



# **MASTER'S THESIS**

Innovative critical thinking for (not only) managerial decision-making of the 21st century – minimization of decision paralysis

Inovativní kritické myšlení pro (nejen) manažerské rozhodování 21. století – minimalizace rozhodovací paralýzy

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(3) DIAMANDIS, P. and KOTLER, S. Abundance. New York: Free Press, 2012.  
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## **Poděkování**

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# **Abstrakt**

Diplomová práce pracuje s transdisciplinárním přístupem vysvětlení paradigmatu kritického myšlení v kontextu 21. století. Pro vytvoření teoretické základny byla použita paradigmatata rozhodování, rozhodovací paralýzy a inovační éry tohoto století. Teoretická část tak představila základní teorie a koncepty čerpané z vědecké a odborné literatury pro vysvětlení mystifikovaného pojmu kritického myšlení, mechanismů, které kritické myšlení mohou podporovat i mu bránit a také důvodů, proč je kritické myšlení klíčovou dovedností 21. století. Následně jsou doporučeny praktické nástroje pro přímý i nepřímý rozvoj kritického myšlení. Nakonec je vysvětlena metodologie diplomové práce, prezentovány výsledky a doporučení a vyvozeny závěry.

## **Klíčová slova**

Kritické myšlení, rozhodování, rozhodovací paralýza, inovační éra 21. století, inovační kritické myšlení

# **Abstract**

The master's thesis uses a transdisciplinary approach in explaining critical thinking paradigm in the context of the 21<sup>st</sup> century. For clarification, paradigms of decision-making, decision-paralysis and 21<sup>st</sup> century innovation era are used to create a theoretical background. Thus, theoretical part introduces the core theories and concepts drawn from evidence-based literature to explain the mystified concept of critical thinking, underlying mechanisms which can either support or block it and reasons why critical thinking is being referred to as a vital skill of the future. Subsequently, practical tools for both direct and indirect development of critical thinking are recommended. Finally, the methodology is explained, findings and recommendations are presented and conclusions are drawn.

## **Keywords**

Critical thinking, decision-making, decision-paralysis, 21<sup>st</sup> century innovation era, innovative critical thinking

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# Introduction

We all make bad decisions, with various level of importance and impact, whether we are presidents, CEO's, middle-managers, small business owners, employees or freelancers. There is an old saying mentioning that the way that a man learns, is by making mistakes. Which is not always true (as we usually repeat the same mistakes, unaware of its systematic nature) and nor at all easy, as we surely observed on ourselves many times. But what if there were mechanisms that can help us make more informed, better structured, more thought-of decisions? That is exactly the aim of this thesis. To uncover this full-of myth concept of critical thinking that can be exactly that foundation stone of quality, universal intellectual thinking and decision-making, transcending disciplines.

Furthermore, critical thinking will be enlightened through concepts and paradigms closely connected to this phenomenon, supported by various reports, studies and meta-studies from the disciplines of behavioural economy, psychology and managerial literature. Thus, socio-psychological theory centred at the thinker and its behaviour will be used to explain the complex nature of critical thinking in the 21<sup>st</sup> century world, where the thinker has to face many specific challenges. A transdisciplinary approach is fostered throughout this publication as the author believes that the very transdisciplinarity is the key part of understanding and explaining the nature of our complex world.

This publication is set into the context of specific paradigms, aiming to explain better the importance of critical thinking in rapid-changing technology times, fake news, innovation and improve the decision-making process corresponding to a profile of educated thinker of the 21<sup>st</sup> century.

Ultimately, This thesis strives to synthesise important information and crucial ideas and theories in an understandable way, so any adult thinker, regardless of occupation, status or education level could benefit from this work, if interested in critical thinking and would like to improve its decision making process and make better sense of this ever-changing and fast-developing world.

# Conceptual framework

## The aim

The aim of the thesis is to enlighten the most important findings in the area of critical thinking using scientific studies, professional literature and practical meta-analysis of this paradigm, to a wide field of readers of not only academic sphere.

## The benefit

The main benefit of the thesis should be the complex summary of scientific studies and related professional literature concerning the paradigm of critical thinking.

## The objectives

a) To identify and explain the most important findings in the field of critical thinking and related paradigms from the theoretical perspective and within relevant, up-to-date literature (corresponding to the theoretical part).

b) To offer the reader practical tools recommended by the acknowledged experts in the field of critical thinking and related disciplines (corresponding to the practical part).

c) To propose an understandable framework of innovative critical thinking (corresponding to the findings chapter, connecting both theoretical and practical part).

The conceptual framework provides a coherent summary of this thesis aim, benefit and objectives. Gradually, each chapter will start with an introduction and end with a brief summary to enable the reader a better orientation and understanding of the chapter content. First four chapters, 'Critical thinking'; 'Decision-making'; 'Decision-paralysis' and '21<sup>st</sup> century innovation era' create the theoretical part of the thesis. Followed by the practical part which includes a comprehensive chapter of 'Practical tools' divided into many subchapters concerning both direct and indirect building of critical thinking.

# **THEORETICAL PART**

# 1 CRITICAL THINKING

*"Many people would sooner die than think. In fact they do so." – Bertrand Russell, Nobel Prize in literature laureate*

The first chapter will provide a comprehensive introduction to the critical thinking paradigm. First of all, leading theories and definitions that emerged from a profound analysis of the critical thinking field will be introduced. Subsequently, the core universal components of critical thinking will be presented and detailedly examined, alongside with a brief description of the concept's limitations. This serves particularly well in demystifying the concept of critical thinking and providing a well-defined framework for its application. Moreover, the role of critical thinking and education will be discussed and analysed to offer a comprehensive picture of the state of critical thinking in educational institutions nowadays. Furthermore, a basic transdisciplinary framework for problem-solving with critical thinking will be suggested. Ultimately, the biological processes concerning our brain, memory and the senses, underlying our ability to think, learn, understand and explain the world, will be explained, to complete the critical thinking introductory chapter.

## 1.1 Definition and background

*"The important thing is to never stop questioning." – Albert Einstein, Nobel Prize in physics laureate*

Firstly, the background of emerging importance of critical thinking will be introduced. Fear of losing jobs due to automation and technology innovation is raising deeply emotional discussions across industries and the globe, affecting masses and provoking world leaders to address this issue. This omnipresent change and innovation have brought a global need for a definition of thought that would tackle this paradigm of complex thinking necessary to be applied in today's world. That's why an increased number of professionals, world leaders and academic journals mentions critical thinking. Koenig, 2011, p. vii in the large report on 'Assessing the 21st century skills' aptly explains that jobs of tomorrow will need to involve: *"skills that cannot easily be automated, such as adaptive problem solving, critical thinking, complex decision making, ethical reasoning, and innovation."* That is the main reason why critical

thinking is and will be a crucial and well-desired skill regardless of profession and also the reason why critical thinking is the subject of examination in this thesis.

To begin, the word "critical" originates from Greek's "*kriticos (discerning judgment) and criterion (standards)*". Etymologically, (the study of the origin of words) critical "*implies the development of discerning judgment based on standards*" (Robert and Petersen, 2013, p. 85). *Thinking* then, comes from the Old English *þencan*, meaning "*imagine, conceive in the mind; consider, meditate, remember; intend, wish or desire*" (Online Etymology Dictionary, c2001-2019). According to Hitchcock (2018) as well as many other researchers, the modern day origin of critical thinking goes back to American philosopher John Dewey 1910's book of 'How we Think' who referred to critical thinking as "*reflective thought*" or in more complete definition as an "*active, persistent and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it, and the further conclusions to which it tends.*" However, it has intellectual roots back in the teaching of antique philosophers and Socratic inquiry 2500 years ago (Robert and Petersen, 2013, p. 85), followed by the history of philosophers such as Francis Bacon, John Locke or John Stuart Mill (Hitchcock 2018).

Arguably one of the first complex conceptualization of critical thinking was proposed in 1990, by 46 international scientists and experts in an extensive report on critical thinking designed for the American Philosophical Association. The experts have agreed that critical thinking, similarly, to reading or writing, have "*applications in all areas of life and learning*" (Facione, 1990, p. 10), thus it has transdisciplinary nature. The experts defined the concept in the following way: "*We understand critical thinking to be purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based*" (Facione, 1990, p. 3). This complete yet rather extensive definition can be synthesized by widely quoted and easily grasped definition of critical thinking proposed by Ennis, 1991, p. 6: "*reasonable, reflective thinking that is focused on deciding what to believe or do.*"

Stanford Encyclopedia of Philosophy's author David Hitchcock 2018 defines the core concept of critical thinking as careful goal-directed thinking, a widely accepted and desired educational goal, a predisposition composed of a skillset for success in life.

Moreover, a large literature review on critical thinking from 2011, describes critical thinking as a cross-disciplinary, vital, innovation skill, "*attitudes or habits of mind,*

include open- and fair-mindedness, inquisitiveness, flexibility, a propensity to seek reason, a desire to be well-informed, and a respect for and willingness to entertain diverse viewpoints" (Lai 2011, p. 2-4). The same author also mentions the importance of both philosophical and psychological roots of critical thinking which remains vital for understanding the method. Socrates, Plato or Aristotle exemplify the philosophical approach, or as can be simply put, approaches of doubting everything including existing knowledge and doctrines, being conscious and learning through self-exploration and inquiry. The psychological approach advises the critical thinker to more focus on skills such as analysis, interpretation and formulating of good questions.

One of the nowadays arguably most complete definition is offered by Sellars et. al 2018: *"Critical thinking is the intellectually disciplined process of actively and skilfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action."* The authors also mention the values<sup>1</sup> of the ideal form of critical thinking which are applicable transdisciplinary: *"In its exemplary form, it is based on universal intellectual values that transcend subject matter divisions: clarity, accuracy, precision, consistency, relevance, sound evidence, good reasons, depth, breadth, and fairness (Sellars et. al 2018, p. 1)."*

Furthermore, Abrami et. al 2015's meta-analysis of strategies for teaching students to think critically argue for following definition: *"Critical thinking (CT) is purposeful, self-regulatory judgment that results in interpretation, analysis, evaluation, and inference, as well as explanations of the considerations on which that judgment is based (Abrami et. al, 2015, p. 275)."*

Another meta-analysis on college students and critical thinking suggest that educators, policymakers and employers view critical thinking as a vital skill, with labels as *"important", "essential", "important component of medium- and high-complexity jobs"*, however, it remains unclear how effectively is critical thinking being taught and how it is or should be tested (Huber and Kuncel, 2016, p. 431). The importance of critical thinking is also supported by Carlton's et. al 2017 meta-analysis of critical thinking and community colleges. Interestingly, this meta-analysis found out that the *"students' levels of critical thinking was more strongly associated with longer-term outcomes*

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<sup>1</sup> A synthesis of the universal intellectual values and how they can be applied is described in the practical part of the thesis.

compared with those at the shorter term (Carlton et. al 2017, p. 71).” Meaning that critical thinking was proven to be more efficiently learned over a larger period.

Dwyer, Hogan and Stewart, 2014, p. 43 propose following: *“Critical thinking is a metacognitive process that, through purposeful, reflective judgement, increases the chances of producing a logical conclusion to an argument or solution to a problem. Instruction in critical thinking is becoming exceedingly important because it allows individuals to gain a more complex understanding of information they encounter and promotes good decision-making and problem-solving in real-world applications.”*

Based on extensive research, frequently various aspects of critical thinking are defined, therefore, it is necessary to summarize that vast majority of empirical literature agrees on crucial points which include that critical thinking is analytical and evaluative type of thinking, widely applicable to thinking of individuals as well as collectives within transdisciplinary fields as well as specific ones. Simply, it is a purposeful way of thinking which comprises of a specific mindset and skillset with the outcome of better decision making or problem-solving (see for example Abrami et. al, 2015, Facione 1990, Hitchcock 2018, Koenig 2011, Lai 2011 or Sellars et. al 2018).

Finally, it is important to remind that critical thinking (CT)<sup>2</sup> paradigm in this thesis will be described in the transdisciplinary context, which is defined by the upper-mentioned authors as a vital skill for the 21<sup>st</sup> century and will be defined accordingly to the conceptual framework of this thesis.

## **1.2 Core components of critical thinking**

*“Thinking is skilled work. It is not true that we are naturally endowed with the ability to think clearly and logically – without learning how, or without practicing.” – A. E. Mander, British writer*

In this subchapter, we will expand on the definition and background chapter of this thesis. According to Hitchcock 2018, summarizing wide research on critical thinking, the critical thinkers possess a skillset comprising of *dispositions, abilities* and specific additional *knowledge of concepts, principals and subject-matter* crucial for the thinking. *Abilities* can be identified directly, whereas *dispositions* indirectly. Similarly, the experts’ consensus (Facione 1990) described two major dimensions of critical

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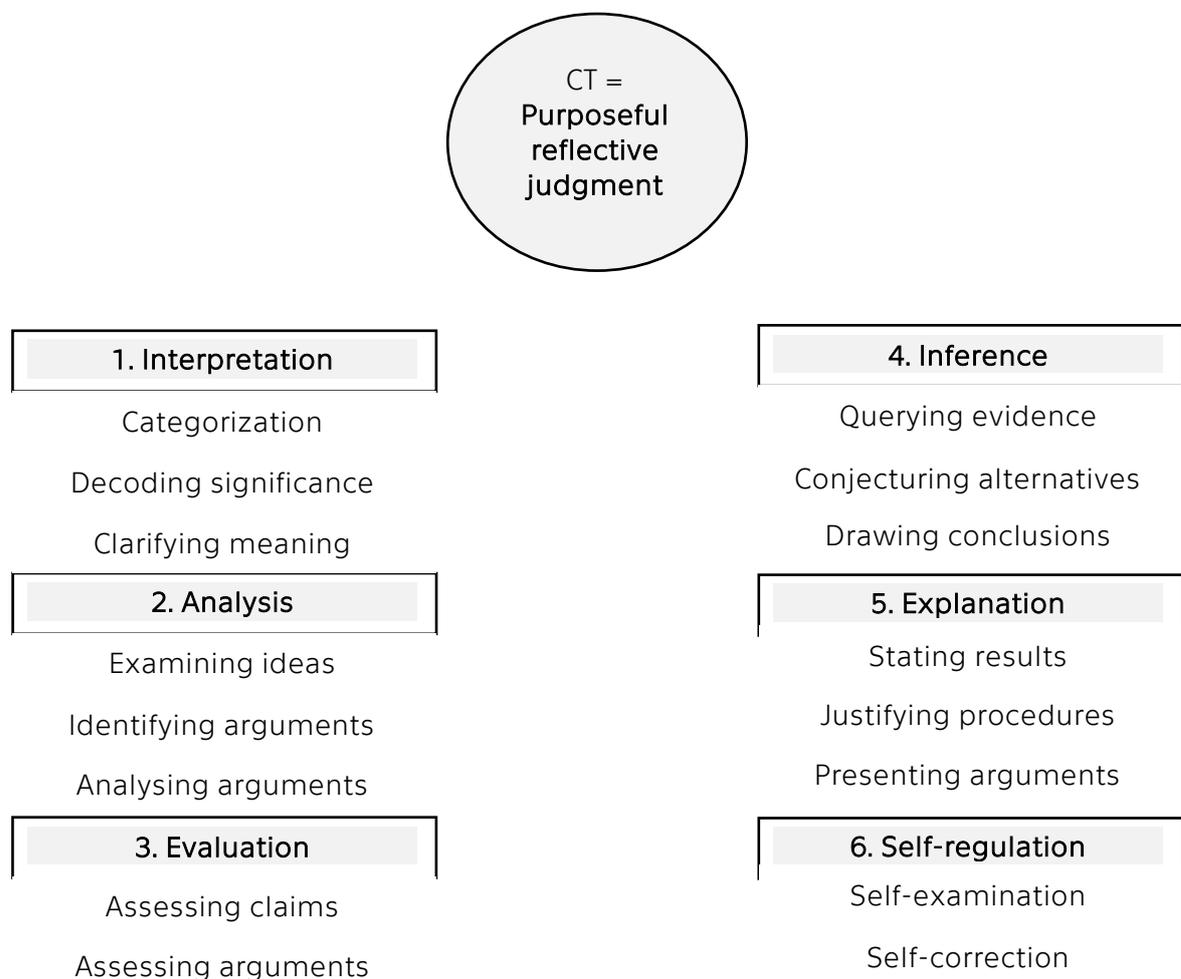
<sup>2</sup> From now on, for simplicity, critical thinking will also be referred to as CT.

thinking: specific cognitive skills (or skillset) and dispositions (mindset) which are generally needed in the critical thinking process and all together create a profile of ideal critical thinker.

### 1.2.1 Skillset

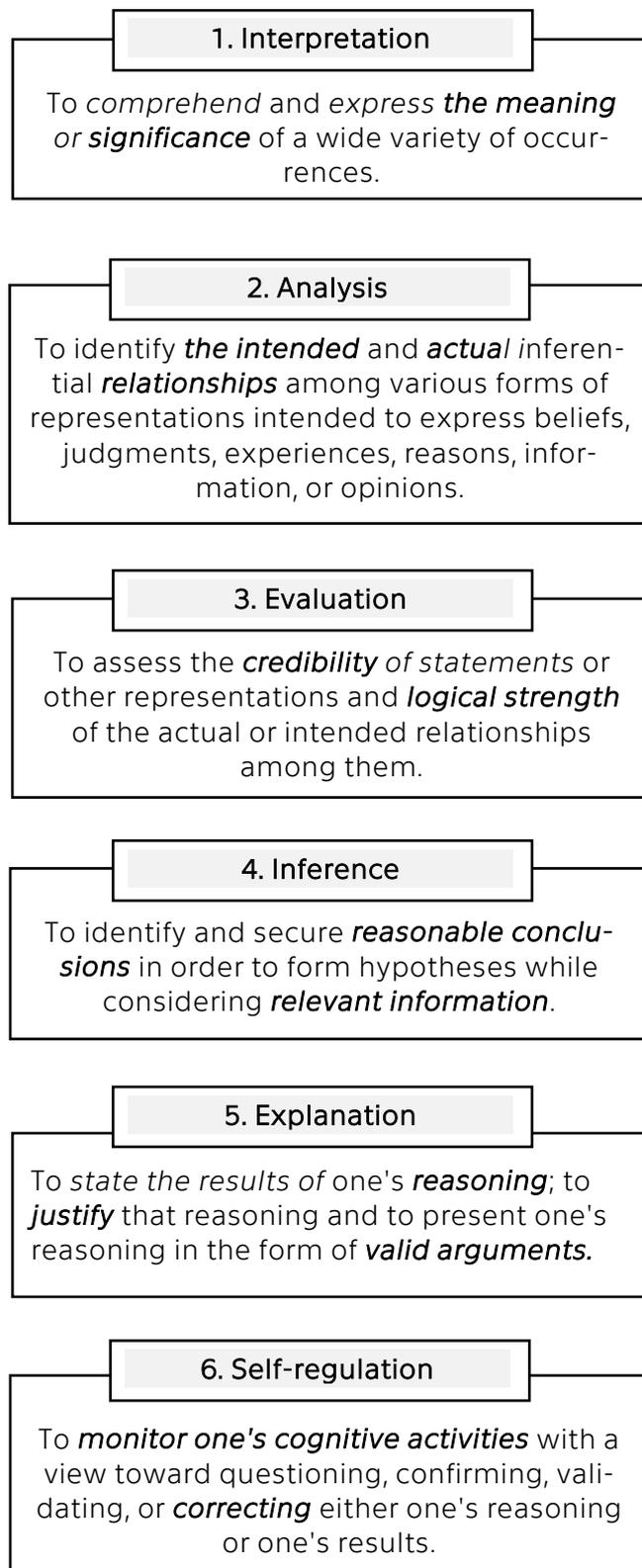
Delphi panel of researchers identified, after 2 years of research with consensus of more than 46 international scientists and experts in an extensive report on critical thinking designed for American Philosophical Association, following cognitive set of skills and sub-skills (Figure 1) including its detailed description (Figure 2) were identified as the first core component of CT paradigm of universal, domain-independent CT:

*Figure 1 The expert consensus of core cognitive skills and sub-skills of CT*



Source: Based on Facione, 1990, p. 3-19

Figure 2 Consensus descriptions of core CT skills and sub-skills



Source: Based on Facione, 1990, p. 3-19, adjusted

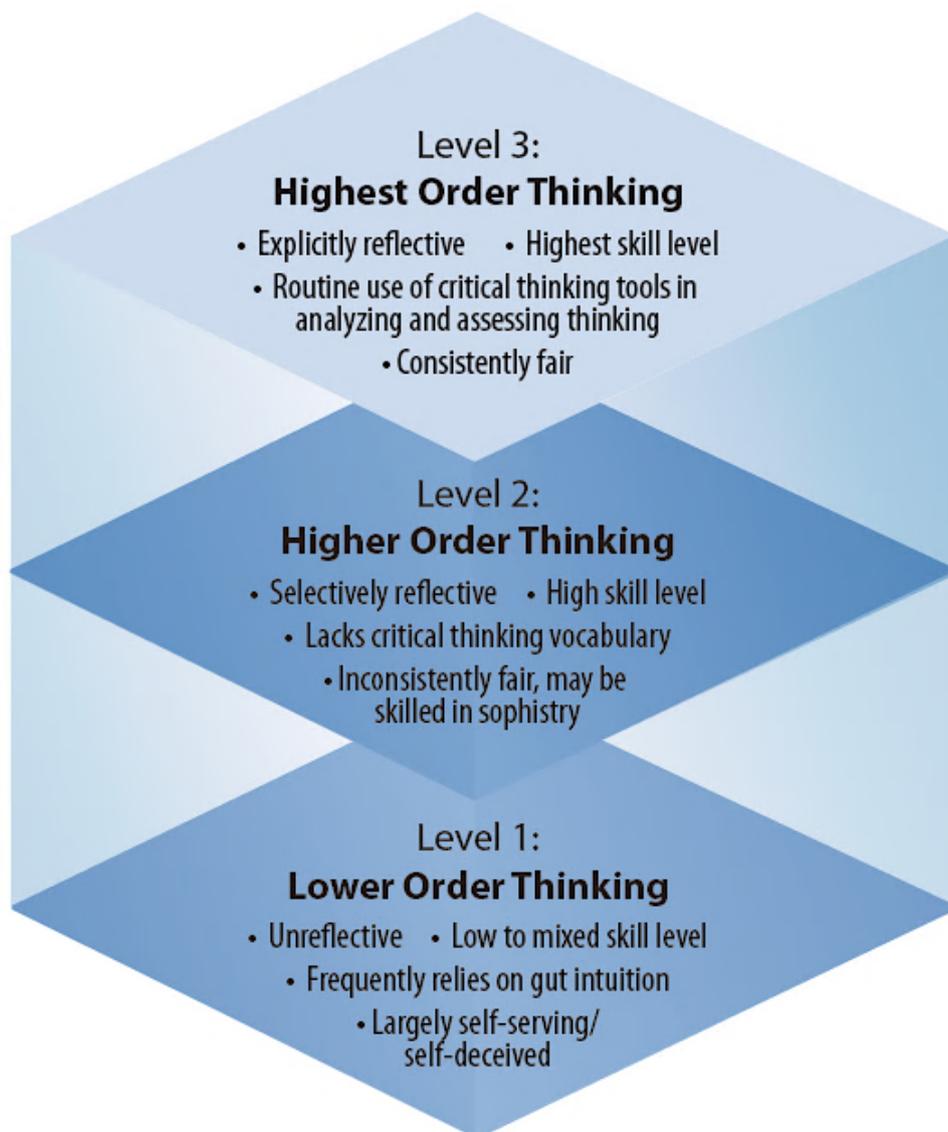
## 1.2.2 Mindset

Furthermore, the dispositions or a mindset of a critical thinker will be described. As the 2015's "Update on the Critical Thinking Mindset from Delphi Report Principle Investigator, Dr. Peter Facione" suggests (Facione, 2015, p. 3), the critical thinker should have following dispositions (intellectual virtues):

- inquisitive with regard to a wide range of issues
- concerned to become and remain well-informed
- alert to opportunities to use critical thinking
- trusting in the processes of reasoned inquiry
- self-confident in their reasoning skills
- open-minded regarding divergent world views
- flexible when considering alternatives and opinions
- understanding of the opinions of other people
- fair-minded when appraising reasoning
- honest in facing biases, prejudices, stereotypes, egocentric and sociocentric tendencies
- prudent in making or altering judgments
- willing to reconsider and revise views where honest reflection suggests that change is needed

To further reflect on the paradigm of critical thinking, many other education experts and critical thinking professionals categorize critical thinking paradigm as so-called "higher-order thinking" which is a type of thinking, characteristic with going beyond the observation and memorization type of thinking and learning to apply more complex cognitive abilities. As it is in contrast with what is considered to be a lower order thinking (Facione 1990; Miri 2007; Sellars et. al 2018). Facione, 1990, p.13 as well as Paul, 2005, p. 34 included in higher-order thinking paradigm, despite critical thinking, disciplines such as problem-solving, decision-making and creative thinking. Thus, making it clear that these disciplines are related, however distinguishable. Paul and Edler, 2008, p. 7 went further when designed a more complex 'Three Levels of Thought' model suggesting criteria suitable for the assessment of one's critical thought which can be used for either personal reflection or assessment of others. The model distinguishes between the different levels of thought as well as description typical features in each level of thought (Figure 3).

