

Chapter 1

Consciousness: an Ancient and Current Topic of Study

1.1. Multidisciplinarity of the subject

The subject relating to the study of consciousness covers a great many disciplines, which reflects the complexity of the concept, and makes it a multidisciplinary concept. From ancient times right up until the present day, thinkers, scientists and engineers wondered about the reality of thought, examining it through the lens of people's actions in their existence and the surrounding society. Philosophers have investigated the field of metaphysics; psychologists the role of the subconscious and the machinery of learning; computer scientists the possible modeling of an artificial plan of action; biologists the cerebral location for the process of decision-making; sociologists an organization of interpersonal interactions; managers a means of personal development; and engineers an optimization of the autonomy of automatons.

A number of factors contributed to a certain reticence to rationally study consciousness before the beginning of the 20th Century. One of the main factors relates to the dissociation of body and mind, which enabled the mind to be given a political and mystical interpretation in its religious form: the soul. The establishment of a stable secular republic in France on 31 August 1871 gave rise to a new era of thinking. Jean-Martin Charcot expounded his theory on hysteria in 1882. At the government's request, Alfred Binet created a metric intelligence scale in the context of the development of intelligence in children and anomaly detection. It was not until the Briand Law of 9 December 1905 that a strict separation between religious affairs and state affairs emerged – at least in France. Article 1: the Republic ensures

freedom of conscience [consciousness] [...]; Article 2: the Republic does not recognize, remunerate or subsidize any religion¹. The uncircumventable dogma of daily life in France probably put paid to a great many intentions to carry out an analysis of consciousness. In the latter half of the 20th Century, work on consciousness related primarily to certain specific traits, such as the study of attention in developmental psychology, and the study of knowledge representation in artificial intelligence. We are still a long way from being able to explain why human beings think a certain way at a precise moment; however, thought is known by certain neurological mechanisms, which associate the faculties of reasoning, memory, motivation and language.

Consciousness is a cognitive mechanism which tends to produce actions in the context of situations. In everyday language, we can see concepts which are similar to consciousness, such as: intention, determination, appetite, motivation, faith, need and belief. These concepts are often held to be at the root of our decisions. They also have a great many points in common.

1.2. Terminological outlook

Intention comes from the Latin, *intentio*, which means “action of going towards”. This is a deliberate action whereby we fix the goal of an activity or indeed the motivation which leads us to intervene. This concept can be broken down into three facets:

- the deliberate design of performing an action – a volition;
- the fact of setting oneself a certain goal – a firm and premeditated design – the same goal that we intend to attain;
- in the tangible concept, modulation of attention, to which consciousness gives a sense, a form.

Determination is a process which also underlies decision making. The word comes from the Latin *terminatio*, meaning “to set a boundary”. The following are the three facets of this concept:

- action of determining, precisely delimiting, characterizing without ambiguity, clearly;
- resolution taken after having balanced several parts;

¹ <http://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000000508749>.

– in philosophy, an action by which a thing, also subject to many different qualities, many different ways of being, is led to assume one state/quality rather than another.

In the same mold as determination, the concept of self-determination reaffirms the taking of a decision by its author. This is the fact of deciding for oneself, with no external influence.

The concept of belief, or credence, is more complex. It comes from the Latin *credere*, which means “to believe”. It is a term which has been coveted throughout history by political figures to control the masses, and thus which has served as a shield and as a weapon. We can identify eight facets of belief:

- taking something to be true;
- having faith and offering submission of spirit relating to a religion;
- relying on someone and something;
- holding something to be likely or possible;
- adding faith to someone or something;
- having confidence in someone or something;
- having confidence in someone – in their talent or in their word;
- thinking, estimating, imagining.

The concept of faith is more far-reaching than simple subscription to religion, and relates also to the effects of belief on an individual scale. The word comes from the Latin *fidō*, meaning confidence or faith. In symmetry to belief, we can distinguish seven facets:

- belief in the truths of a religion;
- dogma of a religion, intended to be believed as having been handed down by God;
- that religion itself;
- fidelity, meticulousness in keeping one’s word, fulfilling one’s promises, one’s commitments;
- obligation which we contract, the assurance that we give of something by treatises, sermons, etc.;
- credence, confidence;
- testimony, assurance, proof.

4 Knowledge Needs and Information Extraction

A concept which leads us into the field of biology is that of need. The French word for this, *besoin*, comes from the Frankish *bisunni*, which means “great care”. We can distinguish four facets of this concept:

- deprivation of something which is necessary;
- indigence, destitution;
- lack of food;
- instinctive motion, from a feeling which leads us to seek or do something.

Appetence is a concept which is very similar to need, but with the added detail that it also offers a dynamic. It comes from the Latin *appetere*, which means “seek to attain” (the same root as the word “appetite”). There are three distinguishable facets for this concept:

- a tendency and magnetism that all beings have toward that which can satisfy their instincts and needs – particularly physical needs;
- attraction for that which may satisfy a need or a whim;
- desire to use or buy a product or brand, experienced by an individual.

