ISSN: 2573-9514

Research Article

Journal of Addiction Research

From Neurons to Brain Discussing the Neural Structure Features in the Flow of Human Consciousness

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Submitted: 2023, Mar 30; **Accepted**: 2023, Apr 20; **Published**: 2023, May 01

Citation: Wu, Y. (2023). From Neurons to Brain Discussing the Neural Structure Features in the Flow of Human Consciousness. *J Addict Res, 7*(1), 24-31.

Abstract

People may never be able to find a neural mechanism that measures the number of action potentials at the neuron scale. For the entire cerebral cortex, a neuron is merely a geometric point, devoid of spatiotemporal features. Neurons cannot tolerate electrical activity that is consistently higher than the action potential. At a certain point in time, numerous neurons collectively generate an "unbearable neural behavior" that forms a "neural sensation." This "neural sensation" merges to create "neural information," which in turn produces a "conscious response" within the entire cerebral cortex. The sensations caused by granule cells in the cerebral cortex are specific, while those caused by projection cells in the cerebral cortex are structural. This is because the distribution of granule cells in the cerebral cortex is highly specialized, while projection cells are homogenized. In a brain, neurons with the same properties possess the same neural sensations.

Keywords: Neural Regional Division, Neural Conduction, Neural Synthesis, Neural Sensation, Consciousness Loop

1. Introduction

1.1 Methods Section

This article reinterprets a series of facts in the anatomy and biology of neuroscience based on the development of neuroscience, and speculates on experimental results that cannot yet be fully explained by neuroscience, forming a series of assumptions. First, the cerebral cortex cannot track the neural activity of every single neuron, so measuring the firing frequency of each neuron is meaningless for the cerebral cortex. Only when the intensity of the action potential reaches its peak, can the biological characteristics of a neuron be sensed by the cerebral cortex. The key point here is that the biological characteristics of a neuron are sensed by the cerebral cortex.

Second, the cerebral cortex only requires two layers of cells – the excitatory layer and the inhibitory layer to perceive neural sensation. The integration between these two layers forms neural sensation. At least in the cerebral cortex, the determination of the spatial relationship between neurons is the main way of expressing neural information. Based on this assumption, I redivided the regions of the cerebral cortex. I believe that the cerebral cortex, as the human organ of thinking, can only be a complete region, and different neural connections form different sub-regions. The six-layer structure of the cerebral cortex should be divided into two parts: the upper three layers of the cerebral cortex exist as the center of human consciousness, while the fourth to sixth layers of the cerebral cortex exist as a neural organ that integrates all sensory organs, neural reflex signals, and human memory structures. Therefore, it is the place where all external environments and human memory converge, and it transmits neural signals to the upper three layers of the cerebral cortex as an "external environment" of neural signals. Therefore, the transmission of neural signals in the human brain is a process of transmitting from one two-dimensional plane to another, and therefore, the way in which the human brain processes information is a three-dimensional spatial structure.

Based on the above discussion, I introduce the third assumption: neural sensations formed by neurons with the same properties in the cerebral cortex are the same. Here, I introduce a fact: most of the neural signals transmitted by the non-specific neural bundle from the thalamus to the cerebral cortex are neural inhibition signals. I believe that this corresponds to the specific neural bundle from the thalamus to the cerebral cortex. The integration of neural signals between specific and non-specific neural bundles in the cerebral cortex forms neural reactions, and the neural regions of the cerebral cortex play a role in "describing neural signals in detail".

What is consciousness? This is an age-old topic. Although new research on consciousness, learning, and memory is growing daily, people only have fragmented knowledge about how the brain constructs a complete image of the external world with shape, color, depth, and motion, and how the brain organizes and implements complex integrated movements in the body.

1.2 Neurons and Neural Impulses

The most fundamental neural activity in the cerebral cortex is the neural impulse. Neural activity is always accomplished by the participation of several neurons. In fact, human consciousness is synthesized by our cerebral cortex, from neurons to regional neural organizations and then to the cerebral cortex. The neural information implications displayed by neuronal properties at different neural structure levels are connected through neural impulses, superimposing to form consciousness. The neural impulse itself is only a partial cause of the formation of consciousness; consciousness is actually the process of making neural impulses flow in an orderly manner.

