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AI IP EI Trilogy: A Human Challenge, and an Innovation Opportunity within Frugal Dimensions; Illustrated with Sport, a Driving Creative Force and Moderating Sounding Board

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Abstract

"Without emotions, intelligence remains artificial", Grannec (2023). Do humans deserve better than that? Emotions are central to creativity and IP recognition. The school play area is the nest for emotional personality development. Let's add another game to the enhancement hall. The rather massive utilization of AI for extended purposes raises concerns and surfaces opportunities with regard to the AI IP EI trilogy, such as depicted in AI IP EI 1st volume; Rebouillat *et al.* (2020). "An opportunity for new forms of creative expression" (Tang, 2024). "The emotional and creative component that is what the IP law is meant to protect" (Cisneros, 2024). New regulations may further help. A safe human centric ethical approach to AI is the due fair reward. Let's try to further evaluate that assumption over time. Thanks to three documents covering a period of about 30 years where AI further materialized as a massive game changer. In 1991 was already underlined, Bogsch (1991) stated that: "The protection of intellectual property has been established with human creations in mind and that, with the advent of artificial intelligence, the possibility of "artificial creation" is emerging. "It is pertinent at this stage to compare data from 1991 with those of 2024. The related comparison reveals that at this point, "Intellectual property issues arising from AI may be spotted in each of the three fields of **copyrightability, ownership attribution** and **infringement**." Apart from the massive growth of data and algorithms recently subjected to AI processing, the three fields outlined, are still valid focuses in 2024. More developments along that path shed light on that persisting opportunity for improvement, including inventions and AI IP EI Trilogy Scientific ap-

proach. A Sport-related short essay describes, and scrutinizes the relevance of the above. Practical theory seems consistent with a massive economic balance and a fascinating human ongoing accomplishment ahead. A substantial preliminary study breaks the ground to build a promising "devenir" to a regulated AI twinned with an ethical EA, Emotions Achievement, with sufficient background awareness. All along, the emphasis is here strictly on educational, illustrative and demonstrative value avoiding legal hindering jargon and non-intentional ramifications therewith.

Keywords

Frontier Technologies, AI, Intellectual Property, IP, Emotional Intelligence, EI, Ethics, Open Innovation, Frugal, Bias, Innovation, Collaborative, Collaboratory™, Adjacent Technology Analysis, ATA©, Biotechnology, Advanced Materials, Green Chemistry, 4C2©, IoT, FRAND, Best Mode Requirements, Sui Generis, Achievement Emotions, AE, Sport, Education, Copyrightability, Ownership Attribution, Infringement, @LEAST©, Serendipity

1. Short Introduction Preamble

A quote also makes it easier to introduce the subject: "Similarly, Rebouillat *et al.* (2020) [1] introduce the concept of the AI-IP-EI trilogy, suggesting that the integration of artificial intelligence, AI, intellectual property IP, and emotional intelligence EI opens new dimensions for innovation, particularly in knowledge-intensive industries;" and SME [2]. From the book and chapter therewith: "Humanizing Technology with Emotional Intelligence", and the chapter-24 title: "Future of Emotional Intelligence in Technology: Trends and Innovations" by S. Chundru and P. Whig [2]. This is also the aim of the present work, a continuation of the article "New Trilogy AI-IP-EI…" [1].

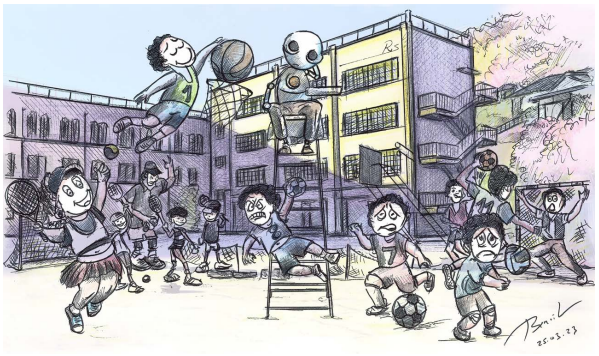
A further coincidence leads the way more precisely. Perfect Match: additionally, a **Perfect Match**: "sans émotions, l'intelligence reste artificielle" (*i.e.* "without emotions, intelligence remains artificial". From the book and banner [3]. "Audedans", "Sans émotions, l'intelligence reste artificielle". Grannec, Yannick. Edited by ANNE CARRIERE, 2023 ISBN 10: 238082309X.

2. Emotions Are Central to Creativity and IP Recognition

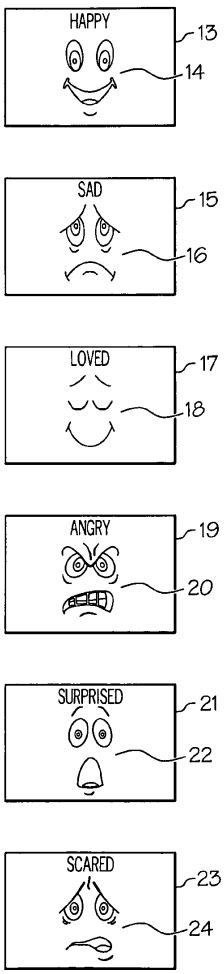
The school play area is the nest for emotional personality development with engraved significant ever remembering situations of most children.

Figure 1(a) illustrates a virtual playground with children of different ages and genders improvising a "creativity" sport session. Obviously the rules and ground usage deviate from standards. Accessories, such as bats, rackets, nets, balls... are quite a few. **Figure 1(b)** drawings, from patent application US20080268408A1 [4], which provides a method to teach emotional awareness to children, are facial ex-

pressions used for emotional identification and educational tool purposes.



(a)



(b)

Figure 1. (a) A virtual playground with children of different ages and genders improvising a "creativity" sport session. (b) Drawings from patent application US20080268408A1 [4] which provides a method to teach emotional awareness to children.

