

Report

Beyond the Algorithms Are Consciousness and Freedom

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Abstract: The study of consciousness has become the “most precious trophy” of neuroscience, artificial intelligence (AI) and psychology alike. Because consciousness is part to the primary dimension of the mind, indeed, the only one we can access directly, and because consciousness is what gives us our knowledge of the world and of ourselves, its scientific study will bring us closer to understanding the very nature of what we are as individuals. The study of consciousness engages the thorny issue of whether we are free beings, individuals who exercise free will and are responsible for our actions. Since today, the concept most widely held in the sciences that elucidate the functioning of the human mind is that, basically, human beings are a complex physiological computational mechanism; it is easy to understand how deciphering the nature of consciousness can constitute a “threat” to the principle of the individual’s moral responsibility. The mechanistic theory warns that freedom, understood as the ability to make decisions that are not circumscribed by any type of rule or pre-established process, may be a mere illusion based on a false sense of “control”. This may seem to be the case, just as for centuries it seemed that the sun rotated around the earth, as that was the impression conveyed to the senses. Along these lines, when we think consciously, we consider the advantages and disadvantages of different options, and make decisions on the basis of an evaluation of the best alternative. However, under the mechanistic premise, all of life’s experiences would be reduced to the culmination of unconscious processes that are beyond our control, and the experience of consciousness would exert no causal function over our actions or our internal states of mind. The main aim in this article is to discuss some of the weaknesses of a strictly mechanistic explanation of how the human works. To do this, it presents a critical review of some of the different approaches to the study of consciousness advanced to date and concludes with the submission of an own proposal.

Keywords: Consciousness, Unconscious, Mechanistic Theory, Freedom

1. Introduction

Freedom, in and of itself, is not a concept considered a suitable subject of scientific study. Science seeks to reveal the cause-effect regularities that explain the behavior of natural elements. Freedom, if it exists, is by definition an undetermined principle of action, not subject to rules, since it is nothing other than the arbitrary and capricious criteria that each individual use when making decisions. Freedom, thus, cannot be “distilled” scientifically, since it can neither be caused by any other phenomenon, nor is its activity stable enough for scrutiny, as it is not subject to any principle.

This “conceptual” difficulty has a second interpretation: If something similar to freedom, as we understand it, exists, at least one of the universal premises upon which the scientific

method rests would clearly be called into question. The possibility that the decisions people make are not the inevitable consequence of the combination of a series of processes that follow certain rules would directly refute the assumption that every phenomenon has a cause and that this cause-effect relationship would be determined by the nature of the physical characteristics of the elements that comprise it.

In light of the foregoing, it is easy to understand that the scientific debate about freedom would subtly be diverted to the role of consciousness in the development of human mental life and actions.

On the one hand, it is impossible to speak of freedom if consciousness is not actively relevant, that is, if it is a mere epiphenomenon. In other words, freedom cannot reside in the subconscious mind. Were that the case, we would have no

access to its contents or control over its activity. Therefore, the degree to which we are able to discern whether consciousness plays a role, and if it does, which role it plays, will automatically define whether there is sufficient margin to claim that human beings exercise freedom [1].

On the other hand, as stated above, scientific laws are physical laws. We live in a physical world and by studying its characteristics, we have achieved an understanding of the principles governing it. However, consciousness, or at least its ultimate nature, resists irrefutable identification with the neurological processes it is involved in or from which it arises. That is, sensations like cold or pain, or the color red etc. only exist in our conscious mind and are neither identical to the stimuli that cause them nor to the neurological structures or activities that deliver them, having completely different characteristics (Leibniz's Law). Thus, it is not surprising that many researchers have recently put their hopes in the "mysteries" of quantum physics in their search for the key that would reveal the ultimate nature of consciousness [2].

Hence, the debate about consciousness represents an unequalled challenge to test the limits of the scientific method and the value of some of the assumptions from which it originates [3].