Figure 3 Three Levels of Thought



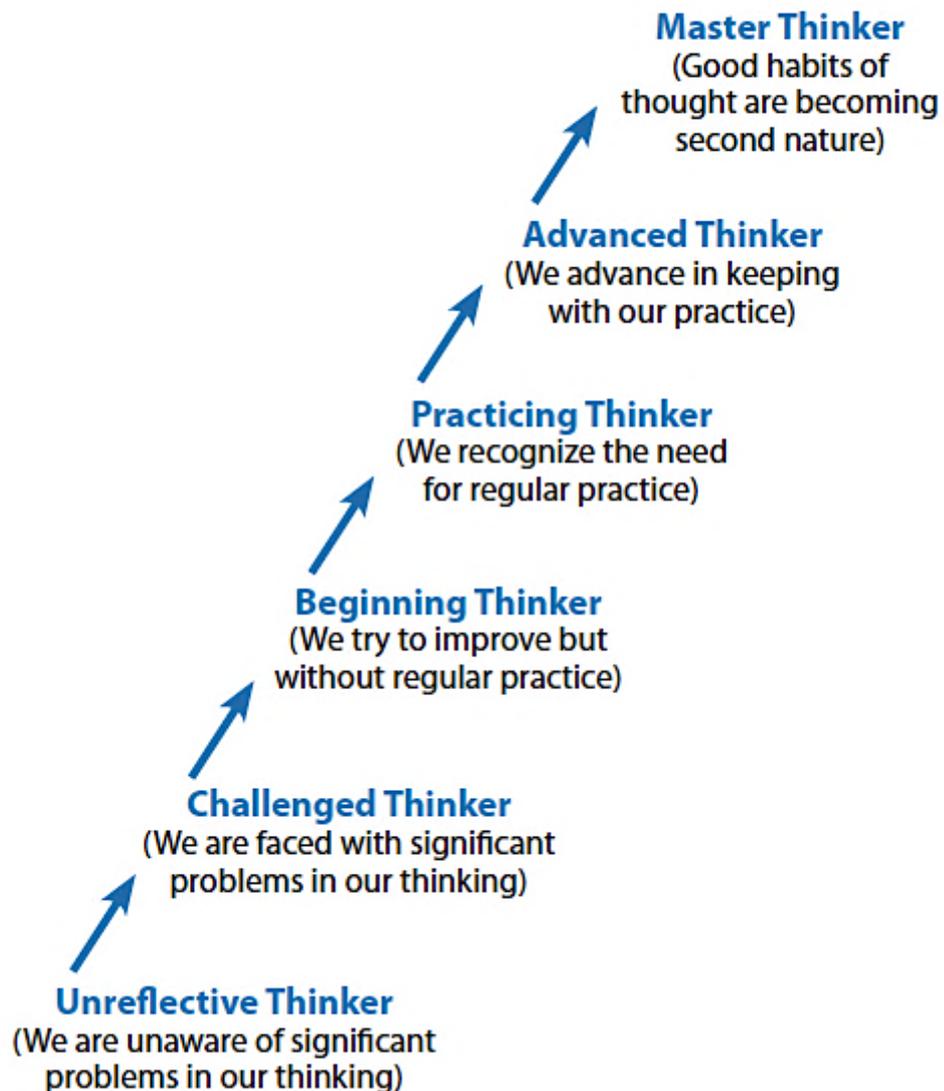
Source: Paul and Edler, 2008, p. 7

In this model (Figure 3), the lower order thinking is clearly distinguished from both higher order thinking types (Level 2 and 3). However, the level 3 'Highest Order Thinking' specifically distinguished further from the 'Higher Order Thinking' to even specify the *mindset* importance and proficiency in the application of critical thinking – the consistency in fairness, dispositions to think critically and the systematic application. It also implies that a thinker can have critical thinking skills but does not have to possess its values which corresponds to the critical thinking dispositions or so-called intellectual virtues.

Moreover, stages of critical thinking development (Figure 4) are proposed to frame the importance of critical thinking as a whole life developing skill and

disposition, which can be trained and improved with adequate practice and techniques to a mastery.

Figure 4 Stages of Critical Thinking Development



Source: Paul and Elder, 2008, p. 20

### 1.2.3 Limitations of critical thinking

As with every concept, critical thinking has its limitations and can be misinterpreted, therefore common errors in applying CT are presented to be prevented in the future. As described by Paul and Nosich 1993 (p. 78-123) in a chapter 'A Model for the National Assessment of Higher Order Thinking' which was commissioned by the United States Department of Education, Office of Educational Research and Improvement of the National Center for Education Statistics:

- a) important critical thinking concepts, may be used vaguely, inconsistently, incorrectly, or misleadingly;

- b) a false, misleading, or simplistic over-arching concept of critical thinking may be fostered,
- c) an unrealistic strategy for the assessment and cultivation of critical thinking may be incorporated.

### **1.3 Critical thinking and education**

*"Education is the most powerful weapon which you can use to change the world." – Nelson Mandela*

Education is undoubtedly an important part of our lives. One would most probably expect that critical thinking should be one of the outcomes that a person receives, or more specifically, will be taught at different educational institutions, at least at universities. However, as we shall see in a while, it is not always so. Tiruneh et al., 2014, p. 3 aptly defined the concept of critical thinking in education:

*"CT instruction is mainly based on the assumption that there are identifiable and definable thinking skills which are domain-independent and can be taught to students to recognize and apply them appropriately in daily life situations and future careers. The goal of CT instruction is, therefore, to help students acquire and transfer those domain-independent thinking skills to solve problems faced in everyday life."*

If we aspire to enhance the quality of thinking of a specific subject, for example, organization's, nation's or one's thinking we should probably look at education. Why is critical thinking not taught properly at schools and Universities? It has been argued by various authors and studies that critical thinking is not widely taught in different levels of education systems, however, it is demanded and considered a crucial skill for the future employability and the 21<sup>st</sup> century competitiveness in general. Also, a lack of measurable outcomes of teaching critical thinking skills in educational institutions is identified across countries. A comprehensive summary is expressed by Paul, 2005, p. 33-34 by his extensive study of American Universities where he identified lack of well-defined critical thinking in faculties in the USA as well as lack of knowledge about critical thinking by professors themselves. His concern can be related to the worldwide problematic:

*"... they teach history but not historical thinking. They teach biology, but not biological thinking. They teach math, but not mathematical thinking. They expect students to engage in analysis but have no clear idea of the elements of analysis (or how to teach students those elements). They want students to use intellectual standards*

*in their thinking but have no clear conception of what intellectual standards they want their students to use or how to articulate them. They are unable to describe the intellectual traits (dispositions) essential to the educated mind."*

Paul, 2005, as well as many other authors, calls for a standardization and conceptualization for both domain-specific and domain-independent critical thinking as well as education of Universities and professors who suffer from bias of competency, thinking that they teach critical thinking yet do not have a specific idea what it is or how to measure it as it has been shown in Paul, 2005 study. Even more disturbing results has presented a 2011 study on more than 2,300 US college students at 24 institutions. According to the study, 54% of the students demonstrated no statistically significant improvements in critical thinking, complex reasoning, and writing during their first 2 years of college (Arum and Roksa, p. 116).

On the other hand, it seems that some researchers have a right direction about how students should be learned to think critically. Diane F. Halpern, former president of the American Psychological Association, argues that there are studies (citing 7 empirical studies) confirming that critical thinking can be taught and have transferable nature when taught explicitly and on *"multiple examples across domains in order to maximize transfer"*. It is so, because critical thinking *"does not automatically result as a byproduct of a standard instruction"* in education. Meaning it really does have to be taught specifically as a critical thinking subject in order to achieve improvement. She also adds that there is no reason to believe that critical thinking could not be taught and learned, however, similarly as writing and mathematics classes predominantly improve skills in those subjects so it should concern critical thinking, if applying upper-mentioned principles (Halpern, 2013, p. 14 - 17). Abrami et. 2015, p. 275, based on his meta-analysis of strategies for teaching critical thinking, he too argues for the existence of *"effective strategies for teaching CT skills, both generic and content specific, and CT dispositions, at all educational levels and across all disciplinary areas."* And also confirms the Halpern's argument that CT should be explained explicitly and taught on real problems: *"Notably, the opportunity for dialogue, the exposure of students to authentic or situated problems and examples, and mentoring had positive effects on CT skills."* Similarly, Lai 2011 (p. 44) in her meta-analysis of critical thinking, offers transdisciplinary applicable, brief recommendations: open-ended types of real-world authentic problems should be used by educators to stimulate CT; ill-defined problems should be used to go beyond the lower-order type of thinking.

### **1.3.1 The role model of critical thinking education**

Finish education, unlike many other nations, seems to have cracked the code for effective critical thinking education. It is often discussed as the role model of world education systems. Like other European countries, Finland has experienced a substantial increase in fake news stories and propaganda targeted against it that can be linked back to Russia since the Russian annexation of Crimea in 2014. It has been a problem for many countries. However, unlike other countries, Finland seems to have an education system fostering “*widespread critical thinking skills*” that seems to be very effective in fighting fake news, conspirational theories as well as enhancing digital literacy (Standish 2017). A recent study measuring “Critical thinking efficacy and transfer skills defend against ‘fake news’ at an international school in Finland” by a Stanford US methodology have proven claims about explicit facilitating of critical thinking skills in Finnish education; while also significantly outperforming the US students. According to this study, they have managed that by involving a separate critical thinking skills course while also adding CT into more traditional subjects in the curricula. In contrast to the US where CT is involved in subject coursework only. Based on this study the researchers explicitly recommend teaching CT in the way Finnish education system does – separate critical thinking courses and application of CT in traditional subjects (Horn and Veermans, 2019, p. 1).

To summarize, although, that there are existing effective, evidence-based strategies for teaching critical thinking, educational institutions (with the exceptions of Finnish education) generally fail to provide a quality large-scale teaching of critical thinking and generally, to react quickly to the technological change and demands of the industry. Which only strengthens the importance of self-education. The role of self-education and development of critical thinking as an innovative skill for the 21<sup>st</sup> century will be further discussed in the chapter four.

## **1.4 The framework of critical thinking for problem solving**

*“Learn to use your brain power. Critical thinking is the key to creative problem solving in business”. – Richard Branson, visionary entrepreneur*

Critical thinking is often described as a valuable tool in the problem-solving process. Supposing the simple before-mentioned definition of CT, proposed by Ennis,

1991, that CT is *"reasonable, reflective thinking that is focused on deciding what to believe or do."* This basic framework might serve well to help conceptualize and structure a problem to a manageable, solvable form in various transdisciplinary fields with the outcome of deciding what to do (Hitchcock, 2018):

- 1) noticing a difficulty
- 2) defining the problem
- 3) dividing the problem into manageable sub-problems
- 4) formulating a variety of possible solutions to the problem or sub-problem
- 5) determining what evidence is relevant to deciding among possible solutions to the problem or sub-problem
- 6) devising a plan of systematic observation or experiment that will uncover the relevant evidence
- 7) carrying out the plan of systematic observation or experimentation
- 8) noting the results of the systematic observation or experiment
- 9) gathering relevant testimony and information from others
- 10) judging the credibility of testimony and information gathered from others
- 11) drawing conclusions from gathered evidence and accepted testimony
- 12) accepting a solution that the evidence adequately supports
- 13) reviewing and reflecting on our solution

## **1.5 Brain, memory and our senses**

*"Great stories don't appeal to logic, but they often appeal to our senses."*- Seth Godin, marketing guru

When trying to answer a question of why it is so important to be thinking critically, it is crucial to understand how people's brains work and make sense of the things around us. A human brain is one of the most remarkable devices known to man and still, with all current advances in human knowledge and technology, not fully understood. It processes millions of pieces of information per second, more than 11 million pieces of information through all of our senses (sight, sound, touch, smell, taste and spatial sensation) from which we consciously process just about 40 pieces (Wilson, 2002, p. 24). The brain also make complex computations for us - around 200 million billion per second (Pradeep, 2010, p. 106), still more than any computer made by a human can do, representing our most metabolically expensive organ with only about 3% of our body weight, yet consuming about 20% of our energy (Pradeep, 2010, p. 135)

and if we would stretch it, it would cover an area of about 2,300 cm<sup>2</sup> (Carter, 2019, p. 39). There are 100 00 billion electrical cells called neurons in the brain, representing more potential connections between them than are atoms in the universe (Carter, 2019, p. 39).

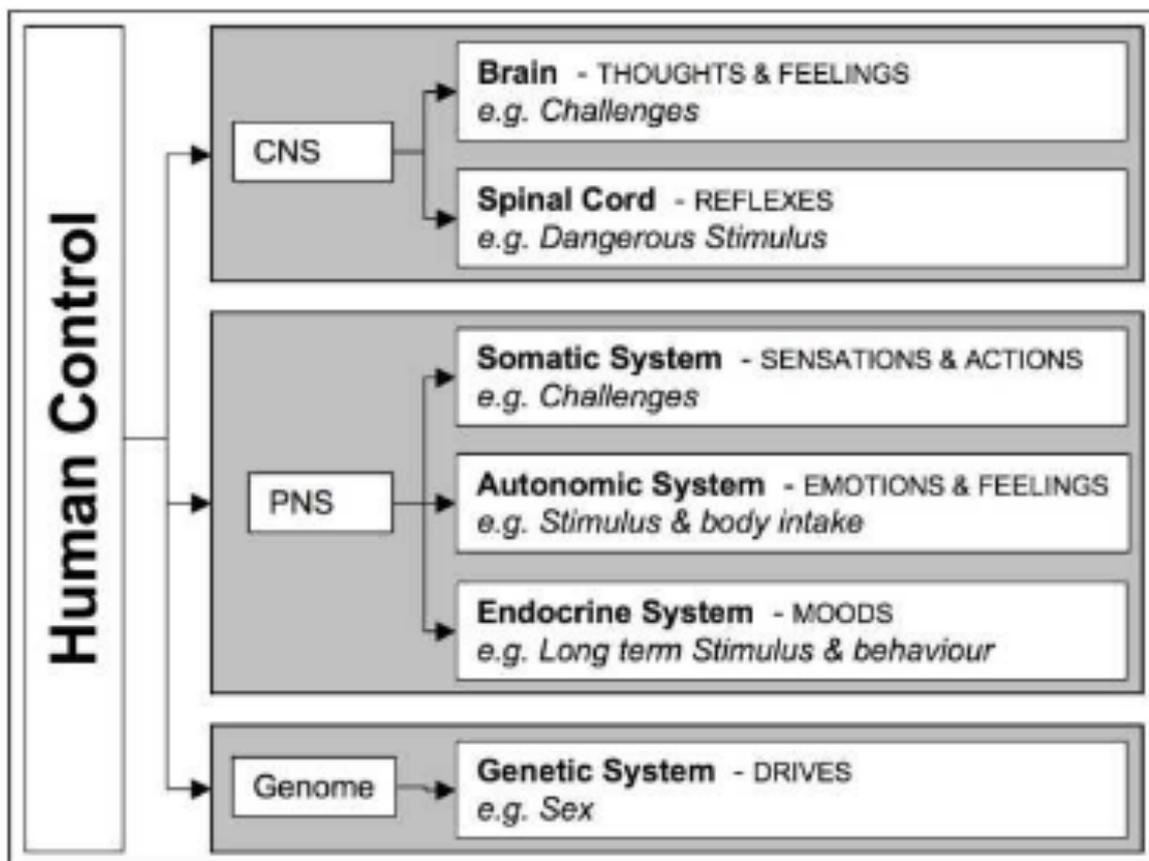
This incredible and complex organ also has many flaws or more precisely specific ways of functioning that can be fundamental in how we perceive, understand and explain our reality – including the diversification of lies and truths which are nowadays often considered relative by many non-critical thinkers. Some of these flaws include the attention filter of the brain which assesses which things are worth our attention and bias, flaws in reasoning which we will discuss later. For a good reason, our brain is only able to hold and process a limited number of information that creates our notion of the world as we are simply not able to remember (with some extraordinary and extremely rare exceptions) every single information perceived, which would be more overwhelming than it already is.

Generally, as pointed out by Zaltman and Zaltman, 2008, p. 38, our brain makes sense of the world by creating so-called mental models or schemas which originate from firing among a particular group of neurons in our brain. These mental models or schemas are created by a set of concepts, these concepts originate by a grouping of thoughts, where the thought is a direct result of the firing neurons. As the Zaltmans present it, the leading cognitive neuroscientists believe that the mind (with all the mental models shaped by complex combination of sensations, perceptions, thoughts, emotions, memories, language and actions (Carter et. al 2019, p. 38-39)) is created by the processes of our brain or in their words "*the mind is what the brain does.*" That is why we possess these mental models for nearly every situation of our life from the idea of what is a good brand to the selection of a perfume or a partner (Zaltman and Zaltman, p. 38). A positive thing to hear is that we can train our brain similarly as we can train our muscles because the brain is *neuroplastic* - meaning that our brains wiring can be rewired most commonly as we learn new things or even unlearn old ones such as bad habits or false information. It is a continuous process that can be either short-, medium-, or long-term optimizing of our neural network (Duffau, 2016, p. 225).

Harvard University professor Gerald Zaltman, as well as several other researchers, states that about 95% of our thoughts, emotions and learning, occur in our unconscious mind (Pradeep, 2010, p. 19). Meaning that a lot of very important tasks that we usually think we do consciously, is not always so, such as deciding what information to pay attention to, interpreting and evaluating that information, learning new things,

and setting goals for ourselves can all be performed by our nonconscious (Wilson, 2002, p. 24). As described by Rauterberg 2010 (Figure 5), biologically, the human unconscious can be framed by our genetic reproduction system (genome), the peripheral nervous system (PNS) and the central nervous system (CNS), which all contribute to information processing.

Figure 5 Framing of the unconscious information processing



Source: Based on Rauterberg 2010 (adjusted); originally from Salem, Nakatsu and Rautenberg 2006

Table 1 Information transmission rates of the senses

<b>Sensory system</b>	<b>Pieces of information (per second, approx.)</b>
<b>Unconscious</b>	
Eyes	<b>10,000,000</b>
Skin	1,000,000
Ears	100,000
Smell	100,000
Taste	1,000
<b>Total</b>	<b>11,201,000</b>
<b>Conscious</b>	
<b>Total</b>	<b>40</b>

Source: Based on Markowsky 2017; Wilson, 2002, p. 24 (adapted)

Upper depicted Table 1 confirms the notion that human beings are predominantly visual creatures and as we have seen in various studies, people are much better in understanding visual inputs, for now obvious reasons, most of the information we receive is visual (Plassmann, Ramsøy and Milosavljevic, 2012, p. 20). It can also offer explanation why we refer to someone with strong sense of purpose as *visionary*, companies have their *vision* statements or why attractive things are referred to as *eye-catching* (Zaltman and Zaltman, 2008, p. 41). That is also why digital platforms such as Instagram and YouTube enjoy such popularity nowadays - they use majorly audio-visual content, which is easily perceivable, much more attractive and easier to process than linear text.

How we work with information and ideas has a great relation to our memory capacity (mainly amygdala and hippocampus area of the brain<sup>3</sup>), where the basic distinguishing comes to working and long-term memory. Working memory is the immediate and conscious information processor which can only hold about 4 chunks of information for a limited time, using conscious focus to keep the information there, if we

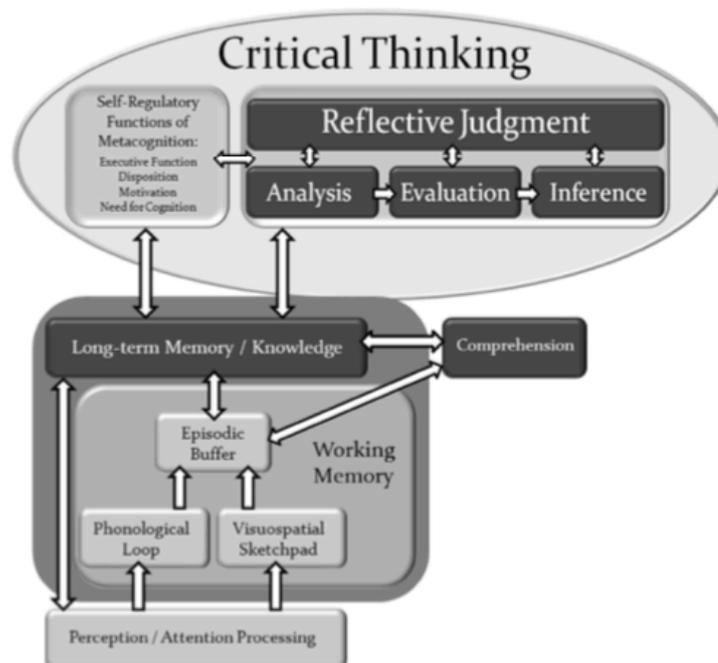
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<sup>3</sup> Generally, the brain is modular, meaning that different parts do different, specific things but simultaneously no part can perform its function fully without the functioning of other parts with which are densely connected. However, in these so-called higher-level functions (such as memory or language processing) many brain areas are interconnected and involved. In contrast with the lower-level functions, such as sensation, which are strongly localized (Carter et. al 2019, p. 38).

do not focus on that information, the working memory “cleans up space” for something else. In contrast, there is the long-term memory which has storage for billions of items for a long time and where most of our knowledge (relatively permanently) is stored, however, the information needs to be revisited to be able to stay there and could be retrieved again (Oakley, 2014, p. 81-83). Carter et. al 2019, p. 99 point out that when we reexperience any of the sensual inputs, they may trigger an elicitation of a memory. Researches show that smell, in comparison to all other senses, seems to be the most strongly associated with memory and also stay accessible in the long-term memory for much longer. For example, a smell of fresh-baked bread can elicit a memory of home feeling or perfume can elicit equally bad and good memories of a particular person or event.

