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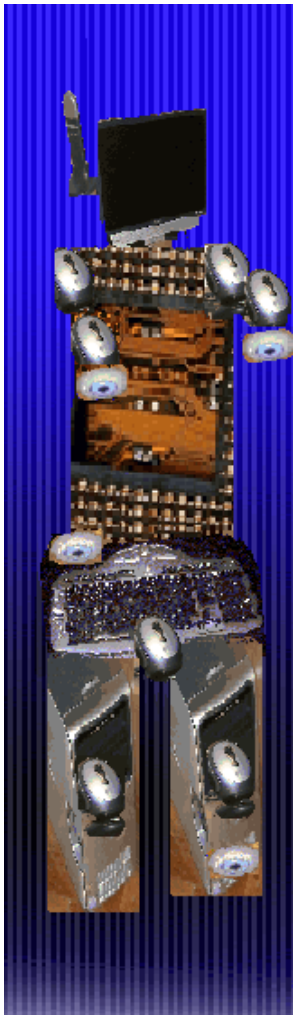
## *GLOBAL COGNITIVE THEORY*

# THE BRAIN AND MODERN COMPUTERS



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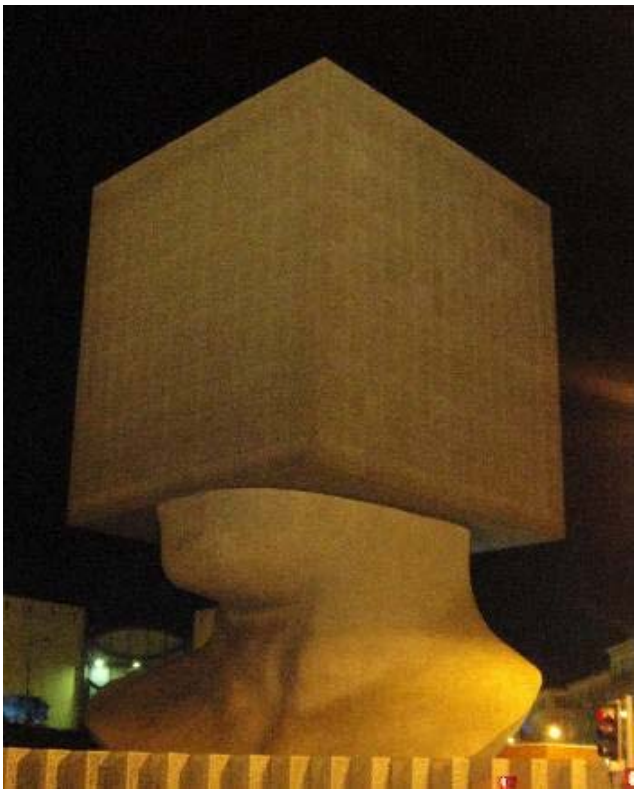
# I. THE BRAIN

## I.1. Cognitive processes of the brain

The *Global Cognitive Theory* focuses on the consequences of the *General Theory of Conditional Evolution of Life* of 1992 on the philosophy of the meta cognition. It analyses the information systems, the cognitive aspects of the brain, and the psychology of knowledge in relation with **neuroscience** and **evolution of brain** in modern culture.

Regardless other possible points of view, according to the *Global Cognitive Theory*, there is no difference between the terms **brain** and **mind** which doesn't mean denying the intrinsic liberty of Life.

### Square brain - Nice



Included in the **related links** are the four free on-line books in which the exposition of the *Global Cognitive Theory* is divided: *the brain and computers, intelligence and creativity, memory, and finally will: the processes of making decisions, and artificial intelligence*.

Also listed in the related links to the *Global Cognitive Theory* is the online book on

the *General Theory of the Conditional Evolution of Life*. Both theories address the central theme of intelligence, its mechanisms, origin, and evolution from various perspectives.

There is also a link to the on-line book of the *Global Scientific Method* and the philosophy of science. It includes the design of **new scientific methods** and the classification of the stages and steps of the scientific method; understanding the scientific method in the broad sense as the application of logic to the generation of common knowledge with a high level of reliability.

The **scientific method** works fine in general, but it works much better in its developmental phase than in its phase of general acceptance. All types of social interests affect the last phase, from the realm of sociology as in the case of *Darwin's theory*, to the technician nature as in the case of the *Theory of Relativity*.