To provide the background necessary for debate, below is an outline of the assumptions that serve as this article's point of departure¹:

1. Science, as a form of knowledge, is not under threat. The review of any scientific assumptions established in the course of the study of human conscious activity, far from being unwelcome, would, rather, be amply justified because of the exceptional nature of consciousness [4].
2. Because there is so much yet to be understood about the workings of the mind in general and about consciousness in particular, it seems reasonable that any effort to hurriedly clinch the discussion on the role of consciousness would run the risk of oversimplifying arguments.
3. The discussion is not about whether we are generically free or not. Assuming that we basically are a mechanism, as the majority of the data we have concerning the way the nervous system works clearly indicates, it is, rather, about deciding whether mechanistic theory applies to human mental activity in its entirety, or whether there is still some margin for some part of it that is not determined by physical-biological or computing principles.
4. Artificial Intelligence (AI) simulates many human psychological functions, including those closely linked to conscious activity [5]. However, this does not demonstrate that consciousness is functionally irrelevant [6] (to the extent that machines do not have subjective experiences), but that we have been able to efficaciously describe and order conscious knowledge that can be

reproduced by artificial systems in very specific areas through different processes that compensate for the lack of awareness [7].

5. The fact that we acknowledge our ignorance about the ultimate nature of consciousness does not necessarily imply any kind of dualism, nor does it open the door to esotericism or to concepts external to the scientific debate such as the soul or the spirit. It can simply be assumed that consciousness is a dimension or way in which matter appears whose characteristics are currently unknown to us and, as such, emerges from our brains' neurochemical activity (Emergentism)².
6. Attributing conscious activity a causal role is no greater a problem than explaining the way in which the brain's neurochemical activity gives rise to conscious experiences. We do not know how this process occurs, but the simple inversion of the process, something which is not exceptional in nature, would explain the causality of consciousness over the neurological.
7. As will be developed later, countenancing an "individual who freely makes decisions" (that is, decisions that are not 100% pre-determined) does not necessarily imply a model of the mind resembling the "Cartesian theatre" as Dennett categorically assumes [8], with the resulting problem of the *homunculus* [9].

2. A Model of the Mind

A debate of the scope undertaken in this paper requires starting with a minimally structured model of the mind. Based on the data currently available about the different psychological functions, the backbone of the model would be the interaction between consciousness and unconsciousness. Without such a model, the limits of "what is reasonable" become too broad. Unfortunately, there is as yet no widely accepted model of the mind, let alone one with the aforementioned characteristics³.

For purposes of this debate, hence, the alternative is to posit "our own" model. As developing this model in its fullness is beyond the remit of this article, what follows is a basic outline of its fundamental elements:

1. Consciousness, in this model, is understood to be the constant flow of contents and activities from which we have direct, subjective experience, and of which we can give an account at any given time. Consciousness is, thus, defined by the quality of the contents that shape it (qualia). All qualia are exceptional in nature and their

² Even though, it is possible that we will never be able to accept consciousness' physical nature as valid, since the only way we can identify conscious contents (qualia) is by using other qualia. In other words, we would be trapped in a paradox with no possible solution. We have called this "*dualism by disparity*" [6] since, by "objectifying the subjective" we would transform it into another different qualia and we would no longer recognize it as the same.

³ This deficiency is not only relevant for this issue. Without minimally accepted agreement, the vertiginous advances made every day in highly specialized, yet unrelated areas generate "mini models" *ad hoc* that thwart any future coherent debate about the mind's functioning.

¹ This article was published in Spanish version in http://www.tendencias21.net/La-consciencia-de-misterio-a-objetivo-cientifico-muy-preciado_a14761.html

value or meaning cannot be reduce to anything else. In opposition to Cleeremans [10] who considers consciousness a special activity.

2. The extent to which none of us has direct experience of how these contents (cold, hunger, fear, the color red, etc.) are generated, their gestation process is carried out unconsciously. In other words, every conscious experience somehow originates in, and is supported by the mind's unconscious activity⁴.
3. Therefore, the mind's conscious and unconscious processing mechanisms are necessarily closely linked to each other and work in perfect harmony⁵ in every one of the mental facets: perception, attention, memory, learning, emotions, thought, etc.
4. The exceptionality of conscious contents relies, among other things, on the coordination of different unconscious devices that create multidimensional⁶ experiences that are unified in reality: we see, hear, touch, smell, feel objects (including ourselves) in an integrated way⁷.
5. The mere flow of conscious contents allows for a unique working space. However, conscious activity *per se* would be the mind's manipulation of these contents⁸. In and of itself, this is a very simple activity, and what makes it exceptional are the possibilities offered by the contents that shape it.
6. When the mind works in conscious mode, it reaches the limit of its computing capacity since, on the one hand, several of its unconscious devices need to work jointly in order to create specific conscious contents and, simultaneously, it needs to manipulate these contents⁹. That is the reason conscious activity is associated with a sense of effort and tiredness, and why, in terms of computing, it is much more precarious than unconscious activity. In other words, when in conscious mode, the mind can only process small amounts of data and can only do it in a sequential way (serially).
7. The mind's ability to work in unconscious mode is enormous. It can rapidly process a huge amount of data and perform several tasks in parallel.
8. The unconscious working mode equips us with the optimum mechanism to select a response when we know which one we should produce in reaction to a particular signal, as it allows us to simultaneously execute many

processes when the corresponding stimuli are detected. This forces the mind to store a lot of information about the regularity of events in order to sufficiently guarantee the efficacy of the response, since the execution of the response is so rapid that it is very difficult and costly to change course once it has been initiated.

