Natural Intelligence

By

David A. Edgar
Chief Technical Officer

Background

The two biggest problems plaguing artificially produced computer intelligence are network bottlenecks and real-time adaptation. The bottleneck problem occurs when a burst of input or output overloads the existing network and computer interfaces. This creates an imbalance in the process where the IT capacity cannot satisfy the demand resulting in poor performance, excessive costs, and limited functionality. On its heels rests the analytics problem which is the ability to process the data, adapt to the unknown, and make decisions in real-time. Current methods are too slow, prone to failure, and cannot cost-effectively scale. This severely restricts their value and use in duplicating human-level intelligence.

Industry has attempted to solve the bottleneck problem using a variety of techniques. The most common method is compression. A compression algorithm removes repeated byte patterns from the data payload. While compression may reduce individual payloads by 10% to 40%, it does nothing to reduce the number of data packets. So, "10,000 sensors still send 10,000 packets, just slightly smaller ones". Failure to solve the problem has forced the industry to either upgrade capacity or downgrade capability or both.

While data bottlenecks have existed since the inception of computers and computer networks, the requirements of sensor processing and artificial intelligence are the straw that broke the camel's back. Where companies may have 2,000 human users producing transactions every couple of minutes for 8 hours a day, now they have 10,000 sensors producing transactions every few seconds for 24 hours a day. The human users produce 480,000 transactions, while the sensor system produces 432,000,000 transactions that must be processed by some form of artificial intelligence. World-wide computer/network capacity is not currently or near-term capable of satisfying such escalation requirements.

Current industry initiatives to produce artificial intelligence (AI) from machine intelligence to deep-learning, all suffer from the same recognized problem. They are manifestations of "narrow intelligence." These systems are only capable of solving specific problems where all the variables are known. For example, Machine Learning is where computers use a statistician's toolset, such as regression analysis, to examine large data sets. This is to draw inferences over the long term for the human supervisor to act on. Deep Learning, an expansion of Machine Learning, is where apps are capable of scanning unstructured data input, like images, text docs, and speech patterns, to perform basic recognition and then action.

All of these AI approaches have one fatal weakness, they cannot adapt to what they don't know. If current AI does not have specific previous experience to a change in the environment, then it cannot make a decision. This fatal weakness is due to the fact that when you do not know the cause of an effect, you must run a statistical analysis of that effect so as to approximate the cause. Many of our mind sciences work this very same way where truth is an approximation, not a true causal root. Unfortunately, systems that only know the "What"

cannot produce intelligence unless that “What” is present. It is knowledge of “Why” that is missing which is required to produce intelligence that can adapt.

The entire AI industry recognizes the shortcomings of current approaches and theorizes that the solution can only be found in what is called “Artificial General Intelligence” (AGI). Unfortunately, the industry has no clue on how such a system should be designed or constructed. So, the industry continues to dump more hardware capacity into “narrow intelligence” in a mistaken belief that all data patterns can be preprogramed and General Intelligence can somehow emerge. The results speak for themselves, a multimillion-dollar computer with the energy signature of a building that exhibits less intelligence than a fruit-fly.

Both problems are rooted in industry’s failure to identify the brain’s natural algorithm for data processing and intelligence production. The brain’s algorithm represents the most evolved method for producing and consuming intelligence in nature. Tapping into this natural process will solve many of the current roadblocks that are currently stifling industry advancement. To mimic its functionality is to follow a blueprint that stretches back to the very beginning of life.

Neural Synchronization

Life is by its own nature impaled on the “*arrow of time*”. All lifeforms must be consciously aware of the passage of time. It is part of the biological process and sits as a fundamental definition of what it means to be alive. All lifeforms achieve awareness through perception of their environment using sensory systems. This perception is accomplished through a rhythmic measurement of space. A biological process maintains state by performing and applying these measurements based on a linear time cycle. In the human brain, time relativity is calibrated through the hypothalamus, which uses the optic charisma like a stellar pulsar to establish a circadian rhythm that regulates the cycling of the biological process. By performing this function, the hypothalamus serializes/sequences sensory input and synchronizes the execution of both the left and right brain hemispheres as depicted in Figure 1.

Each brain hemisphere is individually controlled by the thalamus. The thalamus cycles the linear firing sequence using a sophisticated set of nuclei internally sequenced. More importantly, the thalamus maintains a state of neural synchronization between itself and all the lobes, cortexes, and layers throughout the brain. The reason why most thalamic connections are reciprocal is because two-way communication is mandatory to maintain a synchronous state. Neural synchronization allows the brain to exist in a single entangled state as sensory measurements are cycled, processed, and applied.

All sensory data arrives asynchronously. The brain does not control or synchronize the timing of the sensory observation points. Since there are many different types of sensory systems that all generate data at different intervals, the brain will not waste energy or capacity synchronizing sensory data production. Instead, the thalamus provides a bridge for all the asynchronous sensory data to enter into the brain’s synchronous state.