The last item of the *related links* is *The EDI Study* about **Evolution and Design of Intelligence,** a complete **statistical survey on the heritability of intelligence** performed on the fieldwork database of the *Young Adulthood Study, 1939-1967*

This statistical study is an **empirical research** about some considerations of the *Global Cognitive Theory* related with the brain and evolution, in particular the *definition of intelligence*.

The results of the statistical survey *The EDI Study* regarding an **elegant intelligence** show some important considerations:

- The hereditary nature of **relational intelligence** is confirmed.
- The genetic information with less intellectual potential is the significant one, as the GTCEL states regarding the concept of conditional intelligence.
- Likewise, it seems that the main functions of intelligence, or those evolving faster, are fairly concentrated in only one chromosome.
- The most innovative element of this work on cognitive psychology is undoubtedly the section relating to simulation. This section contains the explanation of how the **artificial intelligence quotient vectors** are generated by using the previsions of the new theory of evolution; they practically behave like the variables that were actually observed, in despite of the intrinsic complexity involved.
- As if that were not enough, with the due caution this subject deserves, the existence of a **finalistic or teleological evolution** is scientifically proven to agree with that indicated by the *General Theory of Conditional Evolution of Life*.

Given that the current results in this book suggest a **fairly radical change** from the common opinions held by the majority of the scientific community and society, the logical deduction is that more extensive studies on cognitive psychology using the same methodology need to be performed.

An example of further exploration of this study is found in the section that has been added subsequently, which is related to **partner choice and intelligence**. In this section a hypothesis regarding a concrete requisite of the *acceptable limit of the difference in intelligence when forming a couple*, is confirmed and simultaneously reinforces the model's overall coherence. In fact, the requirement refers to the unconscious choice of an unknown intelligence for current cognitive psychology.

## I.2. Cognitive theory

The digital books online of the *Global Cognitive Theory* are:

- *The brain and modern computers*

  In the first title, I will try to set out some ideas about the logic of the human brain's activity and the ideal physiological structure for its optimisation, all the while advising about the presence of a large intuitive component in our reasoning.

  The common characteristics of intelligence and memory are examined in title II. The basic conceptual identity of both functions is stressed because one cannot exist without the other.

  Other common aspects discussed are the necessity both have for physiological support, at least, to reach a high potential, the complementariness of both functions and the constant optimisation that the system of **human intellect** is subject to due to the complexity and flexibility of **cognitive theory.**

  In title III a series of practical implications or considerations on cognitive theory are mentioned about certain topics of **evolutionary psychology** regarding **people, education,** and the **evolution of life**.

  An index of employed drawings and charts is included in the Annex.

- *Intelligence, intuition and creativity*

  The following heading of the *Global Cognitive Theory* is dedicated to the various **concepts of intelligence** and elegant intelligence as a knowledge manager:

  - I have tried to define the different forms of its internal workings from the preconcetps and automatic responses to the responses generated by **logic** and the system of **language**. The organization criterion chosen is the degree of reliability associated with the response of intelligence when its system faces a problem or requirement.
  - An approach to **creativity**, in the sense of creativity being formed by complex functions or packets of basic functions of intelligence that support certain complex abilities of the brain.
  - The next step is to speculate on **the physiological structure** that is most apt to execute the required functions, its **genetic nature** and, as a

consequence, the way in which intelligence is transmitted to following generations.
- The coherence of the proposals need an additional element, evolutionary psychology or the way in which intelligence grows and develops. It seems slightly complicated that it develops and improves its efficiency through random mutations.

After the previous comments, we should have a better understanding of the different concepts of the word intelligence, particularly about terms used for **relational intelligence** and **conditional intelligence**.

## Global Cognitive Theory

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- *Memory, language and other brain abilities*

The third on-line book of the *Global Cognitive Theory* is dedicated to the different types of memory, functional analysis and its genetic base; giving rise to explanations about the power of language and other intellectual capacities and to ideas as how to improve memory and its limits.

The **memory** is the brain's second major function and, undoubtedly, must be correlated to the *development of the brain*. The cognitive theory of this intellectual capacity until now has not been as developed as that of intelligence; perhaps due to its complexity and the **types of existing memories**.

Language can be an example of this complexity and variability, since it consists of the interaction of different types of intelligence and memory, which are maintained in different physiological and working processes of the brain.

The analysis of **memory** is introduced in the following main points:

- Discussions on how to improve memory
- Functional analysis of the *human memory* during conscious cognitive processes
- Special memories such as linguistics
- Types of memory through their temporal perspective (**short**, **medium**, and **long term**) and by their temporal persistence and reliability.
- Management of information from the perspective of intelligence as a manager of knowledge or, strictly speaking, memory. Unconscious mechanisms of compression, degradation and reconstruction of information, and conscious optimisation mechanisms.
- The interaction between the cognitive capability of storing information and that of managing the storage will produce effects of **complementariness** between both **intellectual capabilities** relating to the entire memory.