3. The Characteristics and Role of Consciousness

In evolutionary terms, because of its high cost, and because it has but recently appeared in the development of species, conscious mental activity can only be considered an improvement over, or a complement to unconscious activity. And, indeed, that is what it appears to be. It allows us to act with a measure of efficacy in situations where we lack sufficient information to gauge the best response, that is, in situations for which we do not have a functionally operational rule of action.

As noted above, consciousness arises from the mind's ability to internally reproduce with a unique code the most relevant aspects from both the external and internal worlds, to then manipulate them with a degree of coherence. These contents, which are generated from unconscious activity, are experiences related to the senses and emotions that form the different aspects of reality. Every specialized device creates a signal (qualia) which is at once specific, yet compatible with all others. In this way we can compare and operate with qualitatively different elements: hunger, cold, fear..., that is, we can do something unique "add and subtract pears and apples". Consciousness is the result of the coordinated integration of these signals. As such, it represents an "experiment" whose outcome is unknown, since the elements that form it can be combined in infinite ways¹⁰, and because it will be conditioned by the resources available and the state of the organism at the time.

1. The importance and overall efficacy of a possible response can be evaluated on the basis of the conscious contents' characteristics. This is precisely what is necessary when we are unaware of which aspect of reality is relevant or what the most effective response to a given situation will be. This evaluation takes place in three different steps:
 - a. An assessment of the extent to which the real effects (expected or unforeseeable) of the responses that we are improvising may harm or benefit us, and/or facilitate or impede achieving our aim, in any of the internally represented dimensions.
 - b. A comparison of the consequences in different dimensions of reality, allowing us to make a multifaceted analysis of costs and benefits.
 - c. The integration in the evaluation of the need to either respond or not to any other signal or demand from the

4 More developed brains entail more complex unconscious processes and, therefore, a greater capacity of conscious computation.

5 In clear contradiction with those models that pre-suppose that our mental activity is the result of conflict between different subsystems (psychoanalysis or "ecological" models).

6 Therefore, consciousness, technically, and as we have defined it, is not what makes the aforementioned integration possible [11], rather its result.

7 Here it should be pointed out that the mere accumulation of unconscious activity does not produce consciousness, in the same way that the mere accumulation of sounds from different instruments does not produce a symphony. In the mind, the "score" around which the activity of the unconscious devices is organized is reality.

8 The act of thinking in all of its variants: verbally, with images or other senso-emotional contents.

9 This is what we have metaphorically called "*mental activity squared*" [6].

10 Obviously, it would make no sense to store every possible combination, but it is better to reproduce them *ad hoc*.

context that may suddenly appear.

2. Since there is a very high probability of error, developing conscious processing serially makes it, to a large extent, possible to correct our response as we go along.
3. In addition, conscious knowledge allows us to rapidly establish new and original associations, based on the “qualitative” similarities of the situations we experience, and not only depending on the “quantitative” accumulation of regular interactions with events (unconscious knowledge)¹¹. This considerably enhances our range of responses.
4. When we consciously speculate about possible action strategies and consider their implementation, we “experiment” without actually suffering the short or long term consequences that may be associated with these imaginary actions. This allows us to “evaluate their efficacy” in a risk-free way and represents another advantage.
5. This way of processing stimuli is unique in the evolution of the species and it is as sophisticatedly costly as it is efficient. Thus, its maintenance and exploitation place it in the “center” of our mental activity. That is why even when faced with a situation we are familiar with, because unforeseen events can crop up at any time, it is in the conscious mode that the mind “supervises” the evolution of the (motor) response that we execute. This is also why, presumably, genetically we have fewer pre-fixed responses, since, in the long term, it is more efficient to rapidly adjust and correct our reactions to the specificities of each circumstance and individual.

4. Some of the Deficits of the Mechanistic Theory

The mechanistic explanation of the way the mind works is more than reasonable, although there are certain limitations in its structure that cannot be ignored.