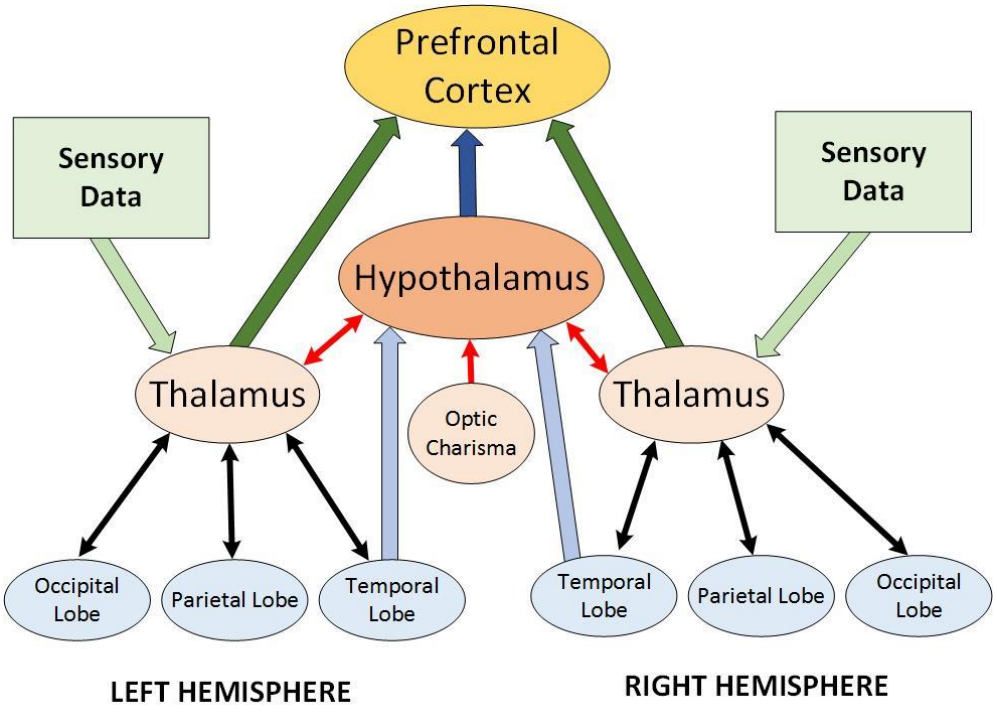

Figure 1 – The Synchronized Brain

Since the thalamus understands the passage of time given to it by the hypothalamus, each of its individual nuclei can maintain state. The thalamus uses timed measurement intervals to translate all sensory data into flat space-time. Basically, a single moment in time. Comparing the slice of space-time against a synchronized state allows the thalamus to produce a measurement of entropy. Entropy is disorder, randomness, chaos. Entropy can be encoded as a set of instructions on how to change state and it doesn't matter what sensory or object format is being measured. A downstream entangled component simply applies these instructions to keep the states synchronized in real-time.

When the thalamus conducts the measurement, it will detect changes/movements in state and will categorize any detected motion as either predictable or unpredictable. Unpredictable states represent entropy and are accumulated, and their change instructions are encoded for synchronization. Predictable states are discarded because their results are already known by the downstream component due to its shared state with thalamus. The knowledge is passed between components by the sheer existence of the timed neural pulse. By discarding predictable motion states, the brain achieves incredible transmission efficiency and response time between its synchronized components.

The thalamus distributes entropy in two directions. The first path is for sensory perception and the second path is for thought production. Since raw sensory perception requires no further refinement, it can be synchronized directly to the state maintained in the prefrontal cortex

through a sensory perception binding point. The prefrontal cortex maintains a state within the brain that can be described as the state of conscious reality. Human consciousness perceives and responds to the state that is maintained in the prefrontal cortex. The prefrontal cortex is the end point for both sensory perception and thought production which are synchronized (bound) at different points within the hypothalamic/thalamic cycle.

The second direction for entropy is thought production. Before a thought can be produced, it must go through a system of natural intelligence production. The production process converts sensory data into cognitive objects for identification, interpretation, and subsequent reaction. The thalamus is responsible for coordinating the firing sequence of all the higher levels that will be executed by the different lobes of the brain, including the occipital lobe, parietal lobe, and the temporal lobe. At all levels, the thalamus will maintain state for that level and share it with the connected component/lobe layer through synchronous connections. By doing this, the thalamus creates a single state shared in by all of its biological components.

The Process of Natural Intelligence

The Process of Natural Intelligence is a highly evolved method for turning sensory data into a state of awareness, so physical life can automate activity and make adaptations to survive. Within it is an understanding of the passage of time and a sensory picture of the environment relative to the biological life-form. Life is a physical process whose primary function is to measure its own existence. This measurement is fundamental to its secondary function which is to preserve that existence. Natural intelligence evolved as a process to reduce entropy to perpetuate the state of the biological process. Life's sense of survival is woven into the tapestry of evolution and drives life to adapt to a changing environment.

The brain requires two different processes, one subconscious and one conscious that work together to produce and consume Natural Intelligence. The primary process of the brain is the subconscious system which maintains and automates the state of the physical biological organism. It consumes over 99% of the brain's energy expenditure processing sensory data, generating awareness, and automating activity. The subconscious process filters out non-deterministic sensory motion (entropy) in order to optimize deterministic reactions. The deterministic nature of the subconscious precludes adaption which is the function of the conscious process. The conscious process has access to long-term memory and can rationalize and make new decisions. The two processes of the brain are symbiotic, yet distinct in their language, understanding, and function. Consciousness runs on symbolic intelligence and the subconscious runs on general intelligence. One has a preset known view of the environment and the other can exceed the sum of its parts to understand change. Together they create a single life-form capable of high-speed repetitive function and slower-speed adaptation.