Finally, we come to the central concept in consciousness, which is motivation. The term comes from the Latin *motivus*, which means “move”. There are only three facets for this concept:

- justification by giving a motive;
- reasons which make us act;
- will to achieve an objective.

1.3. Theological point of view

In Buddhist philosophy, appreciating the present moment is a state of behavior, a quest and in that sense, a motivation for optimism. To begin with, one is conditioned to believe that the “me”, the ego, does not last, and that time does not pass, and is an illusion to the contrary, we follow the Buddhist commandment to become fully conscious of the present moment. Becoming aware of the fact that there is an “I” which forms an integral part of that moment – which is an instantaneous part of a temporally distributed ego – can condition subscribers to find themselves in the moment, which develops the motivation to detach oneself from time; even if it does not work, this stops time appearing to pass by – that is, Buddhists attempt to “live in the now”. Thus, for example in a situation where an individual wants to enjoy the moment of a dinner, he can get away from the pain and anxiety of the disagreements

over the dishes which will burn on the hobs and the uneaten food which will remain. If he tells himself “I may be able to gain a little respite from the pain and anxiety of this disastrous dinner, in which the fully-loaded hobs burn black as the uneaten dishes are taken away”, each instant can be given over to savoring the dish of the moment.

Christian theology, exposed at its very beginnings to the agonizing dilemma of good and evil in human action, defined a concept peculiar to willpower, called “free arbitration of will”, or simply “free arbitration”. This is the faculty of a human being to determine himself freely and on his own, to act and think, in contrast to determinism or fatalism, which hold that will is determined in every act by “forces” which require it.

The French expression “*libre arbitre*” (of which “free arbitration” is the literal rendering), does not give a full enough account of the indissociable link which ties it to the notion of will. This link can be seen more easily in the more common English expression “Free will” and the German equivalent “*Willensfreiheit*”. However, these expressions have the disadvantage of doing away with the notion of arbitration or choice, which is essential to the concept (Erasmus, Luther, Diderot, Saint Augustin, Fonsegrive, Schopenhauer, Muhm, Rouvière).

1.4. Notion of belief and autonomy

More recently, and still within the framework of lexicology, an international language called Kotava, created in 1975 by the linguist Staren Fetcey, expresses the verb “believe” in accordance with three different facets, one of which characterizes reflexivity of the belief relating to the individual himself – a form of self-belief, describing the individual who sees himself, represents or imagines himself. For instance, *I imagine myself eating* would be translated as *fogesestú*, with the prefix *fogé*, denoting self-representation; or *I imagine myself writing* would be translated as *fogesuté*.

Lexicology, which is an extension of linguistics, is in itself a good example of the enigma which enables an individual to concretize his autonomy and desires of action. In the natural order which anyone can observe, we find a hierarchy of natural objects, the majority of which are in a mineral state, and some in a living state. Of all living things, humans are the only ones to define plans in accordance with their surroundings, whilst retaining a high degree of flexibility about the range of their actions. In this sense, it is a peculiarity, and therefore an enigma. Religion has provided elements of a response to this puzzle. Biology and psychology have also made contributions. More globally, however, it is a particular cognitive state which appears peculiar to a state of consciousness which is not a very long way from the

faculty of reasoning. We shall see the reason for this in Chapters 10 and 11. The uncertainty principle, chaos theory or Gödel's incompleteness theorems have, according to some people, brought new elements to this debate, but without being able to resolve the issue. The two academic disciplines which seem most likely to be able to give elements of a response to the question of free will are physics (which studies the laws of nature) and neurosciences (which study the function of the nervous system and therefore the brain, the decisional organ). Physics enables us to better understand the notion of determinism, while neurosciences touch directly on free will. Many writers state that we need motivation. In actual fact, this is not quite true: we *have* motivation.

