next sound		223 phone											
								7592 previous sounds		(and so forth)											
								(and so forth)													
han		227	I					8754 next sound		228 dy											
								33 English		(and so forth)											
								(and so forth)													
dy		228	I					7592 previous sounds		227 han		8 mobile phone									
								33 English													
								(and so forth)													
word parts meci letters		229	Obj																		
ta	Sp	230																			
ble	Sp	231																			
		230																			

Fig. 28K

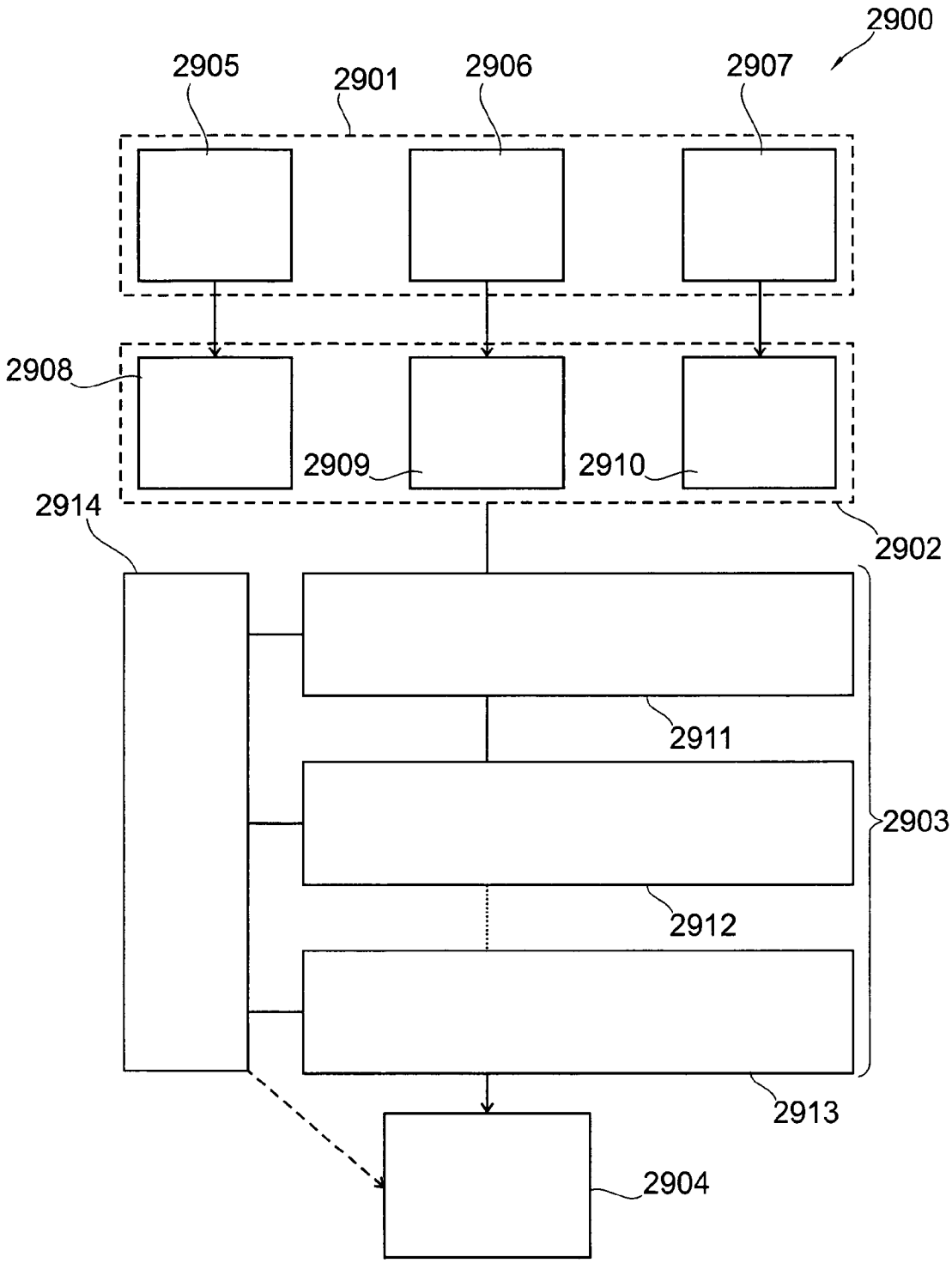
2900
2905
2901
2906
2907
2908
2909
2910
2914
2902
2911
2903
2912
2913
2904