For a single neuron, there are two ways to participate in neural activity: first, the biological properties of the cell itself determine the way a neuron participates in the neural response. Second, the propagation of neural impulses opens and closes a series of neural structures within the entire nervous system. The two may be interrelated causes that influence each other and provide support for the formation of neural information within the region.

Within a complete neural impulse scale, electrical activity is highly complex. Neurons obtain potentials after synapses, which travel along the neuronal membrane and are transferred. The potential transfer may be disordered and endless until these potentials completely exhaust their potential energy on the cell membrane. For a single neuron, there may be several or even more post-synaptic potentials simultaneously. The energy generated by the superimposition of these post-synaptic potentials on the cell membrane may cause a cell to lose its biological function in a short time, at which point axonal evolution occurs. A neuron having only one axon may imply that the axon is a garbage can for excitatory potentials, responsible for transferring excessive electrical activity out of the cell's range to prevent this neural excitatory activity from interfering with the cell's normal biological function. Neurons cannot tolerate electrical activity consistently higher than the action potential, which is the reason for axonal evolution. However, newly formed axons can transmit neural electrical activity far enough so that the biological characteristics of neurons in different regions are simultaneously displayed throughout the organism. This display goes beyond the realm of neurons themselves and has extraordinary significance.

Therefore, the electrical activity of neurons should be divided into two parts: the pre-soma part and the post-axon part, with the axon hillock serving as the boundary. In the pre-soma part, the transfer of neural potentials is achieved through transmembrane proteins of ion channels on the cell membrane. The elastic changes of ion channels on the neuronal membrane adapt to electrical activity, and the electrical signal should return to its original state after passing through. Ion channels themselves do not have the ability to record the movement path and attenuation values of an electrical signal on the cell membrane. At least on the cell membrane before the axon hillock, all neural responses ultimately boil down to the expression of post-synaptic potentials when they reach the axon hillock. From the perspective of the generation and transfer of electrical signals, the corresponding biological processes are vague and lack directionality.

When a post-synaptic potential is transmitted from a neuron's dendrite to the axon hillock, there may be a natural attenuation of the electrical signal as it travels along the cell membrane, without any additional biological processes involved. At the axon hillock, a group of post-synaptic potentials are summed up, and an action potential is generated immediately on the axon, also transmitting the signal through electrical activity. When a post-synaptic potential reaches the axon hillock, the outcome can only be the generation of an action potential or no change at all. The axon hillock can only sense the remaining potential after the attenuation of the post-synaptic potential and cannot determine where it originated or what its initial potential was. Conversely, if the axon hillock indeed had the ability to calculate the path and attenuation of each post-synaptic potential, then with hundreds or even thousands of post-synaptic potentials and their possible combinations, each neuron's axon hillock would need to possess the computational power of a supercomputer. This is not realistic.

As previously mentioned, the axon may simply serve as a "waste bin" for the remaining excitatory potential of a neuron. When the electrical potential on the neuronal membrane exceeds the capacity the membrane can handle, an action potential is generated. This remaining excitatory balance should correspond to the value of the action potential, and the generation of an action potential allows the excess excitatory potential to be rapidly transferred out of the neuronal cell body. For the axon hillock, it can only reflect the sum of all post-synaptic potentials arriving at the hillock and, as a result, decide whether or not to initiate a neural impulse. The biological information of a neuron does not propagate along with the neural impulse. The way a neuron receives information is ambiguous and indistinguishable, and neural impulses cannot continuously transmit the biological information of a neuron.

Neurons cannot distinguish the origin and initial potential values of all post-synaptic potentials; they can only discern the potential magnitude when these post-synaptic potentials reach the axon hillock and output action potentials in an all-or-none manner. This suggests that the encoding function of neural impulse frequency is quite limited. An increase in impulse frequency may indicate the strengthening of a neural pathway, targeting all pre-synaptic mechanisms and possibly controlling some threshold values. Other than that, axonal responses are invariant, and neural impulses propagate in an all-or-none fashion. If the axon hillock cannot differentiate the source of post-synaptic potential information, then axons on the same neuron are incapable of editing the information from post-synaptic potentials preceding the hillock. On a single neuron scale, neurons only transmit neural impulses when the potential value at the axon hillock is higher than the action potential threshold, representing a passive neural mechanism.