Moreover, Dwyer, Hogan and Stewart, 2014, p. 49 propose so-called integrative framework (Figure 6) of critical thinking which describes the complex memory processing and relation to CT. According to the authors, the framework identifies “memory/knowledge and comprehension as foundational processes necessary for the successful application of CT (i.e. analysis, evaluation and inference). The proposed framework also integrates reflective judgement, as well as the self-regulatory functions of metacognition, which both ultimately dictate how well each thinking process will be conducted.”

Figure 6 An integrative framework of critical thinking



Source: Dwyer, Hogan and Stewart, 2014, p. 49

To sum up, this chapter aimed to create a general theoretical background of an integrated understanding of the critical thinking mechanism. This was achieved by, firstly, defining what critical thinking is, using leading scholarly definitions. Subsequently, describing specific skillset and mindset as the core components of the universal critical thinking paradigm, based on profound scientific consensus. Continuing with the state of institutional education, where is largely thought that critical thinking is being taught as a part of general education, however, this is vastly not the case. This is so because critical thinking needs to be taught and explained as a separate subject and applied on multiple real problems to achieve improvements, as was also shown on the world-renowned Finnish education system and their teaching of critical thinking. Moreover, a basic all-purpose critical thinking framework for problem-solving was proposed, since problem-solving is one of the most common applications of critical thinking. Finally, the vital functioning of our brain, memory, senses and the role they play in our thinking was tackled, especially the conscious and unconscious processes in our thinking and general human functioning was explained. This is particularly important in the understanding of the biological processes affecting our critical thinking and learning how we can work with them. Chapter two will continue to explain the notion of critical thinking in the context of the second paradigm, decision-making.

## 2 DECISION-MAKING

*"To be a good diagnostician, a physician needs to acquire a large set of labels for diseases, each of which binds an idea of the illness and its symptoms, possible antecedents and causes, possible developments and consequences, and possible interventions to cure or mitigate the illness. Learning medicine consists in part of learning the language of medicine. A deeper understanding of judgments and choices also requires a richer vocabulary than is available in everyday language." – Daniel Kahneman, Nobel Prize in economics laureate*

The second chapter concerns the paradigm of decision-making paradigm. The process of thinking and the connection to brain functioning will be closely examined. Two thinking styles which were defined by leading researchers of the field will be described, including its relation to learning and making decisions. Afterwards, the focus will move to our instincts and the ability to make large-scale assumptions and decisions concerning the globe, which is essential when elaborating macro strategies and forming an objective opinion, leading to well-informed macro decisions. Furthermore, the bias or systematic errors of reasoning and decision-making will be explained in order to understand better these decision-making flaws that affect each and everybody. Lastly, the Prospect Theory of Nobel laureate, Daniel Kahneman, will be introduced with the main aim to describe the tendencies of human behaviour in certain environments concerning risk and uncertainty.

### 2.1 How we think, learn and make decisions

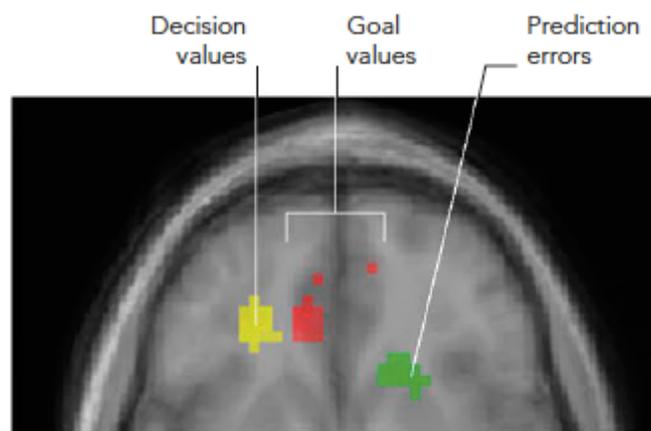
*"Thinking is the hardest work there is, which is the probable reason so few engage in it." - Henry Ford, business magnate*

The basic decision-making is associated with our intelligence, which is primarily an ability to make situation sensitive decisions involving calculation of pros and cons. These decisions and judgments are also profoundly affected by emotions because they drive action as suggested by Carter, 2019, p. 169, who also propose the following basic process of decision-making performed by our brain:

1. *"The brain assesses the goal value—the reward expected as a result of the decision.*

2. It calculates the decision value—the net outcome, or the reward minus the cost.
3. The brain makes a prediction of how likely it is that the decision will deliver the reward, which can be compared with the actual outcome, giving a prediction error. The more complex the problem, the more the frontal areas of the brain are involved.” We can see the brain areas activated in the Figure 7, the activation map below:

Figure 7 Activation map



Source: Carter, 2019, p. 169

To make more informed decisions we should also be able to understand the process of how we think more deeply. Barbara Oakley, an author, engineering professor, polymath, globally rewarded professor and co-author of one of the most popular MOOC (massive open online course) in the world “Learning How to Learn”, suggests following understanding of our thinking states – the *focused* and *diffuse* mode (Oakley, 2014, p. 36).

We need both states of thinking to think, learn and make decisions. What is happening in our brain, is complex neural processing in different areas of the brain, depending on our state which constantly switches from highly attentive to resting, from one hemisphere to another. The focused mode we use to concentrate – turning our attention to something and understand it deeply, the diffuse mode helps us to see new perspectives which are especially important when being stuck. The majority of problem-solving involves switching the modes, which implies skilful application and know-how to be able to switch between them. The problem arises because when we are focused, we tend to stay in the focused mode and reversely. Sometimes, switching to the diffuse mode or even back and forth can get complicated, but the switching is

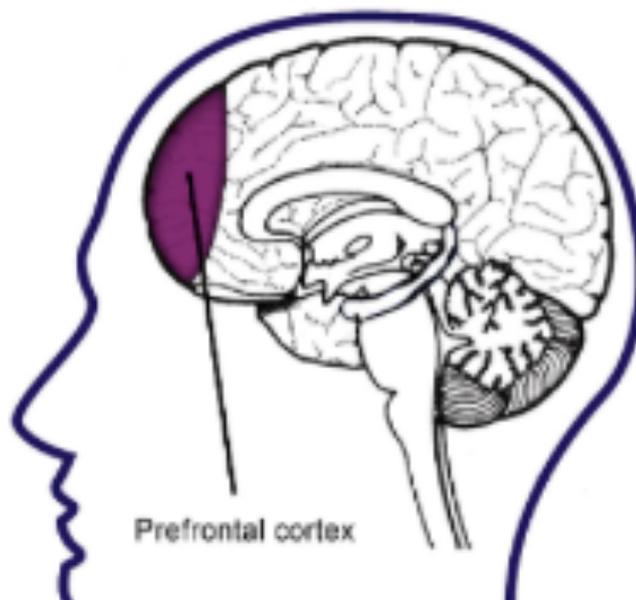
apparently the key method in solving complex problems and making complex decisions (Oakley, 2014, p. 36-89). A summary of these two thinking types can be seen in the Table 2, the area involved in the focused mode is depicted in Figure 8 and areas involved in the diffused mode in Figure 9.

*Table 2 Analogy of thinking types: Focused versus diffuse-mode of thinking*

<b>Thinking types</b>	<b>Using</b>	<b>Focus</b>	<b>Brain parts</b>
<b>Focused-mode (highly attentive state)</b>	Deep focus, concentration, rational and analytical approach	Fixed	Prefrontal cortex located right behind the forehead
<b>Diffuse- or default mode (resting state)</b>	Creative, big picture, 'letting the mind wonder', relaxed approach	Non-fixed	Various areas of the brain involved (diffused)

*Source: Own creation based on Oakley, 2014, p. 37 – 54 and Raichle and Snyder, 2007, p. 1083*

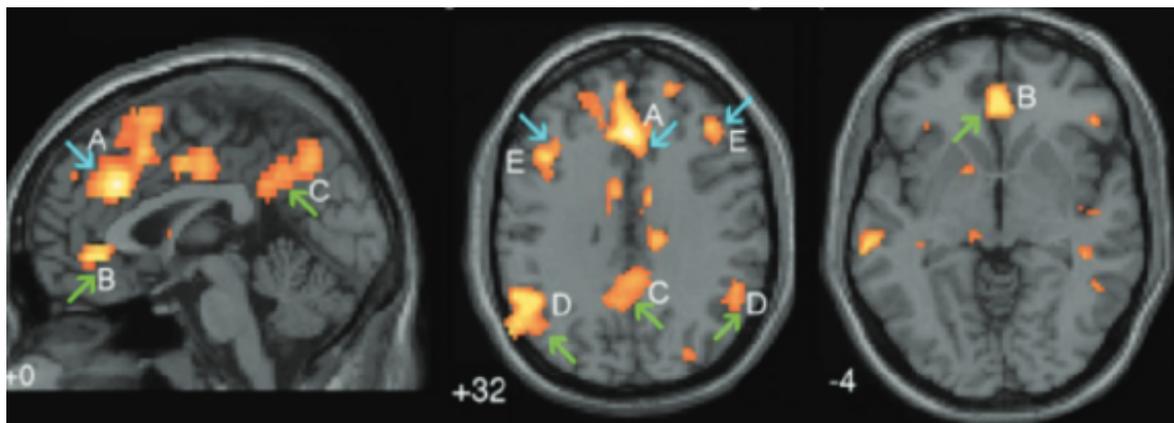
*Figure 8 The Prefrontal cortex - part of the brain involved in focused mode*



*Source: Oakley, 2014, p.38*

Also, during adolescence, the brain relies heavily on amygdala when processing emotional information, because the prefrontal cortex which is fundamental in focus and reasoning continues to mature to late 20s. Around 30 years of age is the prefrontal cortex fully developed, allowing improved executive "higher-level" cognitions – enabling more complex, holistic worldview with less impulsivity and emotional involvement (Carter et. al, 2019, p. 39 and 212).

Figure 9 Parts of the brain involved in diffuse mode



Source: Andrews-Hanna, 2014, p. 259 reproduced from Christoff and others 2009

These different types of thinking can be a core code to the difficult decision-making and problem-solving as it helps us understand how we think and why we think in the way we do. We use focused thinking to solve problems and think about things that we have seen before, that we are familiar with because we already have built knowledge of that problematic and strengthened the neural connections responsible for learning. However, when working on tasks, solutions or problems we have not seen or have not faced before, the pure focused-mode can be highly contra-productive because it only allows us to go through patterns that we have already built and to find solutions we are already familiar with. It is not very helpful when we need to solve a problem we have never faced before; make a decision about something we have never made a decision about or create something innovative nobody has ever had.

So-called *eureka* or *aha* moments can help us express the particular importance of the combination of the focused and diffuse mode. Because diffuse mode rises from the focused one, we still have some underlying thoughts in us, but they remain locked in focused mode. The best ideas often come when we do not focus on them intentionally. There are countless stories of inventors, Nobel laureates, brilliant scientist, writers and artist<sup>4</sup> who solved their hardest problems, got the ideas for their masterpiece when they were doing all the other things but concentrating on the problem, thus as we now know using the diffuse thinking. As the famous German philosopher, Friedrich Nietzsche said: *"It is only ideas gained from walking that have any worth."* This also why taking breaks, doing exercise and resting is equally beneficial

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<sup>4</sup>Such as inventor Thomas Edison, painter Salvador Dalí, writers Jane Austin or Charlie Dickens (Oakley, 2014, p. 63 – 66).

and important as the focused work, because without it we cannot get to the diffuse mode of thinking and see 'the bigger picture'. It also explains why sleeping on bigger decisions is in most cases a good idea (Oakley, 2014, p. 61–76).

## **2.2 Instincts and the worldview**

*"We have many instincts that used to be useful thousands of years ago, but we live in a very different world now." – Hans Rosling, Swedish physician*

The central thought to realize why we are often so terribly wrong at understanding things and making decisions is that our brain is a product of millions of years of evolution, and we are wired with instincts that helped our ancestors to survive in small groups of hunters and gatherers (Rosling, Rosling and Ronnlund 2018, p. 31). But our world has changed a lot from the ancient times of hunters and gatherers for which our brains do not have adequate evolutionary response yet, as evolution is matter of millions of years but the human advance gets much faster, just if we reflect how tremendously has technology advance in just 20 years, the technology we have had in that time would be now considered extremely outdated, even archaic. But we still often base our judgment on our extremely "outdated" instincts. However, we still need them to guide us but in a controlled, not that dramatic manner. This is in most cases work of the limbic system, including the amygdala, responsible for *"instinctive behaviors, deep-seated emotions, and basic impulses such as sex, anger, pleasure, and general survival."* Where amygdala is heavily responsible for emotion and fear generation (Carter et. al, 2019, p. 64). That is why we will not get driven over at the street because we instinctively fear the fast-going cars and react correspondingly, but it is also why the fear prematurely stops us when we want to achieve our best. Because the brain's fear of the unknown and the strive to protect us from purely survival reasons, many times completely unnecessary.

This led Hans Rosling, Swedish physician, public speaker and academic, to design a series of questions about the real world based on reliable statistical data from world renowned organizations such as the United Nations. He tested these questions on a vast amount of people around the world. Intellectuals, students, business experts, even experts in humanitarian professions whom you would expect to have mastered such questions, but even they scored worse than random (than would a group of chimpanzees did if tested on them).

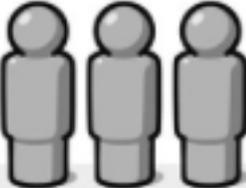
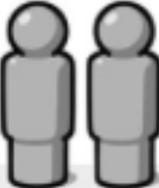
Therefore, aware of our brain limitation, we have to educate ourselves properly to fight the ignorance that these instincts might cause. As the author of "Factfulness", a book considered by Bill Gates one of the most important that he has ever read and endorsed by former US President Barack Obama, says, we need to learn to control our dramatic ancient instincts (Rosling, Rosling and Ronnlund, 2018, p. 32). Rosling, throughout his book "Factfulness" identifies 10 instinct and within them 3 misconceptions that significantly impair our worldview:

**The Gap Instinct:** People tend to divide all kinds of things into distinct (often polarized) groups and imagine a gap between them – the "us" and "them"; "the west" and "the rest"; "the rich" and "the poor". The real situation is that usually there is no gap, the majority is usually in between, when we imagine the gap.

**Mega misconception:** "The World Is Divided in Two"

Factfulness is: to recognize a story about a gap; when working with averages it is crucial to look at the spread or range of the data set and if extremes are presented, be aware that they can skew the data or create an unrealistic picture because extremes usually represent just minority of the population, whereas the majority is usually around the middle.

Table 3 New Proposition of World Division

<b>Billions:</b>				
<b>Level:</b>	<b>LEVEL 1</b>	<b>LEVEL 2</b>	<b>LEVEL 3</b>	<b>LEVEL 4</b>
<b>Money/day:</b>	<b>2 \$</b>	<b>4 \$</b>	<b>16 \$</b>	<b>64 \$</b>
<b>Drinking water:</b>	mud-holes	bucket	outdoor tap	water in-doors
<b>Transport:</b>	walk-barefoot	walk-shoes, bicycle	motorbike	cars, air-planes
<b>Cooking:</b>	using fire-wood	small stove	proper stove	full kitchen
<b>Food:</b>	eat what you find or grow	buy some food	fridge, variety	wide variety
<b>Other:</b>	high child mortality	unstable electricity, school for children	medical bills, high school for kids	>12 years education

Source: Own creation based on Rosling, Rosling and Ronnlund, 2018, p. 57.

As the author itself explains the new proposal of the world division (Table 3): Each figure in the chart above represents 1 billion people (7 billion in total world population in 2017). The 7 figures display how the current world population is spread out across 4 income levels expressed in terms of dollar income per day. You can see that most people (5 billion) are living on the two middle levels, where people have most of their basic human needs met (Rosling, Rosling and Ronnlund, 2018, p. 57-58). There is 75% of the population living in middle-income countries. The perception of it is distorted because of the extremes. On the one side, there are still countries with the majority of extremely poor (1 billion) and on the other, countries with the majority of extremely rich (1 billion) but the fact remains that the majority of the world population lives in the middle – not poor, not rich. Therefore, the author argues that there is no such thing as developing and developed world anymore and highlights that this division comes from the year 1965. He therefore asks the reader *“Would you use a map from 1965 to navigate around your country? Would you be happy if your doctor was using cutting-edge research from 1965 to suggest your diagnosis and treatment?”* (Rosling, Rosling and Ronnlund, 2018, p. 47-48).

**The Negativity Instinct:** People instinctively notice the bad more than the good.

**Mega misconception:** “The world is getting worse”

Factfulness is: learning to recognize negative news and expect them. Bad news is far more likely to reach us than good news, mostly because of the media selection and our brain’s over dramatic attention filter. But seeing more bad news does not mean worsening world. We should try to see the bigger picture, because statistically and historically the world has never been better place to live than in our current lifetime.

**The Straight-Line Instinct:** When people see a line (in a graph) which goes up steadily, they tend to assume the line will continue to go up in future. This is especially troublesome when interpreting data.

**Mega misconception:** “the world population is just increasing and increasing”

Factfulness is: recognizing the assumption of a straight line and remember that such lines are rare in reality. Curves most of the time come in various, changing shapes, therefore we should not assume the straight lines. Also, the population is not just increasing, the number of children on the planet is actually not expected to increase.

**The Fear Instinct:** We tend to perceive the world to be scarier and more dangerous than it really is. Our brain’s attention filter deliberately passes to our consciousness “scary” things to be alert about because of the before discussed survival alert,

that worked perfectly in the ancient times but makes reality very skewed in the current age.

Factfulness is: knowing that fear can be useful, but only if it is directed at the right things. The fear instinct is a terrible guide for understanding the world. Therefore, we should not take news as a determination of the majority of what is happening. Also, make as little decision in the fear, panic mode (the "hot" state), we should better use some calming technique (e.g. make some mathematical operation), really calm down and then think again. Also, before panicking calculate the risk: How dangerous it is and how much we are exposed to it?

**The Size Instinct:** We tend to see things out of proportion, over-estimating the importance of single information and the scale of an issue based on a lonely number. Factfulness is: comparing numbers adequately. Because big numbers always look important, where small ones unimportant without an additional context. Thus, both big and small numbers are misleading if standing alone. When prioritizing, use 80/20 rule – because the largest ones the 20% are probably more meaningful than all the rest, the 80% put together. Also, when looking at group population data, per-person measures are most accurate.

**The Generalization Instinct:** We tend to generalize, make inaccurate inferences across incomparable groups (because this works in one group, it will work in the other, etc.) – it is like comparing the apples with the oranges which can often lead to inaccurate stereotyping.

Factfulness is: knowing that categories can be misleading. Therefore, we should question them, find similarities, differences, and be precise; assume that people are not idiots and look for the smart "why" they might be doing it that way. Also, when considering categories, the majority can mean 51% but also 98% - asking for and assessing the percentage is therefore crucial.

**Destiny Instinct:** We tend to assume that the destinies of many things (people, cultures, religions, countries, ...etc.) are predetermined by certain characteristics which are unchangeable and unchanging.

Factfulness is: The many things appear to be constant just because the change is happening slowly. We should remember to see that the small, slow changes eventually become the big changes. Therefore, we should keep track of gradual improvements; update our knowledge; compare to the history – values of our ancestors versus our current values; collect examples.

**The Single Perspective Instinct:** We tend to focus on single causes or solutions which are favourable to our knowledge and expertise; easier to grasp or make our problems seem easier to solve – we see one (our) solution, where in fact, there are many.

Factfulness is: recognizing that a single perspective can limit imagination and our ability to see different solutions. Especially problems need more accurate understanding from different perspectives. Therefore, we should be aware of over-simplifying solutions and ideas and try to compromise, combine and solve problems on a case-by-case basis. We should also be aware of limited expertise of oneself and others; use different approaches and do not get fixated; and also use numbers alongside our solutions but not only numbers, which could be misleading.

**The Blame Instinct:** When something bad happens or goes wrong, it is our instinct to find a clear and simple reason why someone or something is to blame. This undermines our ability to solve a problem because we are stuck with finger-pointing, which is oversimplistic and prevents us from seeing more complex truth.

Factfulness is: recognizing blaming and finger-pointing. Looking for causes, not “the bad guys” – study the system and its interacting causes that created the problem. Also learning to credit the system, if it solves an issue, is important.

**The Urgency Instinct:** We tend to rush into a problem or opportunity for fear that there’s no time and we may be too late. As for example, typical archetype of “Act now, or lose the chance forever” call to action makes us think less critically and make immediate not well-thought decisions.

Factfulness is: recognizing and learning to ignore the urgency instinct that make us think less clearly and create fear. We should beware of “today only” and “special offer” kind of tricks; it is rarely now or never or either / or. We should also ask for more data – relevant and accurate, time or other information if something feels urgent, because it rarely is as urgent as we think. We should beware of drastic action; create and ask for scenarios – never just the dramatic best or worse case; remember that the future is uncertain. Take small steps – less dramatic is usually more effective.

## **2.3 Bias – systematic errors**

*“The first principle is that you must not fool yourself and you are the easiest person to fool.” – Richard Feynman, Nobel Prize in physics laureate*

Nobel prize laureate Daniel Kahneman defines systematic errors or biases as errors that everybody makes in thinking or particular decision-making. We could have already seen many of them in the previous chapter on instincts. Therefore, if our aim is to think critically about the world around us, we should be aware of the existence of these bias and strive to identify them, understand them and try to avoid them where applicable (Kahneman, 2011, p. 11). Kahneman 2011, argues that we have two thinking systems where System 1 is unconscious, automatic, fast and intuition-based. System 2 is effortful, conscious and slow. System 1 tends to get things done quickly and therefore it is more prone to mistakes and over-simplifying complex problems. On the other hand, System 2, make sense of complicated issues but it needs more time to operate and execute. However, the "lazy" System 2 accept what System 1 gives it, which might be erroneous assumption later turned into judgment completed by System 2, therefore a constant questioning of one's intuition and reasoning is necessary.