The following table summarizes the characteristics of the brain's subconscious and conscious processes:

	Subconscious	Conscious
Nature	Deterministic	Non-Deterministic
Data Format	Globs	Symbols
Execution	Synchronous	Asynchronous
Function	Automation	Adaptation
Response Time	Real-time+	Unknown
Motion Responsibility	Predictable	Unpredictable
Intelligence	General	Symbolic
Object Knowledge Level	Border Only	Contents
Knowledge Structure	Flat	Hierarchical
Analytics	Bottom-up	Top-down

The human brain is the most highly evolved, energy efficient system for extracting naturally forming intelligence to feed its biological needs. The brain starts as an empty shell. But, within it is a powerful Natural Intelligence algorithm that combines a subconscious process with a conscious process to turn sensory perception into awareness into thought and ultimately into automation. Natural Intelligence is a self-perpetuating process that feeds off of its experience to automate activity to minimize energy usage (entropy) and maximize its chance of survival.

General Intelligence

Before the brain can process sensory data, raw data must be normalized into a General Intelligence format. This format allows the brain to process the data through the subconscious process without having to understand the contents of that data. Interpretation of data contents requires a much more complex language and significantly more energy to process. To avoid the problem, the thalamus consolidates the other sensor modalities and normalizes the format by repackaging the sensory data into globs and globular clusters as depicted in Figure 2.

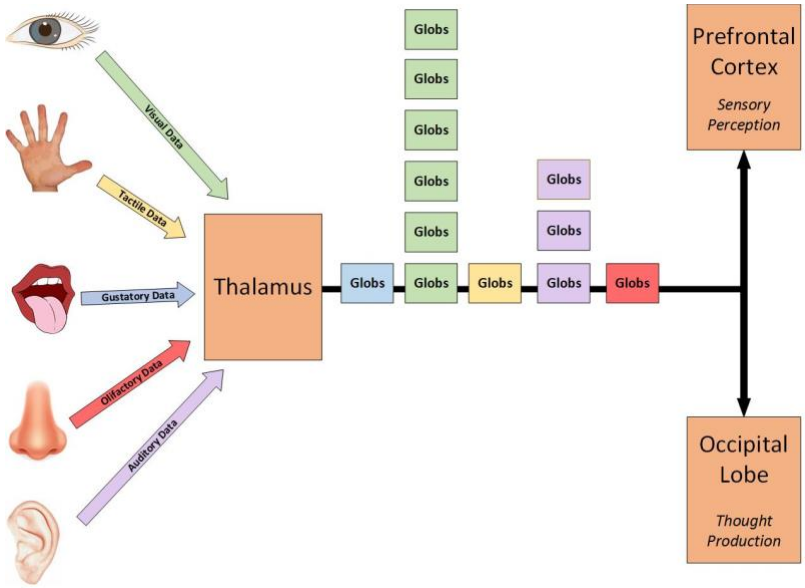

Figure 2 – General Intelligence

A glob is an initial grouping of sensory data and produces basic objectification. Globs can be associated with other globs to form globular clusters. The thalamus uses object boundary intelligence to organize raw sensory data into globs. The glob is the equivalent of a shipping package where the data can be shipped without having to know what's in the package. The glob is the data format of general intelligence and allows sensory data to be combined into a universal format that enables agnostic communication and memory storage throughout the brain with no requirement to understand content.

In the brain, the thalamus sends the globs up two data streams, one destined for Sensory Perception and the other for Thought Production. Sensory Perception by itself does not create subconscious or conscious awareness. It is merely the efficient transfer of uninterpreted data to the prefrontal cortex. To produce awareness requires Thought Production which is responsible for interpreting, automating, and escalating the data. Separating Sensory Perception from Thought Production produces the following benefits:

- It prevents thought production from interfering with sensory perception by creating multiple independent binding points in the prefrontal cortex.
- It is highly efficient in that raw sensory data (sensory perception) travels less than a half brain length to bind as opposed to traveling to the back of the brain and then to the front.
- It prevents infinite regression by executing thought production in a single pass through the occipital lobe forcing further refinement into a subsequent cycle of sensory perception.

Combining all sensory data into globs and feeding it into the occipital lobe defines the first step of Thought Production. By sending sensory data through the primary visual cortex V1 of the occipital lobe, the brain uses the visual processing system to convert the general intelligence to symbolic intelligence. In the brain, the interpretation of all sensory data is based on a visual process. So, whether it is a sound or a tactile feeling, all are represented to consciousness as some combination of visual symbols. Humans are creatures of visual sight and it dictates the symbolic language of the conscious state.

Symbolic Intelligence

Since the lateral geniculate nucleus of the thalamus has consolidated all sensory data, what ends up stored in primary visual cortex (V1) is the unpredictable sensory elements of a single moment in time. At this level of Thought Production, the primary visual cortex V1 is filled with just globs and globular clusters that carry their own state. The occipital lobe's function is to map these globs with symbolic intelligence in order to form subconscious awareness that can eventually produce subconscious reactions or escalate awareness to the conscious state.

The lower occipital lobe (V1 thru V4) as depicted in Figure 3 provides the translation function where globs in V1 can be matched to symbols in V2, assigned associations in V3, and formed

into memory in V4. This framework provides a non-evasive bridge between the language of the conscious state and the globs of the subconscious. The lower occipital (V1 thru V4) allows globs, symbols, and associations to be grouped together for advanced processing, pattern recognition, and memory storage. The layered separation allows the subconscious to use the product of conscious reasoning without the need to understand the details. The subconscious only sees globs and consciousness only sees symbols when looking at the same memory.

The occipital lobe V2 is where the symbolic mapping function begins. Symbols are loaded either by previous cycle memory or by an executive directive (consciousness). Symbols are a hierarchical language used by the conscious state to perform reasoning and decision-making functions. The thalamus will synchronize the current selected set of activity symbols with occipital lobe V2. The V2 state is maintained by aligning the symbol memory tissue in a defined order to match the globs in V1.