Regardless of the type of synaptic connections or the number of post-synaptic potential combinations, for a neuron, the expression of neural impulse intensity only exists in terms of threshold levels, with no numerical variation. The contribution of a neuron to the neural region's information environment is either present or absent, following an all-or-none principle, without any questions of varying degrees. When a neural impulse reaches a certain location, the biological attributes there are activated. The neural integration in the cell body before the axon hillock has already been completed, and the axon hillock's role is only to transmit electrical activity and provide input for the integration of the next-level neurons.

The intensity of neural integration is affected by the coordinated neural activity in the region and is reflected in the composition of neural activity within the area. Neural information encoding is organized within the regional environment, and the coordination of neural integration is influenced by synaptic connections, which are the main reasons for the formation of the neural information environment within the region. The integration in the cell body reaches its maximum neural biological response at the axon hillock, and this response suddenly disappears after the hillock due to the presence of the myelin sheath. In fact, contemporary neurobiology has shown that for most neurons, the principle that the axon hillock is the area of highest excitability still holds true. This biological response is continuously strengthened by the ongoing post-synaptic potentials, generating a definite neural information element during the activation of a neural region, and supporting the formation of neural region information patterns.

In fact: People may never be able to find a neural mechanism to measure the number of action potentials on a neuron scale. For the entire cerebral cortex, neurons are merely geometric points, lacking any spatiotemporal features.

1.3 Neural Region

For the entire nervous system, if the source of a neuron's post-synaptic potentials cannot be identified, then the hierarchical processing and integration of neural signals would be meaningless. The concept of neural signals being processed within regions and then transmitted for further processing is logically untenable. Neural processing within the nervous system can be completed with a two-layer structure: inhibitory cell layer and excitatory cell layer. Their combined effect forms neural responses within the region. The rule of neural information processing is regional activation, where each neural region corresponds to a specific neural function and fully expresses the corresponding neural information in that region.

The cerebral cortex cannot differentiate the biological functions of individual neurons but can only perceive regional neural functions through the formation of neural region information patterns, forming neural responses. The cerebral cortex is not only an information processing and integration system but also a biological organ. It should possess an actual ability to perceive local regions as a whole. At least in the cerebral cortex, the determination of the spatial relationships between neurons is one of the primary ways of expressing neural information. The neurobiological characteristics of each cell within a neural region are established through their mutual spatial relationships, and as a result, they possess neural information features.

In the cerebral cortex, the division of neural regions is a very challenging task. As mentioned earlier, neural processing within the nervous system can be completed with a two-layer structure: inhibitory cell layer and excitatory cell layer, and their combined effect forms neural responses within the region. In terms of neural projection direction, even in the cerebral cortex, the ratio of inhibitory cells and projection cells between adjacent neural nuclei is different. The level of excitability generated by neurons in these neural tissues during a neural signal transmission process should not be the same, which naturally forms regional separation between these neural tissues.

From the perspective of neural signal propagation, neural tissues are actually separated by different neural structures based on the varying proportions of inhibitory cells and projection cells within the nuclei, and boundaries are formed between them. More specifically:

1. In the cerebral cortex, the division of neural nuclei in the direction of neural projection is based on the synapses of projection cells as the boundary.
2. In the cross-sectional view of the vertical neural projection, the division of neural nuclei is based on the principle of neural channel partitioning. That is, the neural signals generated by the neurons within a neural region are ultimately transmitted through the same neural channel. When some neurons overlap at the boundary of a neural region and the location of neurons in other neural regions, this rule still holds true. A neuron does not necessarily belong to only one neural region. If a neural region transmits neural signals to multiple channels at the same time, these neural channels can be considered as different parts of the same transmission channel. These channels can split coaxially transmitted neural signals, that is, they can transmit the signals separately after splitting the same cross-sectional neural signal within a single neural channel. The reason is simple: within a neural response time, the neural response formed by a neural region simultaneously sends neural signals to several neural channels. These neural signals within the channels can be combined and considered as a whole cross-section. After the neural response integration, the different parts of the neural response plane within the neural region are transmitted to their respective split neural channels.

