GLOBAL COGNITIVE THEORY

VOL. III
MEMORY, LANGUAGE
AND OTHER BRAIN ABILITIES

Museum of future science

Mª José T. Molina

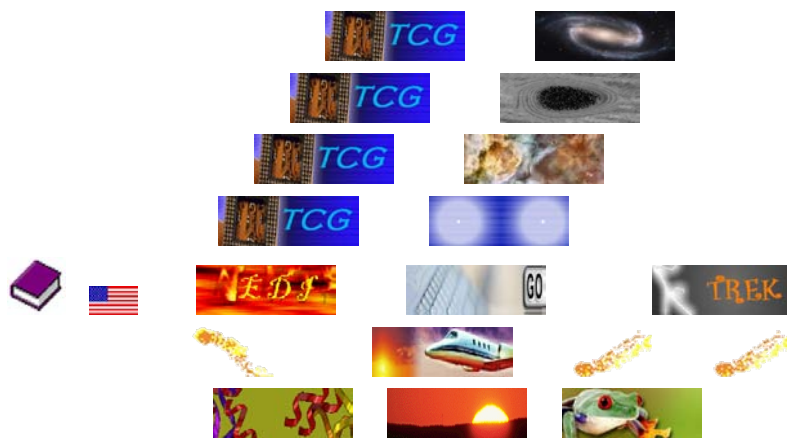María José T. Molina is the author of all the Molwick publisher books.

With over 40 million visitors and two million books downloaded in PDF format from the website molwick.com, she is surely one of the most widely read authors in Spanish of scientific essays in the current millennium.

There are more than 20000 links to Maria Jose's website, where her books on theoretical physics, theory of evolution, quantitative genetics, cognitive theory, philosophy of science, metaphysics and children's stories are showcased in five languages. Many of these links - to all these different fields - come from universities, projects done by university students and blogs created by teaching professionals and Educational specialists.

Moreover, it is interesting to note that these links are almost always accompanied by links to Wikipedia or pages such as National Geographic.

♦

The only antidote for the egocentrism
of pure reason is Love.

Mª José Tiberius Molina

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GLOBAL COGNITIVE THEORY

MEMORY, LANGUAGE
AND OTHER BRAIN ABILITIES

THEORY OF MEMORY

1. Brain memory

The *Memory, Language and other Brain Abilities* online book is the third chapter of *The Global Cognitive Theory* paperback. Therefore, it is highly recommended to read the previous two books for a better understanding of the given proposals and concepts.

In the introduction of the first online book, *The Brain and Modern Computers*, *The Global Cognitive Theory is a consequence* of the application of the *General Theory of the Conditional Evolution of Life* to evolutionary psychology. I also comment the table of related links and I mention the most significant scientific experiments supporting both theories.

The above-mentioned book also contains a small summary of the four online books of the *Global Cognitive Theory*, giving a quick perspective of the theory.

Relational memory
Global Cognitive Theory

The book *The Brain and Computers*, besides describing a general scheme of the cognitive functions of the brain, it states the basic idea that in the concept of intelligence is implicitly included the memory and vice versa.

This interrelation between intelligence and memory suggests an additional reason for the suitability of reading the *Intelligence, Intuition and Creativity* online book.

The essay about intelligence has two big sections with direct repercussions on the memory and language theory. On the one hand, the model of knowledge management with the involvement of the elegant intelligence help us to classify the memory; both from the point of view of the object, regarding to the reliability and time reaction of the memory answers, and the temporal horizon. The other big section refers to the genetic character of the cognitive functions, like intelligence and memory.

The second section of the *Memory, Language and other Brain Abilities* book is about the interesting topic of how to improve memory from a realistic perspective of no existence of miracles or supernatural improvements. However, it roughly points out how to help the natural brain working; which would be easier the better the functional structure is known or the evolutionary psychology understood.