2.1. Not Just a Challenge, but an Opportunity

The rather massive utilization of AI for extended purposes raises concerns and

surfaces opportunities with regard to the AI IP EI trilogy, such as depicted in [1] AI IP EI 1st volume. In terms of the IP dimension, WIPO DG Tang opens the 9th WIPO Conversation [5]: "Training AI (is) not just a challenge, but an opportunity for new forms of creative expression." "This forum is intended to provide a global setting to discuss the impact of frontier technologies on all IP rights. Over the last 5 years, almost 12,000 people have participated in the WIPO Conversation, from 172 countries" [6]. In the tenth WIPO Conversation forum [7]: "AI Outputs: To protect or not to protect—That is the IP Question." Ana Cisneros, IP lawyer, Mexico emphasizes the emotions and creativity at the heart of invention and innovation concluding "**the emotional and creative component that is what the IP law is meant to protect**."

2.2. Really Human? Let's Test over 30 Years?

From different imaginary standpoints… emotions' status may appear as the beach safety flag flying at half-mast to maintain safety awareness. Let's try to further evaluate that assumption over time. Three specific documents are used for this purpose:

- [8] [I] is one proceeding compiled under the reference WIPO PUB 398, following the **1991** international symposium on IP aspects of AI.
- [9] [II] is the practical **1994** book titled "Methods &Tools for Applied AI".
- [10] [III] is the WIPO **2024** Patent Landscape Report related to Generative AI.

Those three documents cover a period of about 30 years where AI further materialized as a massive game changer. Incidentally, let's underline, in document [III], [9] for the sake of transparency: "Other uses of AI will be banned outright in the EU, such as the creation of facial recognition databases or the use of emotion recognition technology in the workplace or schools." Regardless of one's position on the matter. [I] in 1991 the preface, [8] p4 underlines that "The protection of intellectual property has been established with human creations in mind and that, with the advent of artificial intelligence, the possibility of "artificial creation" is emerging.

It is pertinent at this stage to compare data from 1991 with those of 2024 using a basic and rather primitive word count per page of the double open-endings root-human. Document [I] in 1991 with 306 printed pages contains the root-human—310 times, about once per page. Document [III] 2024 with 106 printed pages contains the root-human 57 times, about an 1/2 occurrence per page. Using the root-emotion, two occurrences for [I] and six for [III]. This may delineate some aspects of the human centricity evolution which "trained-in-the-art" can appreciate.

For the sake of completeness, let us note that in [II] the word "human" is combined and indexed as follows:

- human expert,
- human interface,
- human learning process,
- human machine interface,

- human operator,
- human planner,
- human planning,
- human problem solving,
- human window.

No further taxonomy or semantic analysis is necessary at this stage. With some reserve, the test can validate the fact that generative AI is ultimately less human intensive-interactive and possibly more "cautious". Book [II] departs from a textbook to reveal AI as a doubly interactive field involving the engineer and the knowledge expert; ultimately bridging the gap between theoretical AI methods and applied intelligent systems. Given the importance placed on human and the preservation of emotions in AI, the dominant other value of the document [II] is to present the different methods of reasoning. Commonsense competes synergistically with book sense. Figure 2 highlights knowledge-based versus AI-based iteration methods, which may need to incorporate additional human arbitration.

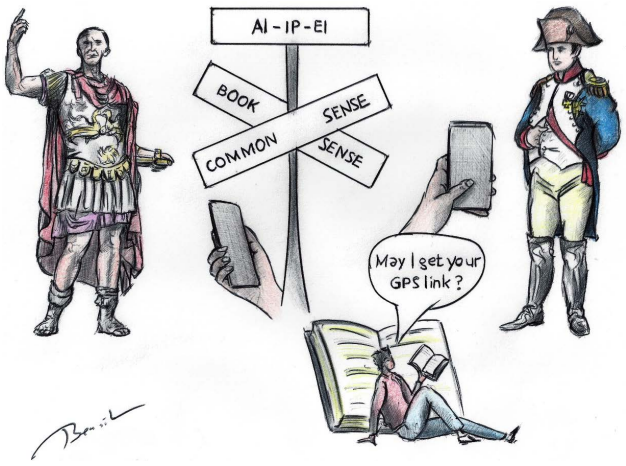


Figure 2. Commonsense competes synergistically with book sense.

Based on [II], [9]: "If we're asked for the telephone number of someone we don't know, we won't even try, knowing full well that we don't possess such data. If we're asked for the telephone number of Julius Caesar or Napoleon, we know immediately that the number doesn't exist, because both lived long before the advent of the telephone. In the last two cases, no Al system can solve the problem. In both cases, it will carry out a lengthy research process and ultimately ask for additional facts which makes the system intelligent."