As previously mentioned, consciousness is synthesized by the overlapping of our cerebral cortex. Neural superposition refers to the phenomenon where, when the cerebral cortex is in a state of saturated excitation, all stimulated neurons form a linkage and jointly synthesize into a single neural state to generate a neural response. In reality, this is a neural phenomenon triggered by the "resonance" of some neurons within the cerebral cortex, and this neural phenomenon has a special neural information meaning. The neural information transmitted by different neural channels is superimposed on the same neural response plane to form new neural information, which is then transmitted by the neural channels in that region. This is the significance of regional neural integration. In the cerebral cortex, neural superposition activities are divided into inter-regional and intra-regional activities. We will first discuss intra-regional neural superposition activities, leaving inter-regional neural superposition activities for later discussion.

The occurrence of intra-regional neural superposition must satisfy the following conditions:

1. The stimulated neurons within the region are in a state of saturated excitation. At a certain moment, some neurons in the cerebral cortex simultaneously undergo a saturated excitation response, forming a neural response pattern. This neural response pattern can be sensed by the cerebral cortex to form consciousness. The concept of saturated excitation state of neurons will be mentioned repeatedly in my later descriptions.
2. All neural superposition activities require the joint participation of inhibitory cells and excitatory cells within the cortical region.
3. Once neural superposition occurs, it has the opportunity to become a fixed neural memory structure. The fixed neural memory structure can be stimulated to form a subconscious neural structure linkage when the neural structure is below the saturated excitation level, reflecting a neural response pattern at a level below saturated excitation. This is because memory itself is a process of weakening sensations and accelerating neural responses; neural memory structure linkage only requires a general intensity level of neural impulses to complete a neural response process.

In regional neural information patterns, the combination of neural signals forms neural information. In the cerebral cortex, neural signals can be converted into neural information when neural tissue is in a saturated excitation state. The so-called neural information is the neural response triggered by the "resonance" of some neurons in the cerebral cortex when they are in a saturated excitation state, and this neural response has a special neural information meaning. The "resonance" phenomenon is the need for a coordinated and consistent response from various parts of the body when dealing with the external environment.

1.4 Neural Channels

In the cerebral cortex, the neural functional area plane and the neural projection direction are perpendicular to each other, and this angular relationship always exists. This perpendicular projection angular relationship can be superimposed between different types of inhibitory cells within a neural functional area plane, while the angle of excitatory cells remains constant, forming invariant excitation ranges and structures on the neural functional area plane.

During a complete neural impulse transmission phase, any neuron can be considered as a straight line, with a corresponding presynaptic structure forming a presynaptic plane. On this plane, all synapses operate simultaneously, and under the control of the same neural impulse, they form a unified presynaptic plane. Since the synapses operate simultaneously, the presynaptic plane is perpendicular to the axon. The same logic applies to a neural channel, where all neurons within the channel also behave in this way during the same neural response time period, as the signal projection arrival time to the target area cannot be accurately calculated separately. Therefore, the neural signals projected by this neural channel and the target projection area have a perpendicular spatial relationship. As long as a neural state can be maintained for a short period of time, the electrical signals generated by the neurons in the same neural channel in a saturated excitation state during the same neural response time period will be continuously balanced and unified, producing a unique neural response plane. Here, there are mainly two types of neural signal transmission within the neural channel: First, when the relevant neural structures are in a saturated excitation state, each neuron has more new synapses opening, forming a relatively complete presynaptic plane. In the saturated excitation state, all related neurons simultaneously generate complete presynaptic planes and are integrated together to form a neural response plane. In the neural channel corresponding to this neural response plane, the sum of all neural electrical signal transmissions should occupy the largest neural channel cross-sectional structure at this time. Therefore, during the saturated excitation state, the neural signal transmission activity in a neural pathway is full cross-sectional transmission, and irrelevant neural signals cannot transmit neural signals within the same neural channel at the same time.

