

KIE handbook of
creativity

edited by
Fredricka K. Reisman, PhD
President, American Creativity Association

**INTERNATIONAL CONFERENCE ON
KNOWLEDGE, INNOVATION & ENTERPRISE
BERLIN, GERMANY, 21—24 JUNE, 2016**



Themes:

Knowledge-Education

Including knowledge management, comparative knowledge, indigenous knowledge, Knowledge & Education, Knowledge Transfer Partnerships, Knowledge Utilisation, Patents & Copyrights and Business & Information Systems, ICT/(Mobile) Technologies in Education—including ICT in Teaching & Learning, Technology Enhanced Learning & Digital Learning, Research and Enterprise in Higher Education

Innovation

Including Innovation, Technology Innovation including Big Data, Predictive Analytics, Deep Learning, and Management/Organisation and Open Innovation

Creativity

Including Concepts—process, product, personality and environment, Business/Organisational Creativity, Arts, Media & Digital Creativity, Creative Industries & Enterprise, Digital Design & Architectures, Craft & Animation

Enterprise

including entrepreneurship, Marketing & Strategy, HR, Talent & Development, Servant/Leadership in Enterprise, SME Business Finance & Accounting, Supply Chain Management, International Business & Management & Ethnic Minority Entrepreneurship

Papers will be published in the KIE Conference Book Series and selected papers will be published in the associated journal of the conference—see www.ijkie.org

For details about registration including deadlines, please visit: www.kiecon.org

KIE Handbook of --- **Creativity**

Guest Editor
Fredricka Reisman, PhD

© All rights reserved.

You are welcome to copy this publication for scholarly or non-commercial use. Otherwise, no part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without permission in writing from the copyright holders.

2015 KIE Conference Publications:

KIE Handbook of Creativity
Research Papers on Knowledge, Innovation and Enterprise Volume III

© 2015 International Conference on Knowledge, Innovation & Enterprise
© 2015 Individual Authors

Produced and Published in London by KIE Conference
Printed in Great Britain by Corporate Document Services, Leeds, England,
United Kingdom

KIE Handbook of Creativity



KIE Conference Books

Contents

Preface

JAMES OGUNLEY. Evergreen Creativity6

Chapter 1

FREDRICKA REISMAN. Introduction11

Chapter 2

ERIK E. GUZIK AND KATHY GOFF. The Microfoundations of Creativity: An Economics Perspective26

Chapter 3

BRUCE B. ROSENTHAL. “Preparing Students to Become Proactive Creative Managers:” Business Education as a Foundation for the Needs of 21st Century Business40

Chapter 4

ROSAMUND DAVIES. Narrative as Creative Quest: The Hero’s Journey and Its Alternatives79

Chapter 5

HANSIKA KAPOOR AND AZIZUDDIN KHAN. Double Negatives: The Dark Triad and Negative Creativity98

Chapter 6

TARA GREY COSTE AND CAROL NEMEROFF. Crazy as a Fox: From Pathology to Productivity114

Chapter 7

CHRIS WILSON AND MICHAEL BROWN. Ambiguity, Uncertainty and New Realities: Perspectives of Creative Value, Utility and Authenticity134

Chapter 8

RICK KANTOR. Art As Open Source Intelligence159

Chapter 9

KUAN CHEN TSAI. Developing a Measurement for the Perception of Creative Learning Environments in Educational Settings178

Contents

Chapter 10

LINGLING LUO, XUEMI DENG, CHUNFANG ZHOU. The Complexity of The Assessment of Creative Climate and Group Creativity192

Chapter 11

MICHAEL BROWN AND CHRIS WILSON. Conformity, Deformity and Reformity: Considering the Domain-idiolect Creativity Dynamic203

Chapter 12

TERRI A. HASSELER, SANDRA ENOS, MAURA ANN DOWLING & ROBERT E. SHEA. Embracing a Creative Praxis: The Creativity Fellows Program at Bryant University228

