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ESCOLA BRASILEIRA DE ADMINISTRAÇÃO PÚBLICA E DE EMPRESAS
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DECISION MAKING NATURALIZED:
THE INTERWEAVING OF
THE UNCONSCIOUS,
THE EMOTIONAL AND THE RATIONAL
IN DECISIONS TAKEN
IN A CONTINGENT WORLD

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DECISION MAKING NATURALIZED:
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A CONTINGENT WORLD

ARISTON DINIZ DE OLIVEIRA

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GETULIO VARGAS**

ARISTON DINIZ DE OLIVEIRA

**DECISION MAKING NATURALIZED: THE INTERWEAVING OF THE
UNCONSCIOUS, THE EMOTIONAL AND THE RATIONAL IN DECISIONS
TAKEN IN A CONTINGENT WORLD.**

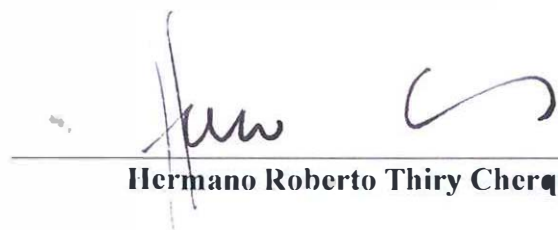
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*Friends are an aid to the young, to guard them from error;
to the elderly, to attend to their wants and
to supplement their failing power of action;
to those in the prime of life, to assist them to noble deeds.*
— Aristotle

Friendship is a single soul dwelling in two bodies.
— Aristotle

Dedicated to my parents, my sisters and Deco, whom tirelessly assisted me, since the prime of my life, in all my deeds. . .

. . . and, with all my love, to Li and Guinho with a deep desire to achieve the great feat of make three bodies being indwelt by the same soul.

ABSTRACT

Given the limitations and inadequacy both of the image of the decision maker as a rational agent, prevailing in the economic and managerial theories, as well as the image of a souled transcendental human being in the prosaic life, it is necessary to replace both images by a evolutionary, emotional and fragile, but more real, image of the decision maker.

RESUMO

Dadas as limitações e inadequações presentes, tanto no arquétipo do tomador de decisão como um agente racional, adotado nas teorias econômicas e gerenciais, quanto no estereótipo de um ser transcendental, tão presente na vida prosaica, se faz necessário substituí-los por uma nova perspectiva: onde o tomador de decisão é um animal emocional, frágil diante do acaso, e fruto de um processo evolutivo.

ACKNOWLEDGMENTS

Throughout my life, I always had the good luck to have marvelous persons around me, trying to help me make good decisions.

Right from the start, my parents offered me an environment of freedom of opinion and intellectual stimulation. I never felt compelled, or even strongly suggested, to make any decisions or take blindly, without the possibility of questioning, any position. Of course, today I diverge from some ideas that they espouse. *Thank you Dona Lícia, thanks Seu João.*

My sisters, Juli and Cema, and my friends, Toni and Deco, had always been sources of heated existential discussions around what to do or not. Another eternal debt to Toni and Deco concerns my ability to handle abstract and counterfactual thinking: nothing that a lot of fiction, beer and *rock'n'roll* does not make easier to do. *Thank you Ju, thanks Cema, thanks Toni, thanks Deco.*

Then came Li, and since then any conception of love swirling around her, or of what comes from her. Making decisions has not become easier—after all we have to reconcile our not always consonant ideas. To make decisions with her is the more definite conscious decision taken by me. *Thank you Dona Fran, thanks Liz. Li, I love you.*

More some friends came into the scene later: Pedreiro (Eugenio) and Massinha (Zé Carlos), provided me with moments of real friendship without blood ties. *Thank you Eugenio, thanks Zé Carlos.*

Some time after, and already in another city, Luiz Alfredo Vidal de Carvalho pointed me to read *Gödel, Escher, Bach: An Eternal Golden Braid*, by Douglas Hofstadter. That just changed my way of thinking about so many things. . . *Thank you Luiz Alfredo, (thanks Hofstadter).*

Then Jarbas Silva introduced me to Alexandre Linhares—and since then I felt welcomed a group of intellectual peers. *Thank you Jarbas.*

More recently, three great new colleagues—a calm one and two crazy *mavericks*—shared their thoughts with me and had the bravery to try to understand my ideas. *Thanks Pedro Leitão, thanks Michel Gomes, thanks Daniel Chada.*

Concerning Linhares, well. . . beyond thank by the intellectually stimulating years that we have shared so far, I have to explicitly acknowledge by the complicity around the decisions that I had to take to get this manuscript take off from the ground. *Thanks Linhares, a Greek (a FARGonaut) among Romans, and so many other barbarians.*

Finally, to my masterpiece (in joint work with my beloved Li) Guinho, my son, thanks for your smile, thanks for your way to be, I love you.

CONTENTS

1	INTRODUCTION	1
2	THE SCOPE AND THE APPROACH	5
2.1	The Scope	5
2.2	Dimensions and Key Concepts of Decision Making . .	7
2.2.1	The Unconscious	7
2.2.2	The Emotions and Reason	9
2.2.3	The Contingent	10
2.3	Naturalizing the Decision Maker	11
3	THE DECISION MAKING BY DIMENSIONS	15
3.1	Decision making is Evolutionary	15
3.2	Decision making is Cognitive	17
3.3	Decision making is Rational... and Emotional Too . .	19
3.4	Decision making is Conscious... and Unconscious Too	22
3.5	The Existential Contingency and Decision Making . . .	25
3.6	Socio-Cultural Factors Influencing Decision Making .	28
4	ANALYSIS	31
4.1	Rational Choice Theory	31
4.2	Prospect Theory	34
4.3	Ecological Rationality Theory	37
4.4	Naturalistic Decision Making	38
5	IMPLICATIONS	41
5.1	Civil Life and Educational Practices	42
5.2	Professionals and Experts	47
5.3	Mathematization and Computational Modeling	49
6	CONCLUSION: DECISION MAKING AND EUDAIMONIA	57
7	POSTFACE: NEXT STEPS	59
	BIBLIOGRAPHY	61

PREFACE

*Not only the origins but the progress of science
comes from acting against reason.*

— John Gray (Gray, 2007, p. 23)

Although theoretical in tone, this manuscript is the result of over twenty-five years of “empirical” experiments.

From the immature decisions of a teenager on what and when to study—and how long would be able to stay on his *rock’n’roll* band—, passing through the choice of a profession and, since then, the accumulation of various roles—son, brother, friend, boyfriend, husband, father, professional computer programmer, executive manager and an *ad libitum* and *ex abrupto* philosopher—grew up several questions about who is the, and what is to be a, *human being*. A little later, came the inexorable question about how much control we have over ourselves.

After a lot of soul searching—and a loss of “the soul”—the realization that we can’t speak about *decision making without a correct conception about the decision maker*, has led me to epistemological, existential questions... which in turn has led me to the evolutionary theory, psychology, anthropology and so on—of course, I never gave up my background from Computer Science and their shameful failure around artificial intelligence.

The present work is about all this.

It can be seen as an embryonic (and pretentious) project of a philosophy of the decision making; as a manifest, claiming the humble recognition of what is really be a human being; or simply as the condensation of the delirium of a son, brother, friend, boyfriend, husband, father, professional computer programmer, executive manager and an *ad libitum* and *ex abrupto* philosopher.

Since the last word has been written and this document is in your hands, is up to you to judge.

Sincerely and honestly,

Ariston Diniz de Oliveira
Rio de Janeiro, Brazil.
March, 2012.

INTRODUCTION

*Our reflections, our conscious thinking,
just sow a devil voice that will try to be listened in the future,
amid all our strident ideas and emotions,
in the course of our erratic and tumultuous
—and often unconscious—
attempts to make a decision about contingent facts. ♦*

— Ariston Diniz de Oliveira

August 1, 2011.

Should I eat bacon, or asparagus? Stand up now, or sleep ten minutes more? Buy a new car, or strengthen my retirement plan? Should I pass by the red traffic light and try to get the scheduled flight, or stop and certainly lose it? Advise my boss about the risks in continuing with the merge process, or keep neutral? Continue with the diplomatic negotiation process, or to command the armies to advance over the enemy?

In short, *to make decisions is ubiquitous in human¹ life.*

Most importantly, almost at all times *to make decisions is not*—biologically, psychologically, socially, culturally, politically and morally—*optional*. In some situations to decide is a question of life and death; and in (nearly) all situations, not to decide is to assume all the consequences resulting from the course of the events that a decision, had it been taken, would influence. It's *as if* you had all control over what will happen simply because—apparently, or rhetorically—you have options to choose from.

The present work has as a basic assumption that the ideas and beliefs that the person has about decision making, even when they don't have a direct impact in the process of deciding what to do—what, surely, eventually they have—always causes an indirect and powerful impression on how this very person sees your merits and power to influence the course of the happenings in your life and all surrounding it.

But decision making is not just ubiquitous and not optional... *decision making is idiosyncratic*, too. The fabric of ideas, beliefs, emotions and reasons that constitute a person, and undergirds your decisions, are accumulated in the course of your entire life—a process of accumulation, ratification and rectification which begins as soon as, if not

¹ The present work was, consciously (and “unconsciously”), done from an *anthropocentric* perspective.

before, you are kicked out of the womb and persists until your latest breathing.

As a whole these ideas, beliefs, emotions and reasons are virtually all tacit, almost always being dogmatically reinforced through habit, but rarely being submitted to a conscious and critical analysis—since that the impulse of philosophizing, despite of having your roots in the sense of curiosity and wonder that all people share (Gopnik, 2010), is frequently inhibited by biological–socio(–familial)–cultural pressing priorities; or is locked out by contingent circumstances that *Signorina Fortuna*, always working in conjunction with goddess *Necessitas*,² imposes in the course of the individual history.

That is, people form (and conform) their ideas, beliefs, emotions and reasons from (to) the demotic practices and the prosaic discourse about what is true or false, correct or wrong, worthy or unworthy, possible or impossible, and so on.

Notwithstanding that the tales, movies, songs, hymns, praying, advertisements, newspapers and sayings that made up the prosaic discourse has embedded in itself a lot of wisdom, they also have as their constituents prejudices, conceptual mistakes and recalcitrants bias.

It's important to note that it is not the case that no one took, or takes, care of thinking systematically about something as abstract as the decision–making process; neither that no one tried, or tries, to decide methodically what is true or false, nor correct or wrong about it. But in the process of formation and evolution of the various forms of human agglomerates, the specialization and segmentation of activities per (sub)groups had, by virtue of the structural gigantism that such agglomerates assume, forced some elites³ to be formed and to be concerned with philosophizing, others to preaching and others still to do science—not to mention about the elites that “took the onus” to themselves of exercising the direct political and military power. Inevitably, in a short time, some elites began to influence the tales, movies, songs, hymns, praying, advertisements, newspapers and sayings that would molds the ideas, beliefs, emotions and reasons of many—if not of all.

But the elites are not stable and perennial: the historic march perpetrated by the social dynamic, punctuated by revolutions and natural contingencies, changes the structure of the socio–cultural fabric—*mutatis mutandis*, the same must apply to the ideas and beliefs that mold and support this same socio–cultural fabric.

² *Fortuna* and *Necessitas* are, respectively, the Roman equivalents of the Greek goddesses *Tychê*—representing chance and luck—and *Anagkê*—for the destiny (fate).

³ The dynamics around the formation and change of the elites presented succinctly here took form under a strong influence of Grynszpan (1999)—even though have in itself not so much of the approach elaborated and advocated by him.

From an intellectual perspective, the *Copernicans Revolutions*⁴ reduced, and will continue to reduce in the future, the influence and the power of the myths and of the institutionalized creeds—whether they are political, religious or scientific. They also influenced, and will continue to exert influence, profoundly in how philosophy is done—making it less dogmatic by reducing the existing margins for rhetorical maneuvers.⁵

In summary: to make decisions pervades the existence of the *Homo sapiens* animal. The way and about what we think, in what we believe, as much as what we feel at each moment affects, overtly and covertly, our decision making; but what we think, believe and feel are constantly, yet that not completely, under great influences of the socio-cultural milieu where we were born and grow and live—the theories that pervades, either implicitly or explicitly, the discourses in use every day in our societies molds our ideas and, consequently, our decisions. It's from the reflection about these issues that the current dissertation has taken life. More specifically, it is the objective of the present work to question how much able to contribute in the process of criticizing and improving the current tales, movies, songs, hymns, praying, advertisements and sayings the decision-making theories in vogue are, and, in so doing, help to form better—yet still transitory—new ideas, beliefs, emotions and reasons that will undergird the conscious and unconscious process of decision making.

4 The term *Copernicans Revolutions* is (loosely) used here to designate a significant philosophical or scientific shift of perspective in our understanding of things. For example, just as Nicolaus Copernicus removed the earth from the center of the universe, taking us to trailer (Kuhn, 1957), Charles Darwin made us more animals (and less angels) than ever (Darwin, 2009).

5 Needless to say that the science itself, as a historical socio-cultural product, above and beyond to be open to their own internal diversity and controversies, is also influenced by both the “renewed” philosophy and the “retreaded” political and religious elites.

THE SCOPE AND THE APPROACH

*Formerly philosophers sought peace of mind
while pretending to seek the truth.
Perhaps we should set ourselves a different aim:
to discover which illusions we can give up,
and which we will never shake off.*

— John Gray (Gray, 2007, p. 83)

*Philosophy [and the science] which surrenders
its somewhat barren monopoly of dealings with
Ultimate and Absolute Reality will find a compensation
in enlightening the moral forces which move mankind
and in contributing to the aspirations of men
to attain to a more ordered and intelligent happiness.*

— John Dewey (Dewey, 1920, p. 26–27)

2.1 THE SCOPE

The present work is based on the conviction that our erroneous assumptions about the nature of decision maker—as well as our ideas about the process of decision making—, whether consciously articulated or not, compromises our (partial) ability to influence the decision-making process itself. The ideas and beliefs that we have about what our identity, our nature, our place in the world and our cognitive capabilities are, compels us to reinforce, and preclude us to try to change, bad habits.¹

Considering that philosophy and science work as—or, at least, should work as—substantial catalysts of change of ideas in (Western) culture, only after they recognize and inform adequately to the ordinary people, as well as the more specialized audiences, about the appropriate role that both our biological and cultural dimensions assume in the decision-making process, philosophy and science will effectively vindicate their responsibility before society around this important subject.

From this, and as outlined in the last chapter, the objective of the present work is to improve our ideas (and beliefs and concepts) about decision making. The strategy chosen to bringing this out is to evolve and defend the idea that

¹ Of course, the same mechanisms are in action around good practices and good habits.

(1) *making a decision is a multidimensional, highly idiosyncratic, process.*

The analysis of some fundamental dimensions that constitute the decision-making process, in turn, will culminate in the following proposition—that will not be so pleasing, in a first guise, for dogmatic people from any side of the two-cultures frontier (Snow, 1959)—:

(2) *The decision-making process is a natural process.*

Concerning (1)—that the decision-making process can be better understood as multidimensional—, it might, at first, did not seem so controversial. This impression will persist till the comfort zone of many be drastically reduced when more attention has been given to the idea—that will constitute the core argument of the present work—that the blending of reason, emotion and feeling, all of them constantly under the influence of biological and cultural factors, need be understood as *the* point of view about decision making. In other words, some idiosyncrasies that characterize the motivation and the proclivities behind each decision-making act come from the biological dimensions that constitute the decision maker, and not just from cultural influences to which he has been exposed so far. The Section 2.2 will introduce briefly the key dimensions/concepts that will be proposed as taking part of the process of decision making.