Second, if a neuron does not reach the saturated excitation level, the number of synapses it opens is limited, and when a neural impulse occurs, it can only form a limited presynaptic plane. Neural impulse transmission relies on the maintenance of neural memory structures, forming limited cross-sectional transmission within a neural pathway. This form of neural transmission activity can coexist with other neural signals within a neural channel, jointly maintaining the neural activity of the human body.

All neural projection signals transmitted by sensory channels expresses spatial relationships. When visual neural projection signals and other sensory channel neural projection signals undergo neural exchange in neural structures such as the thalamus, these exchanged neural signals can no longer convey spatial meaning. The neural signals generated by this neural exchange may be "incredibly strange," but the cerebral cortex can only "choose" to remember these neural signals. These neural exchange signals are caused by the summation of post-synaptic potentials between different neural channel neurons and are a natural law. The cerebral cortex can only "choose" to remember these seemingly "meaningless" neural signals. As a result, these neural signals become distorted and transform into various abstract neural information transmitted to the association areas of the cerebral cortex. Conversely, this abstract neural information will also decompose and return to normal neural signals during the downward reflection process.

Auditory channels, olfactory channels, gustatory channels, tactile channels, visual channels, and so on - the projection structures composed of neural signals from these sensory channels must conform to various scientific rules. Based on these scientific principles, the neural projection structures of individual sensory organs are formed. The human nervous system contains over 800 billion neurons, generating trillions of synaptic connections on the order of magnitude. The entire nervous system possesses sufficient neural resources to meet all the scientific rules required by the external physical space.

1.5 Neural Superposition between Brain Regions

In the cerebral cortex, the fourth layer is a neural structure layer that connects the upper and lower regions, and its role in the cerebral cortex may be more critical than we imagine:

1. When the neural bundle from the thalamus to the fourth layer of the cerebral cortex reaches a saturated excitation state, the full cross-sectional neural signals can instantly cover the related areas of the cerebral cortex, forming a neural state in the fourth layer structure. This type of neural mechanism also forms an instantaneous neural signal barrier layer between the cerebral cortex and subcortical structures, blocking other neural signals from passing through the thalamic neural bundle to various regions of the cerebral cortex at the same moment.
2. In the saturated excitation state, the neural signals transmitted from the thalamic neural bundle to the fourth layer structure of the cerebral cortex form a neural state in the fourth layer structure, allowing the neural transmission activities in various regions of the cerebral cortex to establish logical relationships. In other words, seemingly unrelated neural structures within the cerebral cortex that do not have neural conduction relationships can be simultaneously activated under the same neural state in the fourth layer structure, superimposing and synthesizing neural information with each other. In this way, the neural activities of the entire cerebral cortex progress in an orderly manner under the control of the neural state in the fourth layer structure.

A neural state in the fourth layer structure of the cerebral cortex may consist of two parts:

First, the neural signals from various sensory organs ascend through the thalamus, and the terminal ends of the neural bundles within their neural channels terminate in the fourth layer structure of the cerebral cortex. The neural signals generated by each sensory channel do not undergo neural exchange in the thalamus and independently reach the fourth layer structure of the cerebral cortex's sensory areas. These neural signals from sensory channels independently participate in the neural information integration of the structures below the fourth layer of the cerebral cortex and become a part of the neural state of the structures below the fourth layer of the cerebral cortex.

Second, the neural signals from various sensory channels undergo neural exchange in the thalamic nuclei and are transmitted by the thalamic neural bundles to the fourth layer structure of the entire cerebral cortex's association area. The neural signals transmitted by the thalamic neural bundles and the neural signals generated by each sensory channel together form a neural state in the fourth layer structure of the cerebral cortex.

When consciousness arises, a complete neural cycle may involve the following aspects:

1. The neural signals generated by the specific neural bundles that originate from the thalamus and project to the fourth layer structure of the cerebral cortex form a neural state in the fourth layer structure of the cerebral cortex.
2. The neural structure that is activated within the neural state formed by the structures below the fourth layer continues to be expressed in the three-layer structure above the fourth layer in the cerebral cortex.
3. The diffuse neural signals that project to the cerebral cortex through polysynaptic relays also undergo thalamic integration and then form widespread inhibitory areas in the cerebral cortex, which is completely opposite to the neural process of specific neural pathways transmitting signals to the cerebral cortex. The neural regions that are not covered by inhibitory areas within the excited regions formed by specific neural pathways transmission are the result of neural discrimination.
4. The neural signal formed by this meaningful neural result continues to be transmitted by the fifth layer cells and returns to the three-layer structure above the fourth layer in the cerebral cortex for neural processing, or continues to propagate downwards through the fifth- and sixth-layer cells to form a neural response.
5. The neural signal generated by the neural discrimination result from the above-mentioned point 3 also descends to the thalamus to complete the neural cycle.

