We are IntechOpen,
the world's leading publisher of
Open Access books
Built by scientists, for scientists

6,900
Open access books available

185,000
International authors and editors

200M
Downloads

154
Countries delivered to

Our authors are among the

TOP 1%
most cited scientists

12.2%
Contributors from top 500 universities

BOOK CITATION INDEX
CLARIVATE ANALYTICS
INDEXED

WEB OF SCIENCE™

Selection of our books indexed in the Book Citation Index
in Web of Science™ Core Collection (BKCI)

Interested in publishing with us?
Contact book.department@intechopen.com

Numbers displayed above are based on latest data collected.
For more information visit www.intechopen.com

Introductory Chapter: Super Creativity—Mind, Men, and Machine

Sílvio Manuel da Rocha Brito

1. Considerations and trends

Creativity is a much-requested attitude nowadays that anything and anyone can pass without it. More than this, it turns in a way of life, fundamentally in investigation tasks, in the business procedures, in the family environment, in the learning processes and health diagnosis, and in all aspects of our daily routines. Thus, to increase this, there is the necessity to conjugate synergies of three elements: the mind, the men, and the machines.

Over the mind, since the concept has undergone several evolutions, its considerations constitute a unique basis for understanding creativity, pointing to emotional orientation and triggering mental activities particularly a threat to the use of common sense. So, creativity appears in a relationship experiences' board [1].

The mind experiences are free and transmit us how versatile the mind is; it considers construction and reconstruction of their presuppositions and the way that generate and self-generate their thoughts in a dual kind of wandering: novelty and utility. So, the creator is the wonder-minded subject [2].

This relationship has been expressed in learning processes, mainly in idea creations, decision-making, problem-solving, lateral thinking, and thought movement [3]. This kind of movement is essentially cultural, an extended process that comports kinetic behavior with mind and culture [4].

But the same relationship represents critical thinking, a form to understand different cultural contexts, an association between thinking measures, like fluency, flexibility, originality, elaboration, and creativity, but only during a performance process [5].

Incidentally, this is confirmed in two experiences where the activity is fundamental to develop a creative mind [6].

This can be enhanced by an unbelieving process, developing creativity in several domains. Between an emotional complex form and a thinking way [7], and by another hand, enhanced by our mind wandering [2] constituting a strong ability to make connections in our whole brain with the purpose of empowering relationships reinforcing the creativity [8].

About a person, we can transform a subject into a creative person, to learn and acquiring personalities such as curiosity, cognition, soft skills, feelings, and motivation; to develop a humanistic vision and to develop personal qualities [9] like research and development [10], working in what he or she views as a challenge and in several domains and activities namely creativity achievements [11].

Furthermore, if we specify abstract concepts, probably we do the lateral thinking [12] in many domains better, and some of them are in verbal expressions [13],

innovation tactics [14], environment [15], teamwork [16], leadership expectations [17], and organizational [18] and approach-oriented [19] performances.

If we use the positive mind, we develop creativity, in an equal form, as a man, a person, and a sameness, with positive thinking, and develop and increase creativity by regulating creative emotions [20], but we use also the awe, and by using it, we enhance the creative thinking and control several emotions by positively stimulating the creativity in many perspectives [7]. This will impulse to increase one of the most important personality factors to be creative, present in most studies in this area [21].

But the creativity as a human, personal, and intimate human attitude depends essentially on the will. New theories approach this reality, and one of them is a "tri-angular theory," where creative subjects challenge other common people's beliefs and share an unconscious and conscious reality vision and, in face of this, there originates different combinations of challenge types, creativity materialized examples [22].

According to all this, any human is a creative person [23].

About a machine, with the fast technological development in a brief future, we suppose, there will be difficulty in dating a man from a machine and vice versa. Thus, artificial intelligence is the mainly example in moral decisions, which helps us in making ethical decisions about our expectations; for example, being a part of a platform that helps us to make decisions on the use of autonomous vehicles [24] and health preservation where certain human body organs are changed by bionic devices [25] such as legs, tissues, bones, exoskeletons, and much more.