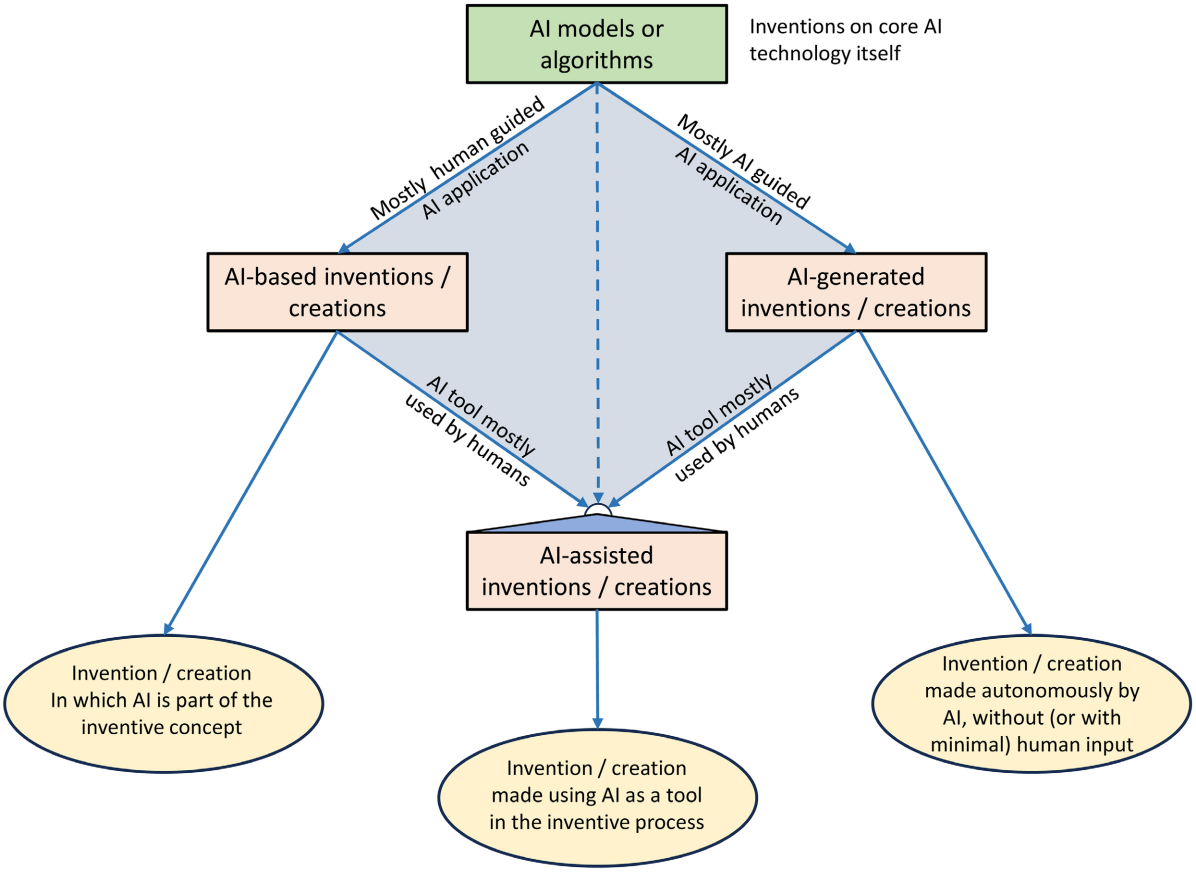
3. AI&IP Economic Perspective

From the suggested citation format [11]: Cuntz, A., Fink C. and Stamm H. (2024), "Artificial Intelligence and Intellectual Property: An Economic Perspective", WIPO Economic Research Working Paper No. 77, Geneva: World Intellectual Property Organization. Figure 3, Figure 4(a), Figure 5, Figure 6 ([11]: pp. 3, 4,

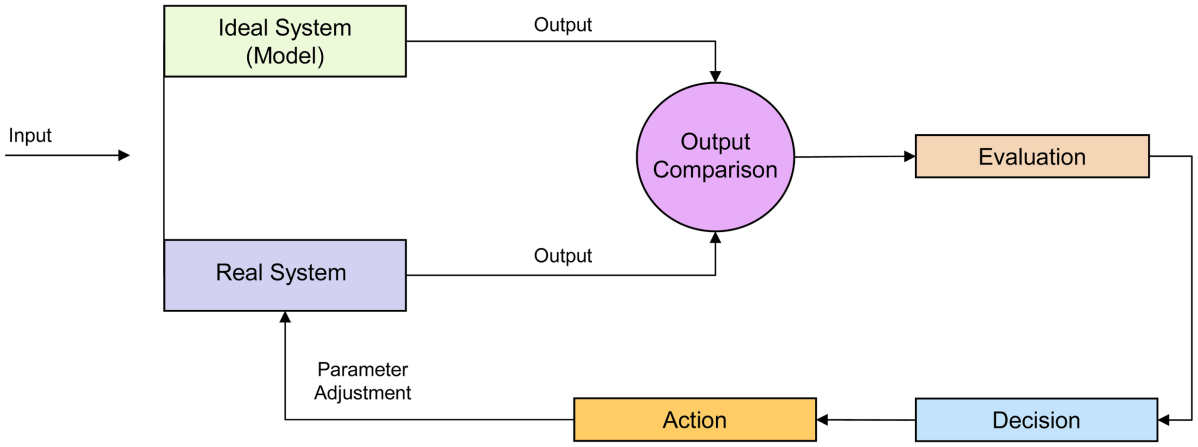
6), Figure 4(b) ([9]: p. 224) **illustrate** the situation [11] in a self-explanatory fashion of [11]:

- Figure 3, the likelihood of a disconnect between knowledge access suitability, and investments.

Figure 3. After@school "self-connected" with satellite…



(a)



(b)

Figure 4. (a) Visualization of the different AI invention concepts [11]; (b) The input-output model [9] (**Figure 4(a)** and **Figure 4(b)** can be combined in series or in parallel).

- as well as the human/machine adaptative involvement, **Figure 4(a)** [11] and **Figure 4(b)** [II], [9] in the AI approach.
- and the rather massive economics, **Figure 5** and **Figure 6**. With favourably balanced risks and opportunities vs. the SWOT anticipated data? Reasonably accurate financial trends have been added to **Figure 5** and **Figure 6**.

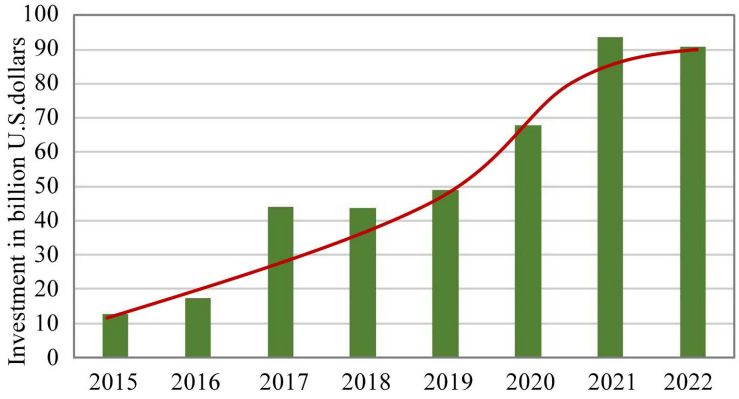


Figure 5. Global AI corporate investments worldwide 2015-2022 (data compiled by Statista, 2023) [11].