Regarding (2)—that decision making is a natural process—, it makes evident that is not sufficient just conceptualize the decision-making process as multidimensional, it is necessary (and urgent) to leave it distant from the misterious aura that, for many, surrounds it. This would not be a difficult task, were it not for the fact that we have more than 2,000 years of defence—through a multitude of different, and sometimes conflicting, ideas—that we have in us something of the transcendent (or unboundedly rational), that make us essentially different from other living beings.² The strategy that will be used to approach this point will be sketched in the Section 2.3.

The articulation of all concepts/dimensions—whose details we be seen in the Chapter 3—in the current scientific milieu will be scrutinized through the analysis of some theories about decision making to be done in the Chapter 4. Lastly, the Chapter 5 will elaborate on the implications that the proposed perspective brings to the decision-making theory, in particular, and to educational, professional and moral practices, as well as civil, political and economic life, in geral.

² For discussions about the autoimage that the human beings have of themselves—from different perspectives and bringing conclusions in dissonant tones—see Gray (2007) and Passmore (2000).

2.2 DIMENSIONS AND KEY CONCEPTS OF DECISION MAKING

*Knowing can be violent,
given the truths that are here to be known.*

— Martha C. Nussbaum (Nussbaum, 2003, p. 45)

As set out in the title of this work, the key dimensions to be briefly discussed in the following subsections, and that will be present throughout this work, are: the unconscious, the emotional, the rational—that are part and parcel of each of us, human beings—and the contingent—fortuitous occurrences that seems to be inherent to the basic structure of nature, being imposed on us at each instant of our life.

2.2.1 *The Unconscious*

*It is a mystery to me why the belief
that unconscious mental states are somehow problematic persists.*

— Paul E. Griffiths (Griffiths, 1997, p. 152–153)

At least since the explicit articulation of the *cogito, ergo sum* done by Descartes, it is a tacit assumption that I am all that I can probe about me, via my conscious faculties, from my (current) self-image.

Sometimes I can (or I am compelled into) engage in a state of doubt about myself. But, generally, this just occurs when I do something so awkward that the contradiction of my expectations about my self-image becomes undeniably evident by itself—for example, because I were drunk, or in a strong moment of rage. But rarely I will attribute my decisions to a “hidden” I; being easier—as a lot of traditions did through history—to assign my deviant behavior to mysterious powers, or to bodily passions.³

To some extent the unconscious was already present in the theoretical reflections about the decision making in ancient times. This is made evident in the following excerpt from the introduction of a recent book about the *new unconscious*:

The ancient unconscious in Western thought might be traced as far back as the fifth century BCE in Greece, if we define the unconscious as internal qualities of mind that affect conscious thought and behavior, without being conscious themselves. Hippocrates proposed (and Galen

³ For some old fashioned dualists—mysterians, for Flanagan (2002)—just talk about passions is equivalent to say “that it is about my body... definitely not about me—definitely not about my soul”.

elaborated on) four basic temperaments—sanguine, melancholic, choleric, and phlegmatic—that are based on bodily humors and shape behavior in conjunction with rational (conscious) thought. This same division into unconscious, biologically based influences and conscious, mental influences is echoed in Kant’s thought over two millennia later. (Hassin, Uleman, and Bargh, 2005, p. 3)

But, whenever present in theoretical and conceptual discussions, the unconscious has always been marked by the stigma of being a source of distraction from the correct way—their advice always being inferior to the irreproachable guidance of the (practical) reason.

Inherited, among other sources, from a Greek ideal,⁴ the prevalence of the (reflexive and conscious) reason was subsequently adapted by the Judeo-Christian tradition, reinforced by Descartes, and ratified and empowered by the Enlightenment. We can recognise this ideal permeating almost all (Western) philosophizing, as much as the sciences, still today (MacIntyre, 1988).

The greater recognition of the power and the influence of the unconscious guiding our actions can be associated with its rescue done by Sigmund Freud. But, unfortunately, though having in it good insights, the flamboyant discourse of psychoanalysis, when associated with some conceptual mistakes (MacIntyre, 2004; Damasio, 2010),⁵ encouraged in almost all scientists and many philosophers a significant dose of distrust upon, or an urgency to keep a secure distance from, it.

With the advent of behaviorism in America, the unconscious will fall in oblivion in the scientific circle and wait more some decades to be seriously adopted by science again. This occurred with the emergence of the cognitive psychology, c. 1950’s, and the return of intuition in the decision-making theory more recently. We can confidently say that a new unconscious is effectively present in the current philosophical and scientific discourses (Wilson, 2004b; Hassin et al., 2005; Kahneman, 2011; Kahneman and Tversky, 2000; Kahneman, Slovic, and Tversky, 1982; Gilovich, Griffin, and Kahneman, 2002; Klein, 1999; Haidt, 2006; Gigerenzer, 2008; Gigerenzer and Selten, 2002; Gigerenzer, Todd, and

⁴ To those who still associate to the Greeks an immunity to everything that is not rational, see Dodds (2004).

⁵ Damasio (2010, p. 177) exemplifies the dual feeling about Freud’s work, shared by me, when he says:

[...] I then spent weeks reviewing Freud’s papers, alternating between irritation and admiration, as always happens when I read Freud.

and Bargh and Morsella (2008, p. 73) states that:

[...] Over the years, empirical tests have not been kind to the specifics of the Freudian model, though in broadbrush terms the cognitive and social psychological evidence does support Freud as to the existence of unconscious mentation and its potential to impact judgments and behavior [...]

Group, 2000), though a lot of work needs be done until the common Joe, as well as the sophisticated experts, takes ownership of a more accurate image about the influence of the unconscious in his decisions.

2.2.2 *The Emotions and Reason*

*Passion is the basis of our noninstrumental relation to others,
and it takes us beyond fixed character,
social roles, institutional arrangements.*

— Mark Johnson (Johnson, 1994, p. 200)

The emotions (and reason) have always been present in the ideas and discussions about decision making. In the prosaic discourse they have brought stories,⁶ precepts, myths, sayings and aphorisms. These, in large part by its narrative structure, have: facilitated (and obscured) the argumentation around delicate issues (e. g., morality, virtuousness); has been used in the education of the youth; and, mediated the assessment of the behavior of individuals and groups in the social context.

Concerning their presence in the theoretical discourse, they were first articulated (in the West) by Greek philosophy,⁷ being followed by the institutionalized religion and, more recently, by science. In any of these universes of discourse—and one cannot underestimate the existing overlap and coordination between them—the attribution of what role would be assigned to each one of them (i. e., emotion and reason) has always been marked by a deep asymmetry: either the subordination of the one to another, or, sometimes, by the imposition of a qualitative dichotomy between them: e. g., Plato (Plato, 1997) argued that the emotions ought to be subjugated by reason; and David Hume characterized reason as slave of the emotions.⁸

⁶ The following can be read in a “reflection” around “the moral” in the book *Fables of Aesop and Other Eminent Mythologists: with Morals and Reflections*:

It is highly Remarkable, that as Pride, and Envy are the Two Passions, that above All Others give the Greatest Trouble to the Sons others Men, so are they likewise the First Emotions of the Mind that we take Notice of in our Approaches to the Exercise of our Reason. (Baarland, Astemio, Bracciolini, and L'Estrange, 1738, p. 37)

⁷ Reading MacIntyre (1988, p. 13–16) we become aware that it is possible find references to the role of the reason and the emotions, before the dawn of the philosophy, in the

[...] body of oral and written matter which provided educated Athenians with those shared understanding without which clearly articulated disagreements and conflicts are impossible. Central to that body of oral and written matter were the *Iliad* and *Odyssey*. From Homer, therefore, Athenians had to begin.

⁸ Given his clarity and objectivity—as well as their consonance with the exposed here—it is worth quoting Hume at great length,

But, the recent philosophy (de Sousa, 1990, 2007, 2011; Nussbaum, 2003; Lakoff and Johnson, 1999; Johnson, 1990, 2008; Flanagan, 2002), as well as scientific results (LeDoux, 1998; Haidt, 2001, 2006; Tucker, 2007; Damasio, 2000, 2005, 2010), suggests that the relationship between emotions and reasons should not be always so dichotomic, so extreme. Indeed, the emerging image suggests that a good part of our “existential” problems are consequent from a flawed understanding about the roles of the emotions and reason in our life, and that a more harmonious articulation between both will be more prodigious for all.

2.2.3 *The Contingent*

*Randomness is indistinguishable from complicated,
undetected and undetectable order;
but order itself is indistinguishable from artful randomness.*

— Nassim N. Taleb (Taleb, 2010a, p. 58)

No one—intelligent or dumb, strong or weak, old or young—can affirm that they will see the sun rise tomorrow; no parent can be confident that him/her will not die before their children; and no manager, regardless of how well assisted he/she is, can assure that their business plan will be successful in short run.⁹

With that said, we continue to arrange meetings to tomorrow (and, sometimes, to next year); to bear children; and to initiate (which would ultimately turn out to be multi-months millionaire projects as) few-weeks millionaire projects. Giving a discount for the overconfidence of some people, there’s nothing extremely wrong with doing so.¹⁰

Nothing is more usual in philosophy, and ever in common life, than to talk of the combat of passion and reason, to give the preference to reason, and assert that men are only so far virtuous as they conform themselves to its dictates. Every rational creature, ’tis said, is obliged to regulate his actions by reason; and if any other motive or principle challenge the direction of his conduct, he ought to oppose it, ’till it be entirely subdued, or at least brought to a conformity with that superior principle. On this method of thinking the greatest part of moral philosophy, ancient and modern, seems to be founded; nor is there an ampler field, as well for metaphysical arguments, as popular declamations, than this supposed pre-eminence of reason above passion. The eternity, invariableness, and divine origin of the former, have been displayed to the best advantage: the blindness, inconstancy, and deceitfulness of the latter, have been as strongly insisted on. In order to show the fallacy of all this philosophy, I shall endeavour to prove *first*, that reason alone can never be a motive to any action of the will; and *secondly*, that it can never oppose passion in the direction of the will. (Hume, 1826, p. 166–167)

⁹ A frustrating state of affairs for some people, since the frenetic search for immediate results has become common practice in the business world (Sennett, 1998, 2007).

¹⁰ Except, of course, for the little distortion of the deadlines for the exemplified project. A typical case of *planning fallacy* (Kahneman and Tversky, 1979a).

the impossibility of prediction is not justification for immobility, to be paralyzed by fear of haphazard.

But, due to the recurrent unforeseen natural contingencies and fortuitous hazards of the life that affects all living beings, it would be expected that all of us had already understood that

*there are too many forms for a decision taken to lead to a failure,
and so little chance that all that is needed will fall in the perfect
places to the foreseen become reality.*

Each one of us, consciously or unconsciously, needs to negotiate our lives in the middle of the existential contingencies, using all resources available to us in the limits of our own *epistemic horizon*¹¹ to live a life as good as possible.

All this considered, to take an accurate¹² decision in the contingent life lived by the *rational dependent animal* (MacIntyre, 2001) that the human being is seems an almost impossible task. At the same time, despite this apparent impossibility, it is undeniable that the recent evolutionary success of *Homo sapiens*¹³ was strongly associated, amongst other factors, to our capacity to make sophisticated decisions—trying to foresee a distant future.

Make sense of all this—that our capacity of take (imperfect) decisions, regardless of the impossibility of making perfect guesses, made us the most prominent of all animals on earth, and that there is nothing of mysterious, of supernatural in this fact—is informative. But more than to make sense of our success, is the objective of the present work to discuss about the necessity of pay attention to our perceptive, emotional and cognitive limits front of the contingent.¹⁴

2.3 NATURALIZING THE DECISION MAKER

*[...S]imply takes 'natural' to mean of nature.
On this reading naturalism is simply*

¹¹ The concept of *epistemic horizon* will be presented and elaborated in more details in the [Section 3.4](#).

¹² To define or to evaluate whether a decision taken was “accurate” (“correct”) is always a complex and almost impossible task—anyway, it is not a task under way here. In the present context the word “accurate” must be read in a somewhat informal tone.

¹³ Diamond (2006b, p. 35) reminds us that:

To place human evolution in a time perspective, recall that life originated on Earth several billion years ago, and that the dinosaurs became extinct around sixty-five million year ago. It was only between six and ten million years ago that our ancestors finally became distinct from the ancestors of chimps and gorillas. Hence human history constitutes only an insignificant portion of the history of life.

¹⁴ Not take in count, either by arrogance or negligence, the impossibility of predicting the future in a decision-making act is, as an old Brazilian adage says, “bring luck to mischance”.

*the requirement that an intellectually satisfying account of whatever
(intentionality, culture, death and taxes, bent spoons)
must show how it is that the phenomenon in question
is part of reality, belongs to the world.*

— Brian C. Smith (Smith, 1998, p. 138)

The term *naturalizing* has had a bad time in the humanities for a long time. If the origin of this conundrum in the past can be justified largely by a bilateral inability to surpass old theoretical divergences—and, already at that time, establish a strategy for the defence of political–financial interests for both sides—, today this state of affairs cannot be unqualifiedly warranted—except, of course, by some old (and new) dogs refusing to learn new tricks, or by old (and new) foxes fighting the grants’s wars.

Unwilling to get into the intricacies of a discussions about reductionist approaches and other *red herring* terms, it may be enough to say that, today, it is increasingly common to recognize scientists from the natural sciences with a discourse “distant of the atoms and molecules” and approaching more and more “the phenomenological”, “the social” and “the cultural”.

In fact, for a long time the natural sciences has not surrendered to the caricature that to naturalize a phenomenon it is necessary to just say that “a giant mass of atoms in intense interaction favors the emergence of. . .”. Neither turn to arguments in favor of unidirectional links between culture and psychology, psychology and physiology/neurology, physiology/neurology and biology/ecology, biology/ecology and phylogeny, phylogeny and chemistry, chemistry and physics, physics and. . . physics.

Even though to take this (unidirectional) path sometimes is not completely fallacious, to take *just* this path is, almost always, simplistic and trivializing—not so informative and not so theoretically effective for doing justice to the richness of the vast majority of phenomena concerning human affairs.

That said, the *unidirectional causal path* can be, and has been, avoided. We have currently in use in the scientific milieu concepts that recognize the existence of causal links between the levels of abstraction in a complementary direction, where were usually seen just unidirectional links as the existing ones. Can be cited as examples that does not surrender to the *unidirectional causal path* the concepts of *downward causation* (Sperry, 1969, 1988, 1991; Murphy, Ellis, and O’Connor, 2009)—used to describe the influence of the mental on the physical phenomena—and the *Baldwin effect* (Weber and Depew, 2003)—used to discuss the influence of culture in biological (evolutionary) phenomena.

One of the objectives of the present work is *to bring the decision maker to the naturalized world*—therefore, the decision–making process, too. And this will be done by discussing constituent dimensions, elements

of this process—the unconscious, the emotions and reason, that are part and parcel of the decision maker, and the existential contingencies with which he/she is subject to—and making explicit the evolutionary history behind them, when pertinent.