1. It would not be licit to attribute the causality of every one of its processes to the mind's unconscious activity. As unconscious activity can only completely disappear with death, such reasoning becomes, in practice, circular. In addition, as already noted, conscious contents arise from unconscious activity. Therefore, the key to elucidate the role of consciousness lies in demonstrating whether conscious activity (work with those contents) contributes in some way to the functioning of the mind and to our adaptation to our environment.
- a. Thorough research has been conducted in different areas of Psychology (perception, memory, attention, learning, emotions, etc.) to determine what occurs when consciousness comes into play and alters certain

processes. Results from these experiments do not easily correspond to the conception of consciousness as a mere epiphenomenon¹².

- b. Moreover, these results follow a coherent pattern, consistent with the role we have attributed to the conscious processing function. They show that, basically, more rapid, flexible, yet less trustworthy associations are established and that this activity often takes priority over unconscious processing [6].
2. The exact same occurs with the exclusive attribution of causality to neuronal support (at least while the differential physical nature of conscious experience has not been identified). When considering neurochemical activity as the only cause of an organisms' behavior and, simultaneously, of conscious experiences (double causality), the debate remains closed as a matter of principle.
- a. It cannot be so easily denied that, for example, pain is the cause that leads us to move our hand away when we prick our finger. When the tissue's destruction is detected, the impulse to move away and the feeling of pain are triggered simultaneously (making the latter a mere collateral phenomenon). That is because when the conscious sensation of pain disappears, you not only do not move your hand away, but you also stop screaming. Assuming that analgesics have had a simultaneous effect inhibiting both the hand's and vocal cords' motor activity, as well as the brain's centers for pain is, in our humble opinion, over-reaching. Independently of whether the presence or absence of pain generates different behaviors, it is not so simple to eliminate the causal capacity of conscious contents.
- b. Similarly, if causality only went in one direction, it seems difficult to explain the effects that mental activity have on the neurological tissue (brain plasticity). Cognitive training to recover harmed functions, neuro feedback, etc. imply that mental activity, especially in conscious mode, generates changes in the nervous system. Explaining these results only through the physical impact of external stimulus is complicated, among other reasons, because without conscious processing those effects take longer to be produced¹³. Moreover, conscious simulation of reality (imagination, dreams, hallucinations...) is enough to obtain similar effects in the brain.
3. If consciousness did not provide anything in functional terms, the fact that it has evolved at all, along with its costly maintenance as a feature of the brain's activity, would not only leave unexplained why information sometimes adopts the conscious format and other times not¹⁴, but would question the very principles of evolution [15].

¹¹ There is a certain parallel between symbolic AI and our conscious knowledge/activity, and the AI of connecting networks and our unconscious knowledge/activity, which makes it easier to understand the differences associated with both forms of computing and knowledge, as well as the limitations of each type of AI [6].

¹² See some recent publications about it [12, 13, 14].

¹³ For example, if used in subliminal stimulus.

¹⁴ Precisely to avoid explaining it, Dennett [7] considers that contents of consciousness are random.

4. Cultural and social norms control a wide range of human behavior, hence it is vital to explain the way they appear, change or endure.
 - a. Mechanistic explanations that attempt this outside of conscious activity are, to say the least, questionable, since the only models they can provide are limited at best¹⁵.
 - b. Additionally, resorting to natural selection to explain the origin of the aforementioned norms as necessarily advantageous for survival [16] is paradoxical when, as has just been noted, it is precisely the theories of evolution that are contradicted when consciousness is stripped of its adaptive value.
 - c. Some of those norms are too arbitrary or changeable (trends, superstitions, games, etc.) to be the result of mechanical-biological processes and/or established rules through regular environmental contingencies.
5. A mechanistic system is only operative when the protocol of action or computing algorithm that it has to follow under each circumstance is perfectly established, and when it receives all the necessary signals or data to act in a given situation. Under this model, the way the human being is able to respond with relative efficacy to unexpected situations would remain unexplained. In situations where adequate information is not available or where it is impossible to determine the best response before taking action¹⁶, it seems that the two most frequently used mechanistic hypotheses to explain how we respond are basically unsatisfactory.
 - a. The first possibility would be that the mind responds randomly. In that case, however, our level of efficacy would be extremely low and our survival, clearly threatened. Besides, it would be necessary for our brains to be equipped with a device for the random selection of alternatives, something that has not yet been identified.
 - b. The second option would be for the mind to be equipped with an exhaustive and versatile system to attribute probability that would automatically select the response with the greatest probability of efficacy, even when this were virtually nil. The problem here is not only imagining the way that system would work but deciphering how it would attribute probabilities without clear criteria and with little available data. Rather, if such a system existed, the difficulty would be in explaining the presence of creative and original responses in known contexts, since the slightly more probable responses would easily tend to be perpetuated.
 - c. In both cases, it would be impossible to explain the phenomenon of doubt, since both devices would select a response within milliseconds. However, since the psychological situation of doubt exists, a conscious experience of it would be an utterly unnecessary and