CHAPTER SEVEN

AMBIGUITY, UNCERTAINTY AND NEW REALITIES: PERSPECTIVES OF CREATIVE VALUE, UTILITY AND AUTHENTICITY

CHRIS WILSON & MICHAEL BROWN

Abstract

The concept of creativity is synonymous with the formulation of value judgements. Related primarily to the experience of new and unfamiliar ideas, creativity is a subject directly connected to conceptions of adjustment, recalibration, measurement and evaluation. Albeit a subjective term open to considerable flexibility of interpretation, creativity has nevertheless become a capacity and commodity of notionally high social and economic value. Consequently, creativity has never been subject to greater scrutiny and judgement and understanding of creative value subject to greater discussion and evaluation.

Exploring aspects of creativity associated with ambiguity and uncertainty through the discourse of authenticity and aesthetics, this chapter positions analysis in the narratives of insight and imagination, the romanticism of discovery and talent, and debates about the increasing virtualisation of creative practice and emerging prospect of artificial creativity. Investigating the potential for what might be described as authentic creativity, notions of forgery and fakery, serendipity, accidental discovery, and the dynamics of positive and negative creative conditions, provide a basis for focused consideration of the 'how' and 'why' of creative activity and the various ways these relate to the determination of value in the 'what' of creative outcomes.

Exploring first the nature of creative value and closely related definitions of creativity, consideration is then given to the temporal and cultural dynamics of creative value judgements before focusing more specifically on contexts of creativity and areas of creative ambiguity. Introducing a series of illustrative case studies, discussion focuses on the parameters of creative value judgements to underpin a tentative definition of creative authenticity. Conclusions highlight a range of possible perspectives related to the subjective nature of creativity and definitions of creative value. Creativity and creative value can be determined simply according to the scale of impact on hu-

man well-being, progress, fulfilment, security, or other suitable value indicator, the quality of lived human experience, the intrinsic qualities of the object, artefact or activity, or combination of all three. Given the inherent diversity and instability of creation and reception contexts, the search for any form objective measure of creative value may be a fruitless one. However, it is in the very subjectivity of creative experience that creative authenticity is most visible.

Key words: Creativity, authenticity, value, experience.

Lights that shine brightly,
Do most clearly in the dark,
Value and function in phase.

Introduction

For a judgement of creative value judgement to occur, a context is required for a perspective of appreciation to take place. Something new needs to emerge and be recognised in its own terms and then related favourably to previously understood concepts and ideas. Simply speaking, for creative value to be recognised, it needs at least to be immediately if only partially understood. Nevertheless an unstable and culturally dynamic term, creativity remains open to subjectivity of interpretation in the interrelationship between novelty and ‘fit’ (Beghetto in Kaufman and Sternberg, 2010), and, as observed by Amabile (1996) in discussion of ‘phenomenological response states’ and the work of Getzels and Csikszentmihalyi (1976), framed by encultured experience, institutionalised expectations and underlying reception biases (Lebuda and Karwowski, 2013).

The definition of creativity, referred to as of central significance in creativity research (Runco and Jaeger, 2012), is paradoxical in that pre-emptive descriptions can only, by definition, ever be predictive and speculative and a satisfactory overarching definition may ultimately prove impossible (Bohn, 1996). Nevertheless, a standard definition of creativity (Runco and Jaeger, 2012) is attributable to a number of authors including Barron (1955) and Stein (1953) and consensus evident in determination of the presence of an appropriate and interdependent balance between novelty and effectiveness according to the “costs and benefits of contrarianism” or uncommonness in any given context and at any given time (Ibid: 92). Creativity is ultimately a social construct (Tornkvist, 1998, p. 10) determined by different emphasise and interests of conceptions of utility and authenticity and related interpretation of honesty, integrity, quality, originality, functionality, and germinability.

