



Rise of Intellectual Workers and Intellectual Work

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This paper seeks to answer the questions What is human intelligence? How does human intellect evolve? How does intellectual worker differ from knowledge worker? How does intellectual work differ from knowledge work? As a synthesis of the literature review, the ‘rise of human intellect’ framework is presented. The novelty of the paper is in proposing to change the ‘knowledge worker’ and ‘knowledge work’ concepts introduced by Peter Drucker in the 1950s to ‘intellectual worker’ and ‘intellectual work’ because they seem to be more appropriate terms with the move from the knowledge economy to the creative and mind economy.

Keywords: creative and mind economy, human intelligence, intellectual worker, intellectual work, knowledge and knowing

Introduction

This viewpoint paper is motivated by the recent enormous interest in developing machine intelligence to replicate human intelligence (HI). Is artificial intelligence (AI) a threat or opportunity for humans? Will AI replace HI? Can AI make ethical decisions? The importance of these questions is demonstrated by the largest single donation of GBP 150 million from Mr Schwarzman to Oxford University in June 2019. The purpose is to establish a new institute to study the ethics of AI. Mr Schwarzman raised important questions ‘Why are we here? What are our values? How does technology deal and interact with that?’ He also said that it was ‘important for people to remember what being human is’ (Jeffreys, 2019). This paper focuses on what human intellect is and how it is evolving.

This paper is further motivated by another, more general, emerging trend, namely by the continuing integration of natural sciences (i.e., mathematics, statistics, chemistry, physics, biology, bioengineering, bionics, engineering, robotics, etc.) and social sciences (i.e., history, anthropology, philosophy, sociology, psychology, economics, education, management, leadership, etc.). Boutellier et al. (2011, p. 2) write that natural sciences seek to discover the laws that rule the world, and they focus on ‘the natural and not on the social world.’ They refer to Ledoux (2002, p. 34) who defines natural sciences as ‘disciplines that deal *only* with natural events’ (emphasis added). The author of this paper, however, disagrees with this definition

because natural sciences are increasingly turning towards understanding human beings in the social world in order to create humanoid robots and to replace parts of human work. Further, Boutellier et al. (2011, pp. 3–4) argue that the difference between natural and social sciences lies in their subject of study. According to them, social sciences focus on individuals, groups, society, social interactions and coexistence. The author of this paper argues that social sciences has started to move toward subjects typical for natural sciences, i.e. to explore how AI can replicate the features of HI. In brief, social sciences focus on what it means to be human, on understanding HI, on finding out *what* features of HI can be imitated and replicated by AI. Natural sciences on the other hand, nowadays increasingly focus on *how* to imitate and replicate features of HI by AI. To conclude, the author of this paper argues that in the creative economy, the subject of study (i.e., HI) in natural and social sciences is converging, which makes the topic of this paper interesting, contemporary and needed.

Additionally, there is a need for this paper because of the proliferation of AI. It seems paradoxical that people design AI without knowing precisely what HI is. 'AI systems have yet to demonstrate the kind of flexible intelligence that enables humans to reason, plan, and act in many different domains' (Strickland, 2019, p. 4). Flexibility of human reasoning is underlined by McAfee and Brynjolfsson (2017, p. 71), arguing that 'the cognitive work that we humans do to navigate so easily through so many thickets of rules is an ongoing demonstration of Polanyi's Paradox, the strange phenomenon that we know more than we can tell.' Similarly, this paradox is expressed in the Oxford Economics publication (2019), where on the one hand Mr Cooper (p. 3) sustains that AI and the robotics revolution 'will transform the capabilities of robots and their ability to take over tasks once carried out by humans.' On the other hand, the report (p. 7) admits that 'it will be difficult for machines to replace humans in service sector occupations that demand compassion, creativity, and social intelligence.' Compassion, empathy, emotional intelligence, and creativity are ingenious human qualities that will be difficult to perform even by AI-enhanced robots. Therefore, this paper seeks to explore contemporary questions: What is human intelligence? How does human intellect evolve? How does intellectual worker differ from knowledge worker? How does intellectual work differ from knowledge work?