Ergo, each dimension/concept that will be discussed here, as well as any proposition to be made, will be done in a theoretical framework that strives to make evident—and thus do justice—to the natural character that each of them possesses. The general strategy will be, as much as possible, to take the decision-making process as it occurs *in the wild* (Hutchins, 1995; Klein, 1999, 2009).¹⁵ The exposition will be based on scientific results from various research areas (e. g., neuroscience, psychology and other cognitive sciences) and will be substantiated, where pertinent, with some philosophical arguments.

A last word for the skeptics about the naturalizing of the *human condition*:¹⁶ any and every human being, were it not for some *innate* traits to socialization (not unique to *Homo sapiens*) would live completely immersed in an individualistic and poorly subjective (and autistic *ad extremum*) world. Just because each human being shares a common biological (genetic) make up it is possible that a partial superposition of their *individual subjective worlds* take place through socialization. This superposition is potentialized by orders of magnitude by the (more recent) possession and the use of symbolic language¹⁷—another capability highly dependent of innate traits. When geographical and historical developmental factors are added to this picture, the possibility of existence of a myriad of *inter-subject worlds* emerge: couples' worldviews, family' worldviews, tribal worldviews, regional worldviews,

15 Even though speaking specifically about cognition, we will try to stay in line with Hutchins (1995, p. xiv) when he says:

[...] I have in mind the distinction between the laboratory, where cognition [decision making] is studied in captivity, and the everyday world, where cognition [decision making] adapts to its natural surroundings. I hope to evoke with this metaphor a sense of an ecology of thinking in which human cognition [decision making] interacts with an environment rich in organizing resources.

In a similar tone, Klein (2009, p. 7) says:

[...] We conducted our studies in natural settings, rather than in laboratories, because we wanted to understand how people think under shadowy conditions, such as ambiguity, vague goals, and situations that keep changing.

16 Human Condition, must be read here as “[...] the experiences of being human in a social, cultural, and personal context” (Wikipedia, 2011).

17 At this point it is impossible not to cite Wittgenstein's somewhat elliptical statement: “If a lion could talk, we could not understand him” (Wittgenstein, 1958, p. 223). In other words, even if a lion could speak one of the various existing human languages, its metaphors, its analogies, its ideas would be closely linked to the characteristics of its embodiment and of their emotional repertoire, making of them “somewhat” unintelligible to the humans.

national worldviews, religious worldviews, philosophical worldviews, and so on, *ad infinitum*.

To the result of this flux and its convolutions (till now, and still, and for ever, in course) we give a name: culture. That is, culture generates culture, but culture is not supported by *skyhooks*. It is the result of the cumulative hard work done by a lot of *cranes*¹⁸ along the evolutionary history (Boyd and Richerson, 2005).

¹⁸ See Dennett (1996, p. 73–80) for an introduction to the contrast between *skyhooks* and *cranes* as metaphorical alternatives for explanation for the work of R&D done by mother nature.

THE DECISION MAKING BY DIMENSIONS

*Darwin's theory shows the truth of naturalism:
we are animals like any other;
our fate and that of the rest of the life on Earth are the same.*

— John Gray (Gray, 2007, p. 31)

The following sections will expose some concepts and theoretical perspectives that are the fruits of the furious concussion of the vortexes of knowledge produced by science and philosophy in the last centuries and that will be able to contribute to a better understanding of what we really are and how the decisions taken by us take place.

3.1 DECISION MAKING IS EVOLUTIONARY

*There are times [, or there was a time,] when
independent decision making is a bad idea...*

— Daniel C. Dennett (Dennett, 1997, p. 66)

Four billion years ago¹ no one could make decisions—just because four billion years ago simply there's nobody out there to take decisions.² Since then, there have been some major evolutionary transitions: critical periods in which organisms have emerged with capabilities to locomotion, perception, social traits and communication (Smith and Szathmáry, 1997, 2000). Over those same four billion years—certainly in the latest one—have also emerged organisms with emotions, reason and consciousness: organisms capable of taking complex decisions.³

¹ Although not defending explicitly any specific cosmology, the present work assumes that both “mythological cosmology” and “religious cosmology” constitute oxymorons.

² Christian (2008, p. xxiv) says to us that: “[...] 3.5 billion years ago, within just a billion years of the Earth's creation, some of these chemicals formed the first living organisms. Biologists call these tiny, simple, one-celled organisms ‘prokaryotes’ [...]”. See Christian (2005) too.

³ Just by mere exercise of imagination, if we do grant to tropisms the status of proto-decisions, it's possible to estimate the history of decision making in the order of billions of years; if we do grant to choice of reproductive partners by complex organisms the status of decisions, then the time interval to consider now is of millions of years; if we do assume conscious reflection about the decision taken as the relevant point—and this would require us to rule out the possibility of unconscious decision making (the implications of which will be seen in the Section 3.4)—, will need wait for the development of consciousness, something that, up to now, is conceded without disputes just to the *Homo* genus: millions of years yet.

Considering only the written history, we can adopt the work of Homer as the first records of something that can be considered a systematic reflection about decision making: we come to thousands of years.

With the publication of *The Origin of Species* by Charles Darwin—roughly one hundred and fifty years ago—we were given an additional theoretical perspective from which we could think properly about various intricate issues—problems which hitherto were almost exclusively under the custody of the power of tradition and the mythical thinking. Considering how recently the theory of evolution has been effectively adopted out of the circle of biologists, it is not so surprising—although, occasionally, a bit frustrating—that we still live immersed in a whirlwind of confusions on the subject.

Even not being exempt from internal and external controversies,⁴ as any good scientific theory must be, the theory of evolution is constantly ratified as extremely prolific and resilient to refutation.⁵

Already designated as an *universal acid* that

[...] eats through just about every traditional concept, and leaves in its wake a revolutionized world-view, with most of the old landmarks still recognizable, but transformed in fundamental ways, [...] (Dennett, 1996, p. 63)

the theory of evolution has already profoundly transformed our conception about life and ourselves: to be the *Homo sapiens* is to be nothing more than an animal, the *Third Chimpanzee* (Diamond, 2006b).

In other words, from an evolutionary perspective all phenomena concerning an (alive) organism can be explained without recourse to supernatural factors. Our reason (de Sousa, 2007) and our consciousness (Dennett, 1993) are no more transcendental faculties—our body, our embodiment being necessary and sufficient to them.⁶ No divine gift, nor demonic influences, neither an intelligent designer are needed: all our capabilities and limitations are the product of a blind evolutionary process (Dawkins, 1986; Brockman, 2006) that molds our biological profile—which results in everything from our eyes, to our (basic) emotions (Ekman, 1999; Griffiths, 1997), to the capacity of have a language (Pinker, 2000)—and that stay in constant interaction with the emergent processes and properties of culture.

4 For example, punctuated equilibrium theory *vs.* phyletic gradualism; and “what is the biological unit (e. g., genes, cells, individuals, groups, species) which is subject to natural selection” question. For one particular battle ground, see (Sterelny, 2003).

5 Mayr (2002, p.16), rightly, states that

[...]there is no longer any need to present an exhaustive list of the proofs for evolution. That evolution has taken place is so well established that such a detailed presentation of the evidence is no longer needed. In any case, it would not convince those who do not want to be persuaded.

6 It is important to highlight that the necessity and sufficiency attributed to the embodiment here is just about the *Homo sapiens* animal. That is, even arguing that *human reason* and *human consciousness* are strictly associated to human embodiment, this does not preclude the possibility of alternatives form of artificial reason and artificial consciousness. More about this point in [Section 5.3](#).

Among the implications of the stated above, it may be highlighted that since our perception, emotion and reasoning capabilities are a result of natural evolution—therefore, being situated and embodied (Varela, Thompson, and Rosch, 1993; Clark, 1998; Lakoff and Johnson, 1999)—, any decision-making theory should consider the decision maker as an embodied animal and not as a, in principle impossible, resulting amalgam of a Cartesian interaction between the *res cogitans* and the *res extensa*—a non-physical, immaterial and eternal substance interacting with the physical world via the physical pineal gland.

That is to say, humans have more in themselves of the *Affe mit Schüdel*⁷ of Hugo Rheinhold than anything of a postlapsarian being.

3.2 DECISION MAKING IS COGNITIVE

*We now understand that the human mind is
fundamentally not a logic engine but an analogy engine,
a learning engine, a guessing engine,
an esthetics-driven engine, a self-correcting engine.*

— Douglas Hofstadter in Nagel and Newman (2001, p. xviii)

The decision maker is a natural organism, a product of evolutionary process of natural selection,⁸ immersed in a physical and socio-cultural environment highly dynamic and complex. But as any capability possessed by a natural organism, the decision-making capability has not came out of nowhere—*by fiat*, out of the blue!

As evolutionary precedents of decision making the capabilities to react to stimulus from environment are provided by: reflexes (definitely, not decision-making acts, yet!); tropisms (generously, proto-decisions. . .); and, instincts (in some cases, semi-complex actual decisions). All of them were used by almost all species that existed so far (at least in the *Animalia* kingdom); and, all of them are still in use

⁷ For some curiosities about the *monkey with skull* of Hugo Rheinhold, see Richter and Schmetzke (2007).

⁸ Were it not by some tragic consequences, the insistence in seeing the ability to make decisions as a transcendental gift (given just to humans) would be just a curious trace of the human arrogance—a sense of superiority that fails to pass unscathed to a simple comparative cognition test (Hughes, 2011). Naturalistic approaches not only nourishes humility, as stimulate new interesting perspectives, as such:

Optimal decision-making requires a set of higher-order cognitive functions by which individuals regulate their actions, thoughts, and emotions according to current psychological or physiological states, goals, and environmental conditions. In particular, individuals must be able to appraise the momentary status of their needs. Therefore, *decision-making is part of a homeostatic process*. (Paulus, 2007, emphasis added)

by existing ones—in some case the same organism can use more than one of them.

But, whatever the level of sophistication of the mechanisms that the organism possesses to apprehend information about and react to the (physical and/or abstract) environment that surrounds it, all of them consist basically in the following elements:

- sensing (via exteroception, proprioception and interoception);
- memorizing;⁹
- processing; and
- acting.¹⁰

Concerning the human decision maker in particular, to be sensitive to, to be knowledgeable about physical and abstract aspects of the world around her/him demands the use of perception, attention, memory, emotion/feeling and abstract reasoning. A mental dimension common to all these faculties can be collectively designated by, against the scientific orthodoxy, the term *cognition*—at least to do justice to its etymology.¹¹ Whenever the term cognitive is used in the present work, it denotes an embodied and situated “to know”:

[...] The brain evolved to regulate the motivational control of actions that are carried out by the motor system and guided by sensory evaluation of ongoing environmental events. There are no faculties of memory, conscious perception, or music appreciation that float in the mental ether, separate from the bodily functions. If we accept that the mind comes from brain, then our behavior and experience

⁹ When it comes specifically to the term “memorizing”, it is necessary some care not to surrender too much to a “neurocentrism”. Even though our brain is, unquestionably, the seat of the pinnacle of what we mean by “memory”, we must not forget that nature makes use of other strategies to retain information to guide future actions. Some in long time scales (e. g., innate immune system and Phylogenetic Memory—see [Llinás \(2001, 176–178\)](#)) and other in short-term (e. g., adaptive immune system—see [Dempsey, Vaidya, and Cheng \(2003\)](#)).

¹⁰ It is important to highlight that “acting” as used here is not a passive output stage in a linear sequence, such as: input + processing + output. It is part and parcel of the highly complex, recurrent and reentrant loops that constitute the capacity to sensing and meaning making ([Clark, 1998](#); [Johnson, 1990](#); [Noë, 2004](#)).

¹¹ According the sense used here, *cognition* departs from the traditional analytic philosophy, where “cognitive”, as well as “non-cognitive”, has to do with a compartmentalized capability associated to the use of formal rules and truth conditional semantics of sentences of a symbolic language.

Cognition comes from the Latin *cognoscere*, meaning “to know”. Such that, to perceive one thing is *cognoscere* something about it: become aware of its existence; get emotionally engaged is qualitatively *cognoscere* that something happened, or is about to happen. This, though not altogether invalidating the common use made of the term *Cognition*, at least calls into question the dichotomies: cognition *vs.* perception and cognition *vs.* emotions.

must be conceived of as elaborations of primordial systems for perceiving, evaluating, and acting. When we study the brain to look for the networks controlling cognition, we find that all of the networks that have been implicated in cognition are linked in one way or another to sensory, motor, or motivational systems. There are no brain parts for disembodied cognition. (Tucker, 2007, p. 59)

From this perspective perception and attention, all about memory, the emotions and feelings, producing and understanding language, and—last, but not least—reason, are (conscious and/or unconscious) embodied and situated cognitive processes: none of them can be a transcendental capability; no one can be influenced by a supernatural power.

Each and every decision taken by us, human beings, comes from the cognitive processes arising out of the evolutionary organismal complex that each *Homo sapiens* animal is.

3.3 DECISION MAKING IS RATIONAL... AND EMOTIONAL TOO

*We tend to judge others by ourselves,
and because scientific and philosophic books are composed by men in
whom the reasonable, logical and objective habit of mind predominates,
a similar rationality has been attributed by them
to the average and ordinary man.
It is then overlooked that both rationality and irrationality
are largely irrelevant and episodic in undisciplined human nature;
that men are governed by memory rather than by thought,
and that memory is not a remembering of actual facts,
but is association, suggestion, dramatic fancy.
The standard used to measure the value of the suggestions
that spring up in the mind is not congruity with fact
but emotional congeniality.*

— John Dewey (Dewey, 1920, p. 6)

Human life is permeated by emotions. Not only the spontaneous ones, resulting from fortuitous events, but also by so many emotions that we actively seek through the arts, sports and various other activities. It can even be said, echoing David Hume, that each and every action of ours is motivated by our emotions—that reason has no power to directly mobilize volitional acts, neither directly restrain us from committing them.

But the asymmetry between the reason and the emotions—previously mentioned in relation to their roles concerning our capabilities to do good decision making and influence our well being—becomes once

again evident when reason is classified as a divine gift; and emotions are relegated to an inferior status, associated with our animal side.

Lakoff and Johnson (1999, p. 3–4) inform us that:

[...R]eason has been taken for over two millennia as the defining characteristic of human beings. Reason includes not only our capacity for logical inference, but also our ability to conduct inquiry, to solve problems, to evaluate, to criticize, to deliberate about how we should act, and to reach an understanding of ourselves, other people, and the world.

And, in the sequence, states that:

[...R]eason is evolutionary, in that abstract reason builds on and makes use of forms of perceptual and motor inferences present in “lower” animals. The result is a Darwinism of reason, a rational Darwinism: Reason, even in its most abstract form, makes use of, rather than transcends, our animal nature. The discovery that reason is evolutionary utterly changes our relation to other animals and changes our conception of human beings as uniquely rational. Reason is thus not an essence that separates us from other animals; rather, it places us on a continuum with them. (Lakoff and Johnson, 1999, p. 4)

Given its embodied and, accordingly, evolutionary character, the reason faculty, so celebrated in verse and prose since immemorial times, simply cannot be an unique feature of *Homo sapiens*—since it is a phylogenetic successor of perception, memory, and, last but not least, the emotions. And, from an evolutionary perspective, to be phylogenetically more recent implies in having characteristics/faculties/traits that were accommodated and harmonized among, and sometimes are inextricably dependent of, characteristics/faculties/traits already present in the same phylogenetic lineage.