We can find a similar pattern with Oakley's analogy to *focus* versus *diffuse* mode (and Ariely's *cold* and *hot* state that we will be discussed in the following chapter) and equally as her distinctions, Kahneman mentions that we need and use both of them. We cannot always think in System 2 which would be impossible both physiologically and psychologically because of the amount of energy and effort used. However, when talking about critical thinking we should strive to use System 2 predominantly, but also be aware where System 1 is working for us and actually simplifies our lives by not putting an overwhelming amount of energy into issues that can be solved easily. The two systems functioning is also synthesized in the Table 4 below:

Table 4 System 1 and System 2

<b>INTUITION - System 1</b>	<b>REASONING - System 2</b>
Fast thinking	Slow thinking
Parallel processing	Serial processing
Automatic	Controlled
Unconscious	Conscious
Effortless	Effortful
Associative	Rule-governed
Slow-learning	Flexible learning
Emotional – "hot"	Neutral – "cold"

Source: Adjusted from Kahneman, 2003, p. 1451 and Rautterberg, 2010, p. 7

The crucial thing to understand about bias is that they result from the use of heuristics or so-called mental shortcuts to make decisions and solve problems, quickly and easily. Therefore, we often misinterpret data or rely on emotions when evidence is

in front of us. There are not necessarily always wrong and can be useful, they might often might work to our advantage such in crisis when quick decision is needed, they save our energy of overthinking, yet equally often can lead us to make costly mistakes which again, we can only try to prevent from happening by recognizing them, recognizing situations in which they often occur and, probably most importantly, learn from them (Backhus et. al 2019).

Also, as Busenitz and Barney, 1997 argue: *“The use of biases and heuristics may also offer some help in explaining why entrepreneurs sometimes make bad managers. Whereas the use of cognitive biases may be beneficial in some circumstances, it can lead to major errors in others. Although research has yet to establish performance implications, it is possible that the more extensive use of heuristics in strategic decision-making may be a great advantage during the start-up years. However, it may also lead to the demise of a business as a firm matures.”* The substantial difference, therefore, lies in where to use the shortcuts in the form of bias and heuristics and where not. As this study finds it can be beneficial in early start-up decision making, where lots of prompt, fast and intuitive decisions are needed but when the positions of the company changes, so should the thinking process of its owners.

Moreover, in Table 5 are described selected bias, corresponding to Kahneman’s and Ariely research.

*Table 5 Systematic errors – bias*

<b>Biases</b>	<b>Description</b>
Anchoring	The influence of the initial value given, or which come up to the mind before estimating a certain value or making a judgment. The final estimate or judgment stay close to the initial value exposed.
Availability bias	Making judgments based on information that we have seen just recently, have personal experience with or is largely dramatic – it can be easily retrieved from the memory, but it does not consider the information in larger context of statistics.
Confirmation bias	A deliberate search for confirming evidence, known as positive test strategy. It is also how System 2 tests a hypothesis. Contrary to the rules of philosophers of science, who advise testing hypotheses by trying to refute them, people (and scientists, quite often) seek data that

	are likely to be compatible with the beliefs they currently hold.
Halo effect	The tendency to like (or dislike) everything about a person or a thing based on the exaggerated first impression you make about it.
Law of small numbers	Exaggerated faith in small samples but, mainly, paying more attention to the content of a message than to the information about its reliability.
Overconfidence bias	A tendency to have more confidence in one's judgment than is supported by a reliable evidence.
Decoy effect	The tendency to choose a variant that can be easily compared to a worse variant – the decoy.

Source: Kahneman 2011; Ariely, 2010, p. 3-12

Few examples of the bias defined by Kahneman and Ariely will be described in more detail to clarify the bias functioning and give examples from real life:

**Anchoring** – a judgment based on initial given value: *“If you are asked whether Gandhi was more than 114 years old when he died you will end up with a much higher estimate of his age at death than you would if the anchoring question referred to death at 35”* (Kahneman, 2011, p. 282). Anchoring is also widely used in business and negotiating when the seller would put the initial value for a negotiated product much higher, whereas the buyer much lower. Furthermore, this experiment says a lot about its effect. Visitors of the Exploratorium were asked how much they would be willing to pay in an annual contribution to save 50,000 seabirds shortly after had been told about the environmental damage caused by oil tankers. And now look at the results: *“When no anchor was mentioned, the visitors at the Exploratorium—generally an environmentally sensitive crowd—said they were willing to pay \$64, on average. When the anchoring amount was only \$5, contributions averaged \$20. When the anchor was a rather extravagant \$400, the willingness to pay rose to an average of \$143”* (Kahnemann, 2011, p. 295). The effect was replicated in many studies and proved to affect novices as well as experts. Including some very disturbing ones such as a study concerning judges who would give higher or lower sentences depending on the anchor given to them (Kahnemann, 2011, p. 298).

**Availability bias** – exaggerating of frequency:

Dramatic events such as plane crash; events that attracts sensationalists attention such as divorces and scandals of politicians and celebrities (and not focusing on other topics); events based on personal experience, pictures and vivid examples. For example, in case of divorce, *"both spouses remember their own individual efforts and contributions much more clearly than those of the other, and the difference in availability leads to a difference in judged frequency* (Kahneman, 2011, p. 312)." Also following examples aptly explains the availability bias of the ease of retrieving from the memory to exaggerated frequency: *"She has been watching too many spy movies recently, so she's seeing conspiracies everywhere,"* or *"The CEO has had several successes in a row, so failure doesn't come easily to her mind. The availability bias is making her overconfident"* (Kahneman, 2011, p. 325). Moreover, availability can lead to snow-balling type of the bias called *availability cascade* which is a *"self-sustaining chain of events, which may start from media reports of a relatively minor event and lead up to public panic and large-scale government action"* (Kahneman, 2011, p. 338).

**Halo effect** – first impression creates the overall expression:

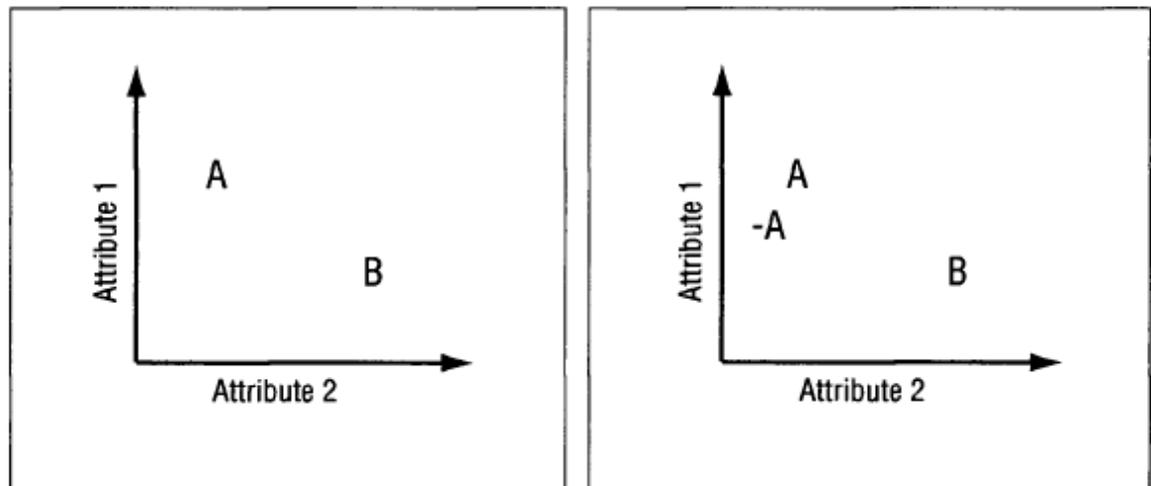
Occurs while making the first opinion about people, events, things, everything, practically all the time. The first impression gets exaggerated weight and creates an overall picture influenced just by the first impression. When we meet somebody and, for example, like his first thought about a topic, we assume that he is overall a good person (based purely on one thought), we do not know him at all, but it does not stop us from making this judgment. *"The principle of independent judgments and decorrelated errors"* – can be used to derive the most useful information from multiple sources of evidence, it strives to make the sources independent of each other and thus minimize the *halo effect*. This rule is part of a good police procedure. When there are multiple witnesses to an event, they are not allowed to discuss it before giving their testimony. Also, in meetings, a simple technique can help before an issue is discussed, all members should write a very brief summary of their position to reduce the bias of halo effect – the first opinion spoken to influence the others (Kahnemann, 2011, p. 201 – 202).

**Decoy effect** (Figure 10)– choosing a variant that can be compared to a worse variant

*"Most people don't know what they want unless they see it in context"* (Ariely, 2010, p. 3): Ariely explains when expressing his vital thought that people do not know what they want unless they compare it to another thing, then can make a choice. For example, we are completely happy with our old phone unless we see an advertising on its newer version, than we choose to buy a new one, because we have a comparison of a

clearly better and worse variant. Also, people generally "tend to focus on comparing things that are easily comparable and avoid comparing things that cannot be compared easily" (Ariely, 2010, p. 8).

Figure 10 Decoy effect



Source: Ariely, 2010, p. 9

Practical example based on the upper illustration (Figure 10) makes the decoy effect clear to explain: "introducing (-A), the decoy, creates a simple relative comparison with (A), and hence makes (A) look better, not just relative to (-A), but overall as well," in relation to other options, in this case, B (Ariely, 2010, p. 9). Finally, the addition of the clearly worse but easily comparable option -A (the decoy) makes us much more likely to choose A as a final decision. Ariely, as well as other researches, tested this theory many times in different settings etc. and people predominantly behave according to this effect. Even when Ariely conducted this experiment on MIT students it worked 75% of the time (Ariely, 2010, p.12). Thus, the decoy effect can explain a lot about our decision-making process and how we have made many of our decisions.

## 2.4 The Prospect Theory

Before introducing the Prospect Theory, we will look at the decision making under different conditions. We should always consider the decision-making environment, meaning certainty, uncertainty and risk:

- Certainty – the subject knows for certain the future state of affairs, their consequences and their probabilities,
- Uncertainty – the subject knows the possible future state of affairs but not their probabilities,

- Risk – the possible future state of affairs, their consequences and their probabilities are known to the subject (Svecova and Fotr, 2016, p. 17).

When making judgment under certainty, we are already pretty sure about the future state of the world, however the complexity comes with the judgment under risk and uncertainty, where we are prone to use heuristics and therefore, we generally tend to certain bias or make specific systematic errors (Table 6).

*Table 6 Making judgment under uncertainty:*

<b>Heuristics</b>	<b>Used when</b>
Representativeness (similarity)	judging the probability that an object or event A belongs to a class or process B
Availability	assessing the frequency of a class or the plausibility of a particular development
Adjustment from an anchor	numerical prediction when a relevant value is available

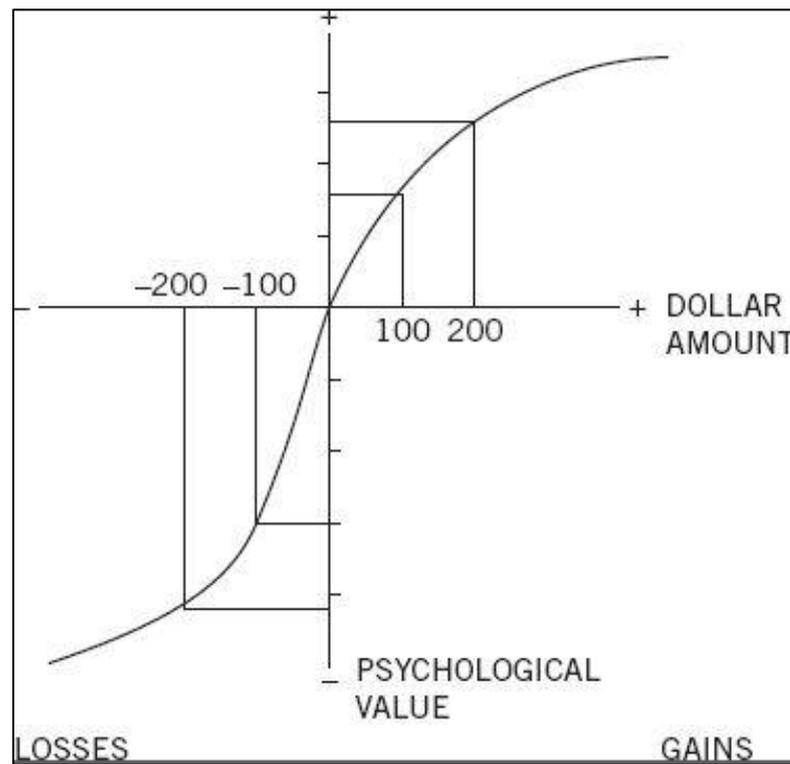
*Source: Kahnemann, 2011, p. 979-1026*

Moreover, The Prospect Theory is a behavioural model that strives to explain how people behave in certain situations, mostly under risk or uncertainty. The ultimate why we should even bother to understand this theory is because Kahneman received Nobel Prize in Economics for this theory. The vital part of the theory creates 3 core cognitive features:

- **Subjective reference points** = adaptation level is highly subjective
  - Status quo – financials
  - Outcomes – expected or feeling entitled to
- **Principle of diminishing sensitivity** = changes are felt differently in different contexts
  - Changes in wealth
  - Sensory dimensions
- **Loss aversion** = loses hurt more than corresponding gains
  - Positive expectations
  - Negative expectation

As Kahneman describes it, if Prospect Theory had a flag, the Figure 11 would be it (Kahneman, 2011, p. 647).

Figure 11 Cognitive features of the Prospect Theory



Source: Kahneman, 2011, p. 648

Kahneman points out the importance of reference point, in his theory, which makes our current state and our past state matter significantly (e.g. state of wealth and the utility of the outcomes) when considering options. Kahneman mentions that the reference point of the subject, usually a status quo, have a value 0. For example: *“Both candidates are willing to accept the salary we’re offering, but they won’t be equally satisfied because their reference points are different. She currently has a much higher salary”* (Kahneman, 2011, p. 634). The application of the three cognitive features of the Prospect Theory can be seen in the bias of Endowment effect or preserving the Status quo bias:

**The Endowment effect** – causes the overvaluing of things that we possess and undervaluing things that we would buy because giving up something is more painful than getting the exact same thing is pleasurable (loss aversion). Therefore, our reference point is much higher if we possess the thing, or much lower if we would like to buy the exact same thing.

**Status quo** – means not reaching any change or agreement, we choose neutral outcome, close to the reference point. Therefore, we sometimes prefer not to change anything at all, preserve the current status, because the negative expectations of loss are by far exceeding the positive expectations (loss aversion).

Figure 12 Making judgment under risk: The Fourfold Pattern

	GAINS	LOSSES
HIGH PROBABILITY Certainty Effect	95% chance to win \$10,000 Fear of disappointment RISK AVERSE Accept unfavorable settlement	95% chance to lose \$10,000 Hope to avoid loss RISK SEEKING Reject favorable settlement
LOW PROBABILITY Possibility Effect	5% chance to win \$10,000 Hope of large gain RISK SEEKING Reject favorable settlement	5% chance to lose \$10,000 Fear of large loss RISK AVERSE Accept unfavorable settlement

Source: Kahneman, 2011, p. 730

The Fourfold Pattern of preferences (Figure 12) is, even by the author, considered one of the core achievements of the Prospect Theory (Kahneman, 2011, p. 731). The essence of The Fourfold Pattern theory is a description how people tend to behave at the circumstances of taking a risk. The result is that we tend to take irrationally high risks in some situation, and also being equally irrationally risk averse at others. Because people attach values to gains and losses rather than to wealth (money), the decisions' weights which they assign to the outcomes are different from the probabilities. The best possible explanation of The Fourfold Pattern comes from Kahneman himself (2011, p. 730 – 734):

**Top left cell** – express the principle that “people are averse to risk when they consider prospects with a substantial chance to achieve a large gain. They are willing to accept less than the expected value of a gamble to lock in a sure gain.”

**The bottom left cell** – “The possibility effect in the bottom left cell explains why lotteries are popular. When the top prize is very large, ticket buyers appear indifferent to the fact that their chance “ticket buyers appear indifferent to the fact that their chance of winning is minuscule. A lottery ticket is the ultimate example of the possibility effect. Without a ticket you cannot win, with a ticket you have a chance, and whether the chance is tiny or merely small matters little. Of course, what people acquire with a ticket is more than a chance to win; it is the right to dream pleasantly of winning.”

**The bottom right cell** is “where insurance is bought. People are willing to pay much more for insurance than expected value—which is how insurance companies

cover their costs and make their profits. Here again, people buy more than protection against an unlikely disaster; they eliminate a worry and purchase peace of mind."

**The top right cell** - "This is where people who face very bad options take desperate gambles, accepting a high probability of making things worse in exchange for a small hope of avoiding a large loss. Risk taking of this kind often turns manageable failures into disasters. The thought of accepting the large sure loss is too painful, and the hope of complete relief too enticing, to make the sensible decision that it is time to cut one's losses."

This chapter introduced and explained some vital theories and principles concerning decision-making. The basics of thinking and two thinking types fast (also called diffused or System 1) and slow (also called diffused or System2) were explained. Having this knowledge about their functioning, knowing their advantages and disadvantages and their activation can significantly improve the decision-making process in terms of effectivity of both working and learning. Also, the thinking types tendency to be biased or make systematic errors is vital, as everybody is biased in some way or another. However, because biases are of systematic nature, we can learn in which situations expect them, identify them and learn to work with them, thus improving our decision-making, objectivity, reasoning, argumentation as well as recognizing biased thinking of others. Subsequently, the importance, of understanding the world in an evidence-based manner, knowing and controlling our ancient instincts, which might substantially affect our worldview and our macro decisions, was made clear. Lastly, the Nobel-winning Prospect Theory, a behavioural model which was designed to explain how people tend to make decisions in situations of uncertainty and risk, was introduced. Overall, this theoretical understanding of human behaviour, inner tendencies and decision-making is fundamental if our goal is critical thinking and application of the knowledge to both every day and managerial decision-making, making them well-informed, reasoned and more effective. The following chapter three will explain what role decision-paralysis plays in our current age.

## 3 DECISION-PARALYSIS

*“Learning to choose is hard. Learning to choose well is harder. And learning to choose well in a world of unlimited possibilities is harder still, perhaps too hard.” – Barry Schwartz, American psychologist*

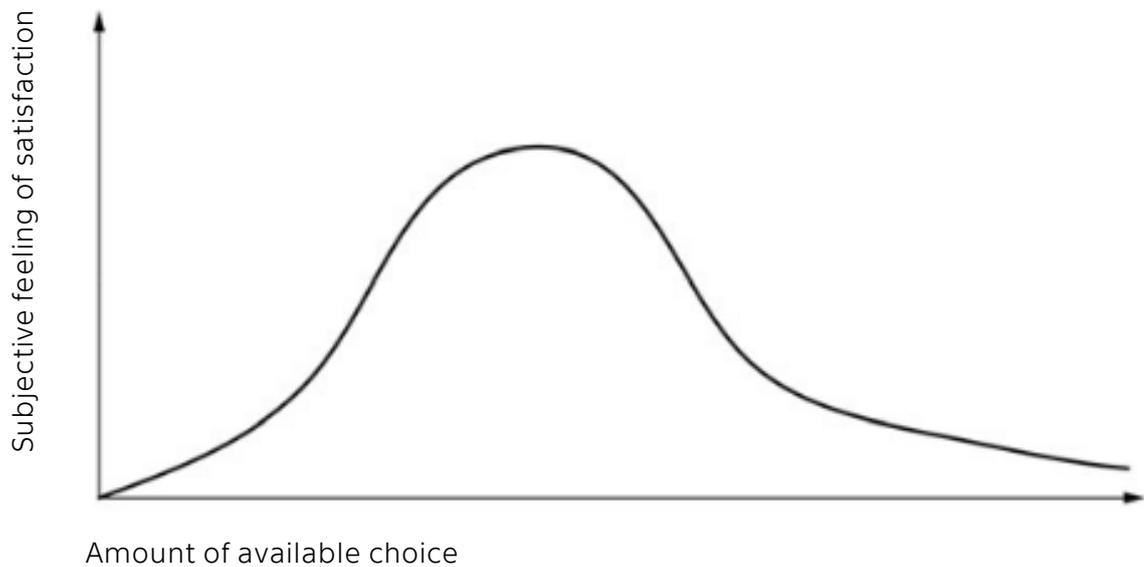
In this chapter, decision-paralysis will be discussed. Firstly, the paradox, that having to choose from many options is not always beneficial nor healthy will be introduced, secondly the ever-presented phenomenon of procrastination that the overabundance of choice might cause will be detailly discussed. Lastly, how and why the criterion of purpose might be of help with the decision-paralysis will be explained.

### 3.1 Paradox of choice

In western societies abundance of choices is often associated with a good quality of life and freedom and happiness. However, sometimes, the exact opposite is the truth. As described by acknowledged American psychologist Barry Schwartz who studies the link between economics and psychology: Having too many choices produces *psychological distress*, especially when combined with *regret from missed opportunities and raised expectations, concern about status, adaptation, social comparison*, and perhaps most important, the desire to have the best of everything—to *maximize* (Schwartz, 2004, p. 221). According to Schwartz (2004, p. 215-217), these are (alongside complex psychological factors) serious contributors to an epidemic of depression. According to Schwartz, 2004, p. 202 by estimates, depression in the year 2000 grew 10 times in comparison to the year 1900. Between common symptoms are loss of interest or pleasure in routine daily activities, including work and family; loss of energy, fatigue; feelings of worthlessness, guilt, and self-blame; indecisiveness; inability to concentrate and think clearly. Which can be and is a huge problem for both companies and employees and does not really help us makes good decisions either.

As we can see, the Figure 13 illustrates the Wundt’s hypothesis that beyond a certain threshold the stimulus no longer causes pleasure but contributes to unpleasant feelings (Piasecki and Hanna 2011). In the case of Schwartz’s paradox of choice, after a certain threshold, the increased amount of choice contributes to decreased satisfaction.

Figure 13 Wundt curve-like relation between amount of choice and subjective feeling of satisfaction



Source: Piasecki and Hanna, 2011, p. 350

For example, Ariely (2010, p. 153) narrates a story of his friend who has spent 3 months selecting a digital camera from two nearly identical models. When he finally made his selection, he asked him how many photo opportunities had he missed, how much of his valuable time he had spent making the selection, and how much he would have paid to have digital pictures of his family and friends documenting the last three months. More than the price of the camera, he said. That is the text-book case of decision-paralysis, that everybody can identify with to a certain level, and also why we should always consider the *consequences of not deciding*. Which means take in account the time spent making the decision, the opportunities we are missing, the minor differences between the choices and our final overall utility.

To get a visual example about how many information we have to see, filter, go through, let's see an example on Google Search of this chapter name 'decision paralysis' alongside with the central topic of the thesis 'critical thinking' in Table 7 below:

Table 7 Results on decision paralysis and critical thinking in Google

Search	Results	Seconds	Section
<b>decision paralysis</b>	42,500,000	0.39	All
	77,500	0.14	News
	273,000	0.18	Video
	235,000	0.07	Google Scholar
<b>critical thinking</b>	885,000,000	0.67	All
	23,500,000	0.29	News
	7,320,000	0.18	Video
	4,380,000	0.03	Google Scholar

Source: Own creation based on Google search data from 28. 7. 2019

As we can see in the Table 7 above, there is a vast quantity of information available in less than a second. Obviously, some of them are more, some of them less reliable and relevant to the topic we are looking for, which does not make our decision-making any easier. In today's world, it is easy to get overwhelmed and probably everybody experienced the excruciating feeling to decide for just one option.