So, this symbiosis [26] is intense and very creative in such a way that, increases the development of human performance at work, as well as occupational health and individual behavior in general, and artificial intelligence is living in ourselves either [27]. In many aspects, especially in a culture, that we can say that we are living an authentic cyberculture paradigm [28]. As mankind progresses with the machine, it also progresses in the new competencies' acquisition, the ignition competence being the creativity attitude [29].
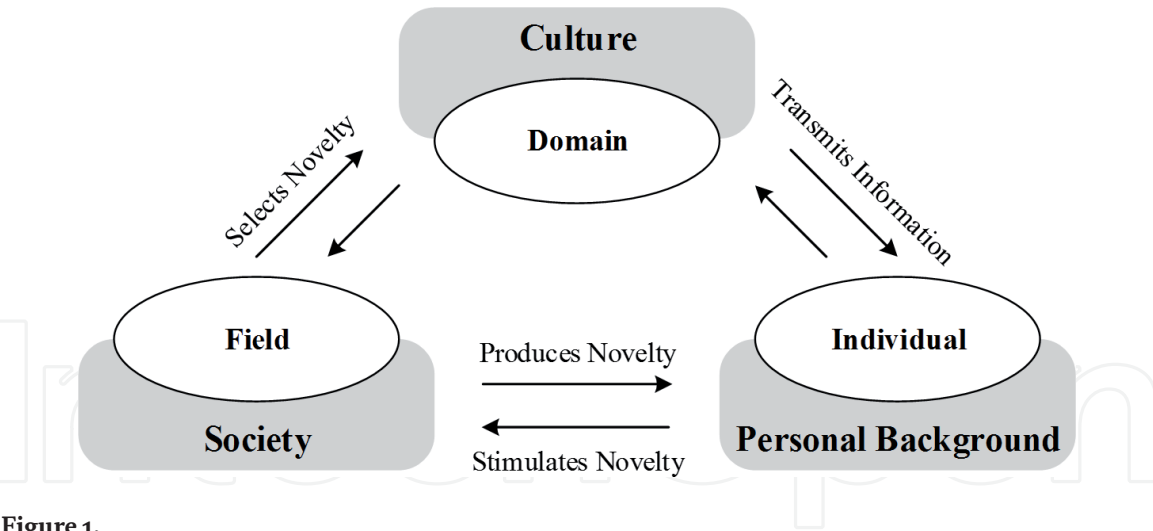
Therefore, the psychological concept of creativity is daily changing, since it is a non-rational and inflexible concept, on the contrary, it rests in intervisibility and in a world where the intellectual heritage belongs to machines; the last word in creative actions belongs to humans [30].

The definition of creative activity is *any kind of creativity that creates something new, be it anything from the outside world, a product of the creative activity, or an organization of thought or feeling that acts and is present in man himself* [31].

Creativity activity is not the same as "creative thinking"; it means interaction between a sociocultural context and the mind of people. It is a systemic phenomenon, more than individual [32]; this is seen as the production of anything new that has a significant impact on a given field and is widely recognized and valued through the demonstration of its social usefulness. In the lower case or in superior case [33], the social significance of the materialized idea depends on what people can do with it.

So, creativity is a systemic process that arises from the relationship between different kinds of actions (individual, field, and domain) that are in different contexts (personal background, society and culture, economy, and globalization) that affect them, as shown in **Figure 1** [34].

According to **Figure 1**, from the "individual" point of view, it is necessary to analyze the cultural and social contexts in which this individual operates. The interaction between the individual domains favours the communication transmission, and the interaction between the individual field stimulates the result occurrence with the original potential, producing and stimulating novelty, where the interaction between "field" and "domain" selects novelty by judgment and selection of creative results.