The relevance of the emotions for the smooth functioning of the reason is stated in a concise and compact form in the following excerpt from Damasio (2005, p. xii):

[...] When emotion is entirely left out of the reasoning picture, as happens in certain neurological conditions, reason turns out to be even more flawed than when emotions plays bad tricks on our decisions.

And he continues, elaborating:

[...] emotions marked certain aspects of a situation, or certain outcomes of possible actions. [...] Clearly I never

wished to set emotion against reason, but rather to see emotion as at least assisting reason and at best holding a dialogue with it. Nor did I ever oppose emotion to cognition since I view emotion as delivering cognitive information, directly and via feeling. (Damasio, 2005, p. xii–xiii)

Thus, a theory of decision making that compartmentalizes the emotions from the reason—completely ignoring the existing dependence between them (e. g., the *homo economicus* construct, as defined by Rational Choice Theory), or proposes that reason, as an independent mechanism, can subjugate the emotions—will have as an obligation to amass sufficient scientific evidence that reason was developed independently of, and still operates as a cognitive mechanism distinct from, emotions.

But, in as much as this biological dependence has stayed opaque, other sources of knowledge were not to be ignored. The Western archetype of reason exalted in various conceptions—whether belonging to scientific, philosophical, or the popular imagery—is that of arbitrator, always qualified to decide accurately between the available options at an impasse. Their alleged accuracy in pointing which is the “best” among the existing options is what makes it better than the mere luck, or better than the impulses of the passions and of the emotions. But, the growing mass of evidence suggests that, when left to “their own luck”, reason alone cannot resolve each and every impasse found.

To explain rational decisions taken in situations where the reason is not of great help de Sousa (1990, p. 203) defends *the rationality of emotions*:

[...] The biological function that makes them [the emotions] indispensable to complex intentional organisms—ones unlike either ants or angels in that they are not subject to simple determinism—is to deal with the philosophers’ frame problem: to take up the slack in the rational determination of judgment and desire, by adjusting salience among objects of attention, lines of inquiry, and preferred inference patterns. In this way emotions remain *sui generis*: the canons of rationality that govern them are not to be identified with those that govern judgment, or perception, or functional desire. Instead, their existence grounds the very possibility of rationality at those more conventional levels.

Later he elaborates his conjecture by stating that:

Emotions have deep biological roots; it is crucial to their nature and function that they are physiologically implemented in human beings. At the same time they are essentially mental—even if we grant the possibility that some of

them may be unconscious. Their character as mental states involves a great complexity of informational, intentional, and causal features usually summed up as their “object-directedness.” [...] The intentional complexity of emotions is what makes it possible for emotions to play a crucial role in rationality. (de Sousa, 1990, p. 331–332)

Nussbaum (2003, p. 3) also recognizes as necessary to propose that our emotions are intelligent (i. e., are rational):

[...] Emotions are not just the fuel that powers the psychological mechanism of a reasoning creature, they are parts, highly complex and messy parts, of this creature’s reasoning itself.

So, in disregarding the emotions, as does the Rational Choice Theory, it is being disregarded the animal that is the *Homo sapiens*; is being looking for a *Laplacian demon* that was exorcised long time ago (Simon, 1955).

Moreover, to relegate the emotions to the condition of villainesses is to deny to them the rationality that they have, bringing to the theory that made this claim the burden of justifying rational decisions taken when reason is not in charge.

3.4 DECISION MAKING IS CONSCIOUS... AND UNCONSCIOUS TOO

*In nature, the “unconscious mind” is the rule,
not the exception.*

— John A. Bargh (Bargh and Morsella, 2008, p. 78)

Since our earliest childhood our (Western) culture strengthens and exacerbates our natural tendency to form and reinforce a sense of identity,¹² individuality¹³ and responsibility: weighing ethical and moral aspects of our thoughts and actions; struggling to weave a causal network in which we stand significantly; and, searching to make a good narrative for our life. Therefore, it is not so easy to accept that “another” (hidden) *I* has been taking decisions by me; or has been, surreptitiously, influencing *my* decisions. But, of any sort, a hard part into the maturing process to adulthood is to give up some comforting illusions.

Concerning decision making—i. e., to best understand it and, consequently, yourself—is needed to reconceptualize the illusion of agency, of conscious control over everything that you do.

¹² For some interesting reflections (and profound ideas) about our identity, our self, see Parfit (1986, pt. III), Hofstadter (2007) and Hofstadter and Dennett (2000).

¹³ As Flanagan (2002, p. 262) highlights “[...] whereas for North Americans [and Westerners, in general] it is important to stand out from the crowd, for Japanese it is not”.

To make sense of this will be instructive—if not mandatory—to adopt, one more time, the evolutionary perspective: we will adopt the position that unconscious beings are phylogenetically prior than the conscious beings—that conscious modes of thought and behavior are more recent, evolutionarily speaking. (Donald, 1991)¹⁴

The implications of this are enormous.

Assume: (i) that in some moment of the evolutionary history consciousness began to take form; so, that (ii) consciousness had arisen in ancestors of *Homo sapiens*—therefore it is not an exclusive trait of human beings, neither a divine gift; which, in turn, characterizes it as (iii) a faculty in continuity with the unconscious—not being a trait that evolved independently; and, finally, that (iv) consciousness has been built based on an unconscious foundation.

An additional coherent assumption can be derived from (iv), namely: (v) that in the course of its evolution, consciousness does not supersede unconsciousness—the former complements the latter, assuming some old functions and adding new stuff; but both remain in full operation, almost always running smoothly.

It is from this evolutionary–embodied–cognitive machinery that our unconscious and conscious takes form. And it is from the embodied unconscious and the embodied conscious that all information that forms and informs our self, our ideas and that guide our (overt and covert) decisions emerges, forming our *epistemic horizon*.¹⁵

Having in itself a lot of Herbert Simon's *Bounded Rationality* (Simon, 1955), as well as a great influence of the Jakob von Uexküll's *Umwelt* (Schiller, 1964, Pt. I),¹⁶ we must understand our *epistemic horizon* as the massive wealth of information arising from the perceptive, emotional, cognitive, linguistic and socializing/cultural capabilities that each living being realizes in the course of their development—capabilities that, although somewhat limited and conditioned by genetic factors,¹⁷

¹⁴ Even though this position is not exempt of controversies. Sheets-Johnstone (1999, p. 77) try to defend that:

[...] the natural history of consciousness [...] demands a re-thinking of the common assumption that historically—particularly with reference to the evolution of nonhuman animals—unconsciousness preceded consciousness [...]

The work of Maxine Sheets-Johnstone is very respectable and their arguments, on many other points, are persuasive and profoundly influences my reflections. But, specifically on this point I choose to remain momentarily silent about their arguments—until I can submit them to better scrutiny.

¹⁵ The concept of *epistemic horizon* has similarities with the same term used by Dennett (2003, p. 91), even though it has been conceptualized initially without prior knowledge about this work.

¹⁶ I must give explicit credit to Hofstadter (1995), Hofstadter (1999), Smith (1998) and Linhares (2000), too.

¹⁷ We cannot, at our will, and without help of tools, for example: recognize ultrasound waves; see the infrared part of the spectrum of light; check the presence of micro-organisms in substances; and, feel flavors and odors that are out of reach of our structurally limited physiology.

possesses, too, an innate plasticity that makes possible a great influence of the physical, social and cultural environment available to this living being.

We can see the unconscious working all the time through a myriad of functions that the brain/body–complex maintain (definitely better) without a single conscious act from our conscious “I”—e. g., breathe and digest. But these are “basic routines”, so taken for granted that, possibly, they will not impress any one.

But then, look carefully in the parsing of phonemes, words and phrases that are carried out automatically, eliciting a coherent meaning of what you hear and evidencing impressions, not so explicit, through the emotions to your (un)conscious *I*. Then, think about the complementary process of weaving coherent and complete sentences in response—where almost all things to be done are carried out, from muscular micro–articulation up to the enlistment of concepts, without the inconvenient interference of the conscious.

To appreciate how inconvenient (or limited) consciousness can be occasionally, just try to think about another subject, or make a simple operation of addition, in the middle of a decision–making process. Sometimes, simply reflecting deeply about the same subject in the course of your conversation changes the outcome of a speaking act. . . sometimes resulting in a sudden stuttering.

Concerning unconscious decision making acts, Damasio (2005, p. xii) says that:

[...] emotions marked certain aspects of a situation, or certain outcomes of possible actions. Emotion achieved this marking quite overtly, as in a “gut feeling”, or covertly, via signals occurring below the radar of our awareness[.] As for the knowledge used in reasoning, it too could be fairly explicit or partially hidden, as when we intuit a solution. In other words, emotion had a role to play in intuition, the sort of rapid cognitive process in which we come to a particular conclusion without being aware of all the immediate logical steps. It is not necessarily the case that the knowledge of the intermediate steps is absent, only that emotion delivers the conclusion so directly and rapidly that not much knowledge need come to mind. This is in keeping with the old saying which tells us that “intuition favors the prepared mind”. (Damasio, 2005, p. xii–xiii)

The fact is that:

When we apply scientific evidence to an analysis of mind, we find that the mind which we always took for granted turns out to be, well, unavailable. We naïvely assume a state of mental agency, a state in which we are in control of

the mind. But when we study its regulatory mechanisms—especially in their biological forms—we find the mind is only partially transparent to conscious inspection, and only partly under volitional control. (Tucker, 2007, p. v)

In the last decades, the amount of scientific evidence about the influence of the uncounscious in social behavior and in the decision making increased substantially. Just to cite some results:

- Attitudes of rudeness, slowness, and hostility were unconsciously triggered, via priming, and “the individual’s lack of awareness of the source of the automatic behavior impulses usually translates into a lack of monitoring or attempt to control them [...] which will also increase the likelihood that the activation of automatic behavior responses will find expression” (Bargh, Chen, and Burrows, 1996).
- By the simple fact of “[...] holding heavy or light clipboards, solving rough or smooth puzzles, and touching hard or soft objects nonconsciously influenced impressions and decisions formed about unrelated people and situations” (Ackerman, Nocera, and Bargh, 2010).
- The “[...] experiences of physical warmth (or coldness) would increase feelings of interpersonal warmth (or coldness), without the person’s awareness of this influence” (Williams and Bargh, 2008).

We cannot always remember all facts around all decisions taken by us. Sometimes we are not even able to justify some decisions. But it is no longer acceptable to attribute our decisions to transcendental elements, or immaterial entities, and, from this, becomes unsustainable the

[...] tempting to think that deep within the brain [or outside our bodies] lives a soul, a free agent that takes account of the body’s experience but travels around the cranium on its own accord, reflecting, planning, and pulling levers of the neuromotor machinery. (Wilson, 2004a, p. 71)

As it is necessary to accept our evolutionary history, and the prominent role of our emotions, it is also necessary to recognize our unconscious. To recognize it is an indispensable step to improve our decisions.

3.5 THE EXISTENTIAL CONTINGENCY AND DECISION MAKING

*[T]here are known knowns: there are things we know we know.
We also know there are known unknowns:*

*that is to say we know there are some things [we know] we do not know.
But there are also unknown unknowns—
the ones we don't know we don't know.*

— US Secretary of Defense Donald Rumsfeld (Rumsfeld, 2011)

The human history, as well as the history of life, is the history of a constant struggle against *chance and necessity* (Monod, 1971; Bennett, 1999; Taleb, 2005). The physical fabric that grounds our existence seems have an intrinsic chancy, fortuitous structure.¹⁸

But we cannot ignore that in the scale of natural phenomena perceptible to the human being—mainly due to intrinsic limitations from our biological makeup (e. g., epistemic biological opacity, psychological biases)—a lot of things appear as (practically) necessary to us. From this, to talk about *the contingent* from a human perspective is necessary an auxiliary (operational) concept of uncertainty, a concept in line with the following:

[...] Every finite information-user has an epistemic horizon; it knows less than everything about the world it inhabits, and this unavoidable ignorance guarantees that it has a subjectively open future. . . . (Dennett, 2003, p. 91)

So, *the certain*, the known that is “less than everything about the world” we inhabit, is the result from:

The intrinsic impossibility of human beings to capture, remember, feel, stir emotions and process all about the world around him/her. *We have always abstracted, we will always to abstract*—not for mere convenience, but by an intrinsic need arising out our evolutive–existential condition.

From this intrinsic cognitive impossibility, from this intrinsic epistemic limitation—the *epistemic horizon*—follows the *unknown unknowns* (Rumsfeld, 2011) and all their consequences in our lives.

To gain some additional structure in the exposition to be done about *the uncertain* and *the epistemic horizon*, two additional concepts will be of great value to us, namely:

- *Epistemic opacity*, to designate our perception of an apparent randomness in the fabric of reality, that actually “[...] is the result of incomplete information at some layer”, and therefore “[i]t is functionally indistinguishable from ‘true’ or ‘physical’ randomness” (Taleb, 2010b, p. 302); and

¹⁸ Considering, amongst other issues, the tension yet not resolved introduced by quantum physics in any strictly deterministic world view, Prigogine (1997, p. 189) say:

What is now emerging is an “intermediate” description that lies somewhere between the two alienating images of a deterministic world and an arbitrary world of pure chance[...]

- *Epistemic arrogance*, to “[m]easure the difference between what someone actually knows and how much he thinks he knows”. (Taleb, 2010b, p. 302)

These two concepts characterize two forces—an almost completely innate (biological), other substantially psychological—in tension to mold the epistemic horizon that each person possesses. The first one arises from a strong interaction with nature (i.e., via our particular phylogenetic profile) and a little influence of nurture¹⁹ (e.g., as responses to the physical and cultural environments surrounding us), the second one is almost exclusive from the nurture domain.

A stunning example of epistemic arrogance as result of a limitation of the epistemic horizon can be found in Kruger and Dunning (1999):

after doing the same test, all students did two rounds of estimation of their performance. In the first one knowing only their score; next, being possible to evaluate the tests of other colleagues, they would estimate their scores when compared to the rest of the class. As the result of their failure to realize how badly they had gone in the test and, concomitantly, how well other colleagues had performed (due to limitation in their epistemic horizons), the worst performers perceived, erroneously, themselves as more capable than others—and the best performers, (due to their less limited epistemic horizons) perceived the scenario correctly.²⁰

Simply, their epistemic horizon prevents people from perceiving their own limitations—making them, sometimes, more prepotent, sometimes, more credulous.

To not know all about everything—i.e., to suffer from epistemic opacity—is not a really great problem—omniscience is just a myth. To be incapable of knowing all about all things must not be seen as a

¹⁹ We must make a little digression about the historical conundrum *nature vs. nurture*: as all rhetoric, vicious and empty dichotomies, the false quandary between nature and nurture should not exist.

From a sensible (i.e., naturalistic) point of view, it's not possible nurture without nature: *ex nihilo nihil fit* (“nothing comes from nothing”)—co-opted here from their historical association with cosmology, to make evident that any cultural construct necessarily occurs in a social (therefore biological (therefore physical)) world.