The paper has five sections. The introduction establishes why the topic is interesting, contemporary and needed. The literature review discusses points and counter-points related to HI. Next, the proposed model of 'rise of human intellect' is presented. Section four argues why the intellectual worker and work concepts should replace the knowledge worker and work concepts in the creative and mind economy. Here, also the differences between intellectual worker and knowledge worker and between intellectual

work and knowledge work are distinguished. Finally, the limitations and novelty contributions of the paper are discussed.

What is Human Intelligence and How Does It Evolve?

In the fourth industrial revolution (Schwab, 2016), in the age of digitalisation and computerisation, robots, AI, Internet of Things (IoT), smart phones, smart cars, smart clothes, smart watches are complementing and helping human life and work. They are integral parts of our lives and everyday practices. Even if it is unimaginable to live without technology, the human intellect, HI, human knowledge, human creativity, human-to-human interactions, social intelligence (Albrecht, 2006; Goleman, 2006) and emotional intelligence (Goleman, 1996) have started to play an exceedingly important role in the creative economy.

In the creative economy, skills related to HI will be in high demand. According to the *The Future of Jobs Report 2018* (World Economic Forum, 2018, p. 12), in 2022 the top ten most demanded skills will be analytical thinking and innovation, active learning and learning strategies, creativity, originality and initiative, technology design and programming, critical thinking and analysis, complex problem-solving, leadership and social influence, emotional intelligence, reasoning, problem-solving and ideation, and systems analysis and evaluation. This list of future skills also demonstrates that skills are needed from both the natural and social sciences. Similarly, based on research from LinkedIn Learning (Charlton, 2019), the most demanded soft skills will be creativity, persuasion, collaboration, adaptability, and time management; and the most demanded hard skills will be cloud computing, artificial intelligence, analytical reasoning, people management, and user experience (UX) design. In brief, HI requires different, soft and hard skills in order to operate successfully.

Human intelligence is multi-dimensional. Gardner (2006) argues that multiple intelligences exist simultaneously. He outlines the five complementary dimensions of mind such as disciplined, synthesising, creating, respectful, and ethical minds. He emphasises the role and responsibility of education in cultivating all five kinds of minds because none of them is superior to the other. 'The five kinds of minds can and should work synergistically' (Gardner, 2008, p. 166). Gardner's theory about the multiple features of the mind is similar to Edward de Bono's concept presented in his classical book, 'Six Thinking Hats' (2000). De Bono assigns colours to different types of thinking such as white – neutral and objective, red – emotional, black – cautious, careful, yellow – sunny, positive, green – creativity and new ideas, and blue – control and organisation. His goals are 'to simplify thinking by allowing the thinker to deal with one thing at the same time' and 'to allow a *switch* in thinking' (de Bono, 2000, p. 176).

Lateral thinking (de Bono, 1990) is about how to use the mind to handle information, to generate new ideas, to look for new and creative ways of thinking. 'Lateral thinking develops as an attitude of mind' (p. 12). The role of lateral thinking increases when innovation is the driver in the mind economy. He asks an important question 'What is a beautiful mind?' (de Bono, 2004). 'The beautiful mind [...] is a mind that can be appreciated by others [...] usually through conversation' (p. 2). The beautiful mind best shows in our relationship with the social world. In the mind economy, the need for a better understanding of mind, knowledge, knowing, thinking, intellect, and creativity is essential.

Drawing on the theory of multiple intelligences of Gardner, Albrecht (2006, p. 9) identifies six categories of intelligence such as abstract, social, practical, emotional, aesthetic, and kinaesthetic intelligence. Albrecht uses the ASPEAK acronym to help to remember these six intelligences. He also refers to Goleman (1996) who identifies self-awareness, self-regulation, motivation, empathy, and relationships as five dimensions of emotional intelligence. Goleman (1996) in his theory of emotional intelligence strongly builds on Salovey and Mayer (1990) who first identified the five domains of emotional intelligence such as knowing one's emotions, managing emotions, motivating oneself, recognising emotion in others, and handling relationships. Building on both Goleman's and Gardner's theories, Albrecht concludes that the main factors in social intelligence are situational awareness, presence, authenticity, clarity, and empathy. The author of this paper argues that in the mind economy, where the driving force of value creation is creativity and innovation, there is a need for a deeper understanding of HI formation and intellectual work.