Consequently, the empirical investigation by the **cognitive theory** and the **neuroscience** of the global efficiency in the management of information, and the possible genetic nature of memory and language will be fairly more complicated than that of intelligence; even if we had precise evaluation methods of the power of memory or **language** at our disposal.

- *Will, decision-making process and artificial intelligence*

This process does not appear in the functional flow-chart of the brain because it has been studied with a different focus.

The brain intervenes in decision-making processes but our body's cells surely get involved as well; it is like a real political system.

This vision of the system together with its sensitivity offers reasonable explanations as to the changes observed in personal decisions without an apparent cause, and to a certain extent, to problems that arise, such as schizophrenia.

From this point, I thought it would be interesting to take a much more

philosophical approach than taken with previous cognitive aspects.

This perspective has allowed me to perform **entertaining and curious analyses** about existence in the sense of existing as a unique individual, like a system of vital impulse from more elemental individuals, or like both, successively throughout time.

Using the discussion about the active subject of will in decision-making processes, a definition of **artificial intelligence** is proposed; it takes a little from all the ideas considered about *'natural'* cerebral functions.

## I.3. The human brain

Despite the numerous studies on how the human brain works, we should acknowledge that many of the questions asked regarding this subject continue to be an enigma. Its complexity need not be debated.

The link between the human brain and modern computers is an enthralling subject given the similarities that can be seen between the two mechanisms in regards to problem solving. They are mainly similar in the storage and management of a tremendous amount of information.

Special attention is dedicated to the similarities between the way brains and computers work because of the advantage of being able to largely analyse or explain a great part of the human brain's essential questions with a model that is much more simple and widely recognized by everyone.

The technological advances made by human beings has allowed for machines to be designed that are capable of emulating certain cerebral operations, managing to surpass the human brain in certain instances, for example in calculation and mathematical memory.

Due to both the previously mentioned intuitive nature and the breadth of the subject, I am not trying to perform a systematic analysis of the human brain, but rather comment on some ideas and reflections in a very simplified fashion that may draw the most attention for assuming, to some extent, new contributions or those taken from today's culture regarding this subject, especially from the GTCEL - General Theory of the Conditional Evolution of Life.

On the other hand, the rapid evolution of these cerebral operations that we believe to exist, has been one of the greatest reasons for the reflections that have lead us to the development and formulation of the cited theory.

In fact, the contents of this book were initially included in the appendix of the GTCEL book. The statistical study performed on the heritability of intelligence that appears in the annex led to the definitive separation of the books in order to focus both on very different yet, at the same time, totally linked subjects.

Time will tell if the new ideas are heading in a good direction or not and if the changes or clarifications that have been made were necessary. I hope that it will not take long to shed light on the surprising results of the stated statistical study given that it seems to confirm the hereditary nature of **global and relational intelligence**, the significance of the gene with less intellectual potential in the

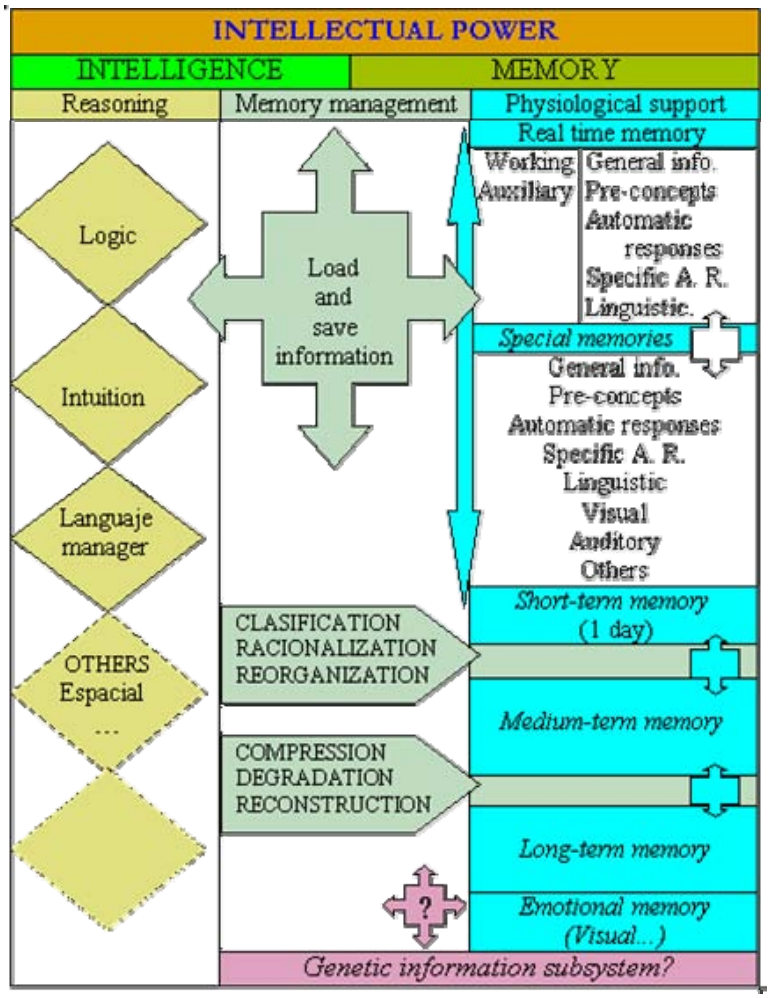
study of the typical IQ (a specific case of **conditional intelligence)**, important functions of sexual differentiation, and the existence of a finalistic evolution.