As shown in investments/market related **Figure 5** and **Figure 6**: "Data compiled by Statista 2023 (see **Figure 5**) shows an increase in global total corporate AI investment from USD 12.75 billion in 2015 to USD 91.9 billion in 2022, with high expectations of earning money from these investments in the coming years. The global artificial intelligence market size is expected to grow twentyfold between 2021 and 2030, from about USD 100 billion in 2021 to nearly USD 2000 billion in 2030 (Statista, 2023) (see **Figure 6**)." "Artificial intelligence (AI) is the latest such breakthrough. While AI is not new, its capabilities and its adoption have grown to an extent that it today can empower innovators and creators of virtually all

types" [11], introduction, first paragraph. In [11] human-count is 32 for 33 p. Once per page for this Economic perspective. Biases described in [1] are worth reminding and reviewing in this context.

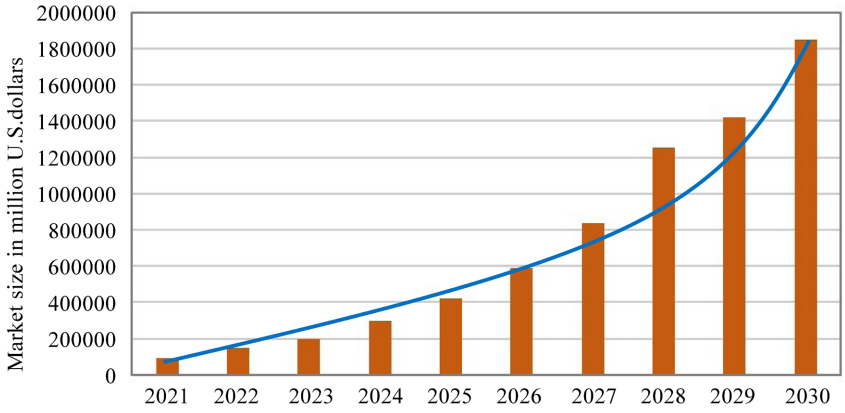


Figure 6. Expected market size (data compiled by Statista, 2023) [11].

3.1. "Another AI Is Possible?" "Human Enhancement Rather than Augmentation"

AI is a long-standing, mid-1940's [1], approach that is still the subject of professional, philosophical and commercial debates? "Human enhancement rather than augmentation." "Another AI is possible.", by Evgeny Morozov, are the headlines on the front page of LE MONDE DIPLOMATIQUE # 845, August 2024 and its English translation [12]. The AI operating model chosen, enhancement or augmentation, may determine a change in the ownership and control of data, models and IT infrastructures, resulting in greater control over the enforcement of intellectual property rights, while taking into account the human attention and interaction required? Rigorously and strictly citing, let's adapt and mention a few of the contributions made by the author of [12] to highlight certain aspects of the daily challenges ahead.

On the other hand, GPS, for example, enables new areas to be discovered, more quickly and quantitatively, but does not simultaneously offer the opportunity to develop new orientation skills, such as those based on celestial constellations or socio-cultural factors and natural awareness. In other words, augmentation tends to deskill with the potential disillusionment of failed delivery, while enhancement improves skills; one then faces the dilemma of being an extra/figurant in a passive role or a creator; an actor capable of interpreting, enriching... works of the mind challenge the learning capacity of AI, without the human; emotions being the driving force behind creativity, as artists widely acknowledge. The gut is indeed a second brain. How does the subconscious mind work? Quantically … possibly!

3.2. Room for On-Going Wider and Deeper Fundamental Improvements...

Document [I] 1991, [8] reveals that at this earlier stage "Intellectual property is-

sues arising from AI may be spotted in each of the three fields of **copyrightability, ownership attribution and infringement**." Apart from the massive growth of data and algorithms recently subjected to AI processing, the three fields outlined above, are still valid focuses, necessitating attention in 2024 [III]. The recent 2024 WIPO 16 pages guidelines leaflet, "Generative AI Navigating intellectual property" [13], part of IP and Frontier Technologies Factsheet, further validates this triple continuum: copyrightability, ownership attribution and infringement. Noteworthy for a large financial context, in [11] for example, AI & economics WIPO, the human-word root count is 32 for 33 pages, *i.e.*, about once per page too.

3.3. Nonetheless

"Some legal scholars, in turn, believe that existing IP laws, originally designed for human contributions to innovation, are not anymore fit-for-purpose and require reform" [11]. For example, "One of the major problems in bringing investment-intensive AI applications into the framework of existing copyright laws seems to be that the latter protects the creative work result rather than the effort or investment which has gone into a product" [I] [8].

4. Emotional Intelligence

"Emotional Intelligence (EI) was created (Peter Salovey & John Mayer, 1990) [14], [1] by the ability of the individual to monitor and control the emotions & feelings for their action. Individuals are joined together to achieve the common goal of the organization and they vary with their emotions and feelings". A time-wise representative, Randomized and Controlled Study [15], of a rather clinical level class, furthermore validates, the potential of EI in HR management; in a conducive business environment. More details will be further reported on this illustrative study within TOE dimensions (Technological, Organizational, Environmental).

4.1. Emotional Hysteresis

[16] Journal of Vision, (2023) 23 (13):5, 1-14, A.B., Cortês, C. Duarte, C. Branco; Hysteresis physics can be translated to emotions' dynamics.

As shown in Figure 1 of [16], a classical representation of a hysteresis loop is described in physics.

On **Figure 7**, "The reference curve (black) represents the response of the system if there were no history effect. If there is a tendency of the system to persist in the original state (−1) for a longer period than the reference, we can say there is positive hysteresis (red curve). If the opposite occurs, and the change of state happens prior to the reference moment, there is negative hysteresis (blue curve)" [16]. Such a phenomenon can be translated to EI science in terms of happiness and sadness (red vs blue) temporal dynamics inducing an AI challenge; possibly detrimental. Hysteresis loops can be combined and subject to computerized modelling to consider complex non-linear dynamics. A "quantic" exercise.