How does human intellect evolve? In the fourth industrial revolution, where computerization, AI, and human robotics are essential parts of our lives, there is an even greater need for social connections and social life in developing HI. Hobson (2004) explores how the human mind and thinking develop. His point is that the mind develops through social and emotional engagement with each other. Hobson (2004, p. xv) even argues that, 'If computers want to think, they had better get a social life.' Furthermore, Hobson (2004, pp. 107–108, pp. 271–272), with a relatedness triangle model, explains how the social intellect of an infant develops. Figure 1 is a modified model of Hobson's triangle.

Social intellect develops on the one hand during the individual, the 'me' relatedness to the physical world, to 'things' (1), to the place, which directly relates to life. It could be, for example, a person's country, city, district, street, workplace (building, infrastructure, etc.). On the other hand, individuals also relate to 'others,' to their social world (2) such as family members, community, friends, neighbours, fellow citizens, and colleagues

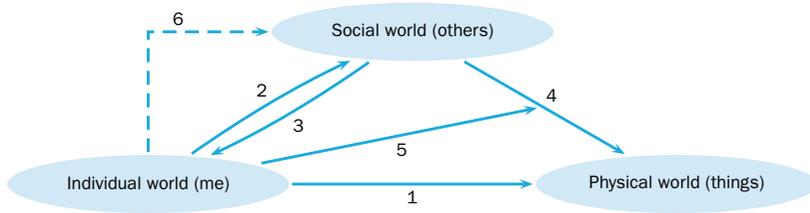


Figure 1 Social Intellect Development Model (adapted from Hobson, 2004, p. 107)

at work. In brief, individuals relate to physical and social worlds at the same time. Therefore, the 'me' has a physical and an emotional engagement. The relationship of the individual to the social world is a two-way relationship because 'others' connect to the individual (3) too. Others have their own relationship to the physical world (4). Individual intellect and thoughts develop when the 'me' experiences and feels how the 'others' relate to 'things' (5), and by internalising, understanding, and by taking others' attitude, the 'me' develops its own attitude and becomes cognitively engaged with the social world (6).

Summing up, on the one hand Hobson (2004) focuses only on the relationships of 'me' to 'others' (i.e., to social world) and to 'things' (i.e., to the physical world) (Figure 1). Both the 'others' and 'things' are external worlds to the individual. What is missing in Hobson's arguments is opening up the internal processes of thoughts, namely the connections 5 and 6 in Figure 1. It is not clear *how* the 'me' understands the 'others' relations to the physical world and *how* the 'me' develops his/her own attitude when cognitively engaging with the social world.

How human thoughts and thinking develop is an eternal problem of philosophy, psychology, sociology, and education. Weed (2003, pp. 166–179) proposes the processes of x and y thinking. She concludes that an x-type thinking process aims to understand and make sense of the direct experience. The direct experiences are experiences in physical and social external worlds (Figure 1). On the other hand, the y-type of thinking process deals with standardising, interrelating, and conceptualising thoughts. This process relates to the internal world, to the sense-making process of a person. Weed focuses on the internal world when discussing the two types of thinking processes and seems to ignore the relationships to the external worlds. Furthermore, the author of this paper does not agree with Weed's saying that 'the x- and y-type thinking processes are [...] *autonomous* of each other [...] the connection between the x- and y-type thinking processes *might* occur' (Weed, 2003, p. 166, emphasis added). Weed admits though that 'Both are needed for human thinking to take place, and *most* cases of human thinking are a mixture of both' (Weed, 2003, p. 165, emphasis

added). However, it could be argued that the x- and y-type of thinking processes cannot be autonomous of each other as they are happening at the same time and place. They must be in unity.

Similarly to Weed, Kahneman (2011, pp. 20–21), drawing on the latest achievements in cognitive and social psychology, presents his view on how the mind works. He uses the terms fast and slow thinking. He identifies fast thinking as *system 1* that ‘operates automatically and quickly, with little or no effort and no sense of voluntary control,’ and slow thinking as *system 2* that ‘allocates attention to the effortful mental activities that demand it, including complex computations. The operations of *system 2* are often associated with the subjective experience of agency, choice, and concentration.’ Importantly, Kahneman, in contrast to Weed, does not separate the two systems of the working mind. He argues that decision-making, and judgments require unity of both systems, i.e., ‘How do I feel about it?’ and ‘How do I think about it?’ (p. 139). His thoughts concur with Goleman (1996, pp. 32, 49), who writes that ‘in a sense, we have two brains, two minds – and two different kinds of intelligence: rational and emotional [. . .] a person has both cognitive and emotional intelligence.’ Moreover, according to Goleman, these are the qualities of emotional intelligence that make us more fully human.