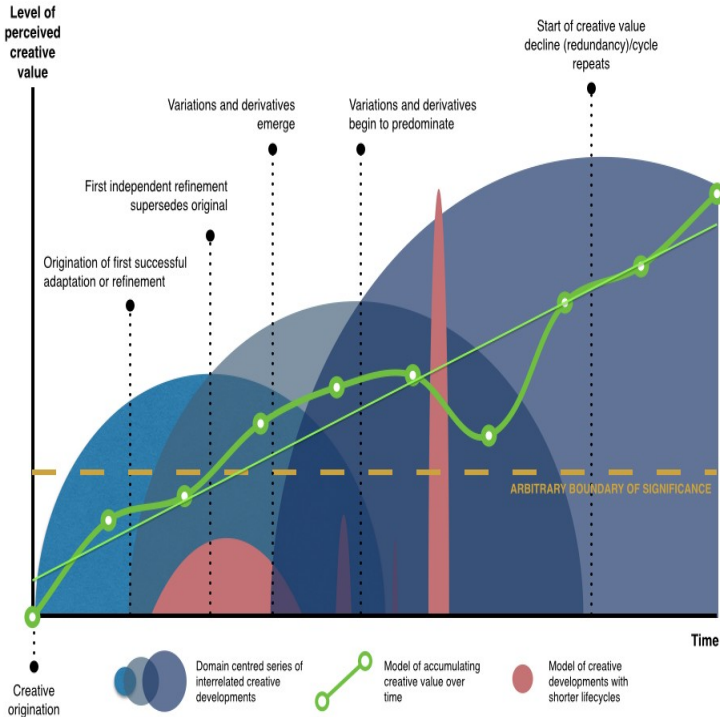


Figure 1: Hypothetical creativity lifecycles

The extent to which something transforms conceptions of what is possible, or how far a new concept or idea may be adapted by others or adopted unchanged can involve a wide dynamic range of variables. There are however discernible patterns and trends evident in the life of creative concepts, ideas and artefacts. Considering figure 1 above, mapping the passage of time against notional levels of perceived creative value, there are a series of definable points that typify the position with which specific examples can be considered to occupy at given points in time. For example, the green line represents a model of gradually accumulating value over time. In the case of historic art works, commercial value, scientific understanding and public awareness and appreciation can be observed to increase gradually over time. Whilst there are occasions when financial value can decline according to temporary variations in specific fashions and trends, in general terms the passage of time develops rather than erodes the perception of value in certain contexts. The

green line and projected variations thereof also represents conceptual innovations that require time before becoming either applicable or recognised.

The areas in the figure represented in pink highlight a model of creative developments with shorter lifecycles. Most notable in the commercial environment, there are numerous examples of gadget or personal accessory of definable intrinsic creative value that emerge quickly, perform strongly in the market before undertaking a marked and rapid decline in public interest. A significant example is the global phenomenon of Loom bands in 2013. A rubber band-based craft activity for children adapted from established techniques for rope making by a crast-test engineer at Nissan in 2012, the global impact of loom bracelet making culminated in the bid of over £150000 in an online auction site for a child's dress made entirely from loom bands (Dearden, 2014) before the trend quickly began to subside from public interest. Briefly flourishing as a remarkably adaptive and engaging commercial venture involving extraordinarily low manufacturing costs and high retail value, and engaging children across the world in craft-based creative activity, the example illustrates the potential for creative ideas to peak and then decline. Loom bands have not been superseded by a more engaging craft activity or incremental development of the same idea. The idea has simply come and gone.