V2 is the first level where identification of the contents of the glob is performed. The matching of a glob to a symbol is dependent on previous experience memory originally stored by the conscious state. So, hypothetically, 5000 different sensory signals (5000 data globs) may now be represented in conscious thought as a single finger symbol. In the finger symbol, the brain has consolidated and translated all related sensory data into a single symbolic element. Higher intelligence is based on the ability to create, abstract, and associates these symbols so knowledge can be organized for memory storage and eventually rationalization.

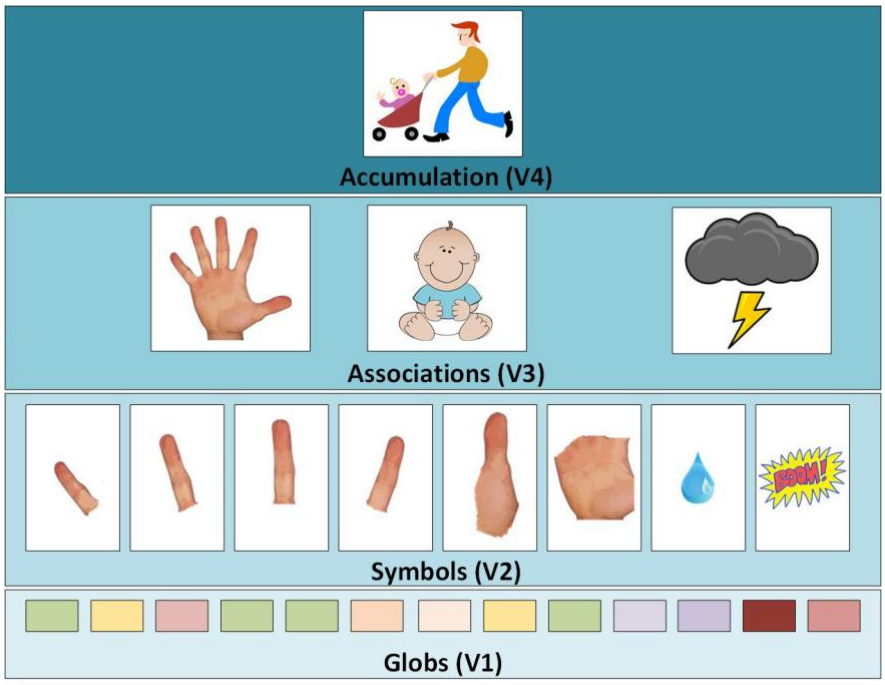

Figure 3 – Symbolic Translation

V3 is where symbols are associated. After V2, the thalamus will synchronously trigger V3 with a set of association symbols. These symbols form the context of the activity. The brain organizes and loads reactions based on a given task or general activity. So, the hand has one set of reactions for holding a baby and completely different set for swinging a hammer. The V3 symbols are functionally indexes for cross referencing short-term and long-term memory. These associations allow the subconscious to categorize unpredictable motion with a general symbolic understanding of the sensory event.

V2 and V3 of the occipital lobe is also the focus level where executive directives from the frontal lobe (consciousness) direct organization. So, if cognitive focus is on a hand, the group symbol for hand may be used. Assuming 10,000 senses for the rest of the hand, 35,000 senses (350 data globs) are now represented by a single symbol. More practically, if you are focused on the road while driving, all the motion outside of that focus will be filtered out of thought production. Cognitive focus allows the brain to reorganize all sensory data on-the-fly and enables a filtration system that can be used to balance energy usage in the lower brain.

As the brains cycles, entropy is continually fed into the primary visual cortex (V1) from the LGN. The primary visual cortex (V1) only processes unpredictable glob motion. All reactions for predictable glob motion bypass the occipital lobe and will be executed automatically by other components of the brain's subconscious process. When an unpredictable glob is encountered, the subconscious lacks the intelligence to understand it, let alone figure it out. The subconscious cannot rationalize, create, or consciously think in any way. It is completely deterministic where every action must be known ahead of time. The lower occipital lobe (V1 thru V4) provides the brain with the means to sort out what it doesn't know

The primary purpose of the lower occipital lobe is to translate globs that are exhibiting unpredictable motion and prepare them for searching memory. Memory is the only place in the brain where general intelligence and symbolic intelligence can coexist; otherwise, the biological languages are incomprehensible. To begin construction of the needed memory, V4 of the occipital lobe accumulates the unpredictable motion globs from V1, the symbols assigned in V2, and the associations from V3 to form a single memory object that can be sent up the ventral stream where it can be processed by the temporal lobe to search memory. This single flat memory construct has distilled in it all the raw data, symbols, associations, and general spatial motion for unpredictable objects in 3-dimensional space.

The Subconscious Process

Some estimates suggest that the brain processes 11 million bits of sensory data per second, yet the conscious mind is only capable of processing 50 bits per second. Others like Dr. Joseph Dispenza, DC suggest,

> *"The brain processes 400 Billion bits of information a second. BUT, we are ONLY aware of 2,000 of those".*

While consciousness guides many reactions, it clearly does not have the capacity to either perform the reactions or process the results. This is beyond its ability and its role in the biological process. The conscious state is ill-suited to process the massive amount of data the brain receives every second, let alone perform the millions of physical reactions required to perform simple activities such as walking a dog or riding a bike. Since consciousness is not functionally capable, the subconscious process is used to perform and monitor reactions. These reactions are executed automatically without access to the conscious state. The subconscious reaction is the hallmark of life and has evolved to perform all the reactions required by the biological process. There is no such thing as a conscious reaction, all reactions are performed subconsciously.