There must be a unity not only between emotional and cognitive intelligence, but also between the external world and internal world when thoughts, social intellect and human thinking develop. Goleman (2006, p. 84) argues that social intelligence, as one aspect of emotional intelligence, has two broad categories, namely ‘social awareness, what we sense about others – and social facility, what we then do with that awareness.’ Primal empathy, attunement, empathic accuracy, social cognition are parts of social awareness. Synchrony, self-presentation, influence, and concern are elements of social facility. Rogers et al. (1992, pp. 297–298) call for more research in this area because ‘little attention has been paid to the way in which individuals interact with external representations or each other when immersed in a cognitive activity’ and there is a need ‘to develop accounts of cognition that are more “situated” in the context in which they occur.’ The author of this paper concurs with these concerns, which she aims to address in this paper.

The unity of the external and internal words when knowledge, knowing and HI arise is illustrated by the ‘becoming to know’ model (Jakubik, 2011a, p. 391, 2011, p. 61). Jakubik argues that her model demonstrates the becoming epistemology that is ‘both an engagement (actions and interactions) with the *real world* in a living present and *making sense* of the experience’ (Jakubik, 2011a, p. 391, emphasis added). The need for this unity corresponds with the thoughts of Spinoza who argued for the unity of mind and

matter and for the unity of external and internal worlds. Spinoza wrote ‘The body cannot determine the mind to thought, neither the mind determine the body to motion [...] the mind and the body are one and the same thing’ (Spinoza, 2001, p. 100). ‘The power of the mind [...] is determined by intelligence alone, we shall determine by the knowledge of the mind alone’ (Spinoza, 2001, p. 229). Durant (1954, p. 187) refers to Spinoza when he writes that ‘The greatest good is the knowledge of the union which the mind has with the whole nature.’ The ‘becoming to know’ model also shows how ontological and epistemological chains link to each other in a specific context and time. Intellect arises when learning and knowing interact during the ‘becoming to know’ process.

There has been an ongoing debate and different views about HI and knowledge ever since Socrates, Plato and Aristotle. Throughout the history of philosophy, different views have developed about what knowledge is and how we know what we know. John Locke (1632–1704) argued that experience and sensation are fundamental in knowing and all human knowledge is based on experience. As a contra argument, Immanuel Kant (1724–1804) maintained that not all knowledge is based on our senses. The mind transforms the sensations to ideas, i.e., transforms ‘perceptual’ knowledge into ‘conceptual’ knowledge. ‘Sensation is unorganized stimulus, conception is organized perception, science is organized knowledge, wisdom is organized life’ (Durant, 1954, p. 271).

The father of dialectical idealism Georg Wilhelm Friedrich Hegel (1770–1831) brought an important contribution to the development of thinking, namely the movement, progression, the interplay of being and becoming. As a counterpoint to Hegel’s philosophy, Arthur Schopenhauer (1788–1869) emphasised the role of will in the development of mind and thinking. He wrote that ‘The will is the only permanent and unchangeable element of mind [...] gives unity to consciousness and holds together all its ideas and thoughts’ (Durant, 1954, p. 313). This concurs with Benedict de Spinoza (2001, pp. 88–89) who writes in *Ethics*, first published in 1677, that ‘the will and the intellect are one and the same.’ Russell (1954) in presenting the French philosopher Henri Bergson’s (1859–1941) thoughts about instinct (i.e., intuition) and intellect concluded that ‘Intellect is the power of seeing things as separate one from another, and matter is that which is separated into distinct things. In reality there are no solid separate solid things, only an *endless stream of becoming*’ (Russell, 1954, p. 822, emphasis added). Spatial intuition plays an important role in both inductive and deductive reasoning. Intellect becomes in a specific place, space and time.