The next section tells the types of memory, analyzing separately the conscious processes and the temporal horizon of the memory. Among the first types, we can point out the instantaneous memory and the specialized ones, which have very particular characteristics, like the visual, linguistic or emotional memory. Concerning the temporal horizon, it discusses the classic distinction of short, medium and long term.

At the same time, it expresses two subjects about reliability and integrity of memory. Whereas reliability of the answers given by the memory manager, which is the intelligence, we have certainly advanced in the second book of *Cognitive Global Theory,* the thinking on the integrity leads us to a discussion about the unconscious mechanisms of compression, degradation and reconstruction of the information.

The fourth section studies the mechanisms of conscious optimization curry out by the brain, and the influence of the

environmental conditions. It uses the expressions *automatic memory* and *directed memory* to emphasize the possibilities of affecting the cited mechanisms of optimization.

Moreover, it describes strategies used by the brain to improve the management of the information, like the dynamic memory or pre-established packages, and to memorize only the opposite to the logic.

The last section refers to evolutionary genetics and neuroscience; it comments the limitations of a conceivable statistical study on the memory similar to the *EDI Study - Evolution and Design of the Intelligence.*

In particular, the problems of the statistical analysis on genetics and memory are due to the different types of memory, the lack of quality indicators and the effects of complementarities, owed to the interaction between the intelligence as the information manager and the cognitive ability to store the information.

Once we have an overall view of the cognitive function of the memory, we go further and try to explain the amazing language power of the brain, the linguistic memory and the verbal reasoning.

Finally, we add some considerations on the genetic base of the language and its evolution.

2. How to improve brain memory

What is memory? Memory is a mechanism that records, stores, and classifies information, making its subsequent retrieval possible. Strictly speaking, we can identify it with the capacity to save but we already know that this saving is as important as the contents and structure of the information.

Forest of unicorns
(Public domain image)

How to improve any intellectual capability is always a recurrent topic. In this case, the first thing to keep in mind is the number of factors that influence the normal functioning of brain memory. Throughout this book, we will analyze the different types of memory according to the various perspectives and we will see how each of them has some characteristics that can help us improve the performance of memory.

A second and very important aspect is to understand that improving an intellectual or physical ability does not mean that

a human can acquire the ability to fly or anything of the sort. It is to say, we must bear in mind that there are established aspects in the brain configuration due to genetics and the early development that act as limits to the intellectual power.

Instead of *how to improve memory* it would be better to say how to use this brain capacity in a way that its natural possibilities of learning are made the most of. From this point of view, the best advice is that an appropriate intellectual exercise will always be healthy. However, we should remember that even if we are not studying the lists of elements, or the Visigoth kings, or the rivers and their tributaries, normally memory is always working because the brain does not tend to cease so often.

For this reason, when I say exercises, I am referring to something other than a memorizing effort to remember everything all day. With the general educational system, I believe that the human memory is sufficiently exercised at least while attending school or university; furthermore, it seems that it is generating a certain accelerated evolution of the human brain capacity from one generation to another.

I would like to point out that a great part of brain memory is attained unconsciously and we do not have many ways of manipulating it except facilitating the conditions of its performance or, better said, trying not to interrupt its normal functioning.

The entire third book of the *Global Cognitive Theory* deals with **how to improve brain memory**; nevertheless, I want to cite the following aspects here for their special significance:

- Memory works much more efficiently when learns something in a pleasant and relaxed environment. We all know that **memory is selective** and that we remember pleasant things much better and that we hardly remember the bad times; this effect is bigger the older the memories are.

○ A complementary yet opposite aspect is that, when we are nervous, memory works very poorly, confusing almost everything. It is important to discuss certain topics with as much calmness as possible, because otherwise, objective information starts to become confused, and there is no human way to reason or understand the emotions.

It seems as if the large quantity of resources that the memory manager was consuming were not free, that it would not work adequately.

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3. Brain memory types

Below, we present various classifications or types of memory according to the different criteria.

The aforementioned presentation does not have an exhaustive nor exclusive character. Some *brain memory types* do not appear and those mentioned may appear in various categories, for I have tried to keep the exposition as clear as possible.