Figure 1.
Creativity Systemic Process. Source: Adapted from Csikszentmihalyi [34].

This triangulation of perspectives and interpretations reflects the senses of what can search to be faced as "new" trough a confrontation os questions and answers between creativity researchers and participants [35] where the active mind is always present.

Some models mean the presence of the man and the machine, where the computational reports contribute to human insights and establish the relationship with the human neural system to quantify the creativity quality levels and the divergence or convergence of creative thinking, giving an integrative perspective of creativity and contribute for developing the creative cognition [36].

All this have the aim to empower creativity in the work conditions on high-tech environments and the collaborator's health, through the optimization of work dimensions as work atmosphere, vertical collaboration, autonomy and freedom, respect, alignment, and lateral collaboration, so creativity emerges from a good climate, management, and knowledge strategy [37].

2. Challenges and proposals

Following these purposes, this single book reveals itself in an interesting vision in how the relational trilogy between humanity, its knowledge, and the use of the machine responds to the challenges placed before it, with respect to the own fears and preoccupations, to the human nature and to its social purpose, as well as to the synergy strategic management between man and machine, and to the results' unpredictable impact.

Like the trilogy mind, men, and machine, this book proposes three moments: the first moment deals with the creativity in humans that suggest what they can do and what they do by doing this. The second moment deals with the creativity in the machines, that is to say, the way in which they propose to the man to develop their capacities. The third moment deals with the collaboration between man and machine interaction.

Therefore, we begin with a spectacular article from Prof. Wesley Carpenter that talks about the power of a special cognitive moment, which conducts a cognitive mutation that will result in creativity, especially on problem-solving and critical solutions. Next, we have an article no less interesting, by Dr Luigi Nasta and Dr Luca Pirolo, who moves us to the fashion world, in a curious form of innovation to increase and improve the commercial relationship form, between fashion companies and customers, in a crowdsourcing operation.

Through the second moment, Dr. Teboho Pitso presents us a wonderful study about the influence of intelligent machines' capacities versus the human's cognition and the use of both in creating value.

The last moment is marked by a special and critical work by Dr. Ikkena Onwuegbuna on the machine incidence in musical creation, and how it can be productive if it interacts with the subject with regard to a process of analysis.

Finally, we finish with a wonderful proposal by Dr. Niki Lambaropoulos, who brings us an innovative project—an adaptive virtual reality brain-computer interfaces, which is very useful for the search of new solutions and for learning new tasks.

In conclusion, this book helps us to understand the union of the real with the virtual, through the connecting link that leads to change and evolve: creativity at its best! Surely, it will be a friend, really good, to have in the pocket or on the head table, which opens the vision for a new time, a new place, and a new world scenario!

Author details

Sílvio Manuel da Rocha Brito[1,2,3]

1 Polytechnic Institute of Tomar, Portugal

2 Entrepreneurship Promotion and Development Association (EPDA), Spain

3 Psique-Ex, Extremadura University, Spain

*Address all correspondence to: silvio.brito@ipt.pt

IntechOpen

References

[1] Spearman C. Creative Mind. The Journal of Nervous and Mental Disease. December 1931;**74**(6):783

[2] Fox KC, Beaty RE. Mind-wandering as creative thinking: Neural, psychological, and theoretical considerations. Current Opinion in Behavioral Sciences. 2019;**27**:123-130. DOI: 10.1016/j.cobeha.2018.10.009

[3] Molaei S, Fini S, Rahmani MN. The role of creative minds (creativity) in the process of academic achievement. Iranian Journal of Positive Psychology. 2018;**4**(1):27-31. ISSN: 2423-6985

[4] Glăveanu VP. The cultural basis of the creative process: A dual-movement framework. The Creative Process, Palgrave Studies in Creativity and Culture. 2018;**4**:297-316. DOI: 10.1057/978-1-137-50563-7_12