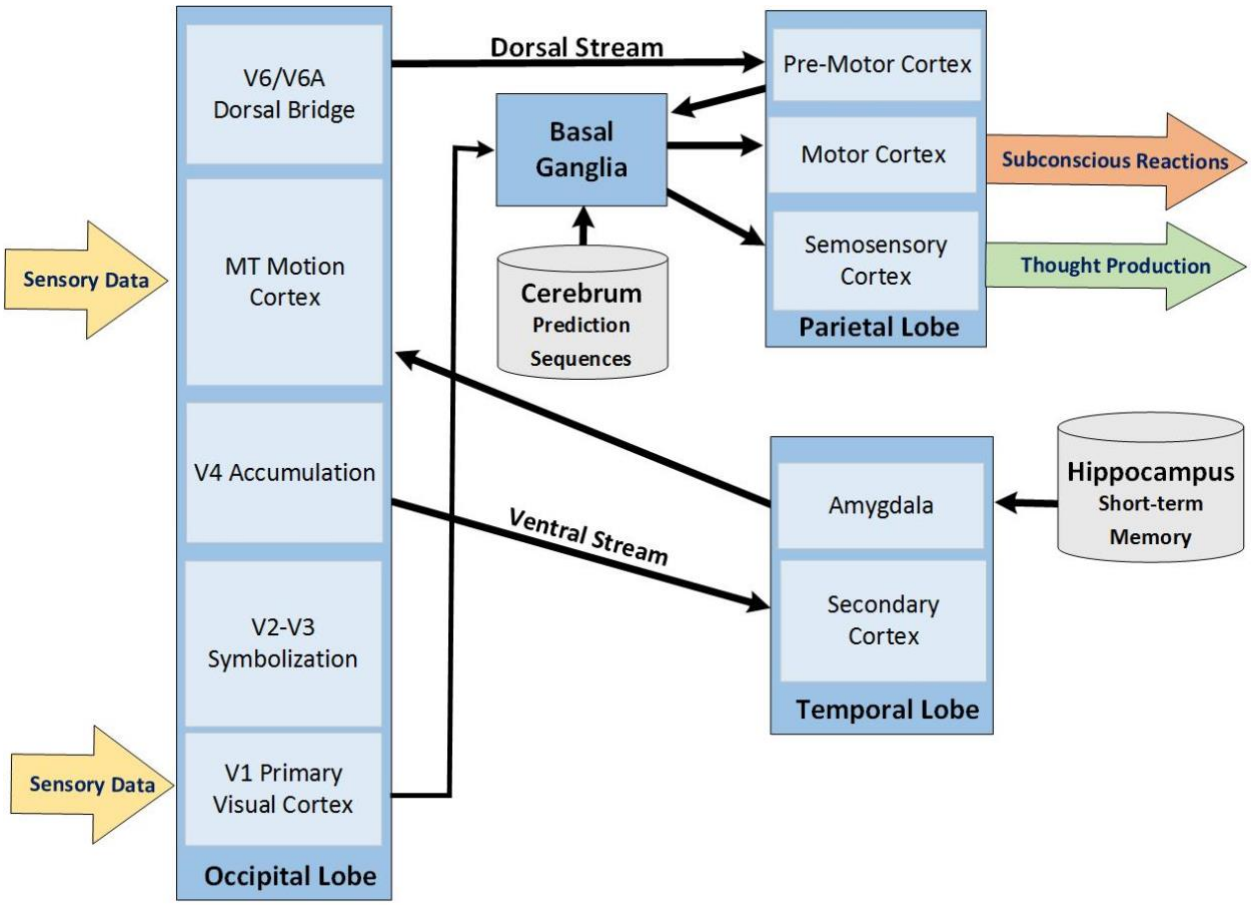

Figure 4 – The Subconscious Process

The primary function of the subconscious process of the brain is to turn sensory data into Sensory Perception, Thought Production, and subconscious reactions. As previously explained, the lower occipital lobe combines general intelligence with symbolic intelligence to create memory associated with the entropy. This is the first stage of Thought Production and once complete, the memory will be sent across the ventral stream to the temporal lobe as depicted in Figure 4.

In the temporal lobe, the amygdala uses the ventral stream data to format a search request using a combination of the globs (V1), symbols (V2), and associations (V3) to identify the unpredictable motion pattern in previous memory experiences. In the brain, the amygdala functions as a search engine providing access to both short and long-term memory. For the subconscious search, the amygdala is restricted to accessing only memory in the hippocampus which holds short-term active memory. Since the amygdala is being accessed inside of the synchronous state, it cannot access asynchronous long-term memory. To do so would collapse the timing of the neural synchronous cycle causing the brain to stall out of real-time.

The amygdala will return all search results with the corresponding actions to the motion cortex (MT). The motion cortex (MT) is responsible for correlating all the actions necessary for creating new subconscious reactions. The selection process will begin by processing all the short-term memory search results coming from the amygdala. Unfortunately, searching memory has no guarantee of results. To resolve failed search attempts, the motion cortex will process the primitive visual stream (rods-only) from the superior colliculus combined with the emotional state of the biological process to make the appropriate choices. Basically, if memory does not provide resolution to the unpredictable motion, the subconscious process may step in and produce a reaction to preserve the biological process (life). These reactions are primal and instinctual and often do not reflect conscious selections. The motion cortex (MT) finalizes and transfers the selection of new actions to the occipital lobe V6 and V6A for distribution through the dorsal stream for final delivery in the premotor cortex of the parietal lobe.