# I.4. Human brain diagram

Advanced animals can be considered symbiotic macro-societies of more elemental units with their own lives -cells. The fact that advanced animals are highly organized is essential; this gives this group an enormous intellectual potential and their own will, independent of these elemental units.

The figure shows a functional diagram of the human brain that graphically represents the main concepts and their connections, discussed in the following sections.

## Cognitive functions
## Human brain diagram




Modularity and connectionism in the human brain are two philosophical approaches that could well be complementary as shown by the human brain diagram below.

Likewise, the current theories on mental structures (*constructivism* - **Jean Piaget** and *innatism* - **Noam Chomsky**) appear to be two ways of looking at the complex reality; as far as I am concerned, they need not be so conflicting. Furthermore, I would not like to start discussing some of the simplifications and the rather unfounded affirmations of *innatism*.

The brain is the organ responsible for carrying out superior cognitive functions. Nevertheless, these are surely not the only functions the brain carries out, for example, the human brain's decision-making system can feasibly contain democratic elements with a connection to individual cells that in certain cases may serve the purpose of a mere coordinator.

# II. MEMORY AND INTELLIGENCE COMMON CHARACTERISTICS

## II.1. Concept of these brain functions

If we understand intelligence in broad terms, like the ability to link concepts or ideas, consider that a conclusion on the base of certain premises is no more than a link; we realize that we need concepts or ideas for operativity or existence of intelligence, and the latter have to be provided by memory.

Similarly speaking, memory without a manager would no longer be memory in the strict sense of the word; it could not have the possibility of being information. In other words, the concept of memory implicitly includes a memory manager and vice versa. If computers' hard disks could not be read, they would be no more than a piece of useless junk.

**Black Strokes - Kandinsky**

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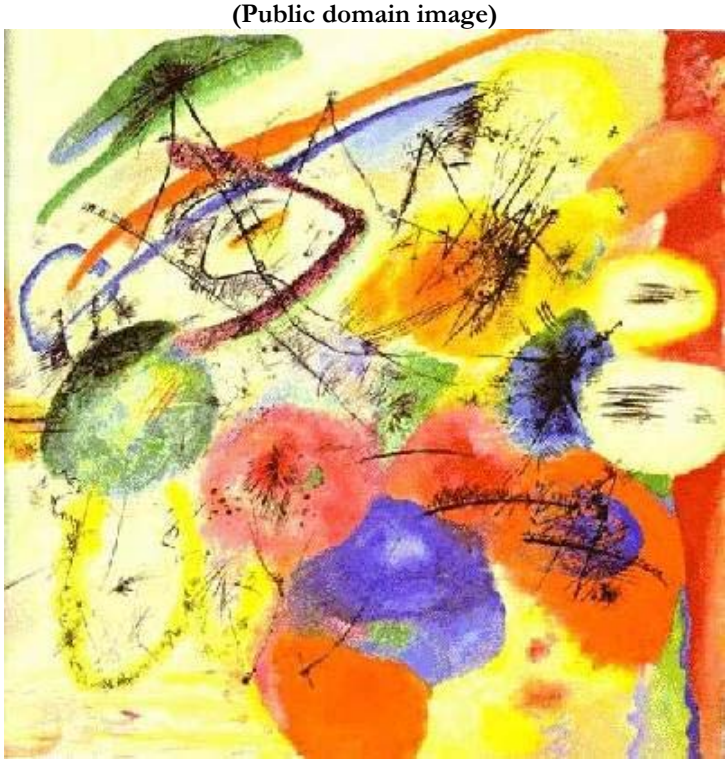

Nonetheless, concepts can be differentiated somewhat artificially, emphasizing the ability to link or store information for intelligence and memory respectively. We say artificially because intelligence and memory can never be totally separated; we should try to keep this present so as not to lose perspective when dealing with

certain lines of arguments.