The connections between different subregions within the cerebral cortex are highly complex, providing the possibility to describe detailed neural activity. However, although the neural activity of different subregions within the association areas of the cerebral cortex is complex, they should all be constrained by the overall framework of the neural environment initiated by the fourth layer structure.

1.6 On Neural Projection Structures

When the human brain is awake, there is a baseline neural excitation activity in the neural tissue, which supports a neural memory structure that is constantly being activated. The neural memory structure contained in the neural tissue below the fourth layer in the cerebral cortex during wakefulness is like a visual image seen by the human eye, constantly exposed beneath the neural tissue of the upper structures of the cerebral cortex, waiting to be activated by the upper structures of the cerebral cortex. From the perspective of transmitting neural signals upward, the neural tissue below the fourth layer of the cerebral cortex can be regarded as a "sensory organ", which is also a central linkage between the human brain and the external environment.

In all neural integration processes, reflexive neural signals first inhibit the transmission of neural signals and subsequently strengthen the confirmed part of the neural signal to form an accurate and clear neural response during subsequent neural signal transmission. The formation of all reflexive neural signals is not a direct result of the excitation of neural signals transmitted, but rather a result of the reverse stimulation of inhibitory neural signals. Here, the non-specific neural bundles that are transmitted from the thalamus to the cerebral cortex are also structured, ensuring the integrity of the above neural processes.

Looking at the six-layer anatomical structure of the cerebral cortex, all upward-projecting neural signals produce neural excitation, while all downward-reflecting neural signals produce neural inhibition. This is because upward neural signals first excite the projection layer, triggering neural signal transmission upwards. On the other hand, when neural signals reflect downwards, the opposite occurs, with neural projection signals first encountering the granular layer, ultimately producing a neural inhibition effect. This feature of the human brain is determined by the anatomical structure of the nervous system and is a fundamental law. Therefore, neural transmission signals and reflexive neural signals have completely opposite neural excitation patterns. Neural transmission signals are divergent, while reflexive neural signals are convergent when transmitted, and this convergence of neural projection signals may be based on the neural memory structure in the fourth layer, which is the result of the highly differentiated neural function of the human brain.

Therefore, a fundamental characteristic of the nervous system is that neural signals transmitted upwards and reflexive neural signals transmitted downwards have different neural information meanings. The upward transmission of neural signals is oriented towards a region, making it a passive neural process, resulting in a neural function that is fuzzy and imprecise. On the other hand, the neural signals reflected downwards contain neural projection structures, which define the range and structure based on the neural signals transmitted upwards, making it a precise neural structure.

The principle behind the cortical control of various sensory organs is that the cortex limits the neural signal transmission of each sensory channel through neural reflex pathways, in order to control the neural signal transmission of each sensory organ. When a sensory organ does not transmit the neural signals needed by the cortex, the neural reflex signals can remain unchanged, while the sensory organ, such as the eye, can help the cortex search for appropriate neural signals by rotating the eyeball until they are found. This is a mode of indirect control of neural signals, and the result is that a precise neural information response pattern can be found for the cortex to choose from. This neural mechanism may be a common pattern of neural signal transmission for all cortical structures below the fourth layer. Within the nervous system, this should be a fundamental neural mechanism.