The basal ganglia is the central control point for managing both new actions for unpredictable motion arriving in the premotor cortex and existing actions for predicted motion drawn from previous experience stored in the cerebellum. The basal ganglia sorts through all the new actions requested and sends them to the motor cortex for execution. All decisions regarding these actions are known and therefore can be performed subconsciously.

The basal ganglia also receives a copy of the entropy from the primary visual cortex (V1). Any entropy not resolved by new actions will enable the basal ganglia to modulate all affected predicted motion actions. Basically, modulation starts, stops, increases, or decreases action potential for each predicted action processed by the motor cortex. The motor cortex produces the final subconscious reactions out of these actions but is not responsible for measuring or understanding the results. This is what makes a subconscious reaction unique. A subconscious reaction success or failure will be judged on the sensory data that the action produces and will be measured by the thalamus in subsequent neural cycles. By doing it this way, the brain can produce a subconscious reaction that requires no access to symbolic intelligence which means no access to consciousness is mandated.

All remaining unpredictable motion not resolved either through new actions or modulation will be processed by the basal ganglia through the somatosensory cortex of the parietal lobe. The somatosensory cortex is responsible for recording the memory of the experience to complete the Thought Production process. An experience is encoded into the brain based on the ratio

between sensory measurement and cognitive measurement. In the human brain, the eyes cycle (sensory measurement) around 33 milliseconds and the frontal lobe (cognitive measurement) cycles around 300 milliseconds. This equates to a 9-to-1 ratio between sensory and cognitive measurement. As a result, the somatosensory cortex will accumulate 9 sensory moments in time to store a single cognitive experience. Each sensory moment in time will contain general intelligence, symbolic intelligence, motor actions, and emotions. When bond together they create a single uniquely patterned experience that is the final product of Thought Production and will be transferred to consciousness.

Each unique experience produced by the somatosensory cortex becomes automatically linked to the previous experience which forms a memory chain (episodic memory). As more experiences are accumulated, the subconscious process eventually has access to memory chains that contain all the predicted sensory states and motor responses to those states. Using this memory structure, the subconscious process automatically feeds the action predictions to the motor cortex and sensory predictions to the thalamus. This self-perpetuating process enables the brain to operate faster than real-time where at a minimum it is predicting 9 sensory and action states into the future due to the time differential.

The Conscious Process

Neural synchronization and the General Intelligence framework of the brain provides the basis for creating a completely automated system for performing real-time reactions to a sensory based environment. While wonderfully efficient, the process is solely dependent on that which is known and predictable (deterministic). Unfortunately, life exists in a non-deterministic environment and past genetic instructions, the brain starts empty. To resolve this problem, the brain needs an additional component capable of performing reasoning outside of the synchronous process. In the brain, this additional process is performed by the frontal lobe where consciousness is maintained. The frontal lobe has its own cycle, its own state, and runs asynchronous to the brain's neural synchronous process.

A natural byproduct of the neural synchronous process is a basic understanding of time and space. The brain manifests this understanding as a state of reality by binding Sensory Perception and Thought Production into the prefrontal cortex as part of the hypothalamic/thalamic cycle. When the asynchronous state of the frontal lobe interfaces with the synchronous state of the prefrontal cortex, it creates sensory awareness of the environment. With the awareness, consciousness can fulfil its primary function which is to create reactions to adapt to that environment. So, whether you're a monkey finding a banana or a rocket scientist building the next space shuttle, to the brain's biological process it is all the same, a process of general intelligence. Only consciousness which uses symbolic intelligence can understand the distinction between the activities and create new reactions.

The conscious process of the frontal lobe (conscious process) interacts with the brain's subconscious process to create awareness as depicted in Figure 5. The subconscious process

starts when sensory data is feed into the thalamus. Each thalamus will measure the sensory data and extract its entropy. The entropy transmitted to the prefrontal cortex is for Sensory Perception and the entropy transmitted to the occipital lobe is for Thought Production. To produce thoughts requires that the sensory motion be translated to symbolic motion in the occipital lobe and run through the parietal lobe for motor actions and final correlation before being delivered through the hypothalamus to the prefrontal cortex. The two Sensory Perception data streams mixed with the Thought Production data stream produce awareness of the environment and oneself.