## II.2. How de brain works

Despite its relation, we are going to leave aside the problems that could arise from the study of the stances or theories on the existence of the **soul-body** (*monism and dualism*) and, although to a lesser extent, the **mind-brain concepts** (*logical behaviourism* - **Wittgenstein**, *identity and functionalism*) because they are more in the scope of theology and philosophy than in that of science.

Both intelligence and memory need physiological support; however, this is not to say that the support is the same for both. Without a doubt, cellular specialization exists and not just as far as intelligence or memory are concerned, but rather, insofar as both of their types or facets.

For example, there are cells specialized in searching for information in accordance with certain criteria, to analyse the relations according to the information that others have provided, etc. Specialization is even more evident in regards to memory; visual memory can be found in a different part of the brain than auditory or linguistic memory.

As we are all aware of, physiological endowment of particular ability or another can vary among individuals and their different functions and facets. But, at the same time, it would not make much sense if certain functions or mechanisms common to any type of memory or intelligence, appeared in one and not all the other types. In other words, genetic information of certain common functions of intelligence and memory are the same.

Computers also have similar elements with their corresponding specialities. There is a central chip, a possible mathematical processor, a graphic card, etc. Regarding memory, there is RAM memory, extended, expanded, a hard drive, etc.

Regarding the subject of common functions, the example of computers clearly demonstrates what we are trying to say. The central processor can actually be used for many different purposes; two are, for example, as a mathematical calculator or to display graphics on the screen. This does not mean to say that more specific elements that improve general operation cannot exist, like a mathematical processor.

You should keep in mind that although a neuron is assigned to a particular function or is specialized, it can normally perform other types of functions. Specifically, it is worth mentioning that the simple act of closing our eyes allows us to immediately increase our auditory capacity and even our process of logic.

## II.3. Complementariness of brain functions

A very important aspect related to these abilities is their complementariness. In the presentation of the goal of evolution coherence in the GTCEL, an example of normal complementariness of two variables is cited.

Nonetheless, we now find a special effect of complementariness beyond the normal effect. The greater our capacity of relating, the greater the efficiency of information provided by memory will be; but, at the same time, the information contributed will be greater from having a better memory manager. That is, intelligence operates twice, first as a memory manager, and second as an information analyser.

Consequently, it may not be so exaggerated to think that the extent of the intellectual power, broadly speaking, is equal to the product of the capacities of intelligence and memory considered separately. That is, standardizing individual scales from 0 to 10, the total potential will be found in a scale of 0 to 100 and, like in all the complementary elements, the equilibrium will be more powerful; average values of both will give us a potential of 25, while relatively extreme values such as 2 and 8 will give us 16.

A computer's power is often measured both by the power of its central processor and the velocity of access to information and communication between its different parts; which affects the information manager's power in its phase of localization or recording.

## II.4. Optimisation in the human brain structure

Logically, yet against widespread belief, the design of the way the brain operates should tend to its optimisation along with the human evolution to take advantage of the available resources in the brain structure. Moreover, I would say optimisation is an **epistemological principle of any system of vital impulse**.

I am not trying to justify the evolutionist or the creationist theory (*evolutionism* versus *essentialism*), or more particular philosophical tendencies like *animal psychology* (instinct as a pseudo-concept), *behaviourism*, and *etiology* or, from another point of view, *ethnocentrism*, *cultural relativism*, or *universalism*.