absurd artifact, a kind of loop that would only waste precious time and energy. Furthermore, the volume of information available for analysis does not affect a mechanical system as it does a human being. The more information about equivalent options is available, the more the human being tends to doubt, with a decision being easier to make the less data there is. On the contrary, the more data that is available to a mechanical system, the better it will conduct its analyses, while it would tend to block when faced with a scarcity of data. Lastly, doubt needs to be accounted for because we experience it, basically, because we do not want to suffer the negative consequences of an option or renounce the positive ones of another, rather than because we do not know which response is objectively a bit better or a bit worse in a given situation.

5. Neurology of Intention

Numerous experiments have measured the neurological activity that occurs prior to making a decision to perform a simple movement [17]. This activity has been interpreted to indicate that the “decision” is caused by the neurological process observed. The problem with this line of reasoning is that it assumes that current neurological measures are trustworthy, and attributes excessive features to these data.

1. Experimental rigor would require identifying every neurological pattern of conscious activity present during the experiment (because it obviously does not disappear) and discarding any causal relationship with the detected unconscious neurological process. Inexplicably, this is never considered. In fact, the neurological activity recorded may simply be part of the decision-making process. The moment the subject reports the decision has been made marks the end of the process (when the definitive “now!” has been reached). This means that time has elapsed since the beginning of the process and may partly justify any lag detected. It would be expected that, during the process, the unconscious and conscious modes work together in such a way that a certain conscious evaluation-determination would gradually increase until reaching a point where, unconsciously, certain preparatory activity (either emotional or motor) is triggered. This, once it has exceeded a threshold of intensity, is what may accelerate the culmination of the moment when the final decision is made¹⁷.
2. It does not make sense to question our conscious ability to judge the causal relation between decisions we make and our subsequent everyday behavior. Rather, we should accept as trustworthy the account given of the extremely complicated situation where the subject 1)

15 Dennett [7] brings the mind's mechanism to its ultimate consequences with total coherence, what forces him to consider rather extravagant approaches.

16 It is important to understand that, in this case, the “burden of proof” lies equally with the mechanistic hypotheses and their alternatives.

17 Using these preparatory neurological signals to surprise the individual anticipating the performance of the decision, as done in some of these experiments, only indicates that we have altered the time intervals the individual is used to, not that the decision is caused by conscious activity.

decides to perform a movement¹⁸, 2) performs it while 3) simultaneously weighing the exact moment the decision to perform it has been made and 4) finally reports it. The one-second time lag that is usually detected in these examinations of neurological activity does not really seem to shed any light on the decision-making process, bearing in mind everything that is demanded of our conscious processing capacity which, as we have already mentioned, is not particularly fast.

3. Without the freedom to decide, the instruction “move your finger whenever you want”, common in these types of experiments, is only mechanically solvable through a randomized decision-making system, whose limitations we have already noted.

6. Hybrid Solutions

While not exhaustive, the foregoing has attempted to present conceptions of consciousness and freedom that are reasonably compatible with mechanistic theory. While our position does not fully coincide with them, they are, nonetheless, important to understand.

The first modern model of how the mind works (that grew out of research in cognitive psychology) is probably Baars's [18]. For this author consciousness functions as a “common blackboard”, that is, it provides the necessary format that information must adopt in order to be exchanged between the different unconscious devices. This model assigns consciousness a role that would justify its existence in evolutionary terms, without questioning the mechanistic theory of how the mind works. Problems arise when trying to account for the fact that the unconscious subsystems interact and exchange information with each other without going through consciousness¹⁹.

Furthermore, some authors consider that, even if the workings of the human mind can be fully explained with mechanistic theory where consciousness plays but a marginal role²⁰, we remain, nonetheless, responsible of our actions, not morally, but as the organism that performs them [20]. They propound that, at a minimum, we are interested in treating each other as if this were true, since this premise provides a useful way to organize social interaction [21].