No wonder that we sometimes get stuck in problem solving or seeing new approaches. Something that Bilalić et. al 2008 calls *the Einstellung effect* or being stuck, not seeing other solutions or options because of our fixation on our previous familiar ideas, thoughts and solutions which prevents the occurrence of new approaches which would help us solving a problem or deciding. As other bias, it has been found to affect both everyday thinking and expert thinking in their field of expertise. This mechanism has also may contribute to creation of various biases<sup>5</sup> (Bilalić et. al, 2008, p. 652).

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<sup>5</sup> As explain in sub-chapter *Biases – systematic errors* more detailly.

## 3.2 Procrastination

*'While we waste our time hesitating and postponing, life is slipping away.'* – Seneca, Greek philosopher

Procrastination originates from the latin *pro* = for and *cras* = tomorrow (Ariely, 2010, p. 111). This subchapter will begin with a surprisingly exact description of the problem we face in this full-of technology era, whether we talk about students, professors, employees or freelances, we all have to face it and this real-world description is, I think, very aptly explained by one of Barbara Oakley student of calculus (Oakley, 2014, p. 146):

*"Procrastination is one of my generation's biggest problems. We have so many distractions. I am always thinking, 'Before I start my homework, let me just check my Facebook, Twitter, Tumblr, and e-mail.' Before I even realize it, I have wasted at least an hour. Even after I finally start my homework, I have those distracting websites open in the background. I need to find a way just to focus on my studying and homework. I think it depends a lot on my environment and the time. I should not be waiting until the last minute to do everything."*

Procrastination or self-sabotage (because we ignore the commands, we give to ourselves) lead to frustration and wasted opportunities. It is often described as a feeling of being stuck, paralysed, such as having an obstacle that we can't get through. As the Princeton University professor and education specialist Dominic Voge describes it: *"We are often agitated, we can't sleep — but we [also] can't work."* Thus, the professor describes how procrastination works on the following principle: our drive to succeed is equally strong as our fear of failure (Figure 14) and we only break this cycle when our fear of not getting things done overweighs the fear of failure (Figure 15) (Chen 2019, Voge 2017).

Figure 14 Paralysis of doing what needs to be done – state of procrastination

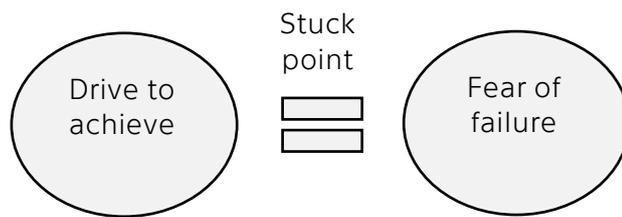
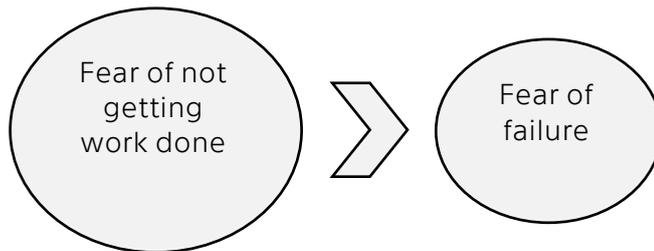


Figure 15 The end of procrastination - getting work done



Source: Own creation based on Chen 2019 and Voge 2017

Surely, we can relate to the ultimate state of the end of procrastination, when the amount of fear of not delivering does not give us any other option than do the required work. We have probably all been there, when writing assignments to school, working on various projects at work and as the big deadline approaches we do not sleep and work until late night hours because we just do not have any other option due to the amount of "responsible fear" we feel and due to the amount of time we have procrastinated before. How many times have we told ourselves we are not going to leave it for the last minute? And how many times have we done it again? This is why. The Table 8 contains research questions from a study of Dan Ariely conducted on more than 150 male college students from elite Berkeley University. Few questions which differed more than 100 percent were selected to demonstrate the enormous gap between the "cold" and "hot" state decision-making of the participants. Ariely differs between those two emotional states. The mechanism of procrastination, as Ariely explains it is exactly based on those emotional state, on the 'the Dr Jekyll and Mr Hyde' site or the hot and cold state as he calls them. When we are in cold state, we are thinking clearly, we want to go to the gym, we really want to start our retirement account and we are, indeed, motivated to finish the project from work way before the deadline. We are motivated and we really want to uphold our promises to ourselves but then the hot state of emotions strikes, we get lazy, we imagine all the things we need to do and the effort we need to make, get dressed, the time to ride to the gym in traffic, when we get there everybody will look at us etc. we start to rationalize all the possible reasons why don't we want to go and we get paralyzed by the aversion of all the things

we would have to do to get to our goal. So, what we decide? We better stay in a bed with ice cream and Netflix. Which means giving in on our long-term goals e.g. giving in on getting fit for an immediate gratification of staying in bed and watching Netflix. Which might be a textbook example of procrastination in the modern era.

*Table 8 Study on attractiveness of engaging in dubious activities in different emotional states*

<b>Question</b>	<b>Nona- roused</b>	<b>Aroused</b>	<b>Differ- ence (%)</b>
Can you imagine being attracted to a 12-year-old girl?	23	46	100
Can you imagine having sex with a 60-year-old woman?	7	23	229
Can you imagine getting sexually excited by contact with an animal?	6	16	167
Would you slip a woman a drug to increase the chance that she would have sex with you?	5	26	420

*Source: Ariely, 2010, p. appendix chapter 5, adjusted*

The study made on Berkeley students by Ariely shows that not only everybody has 'the Dr Jekyll and Mr Hyde' side of us but also that we make largely wrong predictions about ourselves. We think we will go to the gym, but we don't. We think that we finish the project way before the deadline, but we never do, always last minute. Our ability to understand ourselves when we are in a different emotional state does not seem to improve with experience. *"We all systematically underpredict the degree to which arousal completely negates our superego, and the way emotions can take control of our behaviour"* (Ariely, 2010, p. 99). The superego is a Freudian concept of our part of the psyche that could be described as a set of internalized society rules and norms according to which we know "what we should or what is good to do" or "what we should not or is bad to do." The same thing that will not let us descend into anarchy, rob shops and steal everything we see and on the other hand, the thing that let us stop on the red light at 5 am even though no one is around or return a wallet that is not ours (Ariely, 2010, p. 203).

Another unpleasant thing about procrastination is, that it can actually cause physical pain, because of the activation of pain centres in the brain. More specifically, the anticipation of the hated activity is the trigger of pain because we are actively recalling the doing of the hated activity which causes the pain (Oakley, 2014, p. 147). But

as we have probably heard before “to begin is half the work” and as a procrastination expert Rita Emmett highlights with this quote which she named the Emmet’s law: *“The dread of doing a task uses up more time and energy than doing the task itself”* (Emmet, 2000, p. 9) or in other words, when we actually get to do the work, we find out that it is not at all that bad and studies actually showed that when we start, the pain disappears, so it has been proven that the hardest part is really getting started.

According to Voge (2007) and other scholars, procrastination or, in other words, delaying and avoiding things is rooted in:

- fear and anxiety about doing poorly (not upholding to certain standards)
- losing control
- looking incompetent, incapable, stupid
- having one's sense of self or self-concept challenged
- our abilities being judged by ourselves and others

As Voge argues, in our mind, when procrastinating, runs this simple equation: performance = ability = self-worth (self-worth theory). We feel that our performance determines our ability and that our ability is what we are worth. If we are incapable, we do not do well at our tasks, if we fail, we value nothing as a person. So, we procrastinate to have an excuse in case we fail to say that we were just too busy doing other things (rationalization), therefore procrastination = self-protection (Chen 2019, Voge 2017).

According to Voge (2007) and other researchers mentioned in this subchapter, like with other things, just our awareness why we are doing things, understanding the root causes why we put things off can help us overcome it or at least weaken it. Thus, he argues that awareness, self-knowledge and self-worth theory are crucial aspects of fighting procrastination. Also, the more we know about ourselves and the roots of the procrastination the better we get in overcoming it. To finish, it is important to realize that procrastination almost certainly takes its price sooner or later – in a form of missed opportunities and high stress before the deadline or health problems due to the procrastinated exercise and lack of healthy choices. Therefore, it is crucial to understand its principle and try to prevent it, where possible.

### **3.3 Managing choices - the criterion of purpose**

*“You can't connect the dots looking forward; you can only connect them looking backwards. So you have to trust that the dots will somehow connect in your future. You have to trust in something - your gut, destiny, life, karma,*

*whatever. This approach has never let me down, and it has made all the difference in my life.” – Steve Jobs*

We live in a constant stress, performance-based world, full of choices which all affect our well-being and does not create an ideal environment for decision-making. But there are areas in our world where it is different. There are so-called Blue Zones in the world, popularized by Dan Buettner, which are geographical areas where longevity and (or) concentration of 100 years old (centenarians) is exceptionally high (Poulain, Herm and Pes, 2013, p. 89). As Dan Buettner has researched for National Geography these are: Ogliastra in Sardinia, Okinawa in Japan, the Nicoya peninsula in Costa Rica, the island of Ikaria in Greece, Loma Linda in California. The researcher team composed of medical researchers, anthropologists, demographers, and epidemiologists identifies 9 evidence-based common denominators among all places, they called them *Power 9*. These are: natural movement, a criterion of purpose, routines to reduce stress, moderation in eating, mostly plant-based diet, moderate alcohol consumption, faith-based community, firm family and friends' relations. They also reapplied this principle in several cities (communities) across the US. For example, in Albert Lea in Minnesota, after just one year, participants increased life expectancy by 3 years while reduced healthcare claims by 49 % (Buettner, 2016).

Another meta-analysis by Cohen, Bavishi and Rozanski (2016, p. 123) citing McKnight and Kashdan (2009) characterized life purpose as *“self-organizing life aim that stimulates goals, manages behavior, and provides a sense of meaning.”* As can be anticipated, purpose in life means different thing to different individuals. But this meta-analysis conducted by Cohen, Bavishi and Rozanski 2016 which was related to sense of purpose and all-cause mortality has identified following measurables associated with the sense of purpose: usefulness to others, life engagement, life meaning and ikigai<sup>6</sup> – a life worth living concept or the reason why wake up from the bed in the morning (2016, p. 123). This meta-analysis has proven that people who have identified their sense of purpose live longer and happier in comparison to those who have not identified their purpose.

In the lights of this chapter findings, we can state that when thinking about the tremendous amount of choices and opportunities in today's world, one should primarily consider things that are important, effective and work (thus evidence-based). In order

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<sup>6</sup> The Ikigai – life worth living concept is further developed in the practical part.

to save energy, time and reduce the stress that derives from the constant decision-making that can lead to decision-paralysis, procrastination, wasted potential and opportunities. We should also look for tools on how to apply those method to our lifestyle or company culture, these will be introduced in the practical part of this thesis. Now, having seen the context around the complex paradigm of decision-paralysis, which is more than common in today's age, we should be able to understand it and thus prevent it better. As we have seen, thinking critically and thus making better choices can result in improving many other aspects of our life and well-being.

## 4 21<sup>ST</sup> CENTURY INNOVATION ERA

*"If you really want to change the world you have to understand it." – Hans Rosling, Swedish physician*

Chapter four will primarily connect the field of critical thinking, current age innovation and progress of the 21<sup>st</sup> century. Subsequently, it will discuss the importance of critical thinking in the context of information and alternative approaches to the truth and data interpretation. Moreover, the debate will include the future of jobs and finally, tackle the current and future shift in skills demand and critical thinking importance in it. This combination will result in the final puzzle of the theoretical part, a complete analysis of the environment of the critical thinking paradigm.

To begin, innovation is often mentioned among the characteristics most associated with success of companies (Tidd and Pavitt, 2011, p. 7). The phenomena of innovation can be, according to the book of Managerial decision making (Svecova and Fotr, 2016, p. 30), classified as an *ill-defined* or *hard* problem (with contrary to *well-defined* or *soft* problems such as every day, repeated tasks) for which is, for example, typical:

- Unique, new and unrepeatable nature
- Solutions on higher levels of management / decision-making
- Non-existing standard procedure
- Necessity of creative solutions, vast knowledge of specific problematic, experience and intuition

The theory of ill-defined problems offers an explanation why are some concepts such as innovations or critical thinking can be so hard to tackle, conceptualize or even think about. Additionally, they are commonly, just as math and science, very *abstract* and *encrypted* which adds on a substantial level of complexity (Oakley, 2014, p. 43). Abstract, meaning intangible, we cannot take critical thinking to our hands, such as we cannot take the idea of innovation per se, we often can touch the product of innovation, but not the innovation itself. Encrypted, meaning that one word or expression can stand for a number of different operations and ideas. That is also why critical thinking is often categorized in higher order types of thinking, because it is complex type of thinking that might be not that easy to understand, imagine, apply or master. But both concepts, innovation and critical thinking can be applied transdisciplinary, meaning in wide range of 21<sup>st</sup> century disciplines.

Also, Tidd and Pavitt (2011, p. 24) proposed a following division of innovations to 4 broad categories: innovation of product, process, position and paradigm. Where paradigm innovation refers to changes in the underlying mental models which frame what the subject (in our case individual or organization) does. This exactly is what is the purpose of this chapter, how critical thinking should be perceived in the context of innovations of 21<sup>st</sup> century.

## **4.1 Myths, fake news and falsehood**

*"The trouble with the world is not that people know too little; it's that they know so many things that just aren't so." – old saying*

In this subchapter, a light should be shed on why critical thinking is and was so necessary, yesterday, today and hundreds of years from now. Disinformation, misinformation, false or fake news are concepts that have been popularized widely in recent years. However, the truth is, that fabrication of different stories goes all the way back to the very beginning of an information spread and story-telling – a myth. A word myth comes from the Greek's mythos which significates "story" or a "word." Myths are stories that are being told, believed to be true by many, to explain nature of the things, often involving heroic figures; they are symbolic tales of the distant past that concern cosmogony and cosmology (the origin and nature of the universe). They may be connected to belief systems (religion) or rituals and may serve to direct social action and values (Magoulick 2015). Also, the point of explaining the origin of myths here is to stress out that they have a long history in our world, and it would be a mistake to think that only our age is full of myths and falsehoods.

As we should be aware, in today's world there are many myths to be found and being told. They are sometimes very deeply established in our unconscious minds and considered to be general truths within different societies. Myths do not have to be generally harmful, however, what is very problematic about this fact is that these unconsciously established myths have become a part of our belief system and therefore might be difficult to change opinion about. It is only recently, when the term fake news, which is a deliberate presentation of (typically) false or misleading claims as news, has become very popular and even was elected as a word of the year 2017 (Flood 2017). As one of the main differences between a myth and fake news can be considered the fact that fake news are considered to be misleading by design – meaning having specific systematic features of spreading and manipulating audience's cognitive

processes (Gelfert, 2018, p. 85–86). Misinformation is defined by Dictionary.com as a “false information that is spread, regardless of whether there is intent to mislead” (Dictionary.com, c2019.). What have misinformation and fake news in common is the fact that they just don’t distort the historical record but also often spreads damaging stereotypes and lies. As Steinmetz 2018 suggest, according to an MIT research, people are inclined to believe false news at least 20% of the time, regardless of education or social status which leaves a great gap for future research of how to combat this problem. As we can see already, there are not only historical myths but real-world, real-time examples of consequences of spreading partial truths, incomplete or false information, whichever name we give them: fake news, hoaxes, conspiracy theories, disinformation, misinformation or myths. It is no doubt that such consequences can impact whole societies, nations and even the whole world such as was the case with Brexit referendum in the United Kingdom, the presidential campaign of Donald Trump in 2016, claims that vaccination causes autism or denial of global warming and holocaust (Gelfert 2018; Steinmetz 2018). What we are talking about in these cases is nothing less than a tremendous impact on the life of many, legitimization of “alternative” truths and normalization of lies.

#### **4.1.1 Information and critical thinking**

With the exponentially growing (not only) technological advances of the 21<sup>st</sup> century, bearing in mind Moore’s law <sup>7</sup>, the humanity currently has almost unlimited amount of information available through one click of the Internet, and it is the fact that never in history, humanity has had such information available so fast and in such quantity as it has now.

As Jackson and Farzaneh 2012 write, the information available creates opportunities but also problems such as *information overload* which is a term used to describe the overabundance of information. In today’s society, sometimes also called *information society*, the amount of information created every two days equals all the information created since the beginning of writing to the year 2003, which makes it one of the fastest-growing quantities on this planet, recognized as one of the big

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<sup>7</sup> Moore’s law “which states that the speed of computers; as measured by the number of transistors that can be placed on a single chip, will double every year or two - has been credited with being the engine of the electronics revolution, and is regarded as the premier example of a self-fulfilling prophecy and technological trajectory in both the academic and popular press” (Mollick, 2006, p. 62).

potential problems for the society. For example, Twitter reported that just in June 2011 average of 200 million tweets were posted in that month which would create a 10 million pages book that would take 31 years to read (Jackson and Farzaneh, 2012, p. 523).

The problem is not only the abundance but that the information is often highly chaotic which makes it even more difficult to choose what to believe in and also creates *"a gap between what science knows and what people do"* (Ludwig and Schicker, 2019, p. 25-26). Also, never in history have we had to fight with so many fast-spreading myths, misinterpretations, lies, half-truths and *"alternative truths"* that can have a different level of (not only harmful) impact. With these technological advances, social media algorithms, etc. one is more than ever prone to be affected, manipulated by a different type of misleading information which has become much more sophisticated and difficult to recognize from the truth.

Different studies found that false information travel way faster than real news. As Steinmetz 2018 mentions, studies on Twitter found that fake news travel 6x faster than truthful news, and 6 in 10 links get shared on this social network without actually anyone opening and reading it. The largest study made on the spread of true and false news online so far, performed by MIT scientist and published in the prestigious science magazine, has found out that the top 1% of false news reaches approximately 1000 to 100 000 people whereas the truth rarely reaches 1000 people. The authors explained that this may be because of the emotional response of people who are more likely to share the false news, not robots, but people affected by their emotions (Vosoughi et.al 2018). To emphasize the scientific findings, an old saying might come in hand: *"A lie can travel halfway around the world before the truth can get its boots on."*

As it will be gradually discovered in the thesis, one of the strongest, fastest and cheapest known tools against the effect of different type of false information, contributing to making more informed decisions can be the very paradigm of critical thinking.

## **4.2 Future of jobs**

*"In God we trust, others must bring data." – old saying*

OECD, 2019 emphasized that megatrends such as globalisation, digitalisation and socio-demographic change already have and will continue to have major impact on the way people work, socialise, shop or obtain information. Therefore, a paradigm shift should be applied to skills policies as a response to these megatrends to ensure that people will be equipped with higher level skills and remain competitive in the

change that some call the Fourth Industrial Revolution. Namely lifelong approach to learning, upskilling and reskilling, thus adaptation of skills to rapidly changing environment should be fostered and incentivized (OECD, 2019, p. 18-22).

As McKinsey 2017 report shows, innovation and technology potential for innovation of automation is already very high. As much as half of all work activities globally could be automated by adapting currently available technologies. In their midpoint scenario 15% of global work activities could be automated by 2030 in countries of the analysis focus including India, Mexico, China, United States, Germany and Japan. The report also highlights that occupations that require high level of physical work in a predictable environment are likely to be the most affected (clerks, administrative professions or building workers, cleaners). By comparison, less susceptible to automation by 2030 will be jobs with high level of expertise, interaction with others and high degree of cognitive, social and emotional intelligence. The likelihood of jobs automation also seems to correlate with education, where the potential for automation in jobs requiring education lower than high school is 55%, whereas just 22% for those with college degree. Also, early automation adoption and thus higher innovation potential and skills shift is anticipated to be the case in countries with high wages such as Germany or Japan (McKinsey Report, 2017, p. 28 – 30). On the other hand, historically speaking, technology and innovation has brought changes, but it overall creates more jobs than it destroys (McKinsey Report, 2017, p. 41). Based on McKinsey estimations just the introduction of the automobile created 7.5 million jobs, while destroying 623, 000 in the United States (US) just between 1910 - 1950 (p. 43). Personal computer enabled at least 19.3 million jobs in and across industries, while destroying 3.5 million since 1980 - 2015 (p.40). Also, historically, the leisure time has risen while working hours has declined by 50% in countries as Germany, Sweden, UK and the US since 1870 (p .43). In OECD countries the average work hours declined from 42 hours in 1960's-80's to 36 hours in 2015. (p. 44). We can see the pattern here, less cognitively demanding and administrative jobs will likely be subject of substitution (as they have been historically – we would hardly look for typists or get to work with a horse-drawn carriage) because we have more efficient alternatives today, so we will in the future.

The newest, World Bank 2019 report on 'The Changing Nature of Work' confirms, continue and expands the conclusions of McKinsey, 2017 report. The World Bank points out the following, lot of children who entered the primary school in 2018 will work in occupations which do not exist yet (World Economic forum 2016, p.1 mentioned estimation of up to 65% of the children), but at the same time, so is the case now with

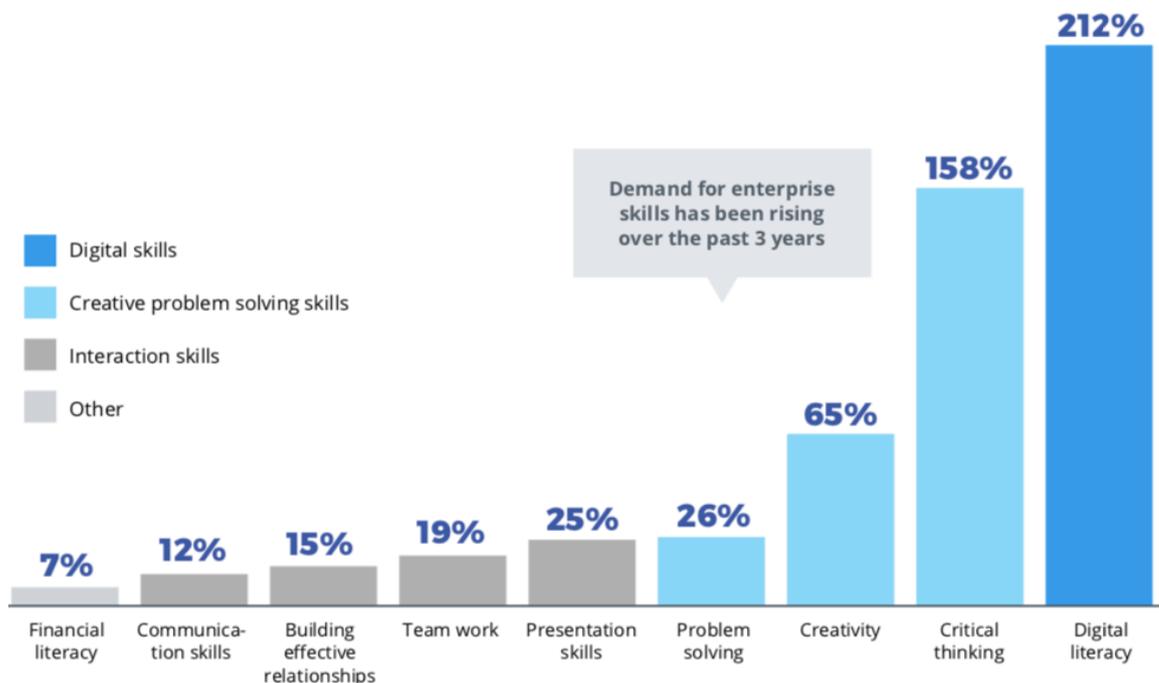
current professions that nobody could imagine in 1950's; today even in low- and middle- income countries people work at positions that have not existed 30 years ago such as app developers or data labellers. That is a natural process of mankind progress and innovation. Jobs evolve, so does the skills required to do these jobs. Apparently, according to the data, technology and automation will almost certainly make some jobs obsolete, but on the other hand, there are already many current jobs being re-shaped, resulting with new and even unexpected skills combination. World Bank also highlights, that cognitive skills (critical thinking and problem-solving) as well as socio-behavioural skills (creativity and curiosity) are in increasing demand and valuable for the market because they are associated with *adaptability*, people who possess them *"work more effectively with new technologies and cannot be easily replicated by machines."* The World Bank also adds, that classical education systems resist the change. Therefore, lifelong, self-education and education outside of schools and formal jobs will have a great importance for meeting the skill shift demands of a future labour market (World Bank, 2019, p. 70).