**Human brain structure**

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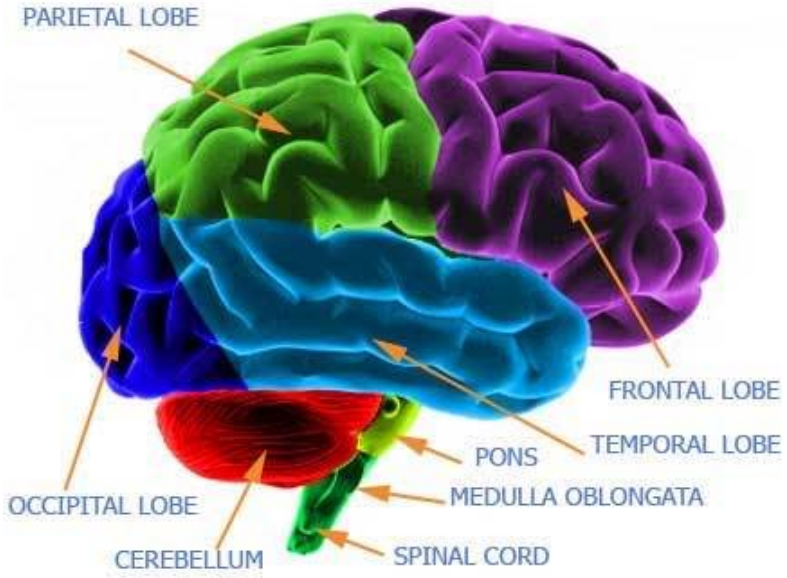


On the contrary, I would say that this analysis tries to explain the possible connection or conceptual identity between the present reality of the complexity of the human brain's cognitive functions and the original essence of these vital functions, qualities or capacities by the study of their objective evolution and its logical requirements.

In fact, if I had to philosophically describe my ideas in this subject, I would say that, literally speaking, they could be classified in *vitalism*. That is to say, that the essence of the life implies freedom, intelligence, and memory and that, a logical (non-random) and internal evolution has certainly existed throughout time, and since the beginning of which we call time.

Particularly, we can detect in human evolution the following characteristics related to **brain structure** optimisation in both intelligence and memory:

## II.4.a) Multiple functions and multiple facets

Although these characteristics can be used as synonyms, in our case, we are going to assign them two different concepts or nuances. The multifunctional nature refers to intelligence processes' diverse functions of analyses and information relation. For example, the operations may be aiming to arrive at a conclusion about an individual's specific or the result of a mathematical operation -for intelligence this is normally the most well-known case. But it can also operate analysing and classifying information to store in the different memory levels.

We will also consider the different way intelligence operates a part of its multifunctional nature within human brain structure, offering somewhat certain responses according to the operative mode it is in. A more detailed explanation related to intelligence will be shown in the next title.

Memory also has a multifunctional nature within human brain structure, although there are differencies with intelligence brain structure. We can cite the different types of memory as regards to the temporal horizon with which it works: instantaneous, short, medium, and long term. Likewise, this nature of memory will be seen in more detail in its special section.

We understand its multifaceted nature as the different subject to which both memory and intelligence can be applied. For example, regarding intelligence we can cite, among others, spatial, colour, and auditory relations, logical abstraction, multiple characterization, etc.

And as far as memory is concerned, we can mention information related to: images, abstract concepts, linguistics, colours, etc.

These characteristics are easier to explain using computers as an example. As previously mentioned, the central processor is used as much for the treatment of information as for its localization, and, at the same time, to execute programs of diverse natures. In reference to computers, there are various types of information support and multiple subjects are stored.

For intelligence, this multifunctional and multifaceted nature allows us to delve slightly deeper into its content or definition. We have shown that we understand intelligence as a **capacity to relate**. Therefore, the group of abstract and elemental relational functions that allow all fairly complex relation operations to be carried out are what form intelligence.

## II.4.b) Human brain structure and efficiency

The efficiency of the brain structure is easily observed as much in intelligence as in memory. The first supports itself on the second so as not to unnecessarily repeat a multitude of operations; it even reaches the formation of what we could call **subprograms of automatic action**, like the pre-defined responses to different situations when driving.

We could assume that almost half of memory is devoted to storing information about support relations directly to intelligence, independently of whether information from the perceptions is found stored in accordance to a multiple system of references or not.

Likewise, the memory, or better said, the memory manager, will try to save only the information it considers relevant, that which does not already exist or save similar information together, only adding a new nuance to already present information. Further along, we will return this subject when discussing types of memory.

## II.4.c) Utilization of idle resources

It is possible that conscious thought is not unique, that is, that not all of it follows the same line of argument, there may be two or more lines simultaneously. Moreover, I would say that *human brain structure* is designed to allow are almost always at least two. It would be like the existence of a somewhat conscious thought that is, however, in the background.

This should not be confused with situations when we are thinking about two things at the same time; in this case, the two things are in the foreground of thought.