Summing up, the integrative and theoretical literature review of this section illustrates the ongoing interests, discussions, and debates about what HI is, what skills and attributes contribute to HI, how human thinking devel-

ops, and how the human brain works. These discourses of social scientists are especially important nowadays when, with the help of technology and natural sciences, we want to create robots enhanced with AI that can replicate HI. The aim of this critical theoretical literature review and the critical discussion of relevant existing models about HI development was to show the main concepts as building blocks of the proposed framework of this paper. The literature review also establishes the arguments and the needs for a new framework and new insight on HI, which is presented next.

Rise of Human Intellect Framework

This section presents the 'rise of human intellect' framework (Figure 2). This is the main outcome or synthesis of the different points and contra points, different views about the rise of human mind, human thoughts and thinking, social intellect, and knowing in the reviewed literature.

According to Bergson, the beauty of the human intellect development is that it is in a constant flux, it is evolving and becoming during the whole life (Russell, 1954, p. 822). In this process, the interplay between perceptions and judgments is crucial (Goleman, 1996; Kahneman, 2011). The interplay between the external and internal worlds (Goleman, 2006; Jakubik, 2011b) is the driver of the development of something new (e.g., feelings, understanding, attitude, action, and knowledge). How individuals sense their external worlds (physical and social) and develop intuitions about these worlds and then how they make sense of all their perceptions through emotional and cognitive judgments lead to new thinking, new thoughts, and to new knowledge of the intellect. Building on these thoughts the 'rise of human intellect' is presented in Figure 2, which shows the synthesis of these thoughts in a simplified way. There is the conscious and/or unconscious will, and the thoughts and objectives of the individual (i.e., 'me') to engage in the worlds of 'others' and 'things' in a specific time and place. While experiencing the external worlds through learning, actions and interactions, perceptions develop through intuitions and sensations. Simultaneously, the 'me' internalises these perceptions and develops emotional and cognitive judgements. In conclusion, the new knowing, thoughts, knowledge, and intellect of the 'me' are formulated by judgements of perceptions. The idea of becoming is a change from being in a specific time and place and moving to another time and place, to another living moment. That is called 'becoming to know,' when the 'me' becomes a new 'me.' Thoughts and intellect arise this way.

In brief, human thinking and intellect development requires physical, emotional, cognitive, behavioural, and social engagements with *both* the social and the physical world. The rise of human intellect is inseparable from its contexts (i.e., place, space, time). In this mutual interconnectedness,

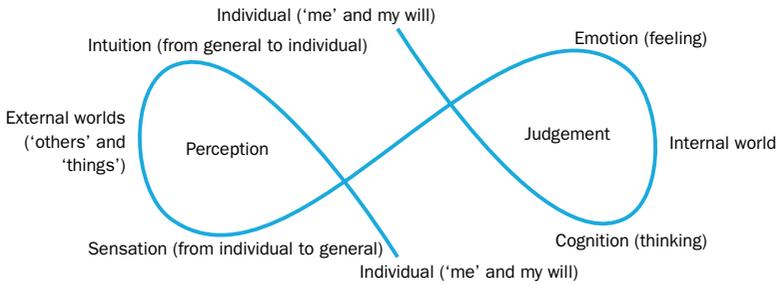


Figure 2 Rise of Human Intellect

the human intellect forms its context, and at the same time it is formed by its context. Human intellect develops in everyday actions and interactions, in work practices. Because of the technological development, the world of work has changed and new ways of working have emerged.

There are studies that aim to understand the new ways of working, their impacts on communication, leadership, and collaboration (Hesse, 2018, pp. 54–78). While digitalisation is transforming businesses and ways of working, there is little attention paid to how it transforms the actors themselves, the human beings, and the human intellect. Sternberg (2018) argues that from research on intelligence the sociocultural aspects are ignored. Therefore, it needs to be explored who the actor (i.e., intellectual worker) is and what the actor does (i.e., intellectual work) in these new contexts of the mind economy. This is the focus of the next section.