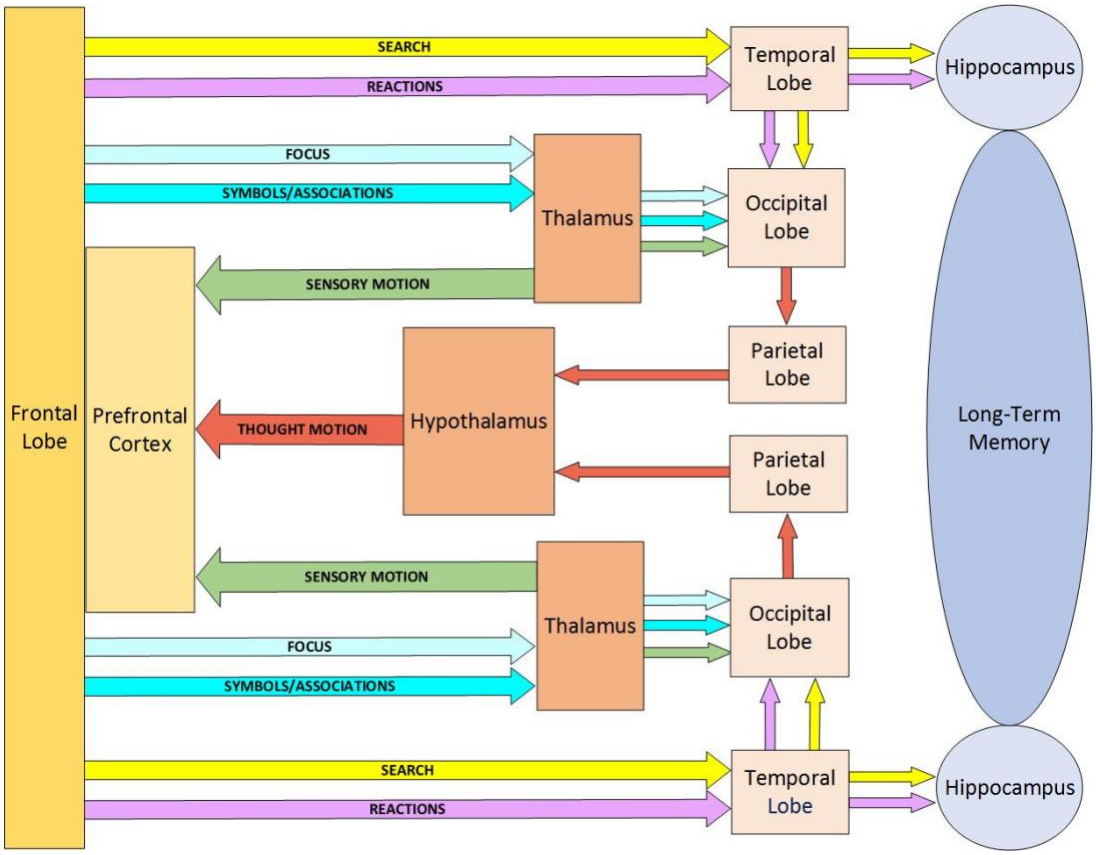

Figure 5 – The Conscious Process

Using the awareness, the conscious process of the frontal lobe can create symbols, make associations, focus awareness, access long-term memory, rationalize top-down, and generate reactions. The frontal lobe is able to perform these functions based on the experience accumulated during the lifetime of the biological process. Previous experiences allow the biological life-form to acclimate its decision-making style based on the environment in which it lives by teaching the subconscious process of the brain how to adapt.

The conscious process of the human brain has very limited capacity. While it has the ability to make action selections, it cannot execute those actions or monitor their results. At best, it can examine small slices at a time using its cognitive focus capability. Focusing allows the conscious

state to magnify specific areas of the subconscious state in order to formulate more precise reactions. In the brain's biological process, there is no such thing as a conscious reaction. The hippocampus (short-term memory) is the interchange point to feed conscious selections into the subconscious process. This is the reason why memory is dormant in the prefrontal cortex and active in the hippocampus. Memory is the only place where both general intelligence and symbolic intelligence can coexist together.

This technique allows data interchange and ensures that the conscious state never interferes with the function of the subconscious process. All conscious selected reactions are retrieved and executed automatically as part of the subconscious process. During the next thalamic cycle, the occipital lobe will find this memory and queue the reactions for transport through the dorsal stream for execution by the parietal lobe. The subconscious state must manage all of it, regardless of what the conscious state is doing. The subconscious manages and runs the physical process and when needed will harvest intelligence from consciousness to fulfil that goal.

Emotions in Natural Intelligence

Unfortunately, the separation of language in the brain's process creates a serious problem. The subconscious state has no concept of symbols, so it has no references from which to understand how consciousness uses symbolic intelligence to form decisions. In a like manner, consciousness can only see symbols and has no understanding of how the globs are processed at the physical level. The result is that the conscious and subconscious processes of the brain have no common language through which to communicate. To solve the language problem, the biological process uses a separate more basic form for communication. It uses rewards such as dopamine release and punishments such as pain to encourage or discourage conscious behavior. The brain also uses emotions to alter the context of both the conscious and subconscious state to influence decision-making. This form of communication can indirectly bridge between general (subconscious) and symbolic (conscious) intelligence.

The brain's goal is simple, process sensory awareness to create reactions that preserve the biological process. The conscious state is given a sensory picture, a symbolic breakdown, and awareness of the passage of time. The subconscious expects to be feed reactions that generate successful predictions to fuel its automation process. The predictions are used by the subconscious process to monitor the health of the biological process. If these predictions are not forthcoming, the biological process will react.

The brain monitors and measures the success of consciousness via the amygdala in the temporal lobe as depicted in Figure 6. The amygdala is responsible for searching short and long-term memory. There is a direct correlation between search success rates and the success of conscious intelligence in satisfying its purpose in the biological process. The amygdala maintains a count of the number of search requests sent and the number of requests satisfied.

The ratio between these two counts allows the amygdala to keep taps on the prediction success of the biological process.