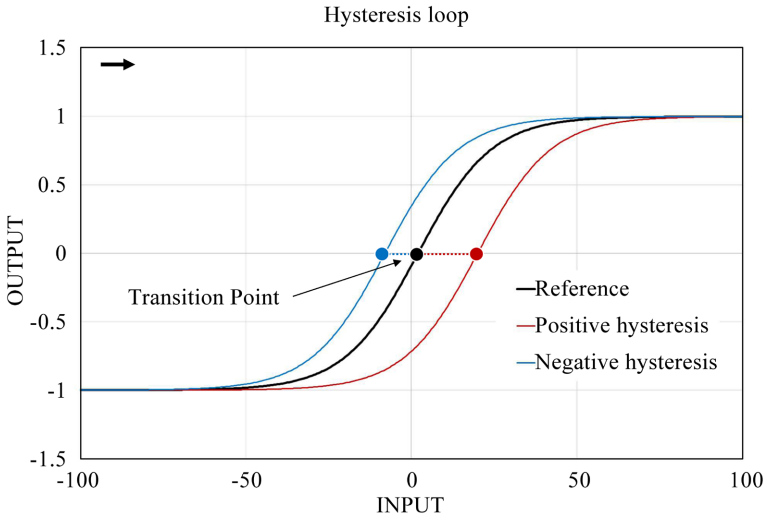


Figure 7. Hysteresis loop and dynamics therewith.

4.2. Crossing the Rubicon

Reference [17] "Artificial Intelligence is breaking Patent Law." Alexandra George & Toby Walsh 616, Nature, Vol 605, 26 May 2022.

Furthermore stated in [17]:

- "We need fit-for-purpose IP law to ensure it serves the public good.".
- "The patent system assumes that inventors are human. Inventions devised by machines require their own intellectual property law and an international treaty."
- "It would be better for governments to create legislation explicitly tailored to AI inventiveness."

Figure 8 is a hopefully entertaining illustrative drawing about fishing and the license that goes with it; ironically, of course, an analogy with an unregulated AI fictitious scenario; created illustratively.

Figure 8. AI "Data" fishing and the license that goes with it?

You're supposed to have a fishing license, but can you fish both upstream and

downstream? What size of fish must be released when caught? Can you use bait? Can an out-of-water fish be caught? On the Air & up/in the Air. Even in your competitor's bag? Can you play traditional music near the fishing area to discourage/distract your competitors/& protect the fish environment? This scenario draws a parallel with AI, which may be devoid of intellectual property laws; the ball is then in the court of the experts and regulators concerned? And down-to-earth reflectors. Moral rights integrity umbrella, part of it. Sui Generis an option too.

4.3. And Now Fiction "Reality"!

In a two-book novella, Becky Chambers [18], "A psalm for the wild-built", (ISBN 9781250236210, 2021), offers the wider human race one of the most "humane" works of literature, illuminated by a fascinating duo of characters: a monk and a robot on an amusing adventure. Two main questions clearly arise: (1) what does the human species need, if not a useless increase rather than an edifying improvement? (2) Can robots go beyond humanity with natural/artificial consciousness and emotional capacities to enable the development of new hybrid communities? And related developments therewith:

- It may take a century for the landscape of intellectual property laws to materialize.
- In the meantime the mandated robot has to resolve his life pending question: "What do you, humans, need and how might I help" [18]. Knowing perfectly well that humans have, about all what they need, given their ambitions.
- The second question relates to the robot's ability to convey emotions "intelligently".
- An example scenario is the robot's reaction to the monk's assertion that robots are probably all connected, networked?
- "The robot's face was angular in its disgust" [18]. He added: "Would you want everybody's else's thoughts in your head?" thus expressing his disgust and horror with his own "natural" facial expression!

There's no doubt that introspective consciousness is within the reach of robots, in the realm of fiction. Per the Oxford's dictionary the introspection is the examination of one's own conscious thoughts and feelings.

4.4. In Terms of Ecological Rationality, Let's Pause and Reflect

"Imagine a cybernetic shower that engages you in a dialogue about climate change and water scarcity, or a car that prompts reflections on the state of public transportation as you drive" [12]. AI frugal approach for environmental requirements from design to operational aspects at users level can benefit from Rebouillat's work [19].

5. World Ranking: The Race Is ON!

"China-based inventors are filing the highest number of generative artificial intel-

ligence (GenAI) patents, far outpacing inventors in the US, Republic of Korea, Japan and India that comprise the rest of the top five locations, a new WIPO report shows" [20]. **Figure 9** represents the Country comparison of generative AI patent filings, 2014-2023, produced by the World Intellectual Property Organization (in the National News [21]). Combined with AI, EI is running sprint races to prepare for the marathon.

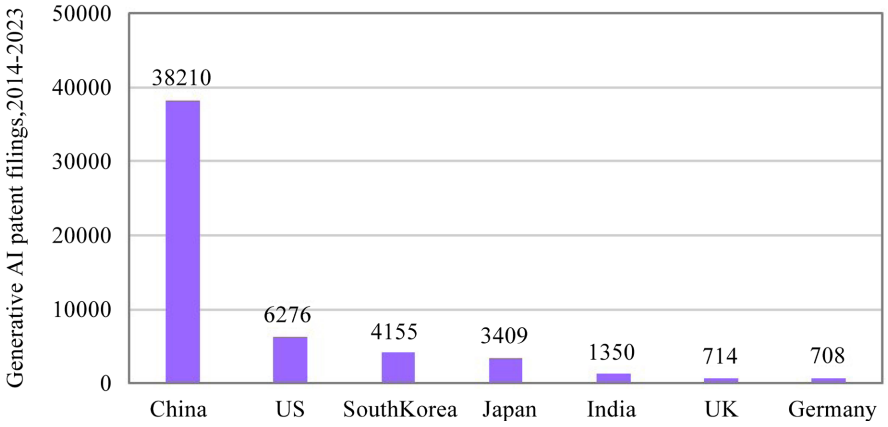


Figure 9. The race is ON! Country comparison of generative AI patent filings, 2014-2023.

5.1. Patent Matter

The emphasis is here strictly on educational, illustrative and demonstrative value. An example of patent extracts highlighting potential involvement of AI/EI approach; within limits.