Fig. 29

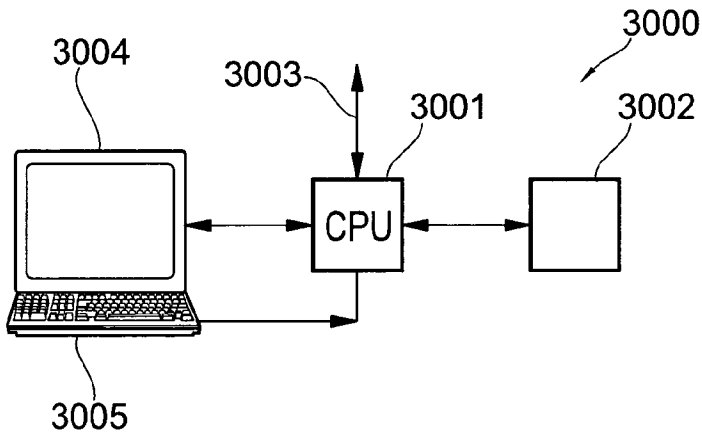

Fig. 30

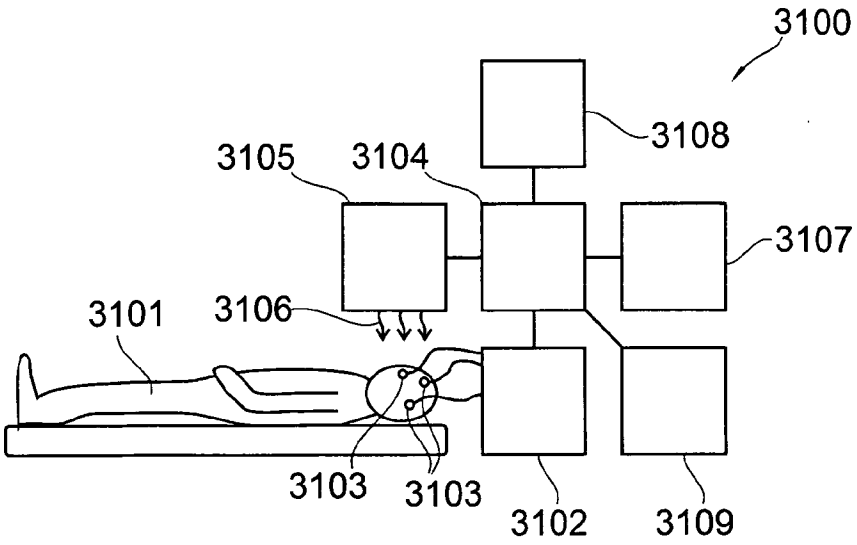

Fig. 31