We all know that brain memory has diverse degrees of temporal retention of data. Over time, the information that our memory provides us with disappears. Other information is harder for us to find in our memory and it is not as exact as it was previously. Other information not only is inexact, but rather we can tell that, in reality, we are reconstructing the data from little information, etc.

We will examine each of these categories and their **brain memory types** in greater detail.

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3.a) Conscious cognitive processes

3.a.1. Instantaneous memory

It contains all information that is accessible in real time, immediately. Although it may seem otherwise, this brain memory is very large; all the information that we constantly use in our daily life is here. We will look at some of its main components:

- **Normal information** such as where things are located, pending tasks, routines, etc.

- The **preconceptions**, those make up a part of our character or personality.

- **Automatic response programs** loaded in a short period of time when we wake up. Linguistic memory and other special brain memories also form a part of this instantaneous memory when they are active.

- **Special automatic response programs** like driving or those that correspond to dangerous situations that are loaded when considered useful.

- **Working memory** associated with the operation of logic or intelligence. This memory is very limited and its optimum operation implies the use of three or four variables simultaneously. When thinking and performing logical operations with more than five variables, it takes a long time to advance.

- **The auxiliary working memory** corresponds to all the variables that are available to be located in the operative working memory cited in the previous paragraph. All the information known about the subject we are working with pertains to this category.

This configuration's automatism allows for the simultaneous performance of various tasks; the human consciousness is similar to the computer's interface and the unconsciousness with programs residing in the instantaneous memory. Therefore, the more automatic the cerebral processes or the computer programs are, the freer the human consciousness, or the simpler and more intuitive the program's interface will be.

Brain memory types
Driving program

However, this simplicity is accompanied by a disadvantage that is good to keep in mind; computer's automatism sometimes does not let us know exactly what it has done or why. It is always necessary to have general knowledge of how computers work, and the only way to have this is with practice and time.

3.a.2. Specialized memory

In this category, we can include the types of special brain memory for automatic loading in instantaneous memory that also form part of long-term memory; although they are not as compressed as this memory, and have their own multidimensional systems of reference.

The following are examples of special memories: **linguistic memory,** certain **visual memory,** the archive of the preconceptions, and pre-established quick response programs such as **emotions.**

3.b) Persistence of brain memory

3.b.1. Short-term memory

All the information that has been dealt with since the last time the system was cleaned or maintenance was performed will be found in this memory, that is, since the last time a person slept enough time to perform this task.

The degree of conservation or state of the information will depend on the mentioned time and, of course, on the physiological or genetic capacity of each individual.

This memory will feed mainly on the data that has gone through the auxiliary working memory, from both medium and long-term memory, and the experience and reasoning during normal life through our perception.

Due to historical evolution, this memory is most efficient for **approximately 16 hours,** reserving **8 hours daily** for its maintenance. Probably not all the time that we sleep is used to clean short-term memory; a significant amount of time is also dedicated to the transfer of information from medium-term to long-term memory (to state it simply), and other diverse maintenance functions.

There are short-term memory cleaning systems that are highly recommended and others advise against strongly. Just say the first will not be easy to obtain if there are elements in the short-term memory that generate tensions and demand the individual's attention. In regards to the latter, the effects of abusive ingestion of alcohol can be an example; this can in turn give us an idea of the effects of non-abusive but counterproductive ingestion, especially for the information contained in this memory.

3.b.2. Medium-term memory

Maintaining information as organized as possible is a way of optimizing the information contained in short-term memory; this will probably make us take in a lot of information that we cannot organize immediately but that we can store to deal with and order afterwards. This eliminates duplicated information and permanently saves information, or similar concepts for reference, and, in this way, saves a large quantity of the memory's capacity or information archive.

In the future, it is very likely that computers will always be working, whether by running requested programs or by reorganizing them.

We can already cite programs that can run automatically: defragmenting and maintenance of the hard drive, cleaning of the Windows system log, search for and downloading of news or any type of program, information compression, anti-virus, etc.