Beyond this, we can add the contributions of our epistemic arrogance, that, through ideological, religious, political, philosophical and scientific ideas and beliefs, can make the world seems sometimes more chancy and, in other occasions, more predictable. From a complementary perspective, once a certain threshold of socialization was reached by the *Hominidae* family, stagnate in a proto-culture similar to those of our closest phylogenetic cousins, the bonobos and chimps, definitively was not an option: culture produces culture, that influences the evolutionary process (Baldwin Effect, see Weber and Depew (2003)), which influences culture, and so on and on, *ad nauseam*. Period.

²⁰ Author's notes in parentheses.

disability, too. But to ignore that you know little and cannot know all about all things, can be risky. And to know that you know little and cannot know all about all things and continue to make decisions as if you can—suffering from acute epistemic arrogance—is extremely dangerous: “[w]e need to speak more explicitly of the things we do not know”. (Wilson, 2004a, p. 204)

3.6 SOCIO-CULTURAL FACTORS INFLUENCING DECISION MAKING

*[... Our practices, our words, our histories, and our cultures
not only affect, but partially constitute,
the ways we take the world to be,
even the way the world is.*

— Brian C. Smith (Smith, 1998, p. 88)

Any (normal) human being draws upon a quasi-philosophical, pre-scientific curious attitude to taking conclusions from experience and creating a (minimally) consistent worldview for yourself—or so is reasonable to think, since some degree of consistency between the assumed beliefs and the decisions taken by a person would be a minimum warranty needed for their survival.

But being born with the predisposition to exploring, to experimenting with everything that is within your reach is no guarantee that it will be present and operative throughout their life—certainly, lives that have not been fully lived are not an exception.²¹

It is necessary that a minimally sustainable physical/ecological and social/cultural conditions be available for this occur. If natural resources are extremely scarce and/or the social life is highly crude it will be difficult (but not impossible, of course) for art, philosophy and science to flourish in its plenitude—but, surely, it will be an opportune time for mysticism, as well as socio-political organizations with a character not very egalitarian, to make itself present.

If natural resources are not scarce to the extreme—i. e., mother nature does not provide an extremely physical/ecologically miserable condition—, any human agglomerate will eventually grow in size. Yet, as this growth occurs, nothing will restrain the parallel growth of the pre-existing asymmetrical and strongly hierarchical (political, military and religious) structures—they will remain powerful and, maybe, their influence will be intensified. But, the greater the group size, the easier will be the emergence of new social forces. That is, it is necessary just some tension from a certain structural complexity (and the necessary time) and then a “free spirit” will take shape—and with

²¹ According to Socrates, “The unexamined life is not worth living” (Porter, 2010, p. 16). Unfortunately, day after day, it is possible to identify many lives terminating without even being aware of their capabilities, of the possibility of having been a worth life.

it art, philosophy and science development will gain moment. But, invariably, in a first moment they will remain subject to the tutelage of the powerful elites that will regulate and limit its forms of expression.

More time will be needed to the emergence of another level of social tensions, which will make viable that art, philosophy and science acquire some autonomy, takes place. Above the minimum threshold of autonomy needed, a stronger body of practices and knowledge will emerge and, most probably, will stay constantly growing and being revised via refutations and corroborations of their perspectives and theories (*à la* Popper (Popper, 2002)). Only a society with this dynamics present in their flux of knowledge can provide to their members new perspectives, new metaphors (Lakoff and Johnson, 1981) for a better understanding about both, the big and minor questions concerning the existence.

Without pretension of completeness, the exposed above is a (deliberately) poor and minimalist draft of the course taken by (Western) *Homo sapiens* populations after the abandonment of the hunter-gatherer lifestyle and adoption of a sedentary lifestyle in its place—until our post-Enlightenment societies. Its function is merely to create a background for what's to come.²² But it serves to a most immediate purpose, too: *to make evident that a complex and abstract-laden decision-making process is potentiated by orders of magnitude in a culturally rich milieu.*

By making this fact clear, it also becomes apparent that a myriad of strategic and complex decisions were present (and necessary) to pass through the border zone between the proto-culture, characteristic of to the hunter-gatherer lifestyle, and the culturally incipient world of the sedentary man.

In other words, even before any sophisticated culture or civilization emerges, when a biological organism (struggling to survive) interacts with features of the environment that it inhabits, the results are scenarios that compels it to make decisions. A more abstract cultural civilized milieu is just a more complex and dynamic scenario, where decisions more complex and dynamic (but, unfortunately, not always so civilized) are taken...

²² For a wider, and yet not so formal/academic, perspective see Diamond (1997) and Diamond (2006a).

ANALYSIS

*Our very nature is such as to prevent us from
fully understanding its very nature.*

— Douglas R. Hofstadter (Hofstadter, 2007, p. 363)

The work done till now was to argue that the decision-making process is based in mechanisms that are intrinsically evolutionary (i.e., natural), embodied (i.e., not based on a transcendental capabilities) and cognitive (i.e., dependent on obtaining and processing information). Some of these mechanisms were designated as emotionals, others associated with the concept of reason—both inextricably related with each other; with conscious and unconscious dimensions and modes of operation; and, the latter being evolutionarily more recent and resting for their proper functioning in the former. Another important aspect was that the very evolutionary process—as well as the existence and each decision-making act done by a living being—are subject to contingencies: fortuitous facts not apprehensible by decision-making agents due to intrinsic limitations of their cognitive/perceptive/emotional/rational capabilities and socio-cultural influences.

Now, I will turn to do the analysis of some decision-making theories, and then, in the next chapter (Chapter 5), to sketch some implications from all exposed.

It is important to highlight that the analysis to be done below will focus on the omissions, the contributions, or in the neutrality concerning the naturalizing of the decision-making process. In the same vein, the exposed implications will concentrate on the negative consequences of not considering the decision maker as an animal (rational, emotional and partially aware of what influences their decisions).

The theories to be analysed are the classical—and predominant in the formal education and public discourse—Rational Choice Theory, the more *down-to-earth* (or, more accurately, down-to-laboratory) Prospect Theory, and the more *in the wild* Ecological Rationality Theory and Naturalistic Decision Making.

4.1 RATIONAL CHOICE THEORY

*[...] mathematics is not really the antithesis of rhetoric,
but, rather, that rhetoric may sometimes be mathematical,
and that mathematics may sometimes be rhetorical.*

— Philip J. Davis and Reuben Hersh (Davis and Hersh, 2005, p. 58)

The Rational Choice Theory owes a great part of its respectability to the their apparent rigor, flaunted through a discourse strictly mathematical (Davis and Hersh, 2005, p. 10).

At the same time, it is strongly questioned:

- because of their excessive use of rhetorical devices and, sometimes, of inadequate math (Taleb, 2005; Davis and Hersh, 2005; Mandelbrot and Hudson, 2006; Taleb, 2010b); and
- due to ignoring the cognitive limitations (Simon, 1955; Gigerenzer and Selten, 2002) and psychological characteristics of the decision maker (Kahneman et al., 1982; Frank, 1988; Kahneman and Tversky, 2000; Gilovich et al., 2002).

No better statement can be found to make evident the characteristic aversion to the psychological characterization of the decision making that pervades the Rational Choice Theory that the following excerpt from Coleman and Fararo (1992, p. x, emphasis added)

Rational choice theory in sociology belongs to still another class of theories: *Little attention is paid to[. . .] the psychological model of the springs of the individual action.* It may seem odd to describe a theoretical approach named after its chief psychological assumption as giving short shrift to psychology. We believe this is accurate, however. What is problematized in rational choice theory is not the individual psychology; it is the component of the theory labeled 2a above—the transition between the micro level of individual action and the macro level of system behavior. In what is probably the most significant instantiation of this distinction, the macro level can be described as the institutional structure, and the micro level as the behavior of the actors within such a structure.

Odd, indeed!

In the passage cited above we have a plain and direct argument about the discardability and irrelevance of the psychological dimension of the decision maker. The decision maker (commonly designated by the term “agent”) is seen like one atom in a gas mass: where statistical patterns emerging from the interaction of an agglomerate of tiny parts is the relevant to understanding “choices” done, or tendencies.

Immediately after the quoted passage we have the following example, that, according to the authors:

[. . .] will illustrate the point about the minor role of the psychological ideas in this approach: The *free rider* phenomenon is a mainstay of rational choice theory. But this phenomenon does not refer to some aspect of individual psychology [. . .] (Coleman and Fararo, 1992, p. x)

The explicit assumption behind all Rational Choice Theory is the *rationality* of the agent(s)—whose preponderance is shown to be an erroneous assumption in the end, as Frank (1988, p. 221–226) makes evident through a brief overview of several empirical results that explicitly contradict what the Rational Choice Theory would have to say about the behavior of real people in situations that potentiate the occurrence of the free rider phenomenon.

What these experiments—performed with real people, mostly during their ordinary life and outside of laboratories—struggle to make clear is that: even though a collective product can emerge as a statistical pattern from the actions of a group of people—and, most of the time, none of the agents intend to produce it¹—, ultimately, *the free rider problem must be seen from the perspective of individual decisions taken by every and each person able to recognize an opportunity and predisposed to try to take advantage of it*. That is, in the end we have individualistic and self-centered decisions done by each one agent, who “chose” to take it.

Once again: the action taken by each person can, and will, influence in an aggregate product, but, anyway, it is about a decision taken by an individual, thinking just about her/himself. And we *cannot ignore that the mechanisms in operation in the person during their decision-making acts are their (conscious and unconscious) perceptions, emotions and rationalizations*. That their rationalizations depends upon their emotions (Nussbaum, 2003; Damasio, 2005; de Sousa, 2011)—and, in the particular case of the free-rider problem, they (the emotions) are motivating the individual in front of an (irresistible) opportunity to take, or not,² the *lion’s share* of it for him/herself.

But the aim of the Rational Choice Theory is not to describe the actual decision maker. When it is said that “[...] in acting rationally, an actor is *engaging* in some kind of optimization” (Coleman and Fararo, 1992, p. xi, emphasis added) can be occasionally understood, or induced to be understood, that some psychological behavior is being described, but the “[...] expected utility theory was not intended as a psychological model; it was a logic of choice, based on elementary rules (axioms) of rationality” (Kahneman, 2011, p. 270). Its objective is prescriptive, normative: determining what a totally rational, therefore artificial and unrealistic, agent should do.

¹ It is from this auto-centrism—and a poor sense of the collective consequences from their actions—that *the tragedies of the commons* (Hardin, 1968; Diamond, 2006a, p.428–430) occur.

² The professor of economics Robert H. Frank proposes their *Commitment Model* where:

[...]the emotions that lead people to cooperate clearly reduce their material gain in these free-rider experiments. The commitment model suggests, however, that people with these emotions might nonetheless carve out a niche for themselves, even in a bitterly competitive material world. (Frank, 1988, p. 226)

And it is precisely because of their theoretical, idealized and prescriptive approach—which is often distorted and used as a descriptive model—that the Rational Choice Theory, historically and practically, does more harm than good in the guidance and formation of the decision maker, in particular, and to the understanding of the decision making, in general.

4.2 PROSPECT THEORY

How can we expect the untrained person to understand randomness when a Harvard professor who deals and teaches the concept of probabilistic evidence can make such an incorrect statement?

— Nassim N. Taleb (Taleb, 2005, p. 204)

Proposed by Daniel Kahneman and Amos Nathan Tversky in the 1970's (Kahneman and Tversky, 1979b), according a recent assessment the Prospect Theory "[...] spread beyond academic psychology, affecting theory and research across a range of disciplines including economics, law, medicine, and political science" (Gilovich et al., 2002, p. 1).

Besides making Kahneman a Nobel laureate (Kahneman, 2003), which by itself makes evident the notoriety and influence of his joint work with Tversky in academia, it's not difficult to recognize that the program proposed by Kahneman–Tversky already informs and influences far beyond the scientific public. To check this, it is enough to take a quick look in the major newspapers (e.g., The New York Times³) and in a few books which have become best sellers: Taleb (2010b), Lehrer (2009) and Thaler and Sunstein (2009).

Undoubtedly, *the principal contribution from the Prospect Theory for the understanding of the decision making was that it demystified the rational decision maker*: by identifying and documenting a (growing) list of heuristics and biases, it turned evident the fragility of the decision maker in front of "simple" choices.

Discreet about the evolutionary theory since their inception, recently it can be noted an increase in explicit associations between the ideas of the Prospect Theory and an evolutionary history of the decision maker—what, surely, helps to reinforce a sense of no-transcendentality around the human being.

An other aspect that has had its relevance changed dramatically in the last decade were the emotions. Although always mentioned, the recent emphasis upon the Affect Heuristic (Slovic, Finucane, Ellen,

³ Queries submitted in the The New York Times's search engine, on 02/10/2012, returned 81 hits for "Prospect Theory" and 886 hits for "Daniel Kahneman".

and MacGregor, 2002; Kahneman, 2003; Slovic, Finucane, Peters, and Macgregor, 2004; Slovic, 2004) has put the emotions in a prominent position in the body of knowledge of the Prospect Theory and the Heuristics and Biases Program.

But some residual presence of the ideal of perfectibility, which is also present in the rational-agent model, lurks in the often excessive tone of negativity surrounding the comments made about human susceptibility to bias in the results of the Prospect Theory. Kahneman (2011, p. 323) says that:

[t]he original formulation of prospect theory included the argument that “highly unlikely events are either ignored or overweighted,” but it did not specify the conditions under which one or the other will occur, nor did it propose a psychological interpretation of it. My current view of decision weights has been strongly influenced by recent research on the role of emotions and vividness in decision making. Overweighting of unlikely outcomes is rooted in System 1 features that are familiar by now. Emotion and vividness influence fluency, availability, and judgments of probability—and thus account for our excessive response to the few rare events that we do not ignore.

Until then, nothing unusual. Every point exposed above is endorsable. But then Kahneman (2011, p. 322) describes a visit done by him to Israel “[...] during a period in which suicide bombings in buses were relatively common—though of course quite rare in absolute terms”.

After noting that “[...] people avoided buses as much as they could [...]”, he says that

[...] was chagrined to discover that my behavior was also affected. I found that I did not like to stop next to a bus at a red light, and I drove away more quickly than usual when the light changed [...]

and confides that “[...] was ashamed of myself, *because of course I knew better*” (Kahneman, 2011, p. 322, emphasis added).

For me, the biggest flaw in the line of reasoning that subsidizes this narrative is not to recognize that the vast majority of decisions taken by us are made from an self-centered, context-dependent, emotional and (mere mortal) human perspective. The expected decrease in the perception of the intensity of risk from the known presence of, say, “just” one bomber in a city rather than two, simply does not occur because the relevant fact is: *just one bomb is the sufficient to put an end to my life, my family, and to all my affairs*. And, as I do not know where the next suicide bombing will take place—but I know that buses are preferred targets—, to be standing next to a bus is enough to be afraid.

The third-person perspective of the probability theory and statistical reasoning, so frequently adopted by Kahneman to do their analysis of the scenarios, is not the natural perspective—not even the most important—that should be considered in such a scenario, and the like. What impresses me most is that the explanation to this peculiar state of affair is evidenced by Kahneman (2011, p. 329) himself, some pages later: “[...a]s we have seen, System 1 is much better at dealing with individuals than categories”. Probabilistic reasonings, statistical inferences, deals with events, or set of events, that can be seen as categories. When I’m in risk, it’s me (an individual) and my affairs that are at stake. Probabilistically, a typical bomb used in these incidents cannot put an end to the *Homo sapiens* specie; but, certainly, just a typical bomb used in these incidents can put an end to my life.