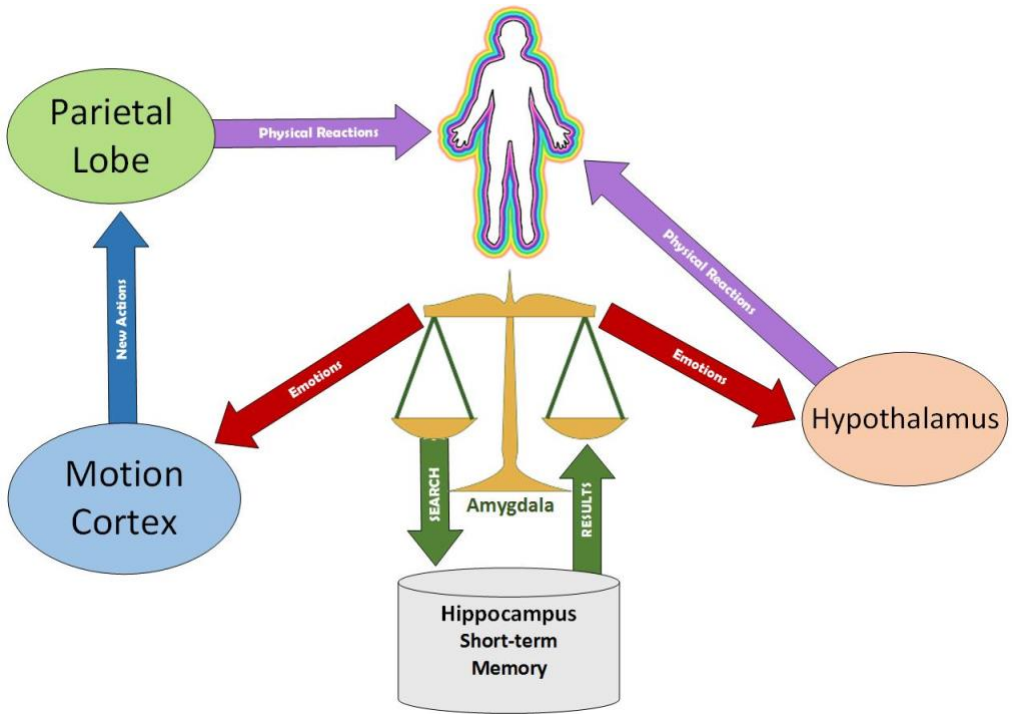

Figure 6 – An Emotional Bridge between Systems

A high subconscious search success rate in the amygdala is an indication that motion patterns are being matched to reactions and predictions are available to the biological process. A low search success rate is an indication that the biological life-form is in danger and is expending too much energy in the lower brain. Without predictions, energy usage rises as the unpredictable data globs require more resources in the geniculate, occipital lobe, ventral stream, and hippocampus. The additional processing requirements will create a shift in the energy signature of the brain. As more energy is required to resolve the entropy, less energy is available to the higher levels. The energy signature begins to resemble more of an animal than a human where lower prediction levels create excess activity in the lower brain. Failure to predict is a threat to survival and the amygdala will create an emotion to preserve the biological process. That emotion is FEAR and it will be placed in the feedback for both the motion cortex (MT) and the hypothalamus.

The hypothalamus produces physical reactions based on the emotional state provided in the feedback coming from the amygdala. The feedback has been placed in the thought binding process which is the point where asynchronous thought production must be sequenced before synchronization into the prefrontal cortex. Certain thoughts carry with them emotional reactions which constitute physical reactions that must be performed by the hypothalamus.

The hypothalamus has direct access to the pituitary gland and brain stem among other things and will execute the physical reactions that are associated with the emotion(s).

For FEAR, the hypothalamus may raise the body temperature which could manifest as sweating. It could lower the temperature which could cause the body to start shaking. At this level, emotions are simply commands to alter the physical state. The emotions themselves cannot be bound to the prefrontal cortex because there is no cognitive translation. Instead, the subconscious alters the physical state in an attempt to communicate. When failure to predict occurs, other emotions may also be mixed with FEAR. The search results in the amygdala may be low, but the symbols and associations indexed in the occipital lobe can match other related memory that generates additional emotions in the amygdala. These emotions are also scaled by the amygdala and repeated access to this memory is used to set the intensity of the emotion.

Over in the occipital lobe, the motion cortex (MT) also receives emotions in the feedback from the amygdala. Repeated failed search attempts have produced a state of FEAR and possibly other emotions. Conscious (symbolic) intelligence has failed to produce a reaction for one or more unpredictable motion objects. The motion cortex (MT) must now step in and use the emotions as a template for selecting a subconscious reaction to preserve the biological process. These are the primal reactions associated with basic animal behavior. An animal may begin to run in the opposite direction of the object, while another similar animal with an additional maternal instinct may step towards the object. Without higher reasoning, the biological process is forced to make the best animal reaction available based on the emotional state to restore prediction levels and survive.

In the case of too much entropy overloading the brain's process, cognitive focus can be set by the conscious process. The frontal lobe can set associations in occipital lobe V3 and focus symbols in occipital lobe V2. By setting associations, humans can generate other emotions that will alter subconscious decision-making for unpredictable objects. By focusing symbols, the occipital lobe can act as a filter to restrict the amount of entropy causing the prediction level to rise in the amygdala with a corresponding reduction in FEAR intensity. Focusing also helps restore the energy signature of the brain by reducing excess use of the occipital lobe and hippocampus.

Conclusion

Understanding the brain's process and the true nature of intelligence remained elusive because it is a system that operates beyond our conscious horizon. The boundaries of that horizon prevent us from seeing the mechanics of our own physical existence by design. We are consciously bias to only understand reality through the lens of cognitive experience. By shaking off the bias, the primitives of the process become seen and knowable. Two central processes, one conscious and one subconscious, each with their own assigned duties, perspectives, and forms of intelligence working together through emotions to survive. A self-perpetuating system

designed to operate faster than real-time to measure sensory data, automate physical operations, and adapt to an unknown ever-changing environment.

Natural Intelligence is the difference between the mere accumulation of knowledge and the actual intelligence process to use that knowledge. The ability to go beyond and be greater than the sum of its parts. It is a system without boundaries whose decision-making is shaped by previous experience. That experience is composed of a unique formula for producing memory patterns using time-dilation to dictate structure. The emotion laced memory fuels a subconscious engine with prediction knowledge that automates all physical reactions. The process of Natural Intelligence is the most evolved, energy efficient method for producing and consuming intelligence in nature and is the foundation for all life in the universe.