[5] Wechsler SM, Saiz C, Rivas SF, Vendramini CMM, Almeida LS, Mundim MC, et al. Creative and critical thinking: Independent or overlapping components? Thinking Skills and Creativity. 2018;**27**:114-122. DOI: 10.1016/j.tsc.2017.12.003

[6] Main KJ, Aghakhani H, Labroo AA, Greidanus NS. Change it up: Inactivity and repetitive activity reduce creative thinking. The Journal of Creative Behavior. 2018;**0**(0):1-12. DOI: 10.1002/jocb.373

[7] Chirico A, Glaveanu VP, Cipresso P, Riva G, Gaggioli A. Awe enhances creative thinking: An experimental study. Creativity Research Journal. 2018;**30**(2):123-131. DOI: 10.1080/10400419.2018.1446491

[8] Beaty RE, Kenett YN, Christensen AP, Rosenberg MD, Benedek M, Chen Q, et al. Robust prediction of individual creative ability from brain functional connectivity. Proceedings of the National Academy of Sciences. 2019;**115**(5):1087-1092. DOI: 10.1073/pnas.1713532115

[9] Richards R. Everyday creativity and the healthy mind. In: Creative Person, Palgrave Studies in Creativity and Culture. 2018. pp. 135-152. DOI: 10.1057/978-1-137-55766-7_9

[10] Hazak A, Ruubel R, Virkebau M. When would creative R&D employees like to work? International Journal of Organizational Analysis. 2019. DOI: 10.1108/ijoa-04-2018-1409. Downloaded by 81.22.47.68 At 21:12 13 January 2019 (PT)

[11] Diedrich J, Jauk E, Silvia PJ, Gredlein JM, Neubauer AC, Benedek M. Assessment of real-life creativity: The Inventory of Creative Activities and Achievements (ICAA). Psychology of Aesthetics, Creativity, and the Arts. 2018;**12**(3):304-316

[12] Ezzat H, Agogué M, Le Masson P, Weil B, Cassotti M. Specificity and abstraction of examples: Opposite effects on fixation for creative ideation. The Journal of Creative Behavior. 2018;**0**(0):1-8. DOI: 10.1002/jocb.349

[13] Piirto J. The creative process in writers. The Creative Process, Palgrave Studies in Creativity and Culture. 2018;**6**:89-121. DOI: 10.1057/978-1-137-50563-7_4

[14] Nilsson ÅW, Jahnke M. Tactics for norm-creative innovation. She Ji: The Journal of Design, Economics, and Innovation. 2018;**4**(4):375-391. DOI: 10.1016/j.sheji.2018.11.002

[15] Richards R. Everyday creativity and the healthy mind. Palgrave Studies in Creativity and Culture. 2018;**7**:153-170. DOI: 10.1057/978-1-137-55766-7_10

[16] Fong PSW, Men C, Luo J, Jia R. Knowledge hiding and team

creativity: The contingent role of
task interdependence. Management
Decision. 2018;**56**(2):329-343. DOI:
10.1108/md-11-2016-0778

[17] Adil MS, Hamid KBA. The
relationships between leader creativity
expectations, intrinsic motivation, and
creative performance. SEISENSE Journal
of Management. 2019;**2**(2):58-68. DOI:
10.33215/sjom.v2i2.123

[18] Kaufman JC. Uniquely creative:
Developing a new outline for positive
outcomes. Creativity. Theories -
Research - Applications. 2019;**5**(2):188-
196. DOI: 10.1515/ctra-2018-0018

[19] Li H, Li F, Chen T. Do performance
approach-oriented individuals generate
creative ideas? The roles of outcome
instrumentality and task persistence.
Journal of Applied Social Psychology.
2018;**48**(3):117-127. DOI: 10.1111/
jasp.12495