A single neural pathway may connect several neural clusters, and in the process of expressing the entire neural projection structure, the connected neural clusters may have different neural descriptions. This depends on the ratio of projection cells to inhibitory cells in the neural clusters, as well as the range of neural signals that the neural projection structure stimulates. The more balanced the ratio between excitation and inhibition cells, and the wider the range of neural signal activation, the more detailed and extensive the neural signal description will be. The upper three layers of the cerebral cortex, as the neural clusters with the most balanced ratio of excitation and inhibition cells in the nervous system, have the widest range, which often leads to an excessive interpretation of the neural signals transmitted through each neural pathway. Therefore, at a specific moment, selecting a definite range of neural information within the entire cerebral cortex is an inevitable requirement. At this time, the original neural projection structure in the neural pathway will be replaced by a new projection structure established by neural reflex. The newly established neural projection structure must be based on the original neural projection structure, and in the nervous system, this is the only active neural mechanism.

The human imagination is incredibly rich, unlike any other living organism. This may be because there are relatively few ion channels on the neuronal membranes of the fifth layer of the human brain, making it less easily excited. In other words, in the entire cerebral cortex, a neural memory structure in the fourth layer or below may have a broader excitation in the upper three layers of the cortex when the neural signal is transmitted. There may be two phenomena here: first, the upper three layers of the cerebral cortex are more prone to produce saturated excitation and form consciousness; second, a neural memory structure can be expressed with very few neurons in the fourth layer or below, which is the need for more refined neural function. When this neural memory structure is transmitted to the upper three layers of the cerebral cortex, it should have a richer neural expression.

In different human brains, the same neural information is supported by consistent neural projection structures. However, different gray matter regions in different brains have different neural interpretations for the same property of neural information. These different neural interpretations can be corrected and continued to form consistent neural projection structures through subsequent communication and interaction between individuals. Perhaps the sensation caused by granule cells in the cerebral cortex is specific, while the sensation caused by projection cells in the cerebral cortex is structural. This is because the distribution of granule cells in the cerebral cortex is highly specialized, while projection cells are homogeneous. In a specific brain, neurons with the same properties have the same neural sensation.

Examining solely from the perspective of projection neurons, the response generated in any part of the cerebral cortex to the same neural projection signal is unique, which is a result of the homogenization of neural projection structure cells. However, the same neural projection signal displays differently in various parts of the cerebral cortex, which is due to the specific distribution of specialized cortical gray matter cells. Nevertheless, at a particular moment, although different cortical gray matter areas have distinct neural information expressions for the same neural projection signal, these expressions in different gray matter regions are always based on the same and unique neural projection structure, demonstrating a conscious response that is consistent with the external environment.

Thus, the neural cells responsible for forming memory details in the brain are specialized, while the projection structure is structural, and the neurons triggering the projection signals are homogenized. As a result, memory is divided into two parts: the specific neural cell part and the homogenized cell part. A neural projection signal may be a highly complex neural structure formed by the combination of some simple neural memory structures through a series of new memory patterns. When we recall, we use the projection structure to search for detailed neural memory structures until we find them. The neural memory structure for the required memory details is ensured by indirectly stimulated neural signals, which are neural reflex signals completed by non-specific neural pathways. Such a signaling pathway can cover the entire cerebral cortex at a specific moment, causing the neural activity of the entire cerebral cortex to unfold under the control of a unique neural reflex signal. This neural reflex signal, after being integrated once again through the thalamus, may form the next upward neural projection structure and stimulate new projection regions at the third layer of the cerebral cortex, forming a neural loop. A neural reflex signal may occupy only a small part of a neural state, but after the neural reflex, this small part of the neural structure can become a new projection structure after thalamic circulation, forming a new neural state in the fourth layer of the cerebral cortex and occupying the entire fourth layer structure of the cerebral cortex, endlessly.

When a neural reflex cannot be completed, the cerebral cortex needs to constantly change the neural projection structure to couple with the neural memory structure. In other words, when the cerebral cortex accommodates external environmental information, as long as the neural projection structure is integrated, the cerebral cortex will automatically ignore the original memory's detailed information environment to avoid interference with the emergence of new neural information. This process is difficult for the brain, and most of the time, the cerebral cortex will choose to give up. The process of the human brain adapting to the external environment is the process of determining a new detailed information environment based on the original neural projection structure, as well as the process of reinterpreting the external environment. Generating a new detailed information environment based on the original projection structure is a form of neural accumulation, and this accumulation process will, to a certain extent, undergo a sudden change to form a new neural projection structure.