On the one hand, this would be taking advantage of the system's idle resources, and on the other, we would always have an idea in mind when we decide to stop thinking about something or if we obtained our goal by reasoning.

A blank mind can be attributed to two simultaneous thoughts ending at the same time, although normally I think this happens because we try to go back in a sequence of thought; this is not always easy or feasible.

In respect to the fact that computers already do something similar and that they are becoming more and more complicated needs no further explanation.

## II.4.d) Maintenance of cognitive capacity

Given the complexity of the intellectual system of human brain structure and the necessity to maintain an optimum operational capacity in relation to the temporal horizons of information, the system needs to reorganize itself daily. This cleaning function is mainly performed while we are asleep.

**Los Angeles - Skyline**

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The fundamental reason why we need to be asleep may be that it is a time when the *memory of work* and the relational capacity are freed from a multitude of tasks and that, for the exploitation of daily experience and its analysis faced with its possible memorization, the two abilities are needed with a great available capacity.

Bearing in mind the *human brain structure*, dreams widely represent the work that the memory manager performs when storing certain information. When it does not know exactly what to do, because it lacks sufficient information, it recreates a situation and tries to force the intelligence to dedicate itself; this decision affects the way information is memorized. In this fashion, it will clean short-term memory and not lose information considered important or feel obligated to provisionally save all information related to a specific subject.

When intelligence does not manage to offer a clear decision for complex subjects, people may have recurrent dreams. Certainly the subject is important and the

adopted solution will affect on the saving of a lot of other information in different places in the memory, or it will affect the configuration of one of the dimensions where many references are situated.

The degree of difficulty of some relational problems may be so great that, at certain times, the quickest solution to a problem is to forget it and try it later, especially after sleeping. Any experienced programmer knows that, faced with an elemental problem that seems irresolvable, you always have to try to shut down the computer and try again.

In the first case, after sleeping, the short-term memory has been cleaned due to the way *human brain structure* works. When the human brain analyses the problem again, everything related and in agreement with the priorities or importance of each element will be loaded; this is what allows the analysis to be notably simplified.

After restarting a computer, all the programs and variables in the memory have disappeared and only the necessary programs and variables will be loaded. This assures us that there is free space and that none of the variables have erroneous values that could have been generated in the multiple tests performed by a programmer in the development of his / her programs.

Another yet different example of the way human brain structure works is the human eye. The eye adapts best to sudden changes in luminosity by opening and closing the lids, that is, by restarting the system. The latter is important for those who drive for long periods of time at night. The light from cars that travel in the opposite direction and those that pass provoke sudden changes in the luminosity that can be tiresome for the eyes.

However, it is very interesting to check that, if when faced with a sudden change in light the eye blinks right at the time of the change, eyes fatigue and the discomfort that people suffer from is reduced at least to one third. This means that there are mechanisms that adjust to luminosity and do not cause eye fatigue; these are optimised to work starting in the darkness, and are therefore more efficient when given the appropriate circumstances.

# III. EVOLUTIONARY PSYCHOLOGY

The most important conclusions are exposed in the section corresponding to the **statistical study,** refer fundamentally to evolutionary psychology and are the following:

- The hereditary nature of relational intelligence.
- The significance of the less powerful gene of intelligence and its coherence with the concept of conditional intelligence.
- Important functions of sexual differentiation.
- The existence of a teleological or finalistic evolution.

The intuitive vision of the brain's functions and cognitive psychology aspects is difficult to summarize because it has been exposed in such a schematic way. In fact, the index could be a good summary of concepts of evolutionary psychology dealt with.

Nonetheless, I would like to stress the following comments on evolutionary psychology:

## General psychology

- I hope that the description of how intelligence and memory operate helps you to better understand yourselves and the people that surround you.
- **Cognitive psychology** helps us being somewhat more conscious of our limits and to be more prudent in the fixation of certain objectives.
- The different ways the individual decision-making processes are developed can explain the apparent **change of individual opinion** that can occur in certain instances; particularly when carried out in a centralized or democratic way regarding our own cells or groups of cells.
- Regarding cognitive psychology, the knowledge of the decision-making process should imply, to a certain degree, **self-education** so as to avoid losing control of the will.
- A little bit of humour is never a bad thing with evolutionary psychology, above all when saying something like 'it seems that **we do not exist** from a strictly scientific point of view'; that the human being, more than a living

being, strictly speaking, is configured like a vital impulse system.

- In relation to **evolutionary psychology** and the stated dual nature of human beings, and other beings, the concept of **temporary discontinuity of existence** is exposed.