Method for Improving the Emotional Quotient in Infants and Children [4].

Abstract. This invention is a method to teach emotional awareness to children. The method uses a video to increase the child's emotional quotient. The emotional quotient is a measure like intelligence quotient that measures sensitivity to emotions. Because the video uses images it can be used with pre-literate or even pre-language children. It can also be used as a tool for teachers, parents and therapists who are using a larger education system or the video can be used by the child as a primary educational tool.

Claim 1. What is claimed is: 1. A therapeutic method for improving the ability of a child to recognize and respond to primary emotions, said therapeutic method comprising: providing a video containing a plurality of images containing exaggerated facial expressions which represent the primary emotions; providing multimedia based markers in the video which correspond each to a particular one of the exaggerated facial expressions that represent the primary emotions in respective ones of the images; and playing the video to the child.

Legend Figure 1(b). The order is happy 13, then sad 15, then loved 17, then angry 19, then surprised 21, and finally scared 23. Each primary emotion has an associated icon. The icon for happy 14 is a smiling mouth and two open eyes. The icon for sad 16 is an upturned mouth with two open eyes. The icon for loved 18 is

a smiling mouth with closed eyes. The icon for angry 20 is an upturned mouth with two open eyes and eyebrows that point downward. The icon for surprised 22 is an open mouth, two open eyes and two eyebrows raised up. The icon for scared 24 is two open eyes, two eyebrows raised and a wavy line for the mouth.

5.2. Science Interlinked

The emphasis is here strictly on educational, illustrative and demonstrative value. [15] Some paper extracts highlighting potential involvement and limits of AI/EI approach.

EXPLORING THE ROLE OF EMOTIONAL INTELLIGENCE (EI) TO STRENGTHEN THE ARTIFICIAL INTELLIGENCE (AI) FOR SUSTAINABLE HR PRACTICES IN THE POST COVID-19 ERA

Abstract. "Emotional Intelligence is booming up as equal to Artificial intelligence... organizations are redefining HR practices quite innovatively using Artificial Intelligence... However, a study found that AI has limits connecting the emotional aspects of the individuals in the work place and is unable to predict the definite emotions which will strengthen organizational productivity... The objective of the study is to explore the role of emotional intelligence in artificial intelligence and prevent possible emotions using machine learning. The conceptual study develops the research model to experiment connection of EI with AI to strengthen the sustainable innovate HR practices in the business environment."

6. Sport, AI/EI: A Short Essay Illustrations... Achievement Emotions...

When emotions are involved, we are facing a rapid process (reaction) focused on a specific event operationalized in two stages (*i.e.* triggering and multiple responses) comprising five components (Sander, 2016 [22]): (1) cognitive evaluation, (2) motor expression, (3) peripheral nervous system response, (4) action tendency, (5) feeling. In order to observe these processes, sports actions provide a relevant illustrative support, due to these actors' physical and cognitive involvement in a variety of interaction contexts. Over the last decade, research interest in 'sport' and 'emotions' has increased sharply. As far as we are concerned, if we consider emotions, their perception, assimilation, management and understanding as a form of intelligence (Mayer and Salover, 1997 [23]), what is the place of the machine (*i.e.* AI) and what is its place in the sports paradigm? As outlined by Rebouillat *et al.* (2020 [1]), usage can vary from one technician to another (e.g. overflowing use of data, disciplined/conditioned use of data, wise/selected use of data): the question of allocated space is important. Descarsin (2024 [24]), intersecting Jung (1957 [25]) and Ellul (1954 [26], 1980 [27]) philosophic concepts, raises the question of the machine sacralization. Even if, etymologically, emotions can be perceived as an incitement to action and can be seen from the outside ('emotere', to go outwards), they are only fully accessible to the individual who experiences them, in other words, through introspection.

At this questioning stage to address in a relevant way the EI and AI in sport context, from learning to the performance quest we are interested in the following three points: (1) sport protagonists in their environment, (2) their decision-making and (3) the duration of their emotional and affective states generated by the events and achievements within their activities.

6.1. Sport Protagonists in Their Environment

Among the practitioners' variety (competitors, students, free or utilitarian practitioners, etc.), our focus here is on institutionalized sport practices in the school and competitive contexts. Many of the situations reported can be compared with other practitioners' ways in different contexts.

In a school context, achievement emotion (AE; Pekrun, 2006 [28]) is the most studied emotions category (Sander, 2023 [29]). These emotions are felt by students when they engage their skills in an activity, during a task performance and the anticipation or even confrontation with the task outcome, in relation to the value subjectively attributed to this didactic and pedagogical proposal. Sander (2023 [29]) suggests that such emotions are often experienced by students because their skills are challenged in many school activities, such as the lessons themselves, exercises, revisions or assessments. In juggling, for example, a student may feel hopeful before achieving a proposed task (subjectively perceived as sufficiently important) if their own skills suggest that they have a greater chance of success than of failure.

According to Pekrun (2006 [28]) this AE construct has been operationalized through three dimensions: (1) valence (*i.e.*, pleasant/unpleasant emotions), (2) arousal (*i.e.*, activating/deactivating emotions), and (3) temporal relation (*i.e.*, prospective, in-activity and retrospective emotions). Based on these three dimensions, Pekrun *et al.* (2023 [30]) have proposed the taxonomy of AE as a $2 \times 2 \times 3$-dimensional structure. This taxonomy inspired Lazarus works (1991 [31]), including the fundamentally important role of control and value appraisals across different types of human emotions, highlights (a) the influence of individual factors, social environments, and socio-cultural contexts on emotions; (b) the effects of emotions on learning, performance, and health; (c) reciprocal causation linking emotions, outcomes, and antecedents; (d) ways to regulate emotions; and (e) strategies for intervention (Pekrun, 2024 [32]). This dimensional structure is relevant to learning (Rebouillat *et al.*, 2024 [33]) and beyond (Pekrun, 2024 [32]), including sporting performance.