Additionally, I completely disagree with Kahneman when he says:

Most graduate students in economics have heard about prospect theory and loss aversion, but you are unlikely to find these terms in the index of an introductory text in economics. I am sometimes pained by this omission, but in fact *it is quite reasonable, because of the central role of rationality in basic economic theory*. The standard concepts and results that undergraduates are taught are *most easily explained by assuming that Econs do not make foolish mistakes*. This assumption is truly necessary, and it would be undermined by introducing the Humans of prospect theory, whose evaluations of outcomes are unreasonably short-sighted.

There are good reasons for keeping prospect theory out of introductory texts. The basic concepts of economics are essential intellectual tools, which are not easy to grasp even with simplified and unrealistic assumptions about the nature of the economic agents who interact in markets. Raising questions about these assumptions even as they are introduced would be confusing, and perhaps demoralizing. It is reasonable to put priority on helping students acquire the basic tools of the discipline. Furthermore, the failure of rationality that is built into prospect theory is often irrelevant to the predictions of economic theory, which work out with great precision in some situations and provide good approximations in many others. In some contexts, however, the difference becomes significant: the Humans described by prospect theory are guided by the immediate emotional impact of gains and losses, not by long-term prospects of wealth and global utility. (Kahneman, 2011, p. 286–287, emphasis added)

Daniel Kahneman is an *opinion leader*—possessing a great power of diffusion of ideas. Exempt an economist or a manager in formation from have the two perspectives sharply contrasted—and describe when each one of them can be relevant, in the case of both can be used really—is to encourage a vicious perspective. It is to establish potentially dangerous ideas⁴ that can be very resistant to changes in the future.

4.3 ECOLOGICAL RATIONALITY THEORY

Also referred to as the Fast and Frugal Heuristics Program, has as its leading proponent Gerd Gigerenzer. Having a good influence on the scientific milieu, the Ecological Rationality Theory was even recognized as the main antagonist of the Heuristics and Biases Program (Samuels, Stich, and Bishop, 2002). Their incursions among the general public can be found in newspapers,⁵ in journals of wide circulation, and by explicit references in popular science books: Gigerenzer (2008) and the best seller Gladwell (2007).

The Ecological Rationality Theory tries to make evident the existing advantages in the decision-making mechanism—*The Adaptive Toolbox* (Gigerenzer and Selten, 2002)—offered to us by evolution. Gigerenzer et al. (2000, p. vii) says to us that:

[...] rationality can be found in the use of fast and frugal heuristics, inference mechanisms that can be simple and smart. The laws of logic and probability play little if any role in the performance of these components of the mind's adaptive toolbox—these heuristics are successful to the degree they are ecologically rational, that is, adapted to the structure of the information in the environment in which they are used to make decisions.

Endorsing a model of *Bounded Rationality* in line with Hebert Simon's "[...] metaphor of a pair of scissors, where one blade is the 'cognitive limitations' of actual humans and the other the 'structure of the environment' [...]" (Gigerenzer and Selten, 2002, p. 4), the

⁴ A few pages later, Kahneman (2011, p. 374, emphasis added) says that:

A theory that is worthy of the name asserts that certain events are impossible—they will not happen if the theory is true. When an "impossible" event is observed, the theory is falsified. Theories can survive for a long time after conclusive evidence falsifies them, and *the rational-agent model certainly survived the evidence we have seen, and much other evidence as well.*

Definitely, mention about a falsified theory during the process of formation professionals can be justified just by one purpose: prevent its resurgence (and adoption) inadvertently.

⁵ A query submitted to the The New York Times's search engine, on 02/10/2012, returned 10 hits for "Gerd Gigerenzer."

Ecological Rationality Theory recognizes that “[...] just as emotions can lead to sensible decisions and commitments, so can social norms and institutions”. (Gigerenzer and Selten, 2002, p. 10)

About the alleged divergence between the Ecological Rationality Theory and the Heuristics and Biases Program, I share the same perception of Samuels et al. (2002) that:

[...] neither research program denies the core claims of the other and, in many cases, it is clear that they should and do endorse each other’s core claims. Finally, we briefly focused on some of the points of disagreement that remain once the illusory dispute has disappeared.

Of course the discourse of the Heuristics and Biases Program sounds more analytic and hermetic, whilst Ecological Rationality Theory is more soft and evolutionarily committed.⁶ But I see both as complementary—where they are not redundant.

4.4 NATURALISTIC DECISION MAKING

*I am ahead, I am advanced
I am the first mammal to make plans, yeah
I crawled the earth, but now I’m higher
2010, watch it go to fire
It’s evolution, baby
Do the evolution
— Do the Evolution
Pearl Jam*

The Naturalistic Decision Making program, as defined by Gary Klein, its chief proponent/defender, is about

[...] how research can be done outside the laboratory setting by studying realistic tasks and experienced people working under typical conditions. Features that help define a naturalistic decision-making setting are time pressure, high stakes, experienced decision makers, inadequate information (information that is missing, ambiguous, or erroneous), ill-defined goals, poorly defined procedures, cue learning, context (e. g., higher-level goals, stress) dynamic conditions, and team coordination [...] (Klein, 1999, p. 4)

Its approach is defended as a different perspective that brings balance to the trend that

⁶ In a brief review were identified more than twenty-five references to the work of the evolutionary psychologist Leda Cosmides (and/or the anthropologist John Tooby) just in Gigerenzer (2000).

[d]uring the past twenty-five years, the field of decision making has concentrated on showing the limitations of decision makers—that is, that they are not very rational or competent. (Klein, 1999, p. 1)⁷

The Naturalistic Decision Making program have as their theoretical center of gravity the intuitive ability of the decision maker. But, concerning the evolutionary character of the intuition, few pages after cite—in a, at least, neutral tone—that

Bechara, Damasio, Tranel, and Damasio (1997) found that intuition has a basis in biology [...] (Klein, 1999, p. 31)

Klein (1999, p. 33) bothers to make evident that :

Many people think of intuition as an inborn trait—something we are born with. I am not aware of any evidence showing that some people are blessed with intuition, and others are not. My claim in this chapter is that intuition grows out of experience.

Of course intuition “grows out of experience”; as it certainly, does not grow out of nothing: innate talents and innate predispositions are conditioning and fundamental factors to arrive, or not, at a proficiency level of an expert.

What is unreasonable is a researcher of the wingspan of Klein not recognizing that something that has a “basis in biology”, at very least, has a dependence to an “inborn trait”.

I can attribute this position just to a rhetorical zeal to not take a totally explicit position on the controversy about the nature *vs.* nurture debate, in favor of the last—thus justifying the claim that he is “[...] not aware of any evidence [...]”.

At the risk of hurting the sensibilities of many, it does not seem reasonable to believe that any human being that existed, exists and will exist can be able to be a Michael Jordan, a Pelé, a Paul McCartney, an Albert Einstein, a Dalai Lama or a Barack Obama. All these

⁷ This declaration can also be seen as a clear allusion to the Heuristics and Biases program.

Parenthetically, Kahneman (2011, p. 234–235) narrates an “adversarial collaboration” between Gary Klein and him whose purpose was to “[...] deal with disagreements”. The results of this adversarial collaboration was a joint article (Kahneman and Klein, 2009) and the realization that

[...] Klein and I disagreed less than we had expected and accepted joint solutions of almost all the substantive issues that were raised. However, we also found that our early differences were more than an intellectual disagreement. We had different attitudes, emotions, and tastes, and those changed remarkably little over the years. (Kahneman, 2011, p. 244)

I quote this experience verbosely here justified by two aspects: first to highlight the noble initiative to make use of an intelligent way to conciliate some (intellectual) divergences. Second, to also make evident as “emotions, and tastes” were significant to justify the remaining disagreements.

are/were decision makers—experts in their domains of expertise. Let me take, for example, Michael Jordan and Pelé: they did not have just exceptional physical abilities that their innate gifts provided to them; they did have perceptual, cognitive, emotional and rational skills too—and all of these capabilities have to be developed from innate potentialities to made of them differentiated experts, between experts, in their practices.

Letting aside this controverse point, certainly the unconscious is present in the discourse of the Naturalistic Decision Making program. About the role of the intuition, is said that:

[...b]ecause patterns can be subtle, people often *cannot describe what they noticed*, or how they judged a situation as typical or atypical. (Klein, 1999, p. 31, emphasis added)

As well as the contingent is present:

[...] teams must manage *uncertainty* and may have to reconcile opposing viewpoints [...]. (Klein, 1999, p. 244, emphasis added)

About the role of emotions in decision making, Klein (1999) is discrete, but says that:

[...e]ven when decision makers are comparing options and trying to find the best one, they may not be using rational choice strategies, such as assessing each option on a common set of criteria. The process may be more like running a mental simulation of each course of action and comparing the *emotional reactions*—the discomfort or worry or enthusiasm—that each option produces when it is imagined. (Klein, 1999, p. 96, emphasis added)

Were not by the exposed above concerning *innate traits*, the Naturalistic Decision Making program—forming a pair with Ecological Rationality Theory—will be a perfect representative of the approach to naturalize decision making that grounds the present work—incidentally, the program would have a greater merit to use “Naturalistic” in its name as well.

IMPLICATIONS

*[...] an education into rationality—
and equally, and for similar reasons,
an education into the capacity to lead a moral life—
must rest, as Aristotle well knew, on an education of the emotions.*

— Ronald de Sousa (de Sousa, 2011, p. 24)

All normal (and healthy) human beings are decision makers. Whether she/he is the greatest leader of a country (e. g., president, or prime minister), a political representative, a military authority, a liberal professional (e. g., a lawyer, a doctor), a parent of a family, or an individual, their lives are permeated of opportunities which demand taking decisions.

Everyone—even specialists, who by nature of its activities should have more sophisticated and accurate theories¹ about decision making, thus having a greater propensity to be more judicious about the decisions to be taken by them—draws upon what can be called a “*folk decision making theory*”² (henceforth, just *FDMT*).

But ordinary people, as much as people that will eventually be specialists, are not born with their *FDMT* ready to use. The individual’s *FDMT* is the result of development (i. e., the entire formal and informal education process) to which she/he is subjected throughout life.³ Hence the need for, in the following sections, talk not just about professionals (e. g., political representative and managers), but also devote some time to talk about the general education—the education of children, adolescents and adults who could one day become a parent, a president, a senator or a senior executive.

¹ Kahneman (2011, p. 219) narrates the result of a study about expert political judgment conducted by Philip Tetlock (Tetlock, 2005) as follows:

The results were devastating. The experts performed worse than they would have if they had simply assigned equal probabilities to each of the three potential outcomes. In other words, people who spend their time, and earn their living, studying a particular topic produce poorer predictions that dart-throwing monkeys who would have distributed their choices evenly over the options. Even in the region they knew best, experts were not significantly better than nonspecialists.

² Adopted here as reference to the part of the Folk Psychology concerning the decision making. Folk Psychology, in its turn, must be understood as “[...] the platitudes about the mind [that] ordinary people are inclined to endorse”. (Ravenscroft, 2010)

³ Considering the exposed by Hofstadter (1963) some decades ago, and Taleb (2005), Mandelbrot and Hudson (2006), Jacoby (2008), Eco (2008) and Taleb (2010b) recently, the results are not going well neither in the U.S., nor in Europe.

A last section will be dedicated to the mathematization and automation of decision making.

5.1 CIVIL LIFE AND EDUCATIONAL PRACTICES

[...] teaching people to navigate
a world with fewer certainties.

— Nassim N. Taleb (Taleb, 2010b, p. 376)

No one is born as a *tabula rasa*, a blank slate (Pinker, 2003). As the result of a successful conception, and a gestation without major problems, every baby will have their innate personality traits, as well as innate perceptual, cognitive and emotional potentials. But the characteristics present in the lifestyle of their family, as well as in the communities in which she/he was born and will live their lives, have a powerful influence on who the babies will become.

The religious practices to which she/he will be exposed, the sports that will engage with (both as practitioner and as a fan), the familiar rituals that will take part, the pedagogical approaches used in the schools that will attend, the political facts to which they will witness or will be participants, as well as the tales, the movies, the songs, the hymns, the praying, the advertisements and the sayings to which she/he will be exposed to, every and each of these aspects and things will work as threads, interacting and interweaving among themselves to form the fabric of their lives, collecting the elements to the chemistry to be done in the future, when their decision-making acts take place.

It is from this perspective that the influence of the ideas (and theories) at work in a society takes vital importance. Just the wrong mix of scientific, religious and political ideas in course in the German society in the first half of the twentieth Century were able to do a whole country embrace the ideals of Nazism. Just another wrong mix of scientific, religious and political ideas could create and sustain the USSR and its regime for so many decades. The same can be said about slavery, feminine submission and anti-semitism: all fruits of wrong mixes of scientific, religious and political ideas.⁴

No single idea had, or could have, the power to avoid all the consequences of these wrong mixes; no single idea will have the power to avoid in the future new incidences. In this light it may seem that the prospects are baleful, no space for a *panglossian* world: no perfect past, neither good times ahead.

But history, rather than not giving to us a magic solution—since, after all, magic solutions do not exist—tells us that *to try to live in the*

⁴ For a brief summary of atrocities committed by mankind in the last thousand years—from which nearly all them were supported by customs and institutions of their time—see Pinker (2011, p. 2–30).

middle of wrong ideas is to leverage new disasters. Following, we have a simplistic example:

[...] According to the Centers for Disease Control and Prevention, things like clean water and improved sanitation—and not necessarily advances in medical technology—accounted for at least 25 of the more than 30 years added to the lifespan of Americans during the 20th century [...]
(Lehrer, 2011)

This anecdote shows to us that was needed almost all their existence so that humanity would be able to accumulate sufficient knowledge to reach the conclusion that to save a lot of people of a premature death we need just: clean water, take a shower once in a while (not just “once in a Blue Moon”) and wash our hands frequently. Ideas as simple as these can have a huge influence on so many aspects of our lives.

But, even if no single idea can solve all problems, some ideas are powerful enough to induce changes in many things in the long term. We can cite *the theory of evolution by means of natural selection* (Darwin, 2009; Mayr, 2002) as the most powerful of all the ideas we have at our disposal in the last century and half.

There is not a concept or idea involving human affairs that cannot be reevaluated from an evolutionary perspective. At this point it is important make a pause to do a caveat:

to be subject to (re)evaluation does not mean that the concept (or idea) at issue will necessarily be discarded, or even profoundly changed.

But certainly a lot of important ideas and concepts already suffered, and others will continue to suffer, a significant impact in their denotation, connotation and/or relevance after be submitted to a scrutiny from an evolutionary point of view. Can be cited as “victims” of the *universal acid* (Dennett, 1996) the ideas of existence of the soul and immortality (Flanagan, 2002), racial and sexual discrimination, human perfectibility⁵ and the *Homo sapiens* absolute superiority. We can cite

5 Second Mayr (2002, p. 235, emphasis added):

In the eighteenth century it was widely believed that the world was perfectly designed by God, and that even where such perfection had not yet been achieved, he had instituted laws that would ultimately lead to it. This belief reflected not only the thinking of natural theology but also the optimism of the Enlightenment, as well as the teleological thinking (finalism) that was so widespread in that period. Lamarck’s theory of evolution, for instance, postulated a steady rise toward perfection. *Modern evolutionists reject the idea that evolution is able ultimately to produce perfection.*

See also Passmore (2000, ch. 12).

also ideas for which a revision was necessary, or are already underway: abortion, euthanasia, altruism and wickedness.