Such a neural arrangement is of great significance, as the cerebral cortex does not need to change the neural projection structure when searching for detailed neural memory structures. An identical neural projection structure fills the entire cerebral cortex, and the related detailed neural memory structures can be evoked and completed in an instant, clarified through the neural mechanism of neural reflex. The same neural projection structure can search for suitable neural results in the upper three-layer structure of the cerebral cortex under the coordinated cooperation of specific and non-specific thalamic bundles. This neural mechanism can select the most needed neural memory structure from a series of similar neural sequence structures without adhering to the constraints of all current mathematical rules. This neural process is a result of the joint selection of two-level neural organizations from the thalamus to the cerebral cortex.

1.7 Several Important Questions

If we can prove that for the cerebral cortex, the action potential of a neuron at any intensity is undetectable, then the action potential of a neuron would be meaningless to the cerebral cortex. However, this cannot explain the fact that neural impulses are widespread within the cerebral cortex. I speculate that only when the intensity of the neural impulse of each neuron reaches its limit, can the cerebral cortex perceive the existence of the action potential of that neuron. The fact that each neuron has only one axon seems to suggest that there are no structural issues in neural signal transmission within the scale of a single neuron. In other words, at a specific moment within a neuron, the distribution of neural signals is balanced and uniform. When humans are in a conscious state, it is likely that the relevant neural tissue in the cerebral cortex is in a state of saturated excitation. At this time, the firing frequency of the related neurons is controlled by the refractory period of the neural cells, and the firing frequency of the neural impulses is at its "highest" state. In this state, the generation and propagation of neural impulses can proceed in an orderly manner throughout the entire cerebral cortex region. The refractory period of neural cells in a conscious state is required for the "resonance" response of neural tissue within the cerebral cortex.

At a specific moment, the saturated excitation event in the upper three layers of the cerebral cortex is unique and is a result of the "resonance" response of neural cells. Within a single neural cell, the biological characteristics of the cell can only be effectively stimulated when it is in a state of saturated excitation, which in turn affects the conscious perception of the entire cerebral cortex. For neurons, saturated excitation is equivalent to strong stimulation, which is a very special characteristic of them. In contrast, the biological properties of neurons appear weak during the awake state.

Neural cells cannot tolerate continuous electrical activity higher than action potentials. Only under the stimulation of saturated excitatory impulses can the axon reach an unbearable potential energy pressure, requiring the generation of new synaptic communication at the next level of neural cells to seek the release of potential energy pressure. Neurons that have not reached a state of saturated excitation do not need to generate new synaptic communication at the axon terminals, as the existing synaptic connections are sufficient to handle the accumulation of excitatory potential energy changes under normal circumstances. At a certain moment, numerous neural cells within the cerebral cortex jointly produce "unbearable neural behavior," forming a "neural sensation." This "neural sensation" converges into "neural information," generating a "conscious response" throughout the entire cerebral cortex. All neural structures are inherently abstract; they only become concrete when biological organisms attribute information properties to them. The combination of neural cells forms neural structures [1-6].

2. Conclusion

A neural reflex signal may occupy only a very small portion of a neural state, but after the neural reflex, this small portion of the neural structure can become a new projection structure following thalamic circulation. This new projection structure forms a new neural state in the fourth layer of the cerebral cortex and occupies the entire fourth layer of the cerebral cortex, endlessly.

3. Acknowledgments

I would like to express my sincere gratitude to Sandra Cai and Ava Wu, who have provided me with invaluable support and resources during the course of this report. They were instrumental in facilitating my point of view on neural structure in the flow of human consciousness.

I would also like to thank my colleagues Xue Lan Jiang and Guo Qing Gu, who have provided me with valuable feedbacks and support throughout the writing process. Their insights and suggestions have been invaluable to the development of this manuscript.

Finally, I would like to express my appreciation to my family and friends for their unwavering support and encouragement. Their patience and understanding have been a constant source of inspiration throughout the writing of this manuscript.

I am deeply grateful for the support and encouragement that I have received from all those who have contributed to this research and helped me to bring this manuscript to completion.

4. Conflicts of Interest Statement

The author, Wu Yao, certifies that he has NO affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript

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