Social by definition and, above all, ubiquitous in human life and its interactions, AE and emotions in general are also approached from a more collective perspective (Campo *et al.*, 2019 [34]). Some authors even describe an emotional contagion (Campo and Djaït, 2016 [35]; Hatfield *et al.*, 1994 [36]) within a collective of coaches (especially in today's growing staffs), trainees and coaches-trainees. Although still largely neglected in sport emotion research (Campo 2019 [37]; Rees *et al.*, 2015 [38]), the social identity approach and interpersonal dynamics offer

many levers for optimizing performance in team sports. The challenge lies in the opportunities to embrace this powerful paradigm, for understanding sport-related behavior, while preserving the intrapersonal and identential dimension of the individual (*i.e.*, without drowning the "I" in "we") for the exclusive benefit of the group-sports identity. Does this data, perceived subjectively in a social context (*i.e.* an interactive environment) and understood introspectively by the individual, define a boundary between man and machine? Can the machine introspect its own functioning or that of another object, subject or group? So, what happens within a rugby team, before, during and after an achievement (i.e., a match, training session, etc.) for each individual? And what does this mean for the team as a whole?

6.2. Decision-Making in Sport Achievements

As part of sport achievements, protagonists (*i.e.*, athletes, pupils, coaches, teachers, referees, etc.) are subject to different decision-making processes and actions, within dynamic situations (*i.e.*, complexity to predict opponents' actions in fields that can be interpenetrated, scoring evolution among time, influence of previous actions on the present moment, players substitutions) to mobilize their resources (Bouthier, 1988 [39], 2014 [40]; Macquet & Pellegrin, 2017 [41]), in a context of time pressure and variable uncertainty (Kermarrec *et al.*, 2023 [42]). In this context (Hanin, 2007 [43]), the relationship between decisions and emotions, which has been the focus of research interest for several decades (Bossard *et al.* 2022 [44], Hanin, 2007 [43]; George & Dane, 2016 [45]; Dugény *et al.*, 2024 [46]), particularly in competition, cannot be ignored.

To understand this relationship between decisions made and emotions, research suggests examining deeper the interplay between intuitive and analytic decision-making examination. Kahneman & Klein (2009 [47]) position situation recognition mechanisms, within the Recognition-Primed Decision (RPD) model, on an intuitive and rational decision-making continuum. In relation to rapid decision-making in sport, the cognitive approach has been widely explored (Roca *et al.*, 2022 [48]) to investigate/examine the rational cognitive mechanisms involved. Regarding the intuitive decision-making, an emerging approach (*i.e.*, Naturalistic Decision Making, NDM; Bossard *et al.*, 2022 [44]; Klein, 2015 [49]) sheds light on the intuitive decision mechanisms favored by experts in complex situations (60 to 81% of expert decisions; Macquet, 2020 [50]). NDM approach (Bossard *et al.* 2022 [44]; Hallé Petiot *et al.*, 2021 [51]; Klein, 2008 [52], 2015 [49]; Macquet, 2020 [50]) highlights the experts' ability (*i.e.*, naturalistic decision-makers) to rely on their intuitions. Decision-makers experiences, in a complex environment (*i.e.* naturalistic conditions) with uncertain outcomes and a need to act quickly in real time, are critical to shaping the responses' relevance (*i.e.*, choosing the most appropriate option) through a sharpened recognition of typical situations (*i.e.*, more targeted information selection and characterization).

In this sport achievement context, the question emotion influences on decision-

making have been only partially explored. From physiological emotion components, such as the examination of cardiac variability (Laborde and Raab, 2013 [53]), to work more directly linked to cognitive evaluation processes (Bossard *et al.*, 2022 [44]; Tenenbaum *et al.*, 2013 [54]), it is primarily the rational mechanisms of decision-making that have been explored (Roca *et al.*, 2022 [48]). The intuitive side of decision-making has yet to be studied. Dugény *et al.* (2024 [46]), by analyzing the relationship between decision-making (Recognition-Primed Decision model) and emotions (Appraisal theory) in a basketball coach, have opened up promising avenues in this research area. Other studies have also investigated the effects of mindfulness training on decision-making in critical and high-demand situations, such as Darses *et al.* (2023 [55]) in a fighter pilots' study in combat aviation.

So, in the current era of technological and artificial intelligence developments, how do sport protagonists and machines fit into this continuum between intuitive and analytical (*i.e.* rational) processes? How can humans use machines and, conversely, how can machines integrate, understand, anticipate and question the intuitive side of these different sports actors? To illustrate, in this rapid decision-making context, during the last World Rugby Cup (WRC 2023) quarter-final, France (*i.e.*, the hoste nation, one of favourite pretender tittle) versus South Africa, just before the decisive penalty (*i.e.*, at a time when pressure is at its highest): what go through the South African substitute captain BM to motivate his kicker HP with this these words 'For South Africa'? Considering the game result and the following tournament outcomes (*i.e.* all the final phase games up to the WRC title were won by a single point), the choice of these words seemed relevant and had an impact on the team. In a context where the South Africans were facing one of the favourites on home soil, data from diagnostic analysis seemed stacked against them. The South African collective entity seemed to be animated at that moment by something more, in particular an additional element beyond the perception of the diagnostic analysis (*i.e.*, analytical decision components). And this adjuvant/additional resource was shared by several members of this entity, a collective supplement.

All these studies on intuitive and rational decision-making continuum and field observations invite us to question sport protagonists' introspection, particularly with regard to intuitive decision-making. In what emotional state, or even emotional state awareness do these actors make their decisions intuitively? And from a technological point of view, how does the machine manage and interpret the sport protagonists' conscious and unconscious or visible and invisible parts? Beyond these investigations, another examination deserves to be raised: What about the experts' emotional state and their emotional state awareness during their sport achievements practice (*i.e.*, before, during and after their decision-making)? For example, in the school context, students experience non-linear and dynamic emotions from one temporality (*i.e.*, prospective AE, in-activity AE, retrospective AE) to another within the same physical activity or activity groups (Rebouillat *et al.*,

2024 [56]).