### **4.3 Critical thinking as the vital 21<sup>st</sup> century skill**

*"As basic automation and machine learning move toward becoming commodities, uniquely human skills will become more valuable." – Devin Fidler, Research Director at the Institute of the Future*

As the matter of future employment skills, a 2015 Report of 4.2 million online job postings from 6,000 different sources in the period 2012-2015 by the Foundation for Young Australians has found out that what is needed in graduates are: firstly, so-called *21<sup>st</sup> century, soft, transferable, transdisciplinary, generic or enterprise skills* that are applicable across occupations; secondly occupation-specific technical skills. Alongside critical thinking, also problem solving, communication skills, digital literacy, teamwork, presentation skills, creativity and financial literacy are mentioned as highly desired skills by employers. It has been found out that employers are also willing to pay for these skills much more than they used to. Moreover, growth in demand by companies for critical thinking in graduates by 158% growth in 3 years has been identified as can be seen in the Figure 16 below. Also, it is predicted that the 'enterprise' skills will be demanded about 70% more in the jobs of the future than they were in the past jobs (Foundation for Young Australians, 2016, p. 4-10).

Figure 16 The Demand for Enterprise skills is on the rise (2012-2015)



Source: Foundation for Young Australians, 2016, p. 10

Figure 17 Comparing skill demands 2015 vs. 2020

### in 2020

1. Complex Problem Solving
2. Critical Thinking
3. Creativity
4. People Management
5. Coordinating with Others
6. Emotional Intelligence
7. Judgment and Decision Making
8. Service Orientation
9. Negotiation
10. Cognitive Flexibility

### in 2015

1. Complex Problem Solving
2. Coordinating with Others
3. People Management
4. Critical Thinking
5. Negotiation
6. Quality Control
7. Service Orientation
8. Judgment and Decision Making
9. Active Listening
10. Creativity



Source: World Economic Forum, Future of Jobs Report, 2016

Table 9 Comparing skills demand, 2018 vs. 2022, top ten

<b>TODAY 2018</b>	<b>TRENDING 2022</b>
<ol style="list-style-type: none"> <li>1. Analytical thinking and innovation</li> <li>2. Complex problem-solving</li> <li><b>3. Critical thinking and analysis</b></li> <li>4. Active learning and learning strategies</li> <li>5. Creativity, originality and initiative</li> <li>6. Attention to detail, trustworthiness</li> <li>7. Emotional intelligence</li> <li>8. Reasoning, problem-solving and ideation</li> <li>9. Leadership and social influence</li> <li>10. Coordination and time management</li> </ol>	<ol style="list-style-type: none"> <li>1. Analytical thinking and innovation</li> <li>2. Active learning and learning strategies</li> <li>3. Creativity, originality and initiative</li> <li>4. Technology design and programming</li> <li><b>5. Critical thinking and analysis</b></li> <li>6. Complex problem-solving</li> <li>7. Leadership and social influence</li> <li>8. Emotional intelligence</li> <li>9. Reasoning, problem-solving and ideation</li> <li>10. Systems analysis and evaluation</li> </ol>
<b>DECLINING 2022</b>	
<ol style="list-style-type: none"> <li>1. Manual dexterity, endurance and precision</li> <li>2. Memory, verbal, auditory and spatial abilities</li> <li>3. Management of financial, material resources</li> <li>4. Technology installation and maintenance</li> <li>5. Reading, writing, math and active listening</li> <li>6. Management of personnel</li> <li>7. Quality control and safety awareness</li> <li>8. Coordination and time management</li> <li>9. Visual, auditory and speech abilities</li> <li>10. Technology use, monitoring and control</li> </ol>	

Source: Based on World Economic Forum, Future of Jobs Report, 2018, p. 6

Also, both World Economic Forum's 'The Future of Jobs Report' from 2016 (Figure 17) and 2018 (Table 9) shows that critical thinking already was in those years and will be a highly desired skill in the job market in 2020 and 2022. Both reports also show comparison in skills demand. The newest Future of Jobs Report from 2018 further suggests (p. 12): "Proficiency in new technologies is only one part of the 2022 skills equation, however, as 'human' skills such as creativity, originality and initiative, critical

*thinking, persuasion, and negotiation will likewise retain or increase their value, as will attention to detail, resilience, flexibility and complex problem-solving."*

World Bank 2019 in preface in its 'Development Report: The Changing Nature of Work' has this to say about the future jobs: *"Many jobs today, and many more in the near future, will require specific skills—a combination of technological know-how, problem-solving, and critical thinking as well as soft skills such as perseverance, collaboration, and empathy."* Undoubtedly, there are countless examples of the need for critical thinking regardless of the reasons proposed in this chapter and thesis involving workforce shift, information overload, alternative approaches to the truth and facts or technology advances. However, those mentioned are certainly the ones that affect and will continue to affect everybody regardless of occupation, education, social status or his conscious awareness.

To conclude, acquiring new skills which are, and in the near future will be in demand, as well as resetting intuition about the world of work, will be critical for our own well-being. With the information required, one might be rethinking the traditional values and be prepared for a rapidly evolving future full of innovations, technological disruptions and change. However, the fear of the future is not in place, as we can learn from historical development there always have been new jobs emerging and some old disappearing, whereas the technology historically created more jobs than it took. Moreover, because of the fact that the rapidness of the advances is highly unpredictable, it is impossible to indicate when the change will happen, but it is certain that it will eventually happen. Therefore, we should prepare strategies for acquiring new skills both for individual and professional development corresponding for these new demands. Also, as innovation is often mention among the characteristics most associated with success of companies, so is critical thinking in the individual abilities of the future, it can be understood as innovation of the mind. This assumption of the importance of critical thinking, was made based on the presented reports predicting (using vast amount of data) the important skills and characteristics of the workforce of the future.

Finally, the theoretical part consisting of chapters one to four created the complete contextual background corresponding to the objective a) which aim was to identify and explain the most important findings in the field of critical thinking and related paradigms from the theoretical perspective and within relevant, up-to-date literature.

# **PRACTICAL PART**

# 5 PRACTICAL TOOLS

*"To a great degree, the highest-performing people I know are those who have installed the best tricks in their lives." – David Allen, leading productivity specialist*

As we have seen in the previous chapter on innovation, the world is rapidly changing, new jobs will be emerging shortly, similarly as the necessity of a rapid learning of new skills to handle the shift in skill demand. As we have also seen, various reports from leading institutions have mentioned as a fundamental skill for these new jobs critical thinking. However, alongside critical thinking and technology development closely operate the distraction, unfocused mind, lack of objectivity, growing fear of the unknown and depression but also managerial evergreens as lack of time-management, motivation, productivity and effectivity.

Practical tools gradually introduced in this chapter, should be of help in fighting these modern era distractions and killers of mental and physical well-being without which critical thinking cannot be fostered. The explanation of why, how and in which concrete areas is the technique of help is provided to make sure that the reader will gain a full understanding of the specific technique, including its usefulness. The practical tools are divided in the subchapters according to its relevance to building specific skills and abilities, helping to foster critical thinking either directly or indirectly. The set of tools comes from carefully selected evidence-based literature and recommendations from highly respected experts on the matter. Additionally, it is believed by the experts, that the application of practical tools should be personalized for every subject, and also experimented with to achieve the best fit for the subject unique goals. In the same understanding that everybody is different and has its unique fingertips, so is every company with its unique goals and necessities.

## 5.1 Building Critical Thinking

*"Too often we enjoy the comfort of opinion without the discomfort of thought." – John F. Kennedy, former US president*

Following practical tools were carefully selected to help in direct application and building of critical thinking and objectivity. Objectivity is particularly important in

critical thinking because it helps assess and reflect upon the components of critical thinking of both self and others.

### **5.1.1 Universal Intellectual Standards**

**Helpful in:** applying critical thinking to different types of situations such as ill-structured problems; directly building inner universal critical thinking standards and critical thinking mindset.

**Why it works:** Based on Sellars et. al 2018, Paul 2005, and Paul and Elder 2008 the use of *universal intellectual standards* is proposed as an effective tool to apply critical thinking in everyday situations. According to Paul and Elder (2008, p. 8) universal intellectual standards should be learned and explained explicitly to function as an inner voice, an automatized better guidance of reasoning and its quality. It was designed by respected authors in the field of critical thinking and educational psychology and is based on the major consensus of scientists concerning the question what critical thinking should be based on.

**How it works:** this method can be used to assess either own quality of reasoning or assess the quality of reasoning made by others by asking the mentioned questions (Table 10).

Table 10 Universal Intellectual Standards with Questions

<b>Standard</b>	<b>Questions</b>
<b>Clarity</b>	<p>Could it be elaborated further?</p> <p>Can examples be given?</p> <p>Could it be illustrated what is being meant?</p>
<b>Accuracy</b>	<p>How could be check on that?</p> <p>How could be find out if that is true?</p> <p>Can this be verified or tested?</p>
<b>Precision</b>	<p>Could more details be given?</p> <p>Could it be more specific?</p>
<b>Relevance</b>	<p>How does that relate to the problem?</p> <p>How is that connected to the question?</p> <p>How does that help with the issue?</p>
<b>Depth</b>	<p>What factors make this a difficult problem?</p> <p>What are some of the complexities of this question?</p> <p>What are some of the difficulties to be dealt with?</p>
<b>Breadth</b>	<p>Does it need to be looked at from another perspective?</p> <p>What would this look like from another point of view?</p> <p>Is there another way to look at this?</p>
<b>Logic</b>	<p>Does all this make sense together?</p> <p>Does what is said follow from the evidence?</p>
<b>Significance</b>	<p>Is this the most important problem to consider?</p> <p>Is this the central idea to focus on?</p> <p>Which of these facts are most important?</p>
<b>Fairness</b>	<p>Are all relevant viewpoints considered in good faith?</p> <p>Are any information distorted because of biased perspective?</p>

Source: Own creation based on Paul, 2005, p. 31 and Paul and Elder, 2008, p. 8-10, adjusted

### 5.1.2 Universal Structures of Thought

**Helpful in:** applying critical thinking to different types of situations such as ill-structured problems; directly building inner universal critical thinking standards and structures of thought.

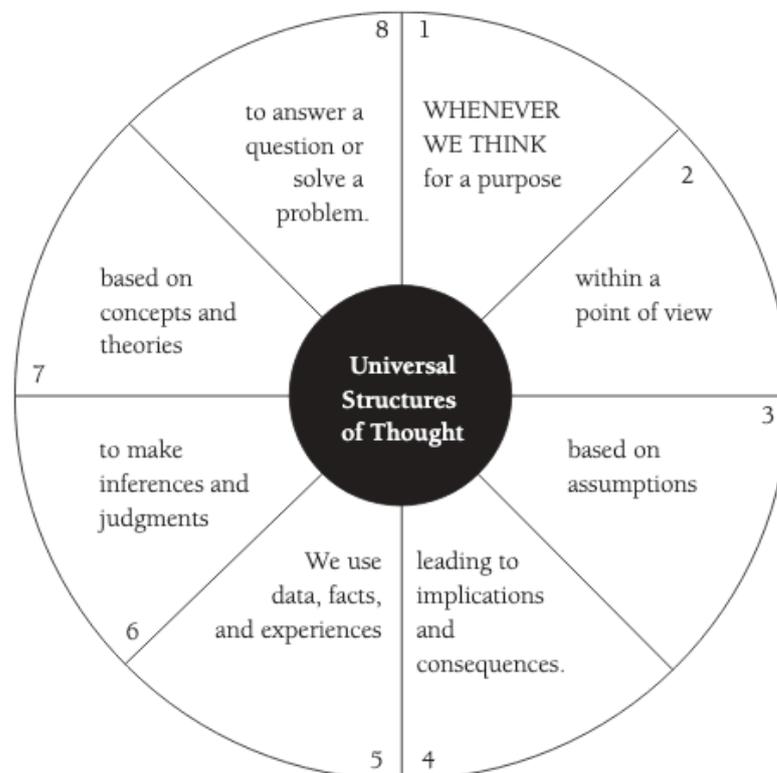
**Why it works:** it was designed by respected authors in the field of critical thinking and educational psychology (Paul and Elder). As Paul, 2005, p. 29 argues that a

skilled, effective and organized thinker is required to be aware and regularly check on the universal structures (elements) of thought (Figure 18) that create a basis for reasoned critical thinking and learning the below mentioned questions.

**How it works:** Similarly to the previous method, this technique can be used to structure and assess either one's own quality of argumentation, reasoning and overall critical thinking of others by applying the questions, modified accordingly. It can also be used as a rapid universally applicable quality checklist. This technique is, in general, more structured, shorter and thus easier to apply and remember.

1. What is my **purpose**?
2. What is my **point of view**?
3. What **assumptions** am I making?
4. What **conclusions or inferences** can I make (that are based on this information)?
5. What **data or information** do I need?
6. If I come to these conclusions, what are the **implications and consequences**?
7. What is the **key concept (theory, principle, axiom)** I am working with?
8. What **question** am I trying to **answer**? What **problem** I am trying to **solve**?

Figure 18 Universal Structures of Thought



Source: Paul, 2005, p. 30

### 5.1.3 Recognizing bias and propaganda

Due to the clarity of this tool as well as the same authors as in before mentioned methods, this technique will be introduced shortly. Thus, Paul and Edler, 2003 identified following principles which a critical thinker uses for identifying bias and propaganda in news and media. It can also be applied as a free structure for critically assessing various body of information.

**Helpful in:** applying critical thinking to different types of situations such as ill-structured, real-world problems; directly building inner universal critical thinking standards for recognizing bias, propaganda and other misleading body of information e.g. fake news.

**Why it works:** It is a simple methodology involving using in practice critical thinking skills, subskills and mindset (viz chapter 1.2.1 and 1.2.2).

**How it works:** applying these principles (Table 11) when analysing a body of information.

Table 11 Recognizing bias and propaganda

<b>Critical thinker does:</b>
○ Study alternative perspectives and world views, learning how to interpret events from multiple viewpoints.
○ Seek understanding and insight through multiple sources of thought and information, not simply those of the mass media.
○ Learn how to identify the viewpoints embedded in news stories.
○ Mentally rewrite (reconstruct) news stories through awareness of how stories would be told from multiple perspectives.
○ Analyse news constructs in the same way we analyse other representations of reality (as some blend of fact and interpretation).
○ Assess news stories for their clarity, accuracy, relevance, depth, breadth, and significance.
○ Notice contradictions and inconsistencies in the news (often in the same story).
○ Notice the agenda and interests served by a story.
○ Notice the facts covered and the facts ignored.
○ Notice what is represented as fact (that is in dispute).
○ Notice questionable assumptions implicit in stories.
○ Notice what is implied (but not openly stated).
○ Notice which implications are ignored and which are emphasized.
○ Notice which points of view are systematically put into a favourable light and which in an unfavourable light.
○ Mentally correct stories reflecting bias toward the unusual, the dramatic, and the sensational by putting them into perspective or discounting them.
○ Question the social conventions and taboos being used to define issues and problems.

Source: Paul and Elder, 2003, p. 21, adjusted

### 5.1.4 Unbiasing - Google way

Two technology giants Google and Microsoft<sup>8</sup> have made their trainings available online for free so plenty of evidence-based materials (including, videos, practical tools, etc.) can be used for personal or internal use within a company. This is what Google has to say about why to make the effort of unbiasing: *"Making the unconscious conscious will help you make more objective decisions, facilitate inclusive interactions, and create opportunities"* (Google, c2016-2017).

**Helpful in:** detecting bias; making better decisions; building critical thinking mindset and skillset.

**Why it works:** Both Google and Microsoft used evidence-based techniques from scientific journals when developing their programmes, to achieve the best results and offer their employees innovative, almost bias-free company culture. However, this is a short synthesis of the main ideas, for a detailed understanding and application for improving own judgement or a company culture, review of the complete course is recommended.

**How it works:** Google suggests to use following customizable framework when detecting bias:

1. Raise awareness about unconscious bias
2. Hold everyone accountable
3. Gather data and measure decisions
4. Evaluate subtle messages
5. Use structure and criteria

**Source:** Google c2016-2017

## 5.2 Purpose, motivation, meaning

*"If you hire people just because they can do a job, they'll work for your money. But if you hire people who believe what you believe, they'll work for you with blood and sweat and tears."* – Simon Sinek, leadership guru and Colombia University professor

The criterion of purpose has already been mentioned before, know what rests the actual way of finding it. Many people list as one of their reasons why they cannot

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<sup>8</sup> For simplicity and similarity of the ideas in both courses only Google training is mentioned in the detail. Microsoft training can be accessed and reviewed under following link available in bibliography (Microsoft, c2015.)

do a certain task they want to do or wanted to their motivation. They say, "I am not motivated to do this", however there is a reason why they are doing what they are doing. They have enrolled to a course for certain purpose, they wanted to get the knowledge, the skill because it interest them, there is wide application of the knowledge beyond but over the semester they might get annoyed by the teacher approach and say that "have lost the motivation". Another example is when unsatisfied at work. Ask ourselves, is there a reason why I am doing this job? Do I like it? Why do I like it? Or is that unbearable that I need to get another job? There usually is a reason why we came to do a job we do or why we started a certain career at the first place we just need to find it. The key part is that they just need to find the active *approach motives*, the underling motivation, because motivation have only effect on us if we are thinking of it or feeling it (Voge 2017).

The majority of experts have mention when fighting with different tasks in life, it is necessary to always have in mind the specific underlaying *meaning* why we are doing things. For example, the Princeton University professor and education specialist Dominic Voge has on its screen written "Reduce the suffering", that is his life mission of helping students with studying difficulties and reduce their suffering by the job he does (Voge, 2017). Therefore, it is important to figure out both our life and professional vision and mission. This is also why companies set their vision and mission statement – to know internally and inform the external why, what, where and how they are doing what they are doing. What they are doing now (mission) and what they want to achieve in the future (vision).

Another important thing, before mentioning the actual tools is the realization that the key is the focus on *process*, the small steps and changes, not the final product, which may be too overwhelming and abstract to grasp. Popular "The journey is the destination" quote could be of help here.

### **5.2.1 Ikigai**

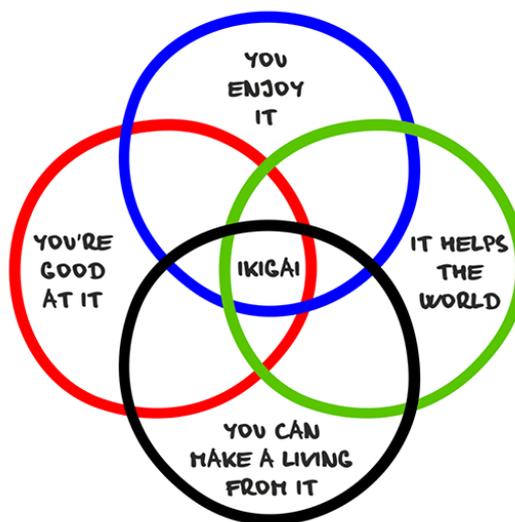
**Helpful in:** figuring out life's purpose, vision or mission; improving decision-making; finding the underlying motivation, well-being, happiness or longevity; reducing decision-paralysis; building critical thinking mindset.

**Why it works:** When talking about the importance of mindset and inner motivation It is not just a regular myth from managerial cook book. There are plenty of scientific studies proving the effectiveness of the concept of "the life worth living (ikigai)". Two long-term studies done. The first study done on more than 40,000 adults over 7

years' follow-up, when 3048 died and then on 70,000 Japanese adult where over 12 years 10,021 died have concluded that "The risk of *all-cause mortality* was significantly higher among the subjects who did not find a sense of ikigai as compared with that in the subjects who found a sense of ikigai" (Sone et. al 2008, p.709; Tanno et. al 2009, p. 67). Also, in other nations, like this one made on Americans concluded that those elders with greater purpose in life were linked with lower risk of stroke (Kim et. al, 2013, p. 427). Even a meta-analysis of 10 studies with more than 136,000 participants on purpose in life has shown the same results and even relation to reduce cardio-vascular disease: "*Possessing a high sense of purpose in life is associated with a reduced risk for all-cause mortality and cardiovascular events*" (Cohen, Bavishi, Rozanski, 2016, p. 122). Therefore, we can conclude, that if we are looking for living longer, more fulfilled and satisfied life, we might look for some tools such as Ikigai.

**How it works:** How it works describe precisely the figure of Ikigai, where we are striving to find an intersection of what we enjoy, what helps the world, what we can make a living from and what we are good at (Figure 19).

*Figure 19 Ikigai*



*Source: Adela Schicker, Procrastination.com 2019*

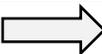
### **5.2.2 The Grit**

**Helpful in:** figuring out life's purpose, motivation; improving decision-making; building grit, critical thinking mindset, psychological well-being; handling decision-paralysis.

**Why it works:** Acknowledged psychologist Angela Duckworth through its extensive research and studies on thousands of people explains that *Grit* can be developed during the life time, it is not something we are born with and ultimately plays a major role in success and happiness.