Of course the polemics involving all topics cited above were not initiated by the inception of the theory of evolution, but the new perspective that evolutionary thought makes available acted as a catalyst in some cases, and like a spark to relighting in others. Laws about marriage, human embryo research, euthanasia, the educational system, organ donation and others civil rights, among so many other topics, certainly, in a near future, will take new forms.

From all this, the value to live in a society whose ideas of the decision makers are evolutionarily informed is high!

We turn now to concerns around the role of emotions in human affairs. I had already made evident that—from a personal, but not extremely individualistic, point of view—emotions are essential to the optimal functioning of the faculties that humans employ when making decisions (Damasio, 2005). Frank (1988, p. 161, emphasis added) widen the need of the emotions for interpersonal situations when he says that:

In the absence of emotional conditionability, no amount of adult punishment and reward seems sufficient to induce a person to behave morally. Perhaps even adult reinforcement, the most ostensibly behaviorist of the various sources of standards, must itself be supported by *innate emotional competencies*.

Nussbaum (2003, p. 3, emphasis added) offers to us an even broader frame to reflect upon the possible impacts of emotions:

[...] a theoretical account of emotions is not only that: it has large consequences for the theory of practical reason, for normative ethics, and for the relationship between ethics and aesthetics. Such an account *has consequences for political thought as well*: for understanding the relationship between emotions and various conceptions of the human good will inform our deliberations as we ask how politics might support human flourishing. If we think of emotions as essential elements of human intelligence, rather than just as support or props for intelligence, this gives us especially strong reasons to promote the conditions of emotional well-being in a political culture: *for this view entails that without emotional development, a part of our reasoning capacity as political creatures will be missing*.

This reinforces the already exposed in the previous chapters: that emotions should be seen as critical to the healthy and appropriate behavior in society, in general, and the decision-making acts of an

individual, in particular; and not just as mechanisms that compromise the well-being of people, by affecting negatively the use of their rational faculties and therefore the potential to always act in the best way possible.

Concerning the unconscious, we have already seen the factuality and power of it in our decision making. But, is also true that the sheer

[...] idea of subliminal influence has met with strong aversion. People do not want to be subliminally steered toward buying 'toothpaste X' and certainly not toward voting for a particular political candidate. Nobody wants to pay \$200 for some ineffective health-improving device. (Hassin et al., 2005, p. 99)

So, since we are aware that sometimes subliminal techniques can be applied, we must

[...] act to decrease or maybe even stop this abuse. One way would be legislation. Another way would be to *objectively inform society about the effectiveness or ineffectiveness of certain techniques*. (Hassin et al., 2005, p. 99, emphasis added)

One last relevant point is that not take the unpredictable as such, is not innocuous, inconsequential. When deciding in which place to live, which insurances contract, which means of transport to use on your next vacation, or when to undergo surgery or a medical treatment, it is not just important to know how chancy the relevant factors around these decisions are, in some cases it is vital to have the unpredictable, the possible contingencies, taken into account. The course of the rest of your life—and of the life of your family and of your community—can be influenced by decisions grounded in mere ignorance of lucky factors in action.

We can't tame the intrinsic randomness of the physical, social, cultural, political and economical fabrics where we live; we can't eliminate all genetic and cultural factors that forms our *epistemic horizons*; but we can talk more about them; we can know about their existence.

Before elaborating a little more about "[...] what do you do if you cannot predict?", Taleb (2010b, p. 203) advises us to

[...] *be human!* Accept that being human involves some amount of epistemic arrogance in running your affairs. Do not be ashamed of that. Do not try to always withhold judgment—opinions are the stuff of life. Do not try to avoid predicting—yes, after this diatribe about prediction I am *not* urging you to stop being a fool. *Just be a fool in the right places**.[emphasis added]

And continues a little after:

The bottom line: *be prepared!* Narrow-minded prediction has an analgesic or therapeutic effect. Be aware of the numbing effect of magic numbers. Be prepared for all relevant eventualities. (Taleb, 2010b, p. 203, emphasis added)

Just to finish this long section, some explicit words specifically about education. The informal dimension of our education—done by family members, friends, colleagues and some strangers who we meet by accident in our lives—only will absorb new roles for the emotions and the unconscious, as well as the influence of contingent in our decisions, gradually, when people who produces media contents, establish public policies and support families begin to have a more frequent and intimate contact with good information about such concepts—enabling the flourish of a new Folk Psychology, and therefore, the flourish of a new *folk decision making theory* too.

This puts the burden of exposing and solidifying these concepts—in the conscious and unconscious of people, and in the right scale (i. e., whole society)—to the formal education; of course without giving up the help of the *mavericks* who, in one way or another, already adopted and defend them (e. g., scientists, philosophers, artists, journalist, and so on). After all, it is from the fundamental and graduate schools, and from the universities, that comes out, among many other occupations, nearly all politicians, businessmen and journalists. It is already a reality in the “developed world”, and an important goal in the “developing world”, to attain that its entire population has the minimum formal education required for their formation as citizens. No more institutional strategic position exists to scale the spread of scientific and philosophical ideas that the educational system—and, in the end, reduce ignorance and establish in its place (good) knowledge should be the *raison d’être* of these educational institutions.

To have the theory of evolution present in all the curricula of elementary education (Hauser, 2006)—as well as to make our schools laic environments (Eco, 2008, p. 272–276)—is as important as having a more psychological approach present in the undergraduate and graduate level.⁶ It is unacceptable to have an economist—who could become the minister of economy of their country, or the Central Bank president—having access only to abstract mathematical models of the (collective and individual) behavior. It is inadmissible to form children that will guide their entire life from misconceptions about their emotions and their autonomy (their *libero arbitrio*); almost all persons so far have an erroneous image about their existential condition, not recognizing themselves as the *emotional–rational animal*, living in an unpredictable world, that they are. *Nosce te ipsum* (“Know thyself”)!

⁶ I agree when Kahneman (2011, p. 145) suggests that:

Psychology should inform the design of risk policies that combine the experts’ knowledge with the public’s emotions and intuitions.

Thaler and Sunstein (2008) and Ariely (2010) are great contributions in this direction.

5.2 PROFESSIONALS AND EXPERTS

*The danger to others posed by people driven by excellence
crystallizes in the figure of the expert.*

— Richard Sennett (Sennett, 2008, p. 246)

In the last section we have seen that erroneous ideas, as well as the correct ones, can lead to disaster: but, of course, *almost ever* is desirable to take the risk with correct ideas in mind.

The predominant focus there was the common Joe—even though some evidenced aspects may have suggested, or referenced implicitly, the experts. In the current section I will turn the focus to professionals, politicians and experts: persons that volunteer, or are paid to, decide in behalf of others—or just help them to make decisions.

To start, some anecdotes:

- In 2005, the then Palestinian foreign minister, Nabil Shaath, said to *The Guardian* have heard from George W. Bush, the then U.S. President, the following

I am driven with a mission from God. God would tell me, “George go and fight these terrorists in Afghanistan”. And I did. And then God would tell me “George, go and end the tyranny in Iraq”. And I did. (MacAskill, 2005)

- On March 9, 2010, *O Globo*—the second largest newspaper in Brazil, with national circulation—tells us that

Four days after the violent storm that hit the city [Rio de Janeiro], the mayor Eduardo Paes renewed [...] the agreement with the Fundação Cacique Cobra Coral, which provides free *technical and scientific assistance to the municipality on climate issues*[...] The ceremony of the renewal of the agreement took place in a public audience with the *medium* Adelaide Scritori [a paranormal] with Paes [...] (Magalhães, 2010, emphasis added)⁷

- Kahneman (2011, p. 215–216) recounts that he was

⁷ A loose translation from the original, in Portuguese:

Quatro dias após o violento temporal que atingiu a cidade, o prefeito Eduardo Paes renovou na tarde desta terça-feira o convênio com a Fundação Cacique Cobra Coral, que presta assistência técnico-científica gratuita para o município em questões climáticas. O convênio, mantido com a subsecretaria de Águas (Rio-Águas), havia expirado no dia 28 de fevereiro. A cerimônia de renovação da parceria ocorreu em uma audiência com a médium Adelaide Scritori com Paes na sede da prefeitura, no Centro Administrativo da Cidade Nova

[...] invited to speak to a group of investment advisers in a firm that provided financial advice and other services to very wealthy clients. I asked for some data to prepare my presentation and was granted a small treasure: a spreadsheet summarizing the investment outcomes of some twenty-five anonymous wealth advisers, for each of eight consecutive years. Each adviser's score for each year was his (most of them were men) main determinant of his year-end bonus.

After analyzing the data "[t]he results resembled what you would expect from a dice-rolling contest, not a game of skill". And, astonishingly,

[n]o one in the firm seemed to be aware of the nature of the game that its stock pickers were playing. The advisers themselves felt they were competent professionals doing a serious job, and their superiors agreed.

Now, *il gran finale*:

[...] Richard Thaler and I had dinner with some of the top executives of the firm, the people who decide on the size of bonuses. We asked them to guess the year-to-year correlation in the rankings of individual advisers. They thought they knew what was coming and smiled as they said "not very high" or "performance certainly fluctuates." It quickly became clear, however, that no one expected the average correlation to be zero. Our message to the executives was that, at least when it came to building portfolios, the firm was rewarding luck as if it were skill. This should have been shocking news to them, but it was not. There was no sign that they disbelieved us. How could they? After all, we had analyzed their own results, and they were sophisticated enough to see the implications, which we politely refrained from spelling out. We all went on calmly with our dinner, and I have no doubt that both our findings and their implications were quickly swept under the rug and that life in the firm went on just as before.

Above we have two cases involving representatives, elected legitimately, adopting stances, at least, questionable; and, a board of executives adopting a stance definitely questionable, when consciously using uninformed ignoramus experts to advise their uninformed clients.

To err is human, as the saying goes, and erroneous decisions abounds in all fields: medicine (Wootton, 2006),⁸ economy (Mandelbrot and Hudson, 2006), advocacy, software project management (Brooks, 1995), management (Roll, 1986; Taleb, Goldstein, and Spitznagel, 2009; Dreyfus and Dreyfus, 1986, ch. 6) and so on. . . and so on, *ad nauseum*. But when much is at stake—especially when you are deciding about, or advising on, sensitive aspects of the lives of others—tolerance to error should be, at least, reduced significantly.

To pay for some (almost) useless insurance contract can be rationally wrong—and socially unjust, since the richest usually get money from a lot of less fortunate ones to become richer—, but, in some instances, can be emotionally justified. Other occupations, such as spiritual “consulting”, can even be emotionally justifiable in some rare occasions—even though, in long run, the costs to be delusioned can be high, both from the individual and from the social perspective. But pay for *fake* economic consulting cannot be emotionally, neither rationally, nor socially justified.

However, to change the general perception about experts—by eliminating their status as untouchable and attributing to their advices accurate weights—will be necessary first to know better *what is to be an expert*. To this, we shall recognize that, like any mere mortal, all experts are subject to the existential condition of a rational–emotional–animal; next, to know which mechanisms they possess at their disposal and which practices led them to the trustworthy and accountable status of expertise, will be needed make public information about their professional practices and process of formation.

Ultimately, it is necessary to make it conventional wisdom that *some occupations, in the course of the history, simply were shown useless. To let them cease to exist can be considered as one alternative. But, given the potential to cause damage possessed by some, this can get to be a necessity.*

5.3 MATHEMATIZATION AND COMPUTATIONAL MODELING

*As machines slip from human control
they will do more than become conscious.
They will become spiritual beings,
whose inner life is no more limited by conscious thoughts that ours.*

⁸ In the following Kahneman (2011, p. 240) tell us about bad decision making, coming from bad habits, which in turn comes from ignorance:

[...Robin Hogarth] borrows from Lewis Thomas the example of a physician in the early twentieth century who often had intuitions about patients who were about to develop typhoid. Unfortunately, he tested his hunch by palpating the patient’s tongue, without washing his hands between patients. When patient after patient became ill, the physician developed a sense of clinical infallibility. His predictions were accurate—but not because he was exercising professional intuition!

*Not only will they think and have emotions.
They will develop the errors and illusions that go with self-awareness.*

— John Gray (Gray, 2007, p. 187)

No different from all the aspects discussed so far, the mathematization and the automation of decision making has always been surrounded by theoretical divergences, ethico-moral polemics and, for those more extreme, the eminence of dehumanization and enslavement of the humans by a mathematical mindset and technology.

Of course, all said in the last section about professionals and experts also applies to statisticians, mathematicians, computer scientists and the like. But the perspective to be adopted in the current section is complementary to anything said till now.

Considering the objective of the current work—naturalizing human decision-making via the recognition of the *Homo sapiens* evolutionary history and the influences of the unconscious, the emotions and the contingent on it—below I will be addressing each of the two mentioned aspects—the mathematization and the automation of decision making—, respectively, as just a tool and as an artificial substitute of the human beings.

I will deal with the mathematization first; then I will focus in the automation of decision making—even though the latter is largely a direct consequence of the former.

First of all, some words about what I mean when I say “mathematization of the decision making”. I designate by *mathematization of the decision making* (henceforth, just *mathematization*) the widespread—therefore highly diffused culturally and, sometimes, institutionalized—, explicit and conscious use of the abstract knowledge (e. g., arithmetic, algebra, geometry, statistics, trigonometry, differential and integral calculus) to make decisions.

We have incontestable evidences of the successful use of the abstract knowledge to solve practical problems since ancient times: in astrology and astronomy, in the development of calendars, in the practices of navigation, in the greatest feats of the ancient engineering (e. g., pyramids, temples, monuments, aqueducts), and so on.

Nothing about this is strange from an evolutionary perspective: our capacity to make mathematics (Lakoff and Johnson, 1999; Lakoff and Núñez, 2000)—as well as our instincts to language (Pinker, 2000) and to do art (Turner, 2006; Dutton, 2009)—is just one more fruit of our innate predisposition to the abstract (Deacon, 2011).

But, of course, some intellectual ruptures deserves prominence, the status of a singularity in the decision-making history, as, for example, the *stochastization of the world*—that Davis and Hersh (2005, p. 18) defines as:

[...] the adoption of a point of view wherein randomness or chance or probability is perceived as a real, objective and fundamental aspect of the world. It refers as well to the utilization of those methods of the theory of mathematical statistics and probability which are intended to reduce the chaos of the single unpredictable event to a less wild and more predictable pattern.

The begining of the process of stochastization of the (Western) world was certainly the fruit of the historical accumulation of knowledge and the existence of a socio-cultural framework that supported it—as [Davis and Hersh \(2005, p. 21\)](#) make evident some pages after:

[...] this view of the universe, for all that it is now so pervasive, is relatively new. It is hardly four hundred years old.