The expression of medium-term memory is useful but does not precisely reflect the nature of its content.

The information retained for a rather long time is in this memory. However, this period will be larger the more the information is relational and contains less concrete information. That is, the information obtained is not only directly, but rather by its relation to other information also saved in the memory.

In this respect, independently from whether certain information is saved in the memory in its original state, (like the birthday of someone you are close to) medium-term memory tends to be more fixed as the information is transformed into concepts and these are defined by the base of a system of multi-dimensional references.

Over time, concepts will only remain in the designated form;

precise information usually ceases being useful. If relevant, becomes a part of instantaneous memory and the memorized relations tend to be incorporated into the cited multidimensional system. Moreover, if required, the system will add a new dimension.

Not all these processes are free from errors; the mechanisms that are good in the majority of cases can turn out to be very inadequate for others.

One of the circumstances that concern me the most occurs when an act or an idea repeats many times during a certain period, and especially when it appears as a hypothesis that develops in various ways. In accordance with normal mechanisms in the brain, this act or idea will save in layers that go deeper and deeper into our brain memory.

Afterwards, when our memory accesses this information, it will be likely to interpret this as its own already accepted information because it is in a deep layer.

The error can be significant -*a strange idea is supplanting our true knowledge or feelings*!

It is called **brainwashing** and it is likely to occur, for example, when we read a book that repeats something thousands of times. Each time we read it, the brain has enough time to memorize the idea or transfer it to a deeper layer. Of course, this effect depends on the ideas and the individuals.

3.b.3. Long-term memory

This expression is more correct than the previous one in that it clearly implies long-term, but also needs some clarification as far as its nature.

If medium-term memory is configured like a multidimensional system, long-term memory is formed independently of the famous 'birthday' by an exclusively multidimensional system in

which there are less dimensions than in medium-term memory, and these are the base of the essential character of a person, not of their knowledge. We are referring to what the commonly known as general personalized principles such as justice, equality, liberty, respect, education, benefit of the doubt, etc.

Knowledge or concepts are found ordered in the deepest medium-term memory layers, or otherwise stated, in the most superficial layers of long-term memory.

Long-term memory

The necessity to re-adapt these principles to a greater or lesser extent is an interesting effect that occurs in personality growth and development. Obviously, the unconsciousness does not like the idea; changing these principles supposes, to some extent, the recognition of some errors in them; this is a large task because all of the remaining memory will change and will need to readjust. In these periods, the person will probably sleep more than it used to.
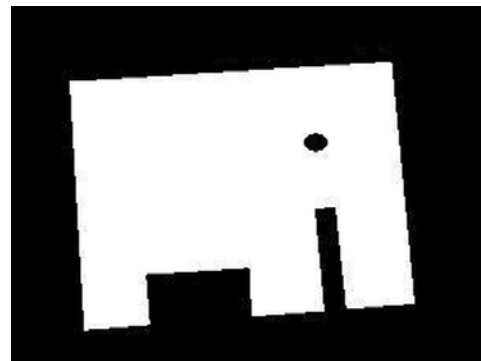
Following the thread, this vision is coherent with the fact that people sleep less, as they get older in normal conditions.

3.b.4. Vital memory

Here, we are not referring to a visual or emotional memory but rather a very special type of memory of visual-emotional nature that is similar to **extra-fast movies** when a person thinks there is a certain probability that he/she will die in a matter of seconds.

The content varies from person to person but usually tends to be a sequence of very symbolic emotive images in

chronological order.

Another type of super special and super persistent memory could be the **genetic memory**, which contains all of the genetic information transmitted to the descendants.

♦

When **Don Magufo** finishes the book,
he happily calls **Einsotro**
to thank him for his collaboration.
Who puts on a pensive face and says:

– Thanks very mucho. –

Afterwards, **Don Magufo** happily calls **Mª José.**
She tells him:

– Thanks very macho. –

He then thinks:
¡Thanks God I haven't called Goblin!

♦ ♦ ♦

♦

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