[20] Chiu F-C, Hsu C-C, Lin Y-N, Liu
C-H, Chen H-C, Lin C-H. Effects of
creative thinking and its personality
determinants on negative emotion
regulation. Psychological Reports:
003329411877597. 2018;**0**(0):1-28. DOI:
10.1177/0033294118775973

[21] Unsworth K. Creativity in
the context of multiple goals. In:
Martin L, Wilson N, editors. The
Palgrave Handbook of Creativity
at Work. 2018. pp. 23-41. DOI:
10.1007/978-3-319-77350-6_2

[22] Sternberg RJ. A triangular theory
of creativity. Psychology of Aesthetics,
Creativity, and the Arts. 2018;**12**(1):50-
67. DOI: 10.1037/aca0000095

[23] Kronfeldner M. Explaining
creativity. In: Gaut B, Kieran M, editors.
Routledge Handbook on Creativity
and Philosophy. New York: Routledge.
pp. 213-229

[24] Awad E, Dsouza S, Kim R, Schulz J,
Henrich J, Shariff A, et al. The

moral machine experiment. Nature.
2018;**563**:59-64. DOI: 10.1038/
s41586-018-0637-6

[25] Pagaduan JV, Bhatta A, Romer LH,
Gracias DH. 3D hybrid small scale
devices. Small. 2018;**14**(27):1702497.
DOI: 10.1002/smll.201702497

[26] Mourad S, Tewfik A. Machine
assisted human decision making. In:
2018 IEEE International Conference on
Acoustics, Speech and Signal Processing
(ICASSP); 2018. DOI: 10.1109/
icassp.2018.8462087

[27] Nagao K. Symbiosis between
humans and artificial intelligence.
In: Artificial Intelligence
Accelerates Human Learning.
Springer; 2019. pp. 135-151. DOI:
10.1007/978-981-13-6175-3_6

[28] Pereira LM. Cyberculture,
symbiosis, and syncretism. AI &
SOCIETY. 2018;**33**(3):447-452. DOI:
10.1007/s00146-017-0715-6

[29] Leigh S, Agrawal H, Maes P. Robotic
symbionts: Interweaving human and
machine actions. IEEE Pervasive
Computing. 2018;**17**(2):34-43. DOI:
10.1109/mprv.2018.022511241

[30] Richards R. Everyday Creativity
and the Healthy Mind: Dynamic New
Paths for Self and Society. Oakland:
Palgrave/McMillan. 2018. pp. 1-377.
DOI: 10.1057/978-1-137-55766-7

[31] Lindqvist G. Vygotsky's theory
of creativity. Creativity Research
Journal. 2003;**15**(2-3):245-251. DOI:
10.1080/10400419.2003.9651416

[32] Janesick VJ. Intuition and
creativity: A pas de deux for
qualitative researchers. Qualitative
Inquiry. 2001;**7**(5):531-540. DOI:
10.1177/107780040100700501

[33] Boden M. The Creative Mind. 2nd
ed. London: Routledge. 2002. 344p.
ISBN: 0-203-34008-6

[34] Csikszentmihalyi M. Stalking a new world order. New Literary History. 2004;**35**(2):339-348. DOI: 10.1353/nlh.2004.0029. Project MUSE

[35] Lebuda I, Glăveanu VP. Researching the social in creativity, past, present and future: An introduction to the palgrave handbook of social creativity research. In: The Palgrave Handbook of Social Creativity Research. 2018. pp. 1-9. DOI: 10.1007/978-3-319-95498-1_1

[36] Mekern V, Hommel B, Sjoerds Z. Computational models of creativity: A review of single-process and multi-process recent approaches to demystifying creative cognition. Current Opinion in Behavioral Sciences. 2019;**27**:47-54. DOI: 10.1016/j.cobeha.2018.09.008

[37] Lapierre J, Giroux V-P. Creativity and work environment in a high-tech context. Creativity and Innovation Management. 2003;**12**(1):11-23. DOI: 10.1111/1467-8691.00263