**How it works:** The principle is detailly schematically described in the Table 12 below.

Table 12 Anatomy of the Grit

<b>GRIT ASSETS:</b>	<b>INTEREST</b>	<b>PRACTICE</b>	<b>PURPOSE</b>	<b>HOPE</b>
	Enjoying and loving what one does	Continuous deliberate practice despite drawbacks	Believe that one's work matters to oneself and others	Believe in oneself and addressing challenges and failures
<b>EFFORT = key, counts twice</b>	<b>SKILL</b>		<b>ACHIEVEMENT</b>	
	= talent x effort			= skill x effort
<b>GRIT COMPONENTS:</b>	<b>PASSION</b> <b>Abiding, loyal, steady way of achieving the long-term goal</b>		<b>PERSEVERANCE</b> <b>Consistency of all the effort, hard work and resilience</b>	
<b>GRIT</b>	<ul style="list-style-type: none"> <li>- The ultimate long-term goal, the life philosophy</li> <li>- The compass that gives direction, the alliance of all the goals to ultimately create our <i>identity &amp; meaning</i></li> <li>- Correlated with happiness and overall well-being</li> </ul>			
<b>GRIT GROWTH</b>	<b>"from the inside out"</b>		<b>"from the outside in"</b>	
	from oneself (interests, habits, challenges, purpose and hope cultivation)		from other people (family, friends, coaches, bosses, mentors, ...etc.)	

Source: Own creation based on Duckworth 2016

**Source:** Duckworth 2016

### 5.2.3 The Growth mindset

**Helpful in:** improving motivation; improving decision-making; building grit and critical thinking mindset; psychological well-being; handling decision-paralysis.

**Why it works:** World-renowned Stanford University psychologist Carol Dweck with decades of research on motivation and success brought fundamental distinguishing, the fixed and growth mindset. These two contrasting types of mindset determine our worldview and profoundly affecting nearly every aspect of our lives. This

research also only further acknowledges the power of thought, the mindset, and as the shift from fixed to growth mindset we can make a profound change in our lives and lives of others.

**How it works:** As described in Table 13 below.

*Table 13 Fixed versus Growth mindset*

	<b>FIXED MINDSET</b>	<b>GROWTH MINDSET</b>
<b>INTELLIGENCE</b>	Given, can't be changed	Can be developed and improved
<b>CHALLENGES</b>	Avoids	Embraces
<b>OBSTACLES</b>	Gives up easily	Persists, seeks improvement
<b>EFFORT</b>	Fruitless, useless	Key to success, path to mastery
<b>CRITICISM</b>	Ignores	Learns from it
<b>SUCCESS OF OTHERS</b>	Feels threatened	Finds lessons and inspiration from it
<b>SEEK</b>	Certainty	Improvement
<b>LEADS TO</b>	Learned helplessness, aversion to change	Learning and continuous development

*Source: Own creation based on Dweck 2017*

**Source:** Dweck 2017

## **5.3 Discipline, learning and effective deciding**

*"No discipline seems pleasant at the time, But painful. Later on, however, it produces a harvest of righteousness and peace for those who have been trained by it." – The Bible, 12:4-11*

### **5.3.1 Habits building and breaking**

The mechanism of habit building or breaking is quite the same and not that impossible how it might seem. Without good habits development, nurturing CT can be quite impossible.

**Helpful in:** goals achievement; building discipline, improving work efficiency and well-being; reducing decision-paralysis; building critical thinking mindset.

**Why it works:** Habits saves our energy because they are automatized, the brain already knows these activities so we are not consciously aware of everything we are doing, therefore we can use the working memory energy for different thing and be more efficient with our time. Habits also differ in length, they can take seconds our hours, therefore they can be used in wide range of activities. They can be both good and bad for us, but the mechanism is exactly the same. Recognizing this mechanism can help us both build a good habit or break a bad one.

**How it works:**

**The cue** – is the impulse, the distraction that drives our attention away from doing a certain activity (it can be seen a long list of the to-do list, social media notification, work messages, emails, all sorts of things that we respond to because we want to delay the activity we should be focussing on). The cue is not neither good, not bad, all depends on how we respond to it (the routine).

**The routine** – is the habitual response of our brain to the cue. If we want to change or build a habit we need to respond differently to the cue, practice to reduce the amount of distraction and, more importantly to ignore the distractions - the response to the cue is what matters the most.

**The reward** – is why any habit can develop and persist. We should reward ourselves after completing periods of intensive working or completing tasks to make it a long-lasting habit (mechanism of conditioning)<sup>9</sup>. It works because our body and brain associate the habit with a reward and create a neurological craving, our body gets to use to it and even before getting the reward we experience positive emotions and pleasure that our body releases.

**The belief** – is why habits have such a power. They can only be developed or broken (in case of bad habit) if we believe and want so. Mental contrasting can be a powerful technique to get to believe. It works on principle of imagining the future when we want to be e.g. an environmental lawyer helping the planet and going around

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<sup>9</sup> Psychology term coined by Ivan Pavlov in his famous experiment where learnt dogs to salivate at the ring of the bell while associating the ring with getting food. Therefore, conditioning is a learned expectancy of our body which releases various chemicals to make us feel a certain way after repeated experience (reinforcement) (Ariely, 2010, p. 179).

the world versus where you are now with all the details. The important takeaway is that anything can be changed. Little by little.

**Source:** Oakley, 2014, p. 160-170; Ariely, 2010, p. 179

### 5.3.2 Ultralearning

'Ultralearning' is a technique defined by Scott Young, an "ultralearner" himself, which is a way of *aggressive* learning enabling the learner to develop skills effectively in a very short time – offering universal techniques in the art and science of learning.

**Helpful in:** learning hard things fast and effectively; maximizing competitive advantage through self-education ("future-proofing").

**How it works:**

1. METALEARNING: FIRST DRAW A MAP. Start by learning how to learn the subject or skill you want to tackle. Discover how to do good research and how to draw on your past competencies to learn new skills more easily.
2. FOCUS: SHARPEN YOUR KNIFE. Cultivate the ability to concentrate. Carve out chunks of time when you can focus on learning, and make it easy to just do it.
3. DIRECTNESS: GO STRAIGHT AHEAD. Learn by doing the thing you want to become good at. Don't trade it off for other tasks, just because those are more convenient or comfortable.
4. DRILL: ATTACK YOUR WEAKEST POINT. Be ruthless in improving your weakest points. Break down complex skills into small parts; then master those parts and build them back together again.
5. RETRIEVAL: TEST TO LEARN. Testing isn't simply a way of assessing knowledge but a way of creating it. Test yourself before you feel confident, and push yourself to actively recall information rather than passively review it.
6. FEEDBACK: DON'T DODGE THE PUNCHES. Feedback is harsh and uncomfortable. Know how to use it without letting your ego get in the way. Extract the signal from the noise, so you know what to pay attention to and what to ignore.
7. RETENTION: DON'T FILL A LEAKY BUCKET. Understand what you forget and why. Learn to remember things not just for now but forever.
8. INTUITION: DIG DEEP BEFORE BUILDING UP. Develop your intuition through play and exploration of concepts and skills. Understand how understanding works, and don't recourse to cheap tricks of memorization to avoid deeply knowing things.

9. EXPERIMENTATION: EXPLORE OUTSIDE YOUR COMFORT ZONE. All of these principles are only starting points. True mastery comes not just from following the path trodden by others but from exploring possibilities they haven't yet imagined."

**Why it works:** These advices were gathered and developed by Scott Young, a man who is an *ultralearner* himself, he collected these techniques based on extensive research and practices of himself and other successful *ultralearners*, while also widely applying cognitive science research. He almost brilliantly explains *ultralearners'* techniques such as the one of Nobel laureate Richard Feynman or Van Gogh mastery despite the fact that he could not draw and only started at the age of 25 or current phenomenal Nigel Richard, who won the French World Scrabble Championship—without knowing French. Young himself managed to finish MIT computer science degree online in 1 year and in 1/100 of costs instead of 4 years and thousands of dollars for tuition fees; became conversationally fluent in 1 language every 3 months including Chinese or Korean or learned himself draw by applying these techniques. However, as he correctly argues, *ultralearning* is not for everybody and not for anytime because it does require a lot of intensive time slots, motivation, dedication and perseverance. It is the right tool though, to learn hard things in a short time period, instead of being mediocre for months or years or even never even develop new skills. Bearing in mind the fact that developing new skills fast is increasingly necessary in current changing, digitalized world. In short it is a well-researched, evidence-based technique for effective career, studies or life improvement.

**Source:** Young, 2019, p. 64-66

### 5.3.3 Embracing failure technique

**Helpful in:** building persistence and critical thinking mindset; psychological well-being; handling stress and building motivation.

**How it works:** Rename your failures and see them as a positive thing. "1,000 or 10,000 ways to NOT create a lightbulb" is a statement accounted to Thomas Edison, one of the brightest inventors of all time for renaming his failures. This is also why, for example, one of the most respected innovators of our time, Elon Musk, creates videos and memes on failure of his space rockets and other inventions. Failure is essential in learning and it all depends on how we see it. If we see it as an opportunity to learn and get better next time or as a reason to give up and not try again, is critical That is also where American society mindset might be a lot before the central-, western- European one. Where, in Europe, often mostly success is embraced and does not leave much

space for failure, which is terribly wrong. That is also why we tend to avoid the failure – because the culture of success celebrating is so deeply rooted in our minds, we tend to forget, that *“success is important, but critically so is failure”* (Oakley 2014, p. 80).

**Why it works:** Before one reaches a goal, it takes some time and one most certainly fails a lot within that time. But what makes the difference between successful people and the unsuccessful ones is frequently the not giving up when things get really hard. The successful people embrace their failures and learn from them. There is also this old saying that *“The master has failed more times than the beginner has even tried.”* As did Edison and as Elon Musk does. Also very well explained is this mechanism in Oakley 2014, p. 183 citing popular math professor Oraldo Saucedo on how failure often fuel success: *“There are a lot of failure-to-success types out there with similar stories. If you’ve failed in the past, you may not realize how important that it can be in fuelling your success.”* Embracing failure is also essential part of what acknowledged psychologist Angela Duckworth calls the grit mindset – the combination of passion and perseverance or the ability to embrace challenge and failure, learn from it, believe in the success and improvement. And as she also mentions that *“some people are great when things are going well, but they fall apart when things aren’t.”* That is exactly why embracing failure is critical – to be able to face life-challenges better, cope with stress, fear and the unexpected.

**Source:** Oakley 2014, p. 79-185; Duckworth, 2016, p. 27-268

### **5.3.4 Schwartz’s decision-making techniques**

**Helpful in:** improving decision-making; building critical thinking mindset and skillset; minimizing decision-paralysis.

**Why it works:** Acknowledged American psychologist, Barry Schwartz believes that there are steps with which help we can minimize or even eliminate many of sources of distress flowing from choice abundance and thus make better decisions. These steps, as he mentions, require practice, discipline, willpower and perhaps a necessary change in the way we think (Schwartz, 2004, p. 221) Schwartz, therefore, based on his extensive research and scientific studies of decision making recommends the following (synthesised).

**How it works:**

**Choose with restrictions**– Simply cost-benefit analyse one of the latest decisions versus the mental work applied to the decision-making process that needed to be done to reach that decision. If the process was more excruciating than the

satisfaction of the final decision, it was not worth it and do not do it again. Application of a "rule of thumb" which Cambridge Dictionary (c2019) defines as "*a practical and approximate way of doing or measuring something*" is also recommend. In other words, put a logical restriction and measure on future decisions such as visiting just 2 shops when going shopping.

**Satisfy more, maximize less** – "maximizers" are those people that most of the time have expectations that cannot be met, worry more about regret, about missed opportunities and social comparison and end up most disappointed with their decisions if they do not turn out accordingly to their high expectations. They are always thinking if there could be something better, so they are actually never satisfied in what they have. Schwartz advice is to accept "good enough" which, every "satisficer" put on standard and criteria beforehand and once find the thing that meets these criteria, no more deciding and looking for better and better. This standardization simplify decision making and increase satisfaction with our choice.

**Opportunity cost and regret** – thinking about other opportunities that we have sacrificed for our choice. As research has shown, the more we think about opportunities that we have had missed, the less satisfied we are for whatever option we have chosen. Therefore, we should try to minimalize thinking and regretting choices that "might have had happen" and "what ifs". A good practice is to reduce number of options before making decisions and focus on what is good in that decision and not what is bad.

**Stable decisions** – "*When we can change our minds about decisions, we are less satisfied with them*" (Schwart, p. 228). Therefore, we should try not to change our decision too much but make more final ones, where possible

**Practice gratitude** – as research has shown, to most of the people, gratitude does not come naturally and training it takes practice because When life is not too good, we think a lot about how it could be better. When life is going well, we tend not to think much about how it could be worse. Therefore, we are not really appreciating what we have in the present. Starting with small steps, such as writing down things to be grateful for each day can make a difference.

**Anticipate Adaptation** - Simply said, we get used to all kinds of things and take them for granted. We cannot prevent it. We adapt to good things as well as bad ones. The problem with adaptation is that "*not only do we adapt to a given experience so that it feels less good over time, but we can also adapt to a given level of feeling good so that it stops feeling good enough*" (Schwartz, 2004, p. 232). We adapt and get used

to everything, so even things that we like doing stop feeling that good after a while and reversely. That is hedonic adaptation. So even when living in the most luxury tropical island, we get used to it after a while and crave a change. What we should do, according to Schwartz is to develop realistic expectation and focus on our sense of a purpose<sup>10</sup>, what makes us happy in life in the long-term.

**Source:** Schwartz, 2004, p. 20 -236

## 5.4 Time-management and prioritizing

*"Time is limited." – old saying*

*"Memento mori"* or *"Remember that you will die"* is an old saying reminding us how remorseless and limited time is. The fact, that time is limited is one of the most important aspects of our lives that we tend to forget about a lot. Sometimes we "wake up" and wonder "where did all the time go" or we tend to complain that we just do not have the time for this and that. The good news is that with effective time-management and prioritizing techniques, we should be working much more effectively than without them, but most importantly prevent decision-making paralysis and thus make more effective, better structured and well-thought of decision.

### 5.4.1 Reasonable Checklist

**Helpful in:** avoiding procrastination and decision paralysis; organizing thoughts and thinking critically about prioritizing; improving productivity and effectiveness.

**Why it works:** Several studies have identified that writing down responsibilities before sleeping has a positive impact on *prospective memory* which refers to remembering to execute goals in the future (Scullin and McDaniel, 2010, p. 1028), writing it down also frees up space in the *working memory* (we are not constantly remembering that we have obligation to do something), which leaves space for more *creative* approaches and problem solving. That is why is widely recommended to write down a *reasonable* checklist or to-do list a night before. Now why reasonable, if we overdo it, we feel pressured and anxious about the long list of our obligations which can trigger aversion and lead to procrastination. Therefore, long, unsystematic, uncategorized

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<sup>10</sup> The sense of a purpose is further described in the section "How to manage our choices - The criterion of purpose."

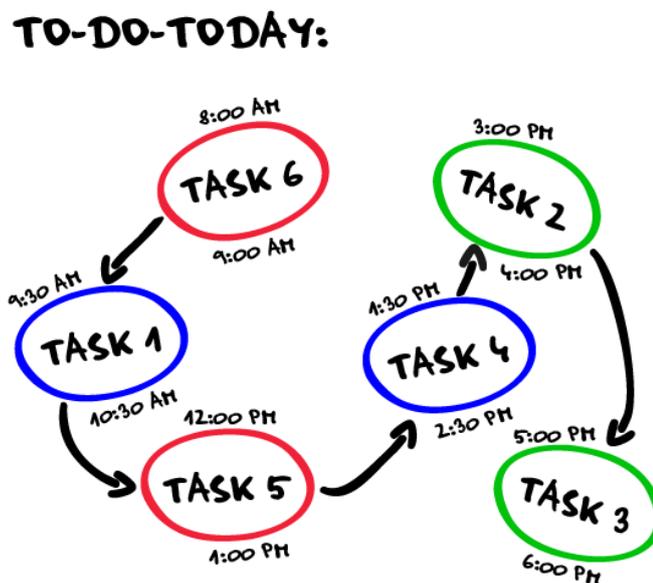
checklists will not do the trick because they can also contribute to the decision paralysis.

**How it works:** The principal lays in writing reasonable, if possible, should be: SMART (specific, measurable, achievable, relevant, timed) checklist the night before the following day or week and adjusting according to the daily workload if necessary. Prioritization is also key here. Therefore, some authors advice to colour code, number code, use a sheet in excel or draw on a paper for the goals to become clearly structured.

**Source:** Oakley 2014, Ludwig and Schicker 2018, Scullin and McDaniel 2010

**Specific technique example:** Ludwig and Schicker, 2018, p. 140 developed technique called To-Do Today (Figure 20), which is basically a combination of a SMART checklist and Eisenhower matrix, where the setting of priority tasks is not in quadrants but in circles and colour codes. Where red means high priority – urgent, blue means medium priority – not urgent and green circle are low priority ones, if they will not get done, the world will not collapse but it is perceived as a great bonus.

Figure 20 Example of a Reasonable Checklist Technique - To-Do-Today Method



Source: Ludwig and Schicker, 2018, p. 142

### 5.4.2 Applying the “I-Don’t-Like-Doing-It job first” technique

**Helpful in:** improving productivity and work efficiency; reduction of procrastination and decision paralysis; improving decision-making; building a habit; building critical mindset.

**Why it works:** Because our body and brain reward us after finishing the unpleasant job by the feeling of satisfaction and accomplishment. Plus giving us time to do more enjoyable thing the day without having “the unpleasant thing” waiting in our head all day. We often put-off the job we do not like or even hate, or in a psychology jargon we identify it as a certain aversive stimulus. We find the task, work project, physical exercise so aversive (or boring) that we put it off or never do it at all if not absolutely necessary. It is, therefore, crucial to remind ourselves that nobody nowhere in the world has a life full of only pleasant tasks to do, we, as anybody else, will always need to do some task that feels unpleasant. The key is how the task is approached, there is always have the choice – to find the pleasant within the unpleasant. The thing is, that we get rid of the anxiety, guilt and stress that would be haunting us for not doing it all day, night, weeks by making the hated task the first thing in the morning so we keep our head clear and ready for our other activities, we enjoy the day more and get the feeling of satisfaction after finishing the hated tasks.

**How it works:** It is easy as this. Do the unpleasant task as a first thing in the morning. The thing is that you approach it this way. Instead of telling yourself: “I am so miserable, my life is terrible, I hate doing this.” Tell yourself this: “Well, I will do it now and I am going to feel amazing after I finish it.” And you will. It will also quickly become a habit, if you do it regularly enough and the suffering from the unpleasant task will get lower and lower, but the reward of feel relieved and accomplished stay. Also, it is important to know, that if we do not particularly like something, we get annoyed easily and give up on it prematurely, it is a typical human nature. As suggests a study of Philippa et. al 2010 on formation of habits in the real world, with the practice and consistent repetition the automaticity increases, and habits get formed. And with these repetitions, you will get better and *“the better you get at something, the more you’ll find you enjoy it”* (Oakley, 2014, p. 148).

**Source:** Emmet, 2000, p. 9-11; Oakley 2014, p. 147-148; the method is also mentioned in Ludwig and Schicker p.146 and p. 161

### **5.4.3 Pomodoro Technique and Deep Work**

These two techniques are similar in their features yet have their specifications. Pomodoro technique recommended by learning specialist Barbara Oakley is more widely used in short sprints about 25-minutes long then taking a short 5-10-minute break and repeat as this several times a day depending on the complexity of the task.

After approximately 4 repetition of this cycle, taking a longer break is recommended. Meaning 15, 20, 30 minutes or however long is needed.<sup>11</sup>

Moreover, Georgetown University computer science professor Cal Newport and bestselling author on topics of culture and technology in his book *Deep work* (2016) mentions several types of this same name technique and even more useful rules. The predisposition of deep work method is that the subject does not want the average results, but the best ones. To our purposes, the most flexible "*the journalist philosophy*" approach to deep work that allows schedule deep work slots alongside the day, whenever is needed will be introduced (Newport, 2016, p. 143–147).

**Helpful in:** focus on the present task; ignore or limit distractions; work effectively; avoid procrastination; build consistency and a good habit.

**Why it works:** Both of the methods allow the subject to focus and effectively switch between what Oakley calls focused and diffuse mode. Newport differs between deep work and shallow work where both of the concepts refer to the type of work we are doing. Deep work refers to undistracted deeply focused work that does allow the diffuse mode to kick in the breaks, all the scheduled time for deep work, focused mode is on. It serves for solving complex problems and creating valuable work. Shallow work refers to administrative, non-cognitively demanding, easily replicable type of work. Such as going to meetings, responding to emails, questions on Slack, filling in spreadsheets and other tasks where our attention is often distracted between various tasks.

Both of these methods (Pomodoro and Deep work) work because they combine the switching between the two types of thinking modes mentioned before in this thesis and therefore work a lot with efficiency of our work time by managing it smarter. They can also be used together.

**How it works:** Generally, in both methods, it is recommended to set a timer for 30-minutes, 1h, 25-minutes, 2 hours, ... whatever time slot is found personally manageable to focus in. Then the time is devoted to work on one specific task with a deep focus, elimination of all possible distractions (turning off of e-mails, social media

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<sup>11</sup> When using Pomodoro or Deep Work technique, the author of this thesis found very helpful a simple web-based app called Marinara Timer ([www.marinatimer.com](http://www.marinatimer.com)). Timer is either set to the classical Pomodoro timer of 25-minute cycle, followed by an alert signaling a 5-minute break. It automatically continues after fourth Pomodoro set when there is a 15-minute break. There is also an option of customizable time periods and break times to suit both individual and team needs. The app can be also shared among team or colleagues and tasks can be delegated within the customizable intervals. And there is no need for installation, just internet connection.

notifications, phone sound) is secured beforehand. Then take a short, scheduled break. Repeat. The idea is working undistracted on the task which is time-framed and divided in a smaller sub-task to be doable, so the attention is kept on maximum. What is also beneficial in these methods, is training of our work under mild stress, in order to handle more stressful situation better in the future. The authors also mention that this kind of scheduling in different variations is (or was) commonly practice by various high-performing athletes, journalist, inventors, scientist such as Charles Darwin programmers and innovators such as Bill Gates or other professionals. As mentioned by Cal Newport, 2016, p. 331: *“depth generates a life rich with productivity and meaning.”* Also, the important part of these techniques is keeping score to make ourselves accountable in what we have finished in Pomodoro sprints and how many blocks of deep work we managed to accomplish in a week. Newport himself also calls for experimentation with the various techniques, rules and rituals that he proposes in order to find the ones that suits us best.

**Source:** Oakley, 2014, p. 173-182; Newport, 2016, p. 143-331

#### **5.4.4 The 4 Disciplines of Execution (4DX)**

This method is recommended by Cal Newport in his book “Deep Work”. What Newport tries to achieve with this technique is help with the all-time difficult *“I know what I need to do. I just don’t know how to do it”* (Newport, 2016, p. 169). This technique is based on extensive consulting case studies for helping companies successfully implement strategies and bridge the gap between *what* (to do) and *how* (to do it) which Newport considers crucial in executing business strategies as well as in executing his “deep work” technique. It has already been explained what deep work is, now it will be explained how to execute it.