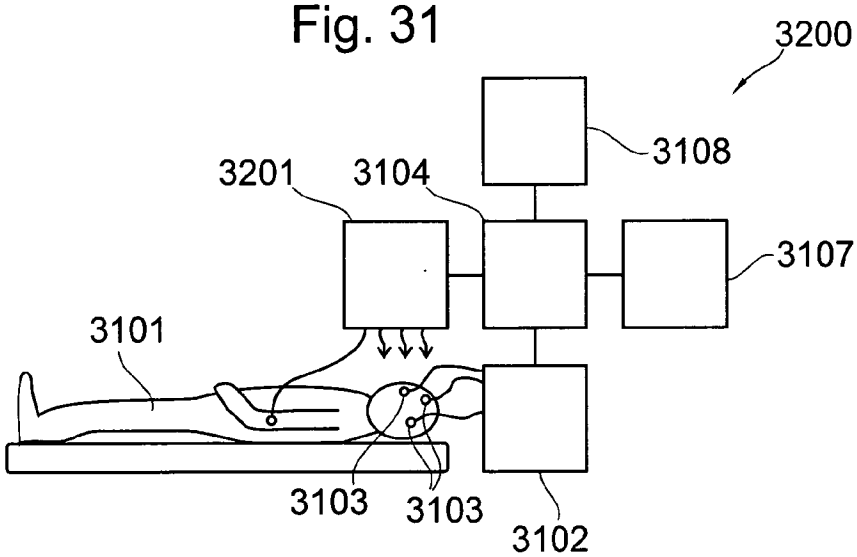

Fig. 32

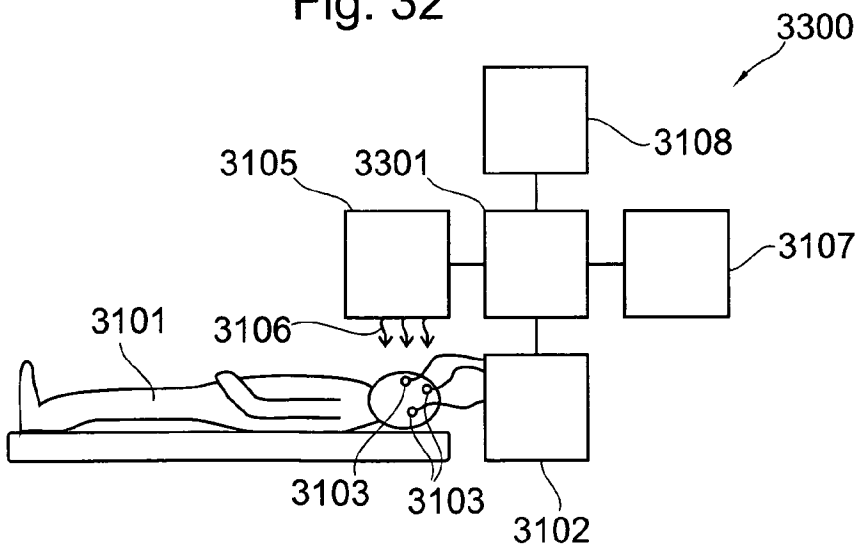

Fig. 33

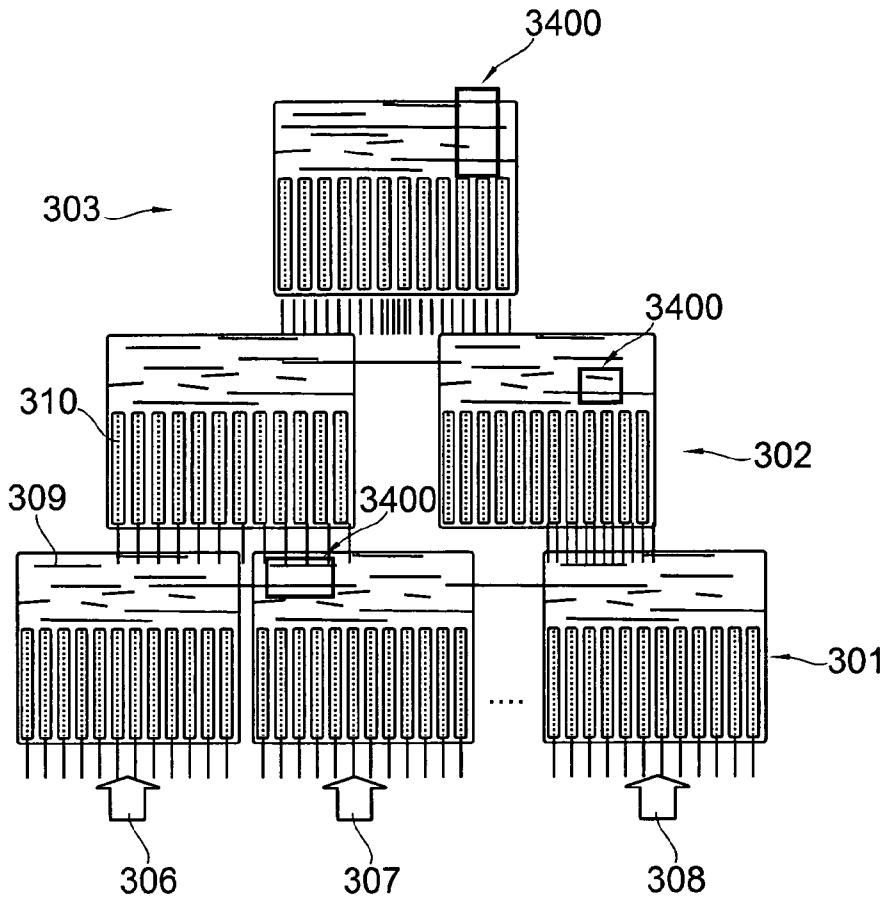

Fig. 34