7. Conclusion: I Decide

It is vital for any organism or system that processes information to differentiate between signals that come from the outside and those that come from the inside. This involves no difficulty, as every organism possesses clear limits and clearly identifies the entry of external information. Logically, organisms endowed with consciousness must maintain this

differentiation in the internal representation they make of reality in order to prevent the system from becoming chaotic²¹.

The representation that the mind makes in conscious mode of the most constant and frequent signals that it receives (body signals [21], repeated emotional reactions, regular thinking strategies, the stable perception that actions have consequences, etc.) is the basis of what we call the “self”. These elements, common to the majority of situations we experience, eventually become familiar to us and allow us to recognize ourselves as what we are: stable, unique and differentiated organisms. Nevertheless, this ensemble of elements is not rigid, uniform and unalterable because, logically, throughout life, new contents will be added. Furthermore, we cannot expect that every response will adhere exclusively to this structure. It will be necessary to learn specific responses in given situations, as well as to react creatively or with the trial and error method in other circumstances²².

It is important to be aware that, qualitatively speaking, the conscious representation of the aforementioned elements is no more complex than that of other conscious contents. It is neither “a mind within a mind”, nor an obscure mystery or complex function. It is simply the representation of the most permanent part of reality in conscious mode. However, the corollary of the ability to generate this representation has given rise to an extremely exceptional processing model²³ because the system is able to recognize itself at all times, it can project and maintain its action on a long-term basis among the jumble of changing circumstances and resulting reassessments of goals that are constantly required by reality. Were the conscious system not “anchored” in this way, the versatility and adaptability to changing circumstances that the mind's conscious mode makes possible would entail a high risk of ineffectiveness. When the experience of the self is linked to an object, it can easily be recovered by the system at any time, even when circumstances no longer require it.

Conscious self-awareness makes it possible to re-evaluate any objective or strategy in the short, medium or long terms with a criterion that is constant and “independent” of the circumstances and that is adapted to what the system knows about itself (interests and competences).

Therefore, what we call Freedom is the faculty we possess to respond to reality with a maelstrom of speculations, conscious simulations and multidimensional evaluations of the effects of the different options being considered, against the background of the constant and familiar sensation of the self. This speculation is limitless because we lack the knowledge that would permit us to choose the correct answer. Freedom is what underlies the process to create “particular rules”, that are formulated on the basis of little available data

18 Since it is a simple and automatic movement, conscious-unconscious interaction would presumably be very well assembled and overlapped.

19 This is what Baars calls “the threshold paradox”, i.e., examining why some data adopt this format and other do not.

20 The ability to inhibit behavior is sometimes attributed to consciousness, even if these are mechanically activated [19].

21 This is what happens with hallucinations, where the individual experiences as real things that are not.

22 As an alternative to models that consider a “multiple self” strategy.

23 In opposition to Damasio [11] we do not think that the “individual's” main function is self-maintenance, because this is inherent to every living organism, even those that lack consciousness. This is different when individual consciousness is closely linked to that function.

and are, thus, exceedingly unstable. In the absence of pre-determined conclusions to our speculations (high flexibility and “constant doubt”), the only limitations to the process are:

- a. The information (truthful or not) that we consciously access about reality.
- b. Our active emotional reactions at the time, and/or those associated with the experiences we internally consider with each option.
- c. The knowledge (realistic or not) of our own intellectual, motor, social, and emotional abilities.
- d. Our conscious competence in considering and configuring original possibilities that are more or less complex (intelligence and creativity).

There are instances where speculation can be brought to an end, and the decision made “accidentally”, because of factors like tiredness, the sudden appearance of important new data, external pressures or influences, simplistic or biased considerations, etc. Nevertheless, the most frequent culmination of the speculation process is to “reach” an option whose balance of costs and benefits (believed or imagined) is profitable for the individual, in line with personal interests and leading to consequences that are tolerable to the decision-maker. This translates into the courage to face the risks entailed in a given action and the will to perform and maintain the response as long as necessary to achieve the individual's goals (capacity for sacrifice and effort).

The human mind possesses a system of conscious analysis specifically designed to make decisions that allow us to respond to the situations that we face throughout life. The efficacy of this system extends beyond the isolated advantages garnered with each victory or success, as, commensurate with our capacities, it allows us to: acquire a degree of “wisdom”, in line with our specific circumstances and individual peculiarities, learn from the mere observation of others and, because these strategies are easily communicated to others, enjoy one of the benefits of living in a group and accumulate and profit from a vast amount of “valuable” knowledge (culture, science, religion) held by the pool.

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