**Helpful in:** prioritization; decision-making; reducing decision-paralysis and getting things done.

**How it works:** The principles can be seen in the Table 14 below.

Table 14 The 4 Disciplines of Execution (4DX)

<b>Discipline</b>	<b>Focus</b>	<b>What it is</b>
<b>1. Focus on the Wildly Important</b>	Key activities identification	What MUST be done
<b>2. Act on the Lead Measures</b>	Sub-activities and measurement	20% of <i>activities</i> produce 80% of <i>results</i>
<b>3. Keep a Compelling Scoreboard</b>	Motivation	Competitive environment
<b>4. Create a Cadence of Accountability</b>	Accountability	Performance mng

Source: Own creation based on Newport, 2016, p. 170 – 176

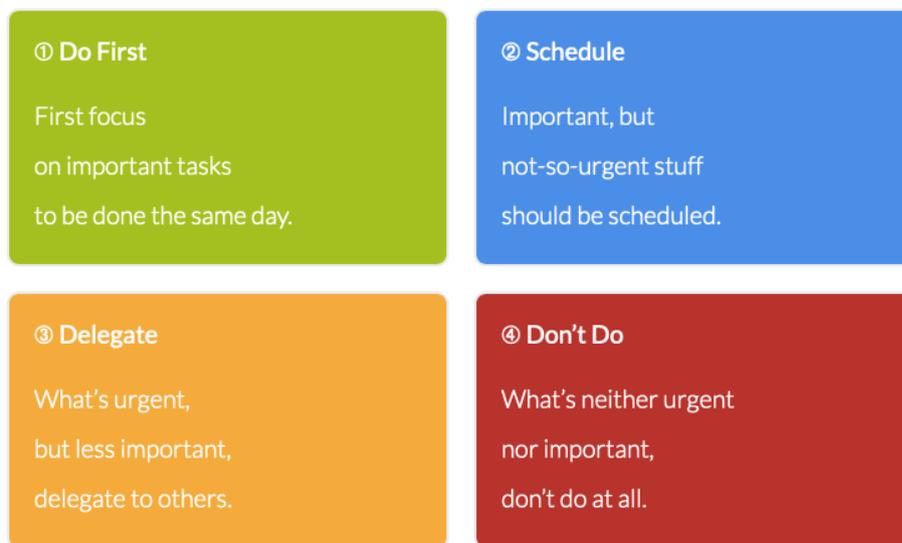
The first discipline implies, in the words of the authors “*The more you try to do, the less you actually accomplish*” (Newport, 2016, p. 171 citing the authors of “The 4 Disciplines of Execution”). Therefore, the focus should be just on small number of *wildly important goals*. For example, let’s say write a thesis in 6 months (around 100 pages). The second discipline uses *lag* measures and *lead* measures. For the case of writing a thesis lead measure is a number of hours spent in deep work while writing a thesis e.g. 6 hours a week. The lag measure describes the output of your work e.g. 4 pages per week. The third discipline is about keeping the score because everybody plays differently when the score is being kept. In an organization, a scoreboard is put in a public place when it cannot be ignored so everybody can see what the record and track of the lead measure is. In case of the thesis, it should be a visible tracking system placed in the workplace of the hours spent in deep work. Last discipline means accountability. In an organization it means regular and frequent meetings to check on the progress with the organizational team. In the thesis example, it means regular, e.g. weekly check-ups on keeping on track, identify bad weeks so work could be improved in the next weeks.

**Why it works:** Because it guides the user to actually execute the work, based on the fact that figuring out *how to execute* is actually more difficult than figuring out *what to execute*. In the thesis example, you know what you have to do – write a thesis but how to write is the actual challenge. The method is also based on hundreds of business case studies. Therefore, the intention of the authors really was to isolate evidence-based disciplines that worked the best. It also has a sub-tone of familiar Eisenhower decision matrix (Figure 21). Also, Pareto’s 80/20 rules is directly involved in the Act on the Lead Measure discipline.

**Source:** Newport, 2016, p. 169 – 177

Eisenhower Decision Matrix (Figure 21) is an easy, not very sophisticated but can be useful tool in quick decision-making and prioritizing developed by general and later American president Eisenhower. To think and decide quickly, under pressure, risk or in lack of time.

Figure 21 Eisenhower Decision Matrix



Source: Eisenhower.me 2017

## 5.5 What technique not to use - Multitasking

Everybody has heard about multitasking, some say it is privileged ability of women, some swear on it as an effective way of handling tasks. However, researches have made it clear by various experiments, that multitasking is not an effective type of working. Yet still, many companies demand multitasking in various job offers. Based on this evidence we might want to cross it out from our dictionary forever.

**How it does not work:** The brain is unable to do two similar things simultaneously because the tasks compete for the same neurons, so when switching to new task the brain is still working on the previous one. Also switching between tasks cannot be done instantly, it requires minimally 300 milliseconds pause, called the "processing gap" which can make multitasking activities, such as talking on the phone while driving, potentially lethal (Carter, et. al, 2019, p. 168). Multitasking can be beneficial at some cases when using it as a way to relax and get some easy tasks done (such as listening to music while whipping out the floor), but not to focus, learn or get complex, higher-order tasks done.

**Why it does not work:** As the expert on learning Barbara Oakley 2014, p. 180 aptly puts it *"Multitasking means that you are not able to make full, rich connections in your thinking, because the part of your brain that helps make connections is constantly being pulled away before neural connections can be firmed up."* Meaning that you are actually making it more difficult for yourself when multitasking. Also, it has been found out that students who multitask have constantly lower grades than those who do not. But most disturbing are claims of Clifford Nass's, a Stanford professor of communication, findings who has found out that constant attention switching online has a lasting negative affect on our brain which get wired to on-demand distraction: *"People who multitask all the time can't filter out irrelevancy. They can't manage a working memory. They're chronically distracted"* (Newport, 2016, p.198).

**Source:** Carter, et. al, 2019, p. 168; Oakley 2014, p. 179 – 180; Newport, 2016, p. 198

To conclude, this chapter offered well-selected, experts recommended, practical tools, supporting the direct and indirect building of critical thinking and related disciplines, corresponding to the objective b) which aim was: to offer the reader practical tools recommended by the acknowledged experts in the field of critical thinking and related disciplines. Also, various tools suitable for both individual and business use were suggested to support the aim of the thesis. The following chapter will explain the methodology used throughout both theoretical and practical part of the thesis.

## 6 Methodology

*"Methodology should not be a fixed track to a fixed destination but a conversation about everything that could be made of happen." - J.C. Jones, an author*

This chapter will review the methodological procedure of the research and design construction of the thesis. The methodology formulation can be simplified to following illustrative framework:

1. Ideas generating
2. Internet screening, database and abstracts screening
3. Mind mapping
4. Idea formulating
5. Framing of the aim and objectives
6. Forming of methodology
7. Specific literature gathering – inclusion, exclusion

The author has decided to use a systematic qualitative secondary research for the thesis to review and synthesise relevant literature corresponding with the thesis's aim and objectives written to the date. The literature used within the thesis is subject of purposive sampling, deliberately selected data most relevant to the research aim and objectives. The master's thesis was divided into two main parts: theoretical and practical. The source for the theoretical part was professional literature formed predominantly by academic journals, books and reports, secondarily of trustworthy and well-referenced webpages, online magazines or essays, relevant to each chapter. The secondary sources were used only when were directly related to the aim and objectives of the thesis and identified as reliable. The literature sources involved in this thesis were subject of Eligibility Criteria (Table 15) and Inclusion Criteria (Table 16) detailly described in the tables below, containing one of the keywords or a combination.

The practical part was based on the main idea of bringing practical perspective and useful tools that served as a natural output for applying presented thoughts in the theoretical part. They were mainly acquired by so-called snowball technique from the professional literature relevant to the thesis topic and mentioned in the practical part, thus preserving the academic relevance. Both Eligibility and Inclusion criteria were inspired by advice from Khan et al. 2003 'Five steps to conducting a systematic review',

Yin 2011 'Qualitative Research from Start to Finish' and Day and Gastel 2011 'How to write and publish scientific paper.'

Table 15 Eligibility Criteria: Assessment Schematic

<b>CRITERIA</b>	<b>INTERPRETATION</b>
<b>Authenticity: Limiting bias</b>	The publication must be authentic, well referenced to limit bias and invalidity.
<b>Author(s) credibility and trustworthiness</b>	Author(s) of the publication must be qualified or respected within the professional/academic/scientific sphere. The author uses formal, academic, field-specific language. Uses precision, backing of arguments and upholds criteria used in a valid research.
<b>Content: High level of intertextuality, stability and continuity</b>	The work is considering/analysing work of others - previously conducted research, putting own findings into context of the field knowledge, making citations to before conducted studies, demonstrating the field orientation and knowledge.
<b>Language, discourse</b>	The publication is written in English or Czech language, type of discourse is academic/professional literature style, using field-specific vocabulary.
<b>Publication eligibility</b>	Primarily books, journals, reports, secondarily online magazines, webpages or essays upholding the criteria
<b>Relevance</b>	The study included must be relevant to the thesis aim or/and objectives, must critically review, discuss or reflect upon the notion of critical thinking.
<b>Keywords</b>	Critical thinking, decision-making, decision-paralysis, 21 <sup>st</sup> century innovation.

Source: Author's own creation

Table 16 Inclusion Criteria

<b>CRITERIA</b>	<b>INCLUSION</b>	<b>EXCLUSION</b>
<b>Author(s)</b>	Academic background, acknowledged professional, trusted institutions	Non-academic background, untrustworthy authors and institutions
<b>Purpose</b>	To educate, inform, understand, generate knowledge	To entertain, sell, promote, persuade, manipulate
<b>Facts, evidence</b>	Presented and verifiable	Very limited, not presented, unverifiable
<b>Discourse</b>	Neutral and formal	Emotional, misleading
<b>Publication</b>	Books, journals, reports, trustworthy webpages	Grey literature (e-mails, internal reports, thesis, untrustworthy web pages, etc.)
<b>Year</b>	1990 <sup>12</sup> and younger	Older than 1990
<b>Language</b>	Czech, English	Other languages
<b>Referencing, citation</b>	Broad, academic	Narrow or very limited
<b>Argumentation</b>	Presented (e.g. contra-arguments, discussion, recommendations)	None or very limited / unreliable

Source: Author's own creation

To conclude, the research and subsequently designed methodology involving eligibility criteria and inclusion criteria served as a guide for choosing relevant publications for the thesis, helping to eliminate bias, increase objectivity and accomplish the thesis goal and objectives.

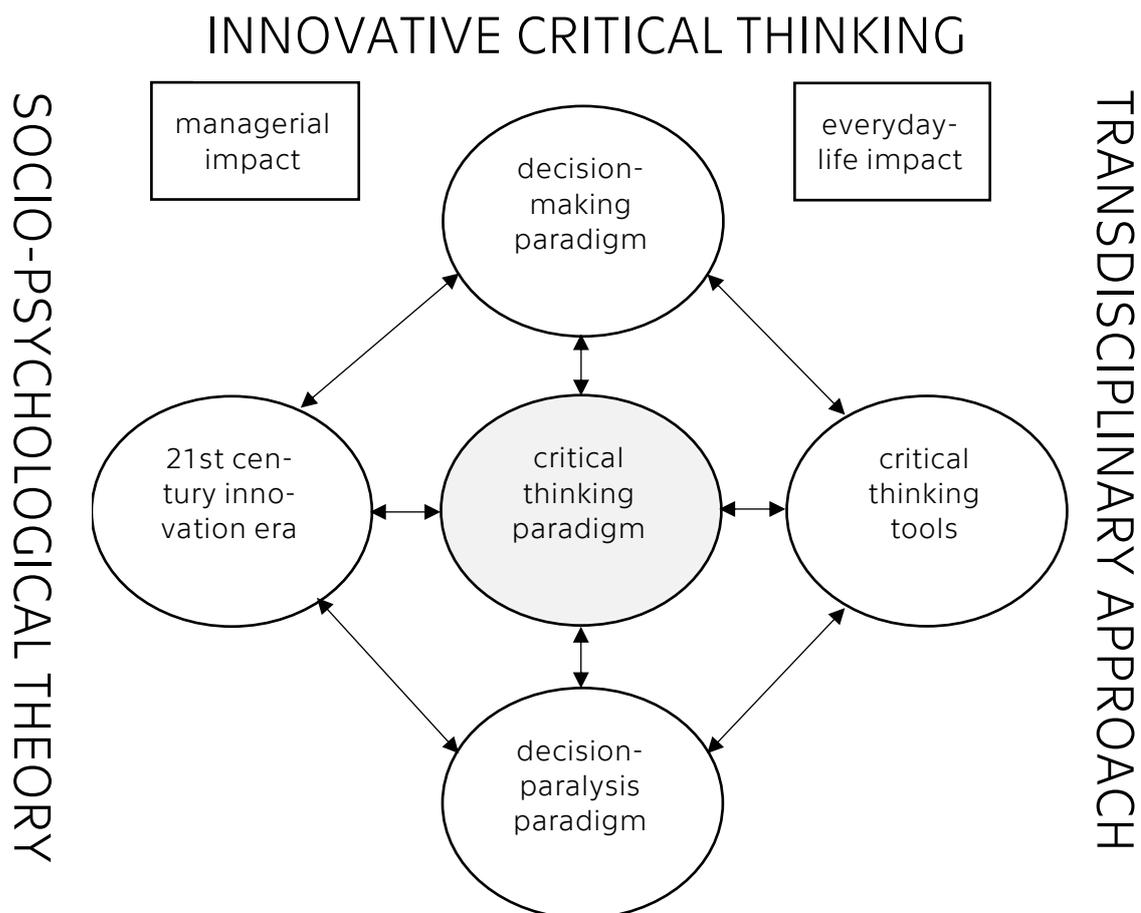
<sup>12</sup> The year of 1990 was selected in order to include the most up-to-date publications as possible, relevant to the topic, assuming that other authors will also present synthesized knowledge of older researches.

## 7 Findings and recommendations

This chapter will present findings from both theoretical and practical part of the thesis as well as specific recommendations, elaborating one new way of how critical thinking can be perceived. Throughout this chapter, a comprehensive clarification of the critical thinking paradigm will be gradually built up. As objectives a) and b) were already fulfilled in the theoretical and practical part, the last objective c) will be introduced in this chapter.

In the lights of elaborated research presented in the practical and theoretical part, the author presents following assumptions about the paradigm of innovative critical thinking, which corresponds to the objective c) to propose an understandable framework of innovative critical thinking (corresponding to the findings chapter, connecting both theoretical and practical part).

Figure 22 The theoretical framework of innovative critical thinking



Source: author's own creation

The theoretical framework (Figure 22) corresponds to the objective c), it visualizes main concepts and paradigms introduced in the thesis and creates a coherent theoretical framework model of innovative critical thinking, a unique way in which was the critical thinking described in the thesis. The paradigms and chapters of critical thinking, decision-making, decision-paralysis and 21<sup>st</sup> century innovation era were used to enlighten the central topic, critical thinking, in the theoretical part. Subsequently, practical part of the thesis was elaborated, consisting of the 'Practical tools' chapter and various subchapters, based on the field experts' recommendations to provide the reader with both direct and indirect tools for critical thinking development. Both managerial and everyday life potential impact was fostered throughout the thesis in order to fulfil the central aim of usefulness to a wide field of users of not only academic sphere. The literature meta-analysis showed as most suitable to use reliable sources of socio-psychology theory centred at the subject concerning the fields of behaviour economy and psychology, simultaneously with a transdisciplinary approach to enlighten a concept of critical thinking which can be universally applied, transcending disciplines. Therefore, the twofold-way of readers impact concerning the individual (everyday life) as well as business perspective (managerial impact) was fostered, thus also the use of managerial literature (especially in the 21<sup>st</sup> century innovation era chapter). This was all done in order to create a combination of upper mentioned concepts and related fields of critical thinking which altogether enable to draw a less abstract, yet universal picture of the critical thinking.

To further elaborate the findings and recommendations of the thesis, some problems were detected when striving to enlighten the paradigm of critical thinking. The first problem with defining critical thinking was discovered through the practical meta-analysis of the paradigm. The concept of CT has been mystified among the general public. Meaning that generally, people are having trouble to understand what CT really is. Daily literature (regular websites, online magazines or self-help books) authors systematically confuse CT for just reasoning or just argumentation, missing out the complete picture and thus mystifying the audience, as is also the case at some authorities which do not know how to define the concept properly. As have been demonstrated in the thesis, critical thinking has its intellectual roots in the Socratic inquiry and Ancient Greece, not by accident. The core components of critical thinking, skillset and mindset are truly vital in its understanding. Because critical thinking is not just reasoning, not just making inferences that serve to just problem-solving or

decision-making rather it is a comprehensive framework composed of complexed elements and also complex in its application, thus, referred to as higher-order thinking type. Furthermore, the author's assumption is that most of the misconceptions around critical thinking have been created primarily, in the vague definition of it, also because various authors do not make sufficient distinction between the universal and domain-specific CT. Therefore, the use of academic literature, where the synthesized consensus of leading specialists crystalizes the important findings about CT. Secondly, CT was mystified in its application. Meaning the shift from the universal to domain-specific CT, which particularly is the case of the failure to teach critical thinking on a large-scale at educational institutions.

That is why the author developed a unique way of addressing the conceptualization and defining most important findings about CT in the context of the 21<sup>st</sup> century to reduce the highly exaggerated abstractness and encryptedness that have been put on the back of critical thinking paradigm. Simply said, an unnecessary difficulty has been created around the CT paradigm. However, this does not have to be the case. There are existing well-elaborated theories and practices, which have been presented throughout the thesis that should be more accessible and widely accepted in academic, professional as well as daily life. Following recommendations will further clarify and summarize the most important findings throughout the thesis and suggest a possible way of seeing the CT concept:

**Problem definition:** Mystification of the CT from various reasons has been detected. Specifically, due to the CT complexity, abstractness, encryptedness and incomplete definitions which creates a general poor understanding of the CT paradigm.

**Recommendation 1:** Due to the paradigm mystification, based on the thesis research, and correspondingly to the objective c) the author proposed own definition for the universal type of CT, naming it 'innovative critical thinking' for which applies the following. Thus: Innovative critical thinking = purposeful, reasoned and reflective thinking focused on deciding what to believe or do in the context of challenges of the 21<sup>st</sup> century.

**Recommendation 2:** Innovative critical thinking is connected with the paradigms of the modern era challenges, which leads us back to the theoretical framework of the thesis, which shows one way (out of many) how critical thinking can be understood. Thus: Innovative critical thinking = critical thinking + understanding of decision-making paradigm + understanding of decision-paralysis paradigm + understanding of 21<sup>st</sup> century era + using practical tools for the critical thinking application.

**Recommendation 3:** Critical thinking, in its nature should be perceived as domain independent, thus transdisciplinary applicable. Which is a crucial predisposition and assumption about CT. Meaning that CT is a universal principle that can be applied in both professional and daily life. Therefore, it should be made clear, when, in general, talking about critical thinking the universal critical thinking is meant. Thus: general referring to CT = universal, domain-independent thinking.

**Recommendation 4:** Universal critical thinking has specific, core features on which is based, meaning universal skillset and universal mindset (viz chapters 1.2.1 and 1.2.2). Both equally important. Thus: CT = universal skillset and mindset.

**Recommendation 5:** CT should not be thought about as a discipline enclosed in itself. Subjective and domain-specific use matters because it requires additional demands in skillset and mindset. Thus: universal CT  $\neq$  domain-specific CT (universal CT = universal skillset + mindset; domain-specific CT = universal skillset + mindset + domain-specific skillset and mindset). Example: It is unthinkable that a project manager will require the same kind domain-specific CT as an artist. This is the crucial distinction. Both professions will require the universal CT and domain-specific skillset and mindset with different weights of importance.

**Recommendation 6:** The application of CT, when adequately used and well-defined, is truly universal, meaning it has wide application in both daily and professional decision-making and problem-solving. Involving application in both micro and macro decisions. However, crucial is the explicit explanation of CT principles, application to real ill-defined problems and both direct and indirect development to build knowledge in various areas, enable transferability of CT across disciplines and finally, see or measure the improvement. Thus: CT building = explicit principles + direct and indirect techniques + learning on real, ill-structured problems.

**Recommendation 7:** A summary of the most important findings in decision-making chapter is proposed as following. Thus: Well informed decision making = understanding System 1 and System 2 thinking + detecting bias and regulating hard-wired ancient instincts + understanding the basics of decisions processes under uncertainty and risk, concerning both micro and macro.

**Recommendation 8:** A summary of the most important findings in decision-paralysis chapter is proposed as following. Thus: Decision-paralysis regulation = limiting the overwhelming abundance of choices + minimizing procrastination + managing choices and well-being through the criterion of purpose.

**Recommendation 9:** A summary of the most important findings in 21st century innovation era chapter is proposed as following. Thus: Importance of critical thinking in the 21st century innovation era = recognizing fake news, misconceptions and falsehoods + maintaining competitiveness in the age of automatization + rapidly reacting to skills and job shift by effective learning and understanding of many concepts and causes.

**Recommendation 10:** A summary of the most important findings in the practical tools chapter. Thus: Practical tools = direct and indirect tools for CT building + application of CT to learning, problem solving, decision making or decision-paralysis situations.

This chapter coherently summarized findings from previous chapters as well as presented new ones which aroused from the overall combination of the theoretical and practical part. Ultimately, the most important findings of the thesis were presented in the form of concise recommendations. The next chapter will briefly summarize the aim, accomplishments of the thesis and provide a complete conclusion.

## 8 Conclusion

Overall, the thesis aimed to enlighten the most important findings in the area of critical thinking using scientific studies, professional literature and practical meta-analysis of this paradigm, to a wide field of readers of not only academic sphere. This was achieved through the theoretical and practical part of this thesis creating the unique conception of combining critical thinking, decision-making, decision-paralysis, innovation and 21<sup>st</sup> century innovation era paradigms as well as recommending practical tools for both direct and indirect building of critical thinking. The variety of important concepts how to work to and what to be aware of when building critical thinking were defined and presented in the thesis, including the reasons why is critical thinking one of the most desired skill. The whole structure of the thesis had its systematic nature where the individual chapters and subchapters were organized to gradually uncover a comprehensive picture of critical thinking, using evidence-based literature based on socio-psychology theory and transdisciplinary approach. Two-fold way of using this thesis either in guiding individual critical thinking (everyday life) or business, organizational (managerial) impact was fostered throughout the thesis. Therefore, the aim as well as objectives of the thesis were fulfilled, as summarized in the findings chapter.

To finish, it is important to mention that this thesis was an attempt of critical thinking application on specific paradigms. Also, it was not the purpose, to offer one correct solution how critical thinking should be perceived and defined. But rather suggest one way of enlightening and clarifying the concept due to its lay mystification by offering a comprehensive publication with well-selected resources and quality information that can be used transdisciplinary.

Ultimately, the author's overall presentation of critical thinking in this thesis was designed in the manner to evoke in the reader a strive for a life-long learning supposing cultivation of its core universal components, the skillset and mindset, producing a profile of an independent, educated thinker of the 21<sup>st</sup> century. Critical thinking is and should be perceived as a process of so important life-long learning and education, not something we are given, nor something we can learn in days or hours. I would, therefore, conclude with Nelson Mandela quote:

*"Education is the great engine of personal development. It is through education that the daughter of a peasant can become a doctor, that the son of a mineworker can become the head of the mine, that the child of a farmworker can become the president of a great nation. It is what we make out of what we have, not what we are given, that separates one person from another.*

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