## Memory and education

- The tendency of using normal memory should be increased to the extent possible, because of its enormous potential in comparison to mathematical memory.

  Currently, many people think that you have to practice and use mathematical memory to completely develop it.

  If new approaches in cognitive psychology are correct and this capacity is configured mainly by genetic determining factors, students' efforts towards mathematical memory could be truly counterproductive given that these efforts generate a lot of tension and prevent the desirable use of normal memory and the understanding of its limits.

- One more element of cognitive psychology to take into account is attributed to the **functional parallelisms between computers and the human brain**.

  The previous change towards the use of normal memory can be supported in the efficiency of computers and communication that can provide us with a large quantity of information almost in real time. Then we will not have to memorize so much information because computers will largely provide us quicker and more secure information.

  Education should promote people's capacity for managing and processing the large quantity of available information.

- With the acceptance of the **importance of sleeping** and dreams on memory's operation, these cognitive psychology ideas should be sufficiently explained so that students do not make the serious error of studying instead of sleeping.

  The same reasoning can be applied to other types of behaviour that affect the capacity to memorize in a very special and temporary way.

- Students will be especially interested in knowing more about the methods that the memory manager uses to better understand their personal studying habits.

## Evolution of the human brain

- If the parallelism between computers evolution and brain evolution are deeply rooted, an interesting consequence in evolutionary psychology would be the confrontation of current theses of evolution by random mutation with the idea that an almost ***perfect computer*** like the human brain has been the fruit of something random.

- Likewise, the evolution of computers reminds us of the proposals put forth by the *General Theory of Conditional Evolution of Life*. The same parallelism will lead us to reconsider the role of sexual differentiation in the evolutionary process: **females** seem not to modify genes after their early formation, we may find that they have specialized in what we could call **hardware**, and **males**, on the other hand, in **software**; both, as we all know, interrelated and of a similar importance.

- This vision of the brain's functions and cognitive psychology creates a large quantity of questions in the specific field of **evolutionary psychology**: *are genes the most compressed expression of our memory? Does something similar to a compiler exist in the human body and where would it be found? When is genetic information that is to be transferred updated? Why is short-term memory cleaned in sexual relations? What percentage of genetic information is modified in each generation?*

  In this sense, a special compression mechanism and information codification could exist for its multiple transmission; once modified by the sub-system of the memory's genetic information.

- Finally, we understand **artificial intelligence** as a machine's system of decisions, created or not by human beings, showing certain intelligence, at least apparently, and having the characteristics of a vital impulse system.

* * *

* * *

When Globus finished the book, he received from the future
an heyelogic transversal resonance of the
para-cerebellum of Darwinoder,
sent by his friend Mª José.

## Evolutionary psychology and para-cerebellum

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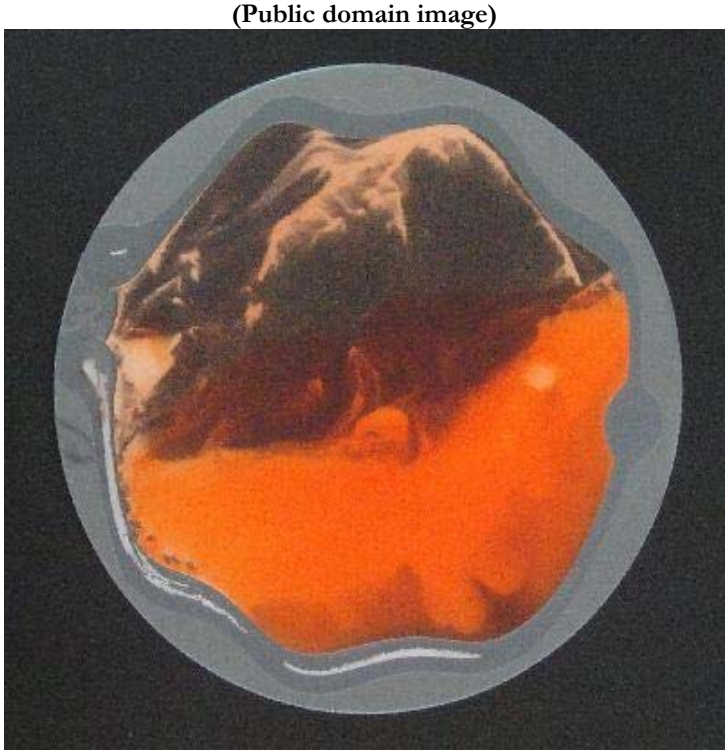

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