Intellectual Workers and Intellectual Work versus Knowledge Workers and Knowledge Work

Already in the 1960s, Peter Drucker (1966, 1969, 2001, 2008) coined the terms ‘knowledge worker’ and ‘knowledge work’ to differentiate them from the physical worker and manual work of the industrial economy. ‘The terms *knowledge industries*, *knowledge work* and *knowledge worker* are nearly fifty years old. [...] Knowledge has become the key resource and the only scarce one.’ Knowledge workers are professionals. ‘The knowledge society is a society of seniors and juniors rather than of bosses and subordinates.’ (Drucker, 2016, p. 38–39) However, this paper argues that, in the creative or mind economy, it would be more appropriate to change these terms to ‘intellectual worker’ and ‘intellectual work.’ The arguments are that human intellect is more than knowledge, intellectual worker is more than knowledge worker, and intellectual work is more than knowledge work.

Table 1 shows the similarities and differences between knowledge workers, knowledge work of the knowledge economy and intellectual workers and intellectual work of the creative and mind economy. In the creative econ-

Table 1 Knowledge versus Intellectual Workers and Knowledge versus Intellectual Work

Questions*	Knowledge workers	Intellectual workers
Who am I?	Knowledge workers identify themselves mainly by their profession (e.g., lawyer, teacher, knowledge technologist). They are professionals and specialists of their fields of knowledge acquired in formal and continuing education.	Intellectual workers identify themselves mainly by their interest in a specific field (e.g., doing art, playing music, doing science, social work).
What are my strengths?	Knowledge workers ask and seek for feedback from others to know their strengths.	They receive feedback, appreciation from others based on what they strengthen in their personal traits.
How do I work?	They prefer to work independently and autonomously with no control and supervision. They seek to solve problems with applying their specialized knowledge. They are result-oriented, they apply substantial theoretical knowledge in their work.	They seek to find big, general, urgent, important problems that matter not only for their organisation but also for the whole community and society (e.g., climate change, wars, social injustice).
Where do I belong?	Belonging to a professional community is more important for knowledge workers than belonging to an organisation. They decide where they want to belong. They are highly mobile.	They want to belong to an organisation, community whose values and ethical principles do not contradict with theirs.
What is my contribution?	They want to contribute quality and quantity by solving tasks assigned to them, by acting upon their knowledge. They thrive for performance and achievements not primarily for money.	The main objective for intellectual workers is to contribute with creative new ideas, innovation to solving problems they perceive significant in physical and social worlds.
What are my relationship responsibilities?	Knowledge workers take the responsibility for their work. They are not subordinates but specialists and associates. They do not need bosses to manage them. They need colleagues who trust them.	Intellectual workers not only take responsibility for their relationships but they are continuously seeking to improve these relationships.
How to plan for the second half of my life?	Knowledge workers think about their future, they are ready to start a new career, to move to another organization, they are 'knowledge nomads,' mobility within their special field is important for them. They care about their own success.	Intellectual workers think about finding joy, happiness, and satisfaction in their own work and at the same time, they help others to flourish and succeed.

Continued on the next page

omy, value is created through innovation, imagination, new ideas, and new thoughts of intellectual minds. Nevertheless, applying existing knowledge and developing knowing will continue to play important roles in the future.

Table 1 *Continued from the previous page*

Questions*	Knowledge work	Intellectual work
What is my task at work?	Knowledge workers can define and perform the tasks at work.	Intellectual workers not only are able to define for themselves what the task/work is but they have arguments for <i>why</i> the task is important.
How do I manage myself at work?	Knowledge workers are not subordinates. They are specialists, professionals who can manage themselves.	Intellectual workers are able of leading themselves and have an impact on 'others' and 'things' in their work.
Do I have autonomy at work?	Knowledge workers need autonomy and trust to conduct their work, to make their decisions.	Intellectual workers achieve autonomy in their work and make decisions by considering 'others.' They want others to follow them for what values they have and for what they did for others.
Do I continuously innovate in my job?	They aim to continuously innovate in their work, find solutions for the problems.	Creativity and innovation are their everyday practices.
Do I learn and teach continuously?	Continuous learning and teaching have to be built into their job. It is not training but learning that drives them.	They continuously learn, develop themselves, and care about others' learning.
Do I contribute not only quantity but quality as well in my work?	They are accountable firstly for quality and then for quantity contributions. They want to demonstrate their own contributions to the organisation.	They consider ethical values, quality, and quantity in their work contributions. They thrive in sharing their expertise with others.
Does my organisation treat me as an asset rather than a cost?	Knowledge workers are loyal not to their organisations but to their knowledge area.	Intellectual workers look for joy and happiness in their work, they are loyal to their profession and field of expertise.