But the scale that the stochastization, in particular, and the mathematization, in general, assumed so far—particularly when we take into account the historically slow process of consolidation of psychology and evolutionary theory—is in grand part responsible by the current entrenchment of the Rational Choice Theory and Co. in the (Western) culture.

Of course, the mathematization is not a problem in itself⁹—we can find a respectable defense of a reasonable use of formulas and algorithms in support of the decision making in [Kahneman \(2011, ch. 21\)](#), who, in turn, endorse and cite extensively the polemical and influential work of [Meehl \(2003\)](#).

Anyway, when taken in a broad intellectual perspective—where the emotions, the unconscious and the unpredictable¹⁰ are also present—the mathematization assumes the auxiliary role that intrinsically belongs to it.

From all exposed so far in the present section, the potentially dire consequences of the mathematization of the decision making is already addressable, or will be, by the educational and cultural reorientation suggested in the previous sections. I will turn now to the automation of decision making.

The *Homo sapiens* seems to have a natural¹¹ impulse to relieve her/himself from the burden of repetitive and risky tasks. From ingroup labor division, to slavery, to animal domestication, to the use of sophisticated mechanical-hydraulic devices, to abstract maps

⁹ To potential problems coming from an uncritical mathematization of some aspects of life, see [Davis and Hersh \(2005, p. 93–98\)](#).

¹⁰ Important to take into account the relevance that gambling had on the development of mathematical and philosophical ideas about the unpredictable. See [Bennett \(1999\)](#).

¹¹ The use of the word “natural” here—and, hitherto, just here—is to be considered in an informal tone, not conjuring any evolutionary conotation.

and calculating devices (e. g., the abacus), we reached the electronic computer.

We can find the more ancient echoes claiming for the automation of decision making in Leibniz's *calculus ratiocinator*,¹² whose purpose was:

to bring under mathematical laws human reasoning, which is the most excellent and useful thing we have. (Excerpt of a Leibniz's letter at Parkinson(1966, p. 105) cited in Davis (2000, p. 17))

Since that time, we have technological and theoretical contributions—as well as the interest of the business men—that culminated in computational artifacts, both hardware and software, and a robust intellectual *corpus* of knowledge around it.¹³ From these achievements, can be cited as relevant to the decision making the use of the computational artifacts as:

- calculating and mathematical/statistical modeling machines;¹⁴
- data manipulation machines;
- platforms to simulate and study human rational faculties;
- platforms to simulate and study human perceptive capabilities;
- platforms to simulate and study human psychological capabilities;
- components on the creation of artificial rational (robotic) agents;
- components on the creation of artificial psychologically plausible (robotic) agents.

¹² Davis (2000, p. 16) describes the *calculus ratiocinator* as

consisting of three major components. First, before the appropriate symbols could be selected, it would be necessary to create a compendium or *encyclopedia* encompassing the full extent of human knowledge. He maintained that once having accomplished this, it should prove feasible to select the key underlying notions and to provide appropriate symbols for each of them. Finally, the rules of deduction could then be reduced to manipulations of these symbols, that is to what Leibniz called a *calculus ratiocinator*, what nowadays might be called a symbolic logic.

¹³ To name a few works already considered classics: Turing (1936); Dahl, Dijkstra, and Hoare (1972); Dijkstra (1976); Garey and Johnson (1979); Knuth (1997a,b, 1998); Papadimitriou (1994); Hopcroft and Ullman (1999); Hennessy, Patterson, and Goldberg (2003).

¹⁴ The word *machine* is used here to designate a computational artifact as a whole, not necessarily just the hardware part of it.

Can be cited as an expression of the first two approaches—calculating, mathematical/statistical modeling and data manipulation machines—the use of computers to do operational research systems (Papadimitriou and Steiglitz, 1998; Linhares, 2009; Linhares and Yanasse, 2002, 2010), statistical studies in general, the decoding of the genome, the handling of large volumes of data by Business Intelligence (BI) applications, and the like. The ideas defended in the present work brings no major implications for these first two items—since both are associated with aspects already discussed earlier and should have their use realigned when new directions, arising out of a new mindset, appear (from the revision of the educational and cultural practices already proposed).

Concerning the third, fourth and fifth items—the study of human rational, perceptive and psychological faculties through simulation¹⁵—, whenever disregarding the relevance of the emotions for decision making, any fruit of these approaches—although, sometimes, providing results as interesting as those reached from mathematical and statistical models of human behavior and, at other times, certain results far superior¹⁶—will, due to their remoteness of what is really being a human being, be superficial and, very often, sterile.

Another point to be made, is that these simulations always ignore the implications of the absence of the embodied and situated character of the human beings bring to them. Canned input and poor output, mediated through the traditional symbolic approach, using a von Neumann architecture, will always be doomed to failure when what is at stake is the ability to make decisions at the human level.

Finally, the sixth and seventh approaches mentioned above—the creation of artificial (robotic) agents—, by, for instance, a physical (or virtual) support that resembles (and try to act like) a body and, generally, possesses a sensorial grid around their computing capacities, have a tremendous opportunity to interact with, and sense the, world differently. But until now, I'm not aware of anyone who has taken full advantage of this potential.¹⁷ Once again the principal gap is the absence of emotions.

I completely agree with Hurley, Dennett, and Adams (2011, p. 91–92) when they say that

¹⁵ Although some initiatives in the history of *artificial intelligence* (AI) and *cognitive science* can be classified as associated with just one of the items listed above, almost all have to be associated with more than one (see Haugeland (1989), Flanagan (1991) and Boden (2006)). Important to highlight that rarely those in charge for these initiatives had an accurate awareness of what they were doing.

¹⁶ But in the end, six decades after Artificial Intelligence be incorporated as a research area, almost all their results have become mere tools, or, sometimes, (just) useful methods. ... so distant from being a *truly* artificial intelligent agent as static paper dolls, in the role of figurants in an action movie, will fail to pass the thrill and dynamism needed in the pivotal scene of the movie.

¹⁷ For some details about a line of research that began well, but over time has been distorted by political and financial interests, see Ekbia (2008, ch. 8).

We see knowledge maintenance, reasoning processes, and comprehension as richly embodied processes that cannot be disengaged from emotions that play out in varieties of bodily sensation. Not only are the concepts that make up our thoughts derived from embodied interactions with the world ([...]), but the methods for manipulating these concepts, rather than being somehow purely abstract and disinterested rule-following, are also richly entangled with bodily feedback. We *feel* whether something makes sense or whether something *strikes* us as “true”; and we *feel* our way through problem-solving episodes—in the same way that we fell a stomachache or a cool breeze. The most abstract thought and the most abstruse and rarefied logic can only come to be because of bodily sensation.

And from this follows that no intelligent agent—whether a carbon-based (human) or a silicon-based one—can be trully (carbon-based or silicon-based) intelligent without emotions.

By an irony of destiny we already knew, decades ago, some intrinsic limits and susceptibility to failure inherent to all approaches to artificialization of intelligence, since, to some extent, all of them have always been subject to the sagacious criticisms made by Hubert Dreyfus in the 1960’s (Dreyfus, 1992)¹⁸—to be fair, given his phenomenological and existentialist approach, no evolutionary tone can be found in Dreyfus (1992); however, the situated and embodied character of human intelligence, the influence of the unconscious (and the “fringe of consciousness”), and the relevance of emotions and feelings were already highlighted in their work.

Then, how to explain this apparent blind-spot in so many projects and initiatives, conducted by so many smart people, for so long?

Putting aside (important) aspects concerning institutional, political, economic and financial dimensions, of all the risks that can be cited, the more subtle, and therefore more dangerous, which may plague researchers and their sponsors is the *Eliza Effect*. Hofstadter (1997, p. 88–89) describe it as the idea that

[...] lay people have a strong tendency—indeed, a great willingness—to attribute to words produced by a computer just as much meaning as if they had come from a human being. The reason for this weakness is clear enough: Most people experience language only with other humans, and in that case, there is no reason to doubt the depth of its rootedness in experience. Although we all can chit-chat fairly smoothly while running on a mere half a cylinder,

¹⁸ Other sagacious analyzes of the “[...] dream of the creation of things in the human image [...]” (Ekbis, 2008, p. 2) can be found in Linhares (2000), Ekbis (2008) and Hofstadter and Fluid Analogies Research Group (1995, ch. 4 and 11).

and often do at cocktail parties, the syntactically correct use of words absolutely drained of every last drop of meaning is something truly alien to us[...]

What came to disturb me ever more over the years was the fact that not just lay people were susceptible to the Eliza effect. AI researchers, too, often seemed to conflate the ideas behind their own programs' utterances with the ideas that would have been in the mind of a human who made the same statements.

That is, when the human enthrallment for mechanization (Wood, 2003; Kang, 2011) and a natural predisposition to attribute agency (and intelligence) to so many things around us—including forces of nature, which certainly helped to forge in ancient cultures the myths of natural deities (i. e., animism) and, till now, reinforces astrological practices—*converge in the figure of the computer*, the slightest trace of intelligence or autonomous behavior—being it real, a mere trick, or even the fruit of a fully stochastic pattern—, encourages in people a high level of credulity (and wonder and fear), causing them to assign to the artifact a lot more than it really is. This impulse can be so strong, that even people who do not aim just the material benefits of these projects, dedicate their lives and put at risk their careers by the mere *prospect* of be able to create such intelligent automatons.

But, to create an, in principle viable, artificial artifact capable of intelligent acts—and, concomitantly, capable of making reasonable decisions—is needed much more than mere faith in a prospect. It is needed, beyond all material and institutional support, the right point of reference, the right model from which to abstract the irrelevant and obtain the necessary.

So, it is not just the silicon based constitution of the computer, neither the mere use of logical–mathematically structured languages to animate it, that enlarge the gap between a human beings and an artificial intelligent computational artifact—an artificial decision maker. It is the absence of *the embodied and situated perception of value—of the continuous irrigation of meaning that the embodied and situated emotions supply to all our concepts, ideas, thought, narratives of life and our whole existential history*—that prevents an (almost) complete obliteration of the Eliza effect from our computational artifacts, making all initiatives to make an automated decision–making system seen so far as ludicrously fragile. And, certainly, so will be for a good time ahead.

CONCLUSION: DECISION MAKING AND EUDAIMONIA

*To believe is to feel comfortable with a particular conformation
between your ideas, reasons and emotions
—even if all your ideas, reasons and emotions are definitively wrong.*

— Ariston Diniz de Oliveira

July 26, 2011.

Byron Brassballs is a remarkable figure in my life. Since 1986 the following words from him recur occasionally in my reflections on the human being:

Yes, I am religious. But I've got the decency to keep it in church. (Miller, 1986, Issue #3, pg. 9)

The statement above was said by Byron Brassballs after he be questioned by a reporter if he was a religious person. This question came just after Byron Brassballs confide that he had pushed a crippled man onto a subway track, almost killing him, because he thought that the crippled man was a beggar who was going to rob him. Well, Byron Brassballs is a fictitious character. . . But his ability to compartmentalize beliefs and attitudes is so real. . . so frequently taken in human affairs, that it always comes to my mind when someone defends actions taken through phases like "It was my duty as a manager . . .", "This is what politicians do in these situations. . .", "...you have to be pragmatic . . .", and so on.

The epistemic negligence that undergird the compartmentalization between beliefs and attitudes evidenced above is also present, in a more attenuated form, in a myriad of worldly situations that pervades our daily life.

We know our emotions, but we insist that our ideal is to be just rational.

We notice that details concerning the decisions taken by us roll down between the fingers of our conscience, but we continue to ignore these facts, making decisions with the arrogance of those who have an ontologically impossible free will.

Almost every day we have irrefutable evidence that we do not control the events that surround us; that we cannot anticipate what will happen to us—nor with what is around us—just some minutes ahead, *but we insist on predicting the unpredictable.*

The present work is about the need to take, up to the last consequences, some “truths”, already available to us, about the human nature and the world in which we live.

The perspective adopted here was about decision making because I believe that we are naturally predisposed, and culturally reinforced, to recognize our lives as a succession of choices—even though, as was repeatedly defended here, we do not always have the control over what we decide, or do.

However, we are not mere automata, or a bunch of atoms bouncing at random among so many other atoms. We have some room for maneuver, where we can make decisions. And in this room, to make decisions is about *ethics*.

Not simply in the sense of doing right or wrong. All decisions must be taken as answers to the most central question of the *eudaimonistic ethics*: “How should a human being live?” (Nussbaum, 2003, 31–32)

Of course there does not exist an universal answer, a general recipe, to this question. Every and each decision taken needs to answer the question considering:

[...] the person’s conception of *eudaimonia*, or human flourishing, a complete life. (Nussbaum, 2003, 32)

And the person’s conception of a complete life can involve so many things. . . To the hedonist the complete life is all about pain and pleasure. To some others the complete life is about the beauty, the good and the truth.

I take part with a view from Alasdair MacIntyre (MacIntyre, 2007), inspired by his peculiar reading of Aristotle: to have a complete life is to have all possible roles that you can assume throughout your life into a cohesive and coherent narrative. In this narrative takes place: success and failure; tears and smiles; the ugly and the beautiful; births and deaths; and so on. But in the end, what should count is the consistency and value that you assign, and always wanted, to the narrative that was his life. The decisions that you take at every second influence this narrative; each idea that you have, every emotion that you experience help to write this story.

But, given the impossibility to control everything, it is up to us to just use [D.C. *al Coda*¹]

*Our reflections, our conscious thinking,
just [2.to sow a debil voice that will try to be listened in the future,
amid all our strident ideas and emotions,
in the course of our erratic and tumultuous
—and often unconscious—
attempts to make a decision about contingent facts. ♠*

¹ *Da Capo al Coda*: go back to the beginning—“Capo” in Italian—of the piece (document) and play (read) until you see a circle with a cross through it (the Coda sign). The beginning of the document is repeated here, just for your convenience.

POSTFACE: NEXT STEPS

*For the classics,
philosophical insight was the product of a life of leisure;
for me,
a life of leisure is the product of philosophical insight.*

— Nassim N. Taleb (Taleb, 2010a, p. 84)

Any work which nourishes the pretension to completeness to the point of not remaining anything else to be said about its subject, were born already fated to failure.

All said here is supported by a transitory certainty that any truth must aim: to survive as much as possible the attempts to refutation.

After this caveat, some next steps to be taken by me in the near future...

Having the base furnished by an evolutionary perspective—where the unconscious and the emotions take their deserved status, as well as the unpredictable is constantly around the decision maker—I will dedicate some attention to a complementary perspective of the decision-making acts, already cited before *en passant*, as part of a *homeostatic process*: therefore, having as its objective to maintain, or to achieve an improvement to, the current existential well-being of the decision maker (and their affairs); as well as set the future prospects of their life in a tolerable, if not in a superb, status.

Another target to be pursued by me, is a better understanding of *the fragmentary and conflictual character of the modern decision maker* as fruit of an innate predisposition (and a cultural reinforcement) to have various *personas*, multiple roles, both along their life and along a same day—and its consequences for the perception, conception and achievement of an ethical life.

Last, but not least, I will continue to pursue my computational cognitive modeling initiatives: sometimes you need the impediments imposed by the ruthless practice of the craftsmanship—i. e., the direct contact with the raw material from which something will take form—to attain an objective sense of limit of what is possible to be made and to accrete inspiration for new ideas.

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