6.3. Hysteresis and Emotional States Duration in Sport Achievements

Emotions, their management and their relationship to decision-making in the sport achievement context form a contingent of individual and collective experiences with which each protagonist has to cope. Despite success or failure anticipations, with its rescue plans and strategies, the repercussions of event outcome can have a more or less long-term impact. A resonating form that influences the current and future states of those involved in sport. In relation to sport performance, Hardy *et al.* (1994 [57]) have already explored the concept of the hysteresis hypothesis using the catastrophe model of anxiety and performance.

Focusing more on emotional states and impressions expressed by individuals, Sacharin *et al.* (2012 [58]) used recognizing emotion expressions to investigate emotional hysteresis effects (*i.e.* an impression persists well after changes in facial expressions that favour an alternative impression). Their results suggest that the perceptual similarity of emotion expressions may determine the extent to which hysteresis and uncertainty occur. Hysteresis and uncertainty effects support a dynamic systems property in which the emotion decoding is state dependent. More recently, in a completely different social context, Margies (2024 [59]) explored hysteresis effects on individual and collective feelings in young adults' daily lives after a crisis situation (2008 economic crisis in Spain). Effects that determine our behavior and some of our feelings. Thus, the way and the place (*i.e.* socially visible or not) in which we interpret our experiences will have an impact on the feelings we consider legitimate and the way we deal with situations. And Hao (2017 [60]), in mental health context, studied the hysteresis effects through dynamic emotional transition. An approach that could lead to an improved brain-computer interface system for monitoring stress and detecting emotional changes. A system to provide restorative feedback stimuli for emotion regulation training.

Continuing with World Cup 2023 quarter-final example, how did the French rugby team get through this disaster and what is still resonating today? And from a technological point of view: how does the machine manage this part, which is buried deep within the individual and a collective, immersed in a dynamic and social context (*i.e.* a varied and variable environment with both visible and blind components)? What about human and technology introspective and outrospectival treatments?

To conclude this sport exemplification, although the machine cannot, for sport protagonists, within the time limits imposed by the action in different temporal perspectives, (1) act directly on the pitch with them or in their place, (2) nor explore or even become aware of their affected internal parts and (3) even digest a disaster for them, it seems interesting to consider how technology could be used to support training for these achievements (e.g., with the possibility to freeze and/or restart the actions). Promising works in the teacher training field seems to

outline a technological avenue, close to real practices with virtual reality or the 360˚ camera (Ridou and Pasco, 2023 [61]). Mascret *et al.* (2022 [62]) and Musculus *et al.* (2021 [63]), in sport performance context, are also charting this course.

Furthermore, this essay and positioning invite to observe and explore EI as defined by Mayer and Salove (1997 [23]) in the direction of the intersection of: (a) AE state and mindfulness, (b) the NDM and (c) emotional hysteresis effects.

7. Conclusions

Emotional intelligence is as essential [15] as artificial intelligence, both in their own way. Humans, in general, can control emotions within their emotional intelligence capacity. Without emotional dimensions, artificial intelligence remains artificial. These elements determine the unique character of the resulting innovation as per the prerequisite of inventiveness. AI/EI are therefore calling for a new or refreshed IP framework. Historically this renewal process is slow, moreover in the case of an AI game changing environment. The comparison between 1991 and 2024 reveals that, at this point, "Intellectual property issues arising from AI may still be spotted in each of the three fields of **copyrightability, ownership attribution, and infringement**." Worth underlining as well is the EU regulation initiative of EI profiling at school, "such as the use of emotion recognition technology in the workplace or schools."… Born from an expert system basis, AI processing is mostly machine driven and can be used to augment or enhance, thus stimulating human intelligence to complete longer-term goals. Another AI is then possibly pending on humans, mostly in the EI role.

Therewith, the place for improvement is wider and deeper especially with frugal rationality towards environmental management. A financial balance between investment and massive market potential shall support a human harmonized equilibrium and sustainability without precipitation but FRAND dispositions. FRAND stands for "fair, reasonable and nondiscriminatory." Rebouillat *et al.* [19] [64] [65] set the ground for an anticipated IP business strategic collaborative orientation as part of the early innovation, market and R&D strategies.

The above is illustrated in the study, taking into prime consideration the need to help an audience from a large spectrum of experts vs. the abundantly selected subject matter. A spot review of a science fiction novella provides a relaxing reading brake with a probing question: can robots go beyond humanity with natural/artificial consciousness and emotional capacities to enable the development of new hybrid communities? There's no doubt that introspective consciousness is within the reach of robots, in the realm of fiction. Human creativity remains complex. Often cited are imagination, intuition, emotions, and abstract dimensions, not to forget the serendipity inventive factor. Human and AI challenges ahead!

Short sections' titles, here below, shall facilitate the accessibility to the content with an intent to express the main conclusion of the section under consideration.

The @LEAST© acronym covers the following grounding attributes: L Legal, E Ethical, Equitable, A Advanced, Accountable, Accessible, S Safe, Secured, T Tol-

erable; as minimum contextual prerequisites in the field of interest hereby.

1 Short Introduction Preamble/2 Emotions are central to creativity and IP recognition/2.1 Not just a challenge, but an opportunity/2.2 Really human? Let's test over 30 years?/3 AI&IP Economic Perspective…/3.1 "Another AI is possible?" "Human enhancement rather than Augmentation."/3.2 Room for on-going wider and deeper fundamental Improvements./3.3 Nonetheless/4 Emotional Intelligence/4.1 Emotional Hysteresis/4.2 Crossing the Rubicon/4.3 And now fiction "reality"!/4.4 In terms of ecological rationality, let's pause and reflect/5 World Ranking: The race is on!/5.1 Patent Matter/5.2 Science interlinked/6 Sport AE/EI: a Short Essay, Illustrations… Achievement... Emotions.../6.1 Sport protagonists in their environment/6.2 Decision-making in sport achievements/6.3 Hysteresis and emotional states duration in sport achievements/7 Conclusion

All along, the emphasis is here strictly on educational, illustrative and demonstrative values.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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