Notes * Proposed by Drucker (2001, pp. 131–159, 2008).

Additionally, there will be a great need for emotional and social intelligence (Albrecht, 2006; Goleman, 1996, 2006; Sternberg, 2018) that will promote the move from knowledge toward wisdom. Indeed, there is a need to move away from a more egocentric ('me') view toward an altrocentric ('others') perspective in feeling, thinking and in behaving. For intellectual workers it is important that they contribute to making the world a better place for all.

Both knowledge and intellectual workers have strong intrinsic motivation. Knowledge workers seek not only financial recognition but also appreciation at work. Knowledge workers apply their theoretical knowledge at work. Intellectual work is hard work, and as a continuous struggle it is an attitude. It will not necessarily lead to fast success and appreciation. Therefore, intel-

lectual workers need more persistence, determination, patience, and support from others. They need to be fully (i.e., emotionally, mentally, socially and physically) engaged in what they do.

Conclusion

This paper aims to address important questions about the creative and mind economy, such as: 'What is human intelligence? How does human intellect evolve? How does intellectual worker differ from knowledge worker? How does intellectual work differ from knowledge work?' By examining the arguments and counter-arguments about human mind, thoughts, thinking, knowing and intellect development in the literature, the 'rise of human intellect' framework (Figure 2) is created. This framework shows, in a synthesised form, the interplay of the physical ('things') and social ('others'), external and internal worlds of the individual ('me') in a living moment and place. It also demonstrates how the perceptions develop through intuition and sensation, how these perceptions are judged emotionally and cognitively (i.e., system 1 and system 2, cf. Kahneman, 2011), and how they become integral parts of the individual intellect. Human intellect formation is a continuous movement from states of being to becoming (Russell, 1954). The author of this paper concurs with McAfee and Brynjolfsson (2017, p. 120) who argue that 'for a long, long time to come, people will still have a large role to play in creative work, even as technology races ahead.' They further argue that being creative 'requires that the creator be living in that world, and computers are not "living" in ours in any real sense of the word.' The proposed framework of this paper therefore facilitates a more enlightened understanding of HI development.

Answers to questions How does intellectual worker differ from knowledge worker? How does intellectual work differ from knowledge work? are presented in Table 1. Moreover, the paper argues that, in the creative and mind economy, it would be more appropriate to use the concepts of 'intellectual worker' and 'intellectual work' rather than knowledge worker and knowledge work that were appropriate in the knowledge economy (Drucker, 2001, 2008).

Main limitations of this paper are that it explores only a limited range of literature and that human intellect is approached here from one, mainly social sciences' perspective. These limitations, however, offer areas for further research. The rise of intellect needs to be explored more from the educational, sociological, and other social science viewpoints, as well as from the natural sciences' perspectives. Strickland (2019, p. 4) argues that 'everybody thinks that [...] AI will transform society from top to bottom – yet no one knows when AI agents will be smart enough to really shake things up.' As further research, it would be an interesting topic to research

the conditions of joy, happiness and pleasure from intellectual work and to study the wellbeing of intellectual workers.

Creative, intellectual work gives moments of satisfaction when feelings and thoughts are united. How to be happy and intelligent, and how to be happy through intelligence are concepts not easy to determine, but are linked with the outcome of hard work, the continuous struggle to achieve a goal or vision. It could be argued whether the vision and goal are fixed or move during the intellectual journey, yet they do emerge along the way. Bertrand Russell (1954) provides the following analogy for the process of intellectual work when he writes that ‘first walking all over the mountain in a mist, until every path ridge and valley is separately familiar, and then, from a distance, seeing the mountain whole and clear in bright sunshine’ (Russell, 1954, p. 145).

Regardless of its limitations, this paper offers a new, original framework for a better understanding of the ‘rise of human intellect’ (Figure 2). It has also novel suggestions (Table 1) for using the concepts of *intellectual worker* and *intellectual work* that seem to be more appropriate in the creative and mind economy than the *knowledge worker* and *knowledge work* of the knowledge economy. Although this paper may be imperfect, in Durant’s words, ‘we may be forgiven if we advanced the matter a little, and have done our best’ (1954, p. xv).

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