1.5. Scientific schools of thought

The first cognitive science center was founded in 1960 at Harvard University by two psychologists: Jerome Bruner [BRU 56] and George Miller [MIL 56], who were interested in the mental mechanisms involved in language. Hoping to introduce greater formal rigor into social sciences than some of their predecessors such as Frederick C. Bartlett [BAR 25] and Jean Piaget [PIA 23], they worked with researchers in computer science, equating cognition to manipulation of signs, and viewed computers as a good model of the human mind. Stemming from the field of cybernetics (artificial intelligence or AI), this new way of looking at cognition would inspire the pioneers of artificial intelligence and give rise to an entirely new branch of cognitive sciences. In the mid-1980s, when the American psychologist Jerry Fodor [FOD 75] had just put forward his theory on the modular architecture of the mind and the computational theory of mind was beginning to gather momentum, in France, we witnessed the birth of a long-awaited institutionalization. The first association in cognitive sciences, the Arc (Association for Cognitive Research) appeared in 1981, founded mainly by researchers in computer sciences, psychologists and linguists. These researchers modeled their work on American cognitive sciences, which had emerged twenty years earlier. Thus, in the 1970s, before the creation of the Arc, computer scientists, psychologists and linguists came together on many occasions, to develop a theoretical computer science oriented at comprehension of language. These meetings were financed by INRIA (the French National Research Institute). The objective was that of artificial intelligence: to simulate cognitive functions. After having studied neurobiology, Patricia Churchland [CHU 86] put forward eliminative reductionism – i.e. the reduction of mental states to the underlying biological phenomena and the elimination of the psychological level. As a toehold, Churchland uses the trains of thought in the area of AI, which simulates functions of the brain as an automaton with input and output. The ideas of Gerald Edelman [EDE 87] have a considerable following amongst neurobiologists. Joint winner of the Nobel Prize in Physiology or Medicine in 1972, Gerald Edelman constructed a theory of memory and consciousness, based on the

principle of progressive natural selection of the links which are established between neurones. His work constitutes an attempt to bring together neurobiology, evolutionism and genetics, where he defends his theory of neuronal groups. He believes that the mechanisms of perception and memory are based on the principle that, of an infinite number of connections which could be established during the brain's development, only certain pathways are stimulated by the subject's actions and the information given to him. Edelman [EDE 92] proposes a biology of consciousness, with emphasis placed on the processes of acquisition and modification by feedback of the acquisition on the innate potentialities. The model of consciousness has been influenced twofold by the revolution in cognitive sciences, inspired by computing (algorithms, memories, computation) and the neurobiological revolution (neuronal group selection, interconnection, neuromediators, psychoneurobiological representations). Neurosciences are the key to the processes of learning, social behaviors, neurological and mental dysfunction, foreshadowing a fundamental aspect of psychology.

1.6. The question of experience

For ethical reasons, few experiments have been performed on human beings to date. Dr. Rick Strassman, a neurologist specializing in *hallucinogenic substances*, was sanctioned by the US Department of Defense between 1990 and 1994 to inject a cohort of 60 healthy human patients and observe the effects of hallucinogenic substances [STR 96]. His research aimed to investigate the effects of the molecule *N,N*-dimethyltryptamine (DMT), a potent entheogen, or psychedelic drug, which he believes is produced in the pineal gland in the human brain. DMT is found in many and varied naturally-occurring sources, and is associated with human neurotransmitters such as serotonin and melatonin. There is a theory that DMT plays a role in the formation of dreams. Indeed Strassman also hypothesized that an individual who has a near-death experience causes the pineal gland to produce a relatively large amount of DMT, like in a dream-like state, which would explain the visions related by survivors who have come back from near-death experiences.

Oxytocin is a peptide hormone made by the paraventricular and supraoptic nuclei of the hypothalamus and secreted by the posterior pituitary gland (neurohypophysis). Its name means "quick birth". Indeed, it is involved in the process of giving birth, but in both men and women, it also seems to favor amorous social interactions, or which involve cooperation, altruism, empathy, attachment or the sense of sacrificing oneself for another – even for another who is not part of the group to which a person belongs [COO 02; BLA 56; BLA 60; BLA 64; UVN 03]. In certain situations, oxytocin can also induce radical or violent behavior for defense of the group – e.g. against another person who is refusing to cooperate. In these instances, it becomes a source of defensive (and not offensive) aggression.

Experiments relating to *isolation* have been conceived of. They are erstwhile, and only historical studies of archives relating to the subject reveal their authenticity. Of course, such experiments could never be countenanced in today's world, for reasons of human rights and ethics. In the Middle Ages, the Holy Roman Emperor Frederick II of the House of Hohenstaufen wished to know what sort of language and what way of speaking would be adopted by children brought up without ever speaking to anybody. Also, his chronicles tell us that the Franciscan monk Salimbene of Parma asked wet-nurses to raise children, to bathe and wash them, but never to prattle with them or speak to them, because he wished to know whether they would speak Hebrew, the most ancient language (or at least it was thought to be at the time) or Greek, or Latin, or Arabic, or possibly the language spoken by their biological parents. His efforts were in vain, because all the children died... indeed, "they could not survive without the smiling faces, caresses and loving words of their nurses". According to Aroles [ARO 07], the tale of children raised by wolves is a fallacy. Aroles is the only one to have conducted an inquiry into the question of the wolf-children by searching in the archives. Certainly, throughout human history, infants have been adopted by lone she-wolves, but apparently, never has a whole pack of wolves adopted a small child, be it Indian, Jewish or otherwise.

As we shall see in the coming chapters, we are not merely the product of our environment. We are the product of our biology. More globally, we are the product of mutual dynamics between the outside world, our internal world and our past and present behavior.