The concentric blue hemispheres represent the longer lifecycle of related examples of creativity or domain-based fields of creative activity. Whilst physical art objects are subject to the principles of value accumulation through the passage of time—there being a distinction between the historical and antique status of Beethoven's original score and the value of the music it has long since successfully communicated, as opposed to the status of a painting and any form of duplication or reproduction—many artistic practices are identifiable within a framework of heritage but nevertheless situated within a clearly identifiable timeframe of significance and impact. Perhaps more clearly evident in some areas of modern consumerism, the lifecycle of consumer electronics tends to involve a period of early adoption followed by mainstream adoption. From creative origination, an example such as that of the modern mobile telephone can be seen to trigger competition and adaptation followed by variation and derivation. Many profound and significant examples of creativity have their day, become superseded by albeit derived but nevertheless distinct ideas, or simply become redundant. In questioning creative value, the decision about position or perspective, context or particular milieu can be significant in informing any evaluation or judgement. The model can also be seen to represent that of a creative body of work of an individual. With most artists, scientists and practitioners of other creative disciplines, there is, normally, a retrospective creative peak identifiable in any given body of work. Peaks rarely occur at the very beginning of creative careers or at the very end—except perhaps in the case of careers cut short—and consequently it is possible to map the emergence of creative quality, recognition and success over time, and, as identified earlier in this section, creativity is only ever possible to define in any detail in retrospect anyway.

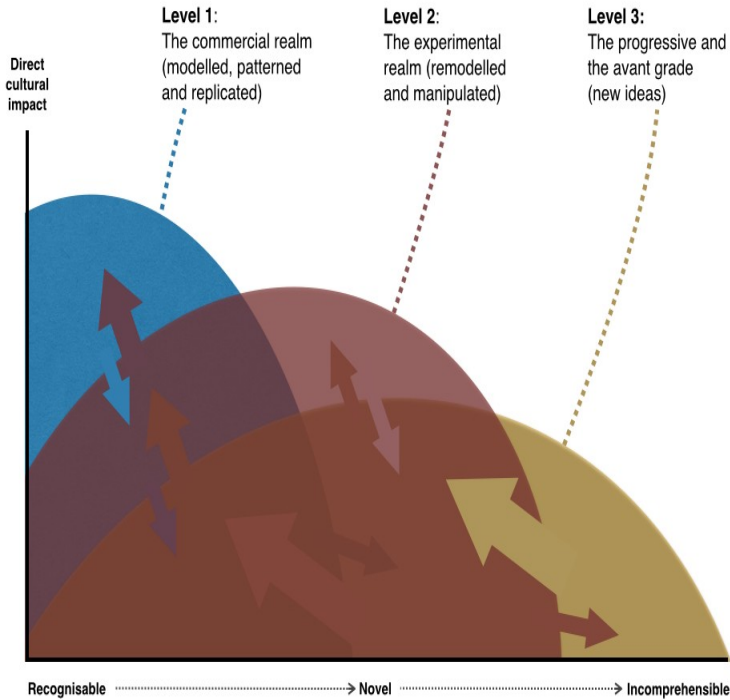


Figure 2: Conformity and creative recognition

Cultural patterns and trends with respect to the macro scale of creative judgement and recognition are also significant. Over time, cultures maintains a balance between different levels of creative activity and expression; never giving undue prominence to the most novel or unusual but maintaining appropriate space through which new ideas can emerge and feed into wider discourse and cultural experience. For example, considering Figure 2 above, developed societies predominantly maintain complex cultural networks incorporating increasingly ready access to modern everyday culture (Levels 1 and 2) and support more progressive and experimental development (Level 3) across a spectrum of activities through cultural conventions, institutions and social structures. As the novel and initially incomprehensible becomes more widely understood and ultimately adopted and adapted, the impact or immediacy of creativity dissipates and becomes normalised; the spontaneous, once

emerged, can only ever be repeated and remodelled and become increasingly mundane or adapted into new forms. With respect to creative value, creative products move in cultural space until eventually settling in a position of post-humous record. Creative value is a dynamic and unpredictable concept reliant on numerous factors, and creative assessment clearly more secure when dealing with explicitly ‘original’ utilisation of established and well understood mechanisms, conventions, materials, or frameworks, and tangibly more challenging when dealing with the unfamiliar and the unusual, open to subjectivity and interpretation. The unfamiliar is much more palatable when it ‘works’ and quite alien and certainly marginalised as a minority pursuit when it doesn’t.

Considering the anthropology of creativity: Can you be creative in paradise?

There is a common perception of a correlation between ‘happiness’ and creativity and a general conception of creativity as a ‘fun’ activity (Torncvst, 1998, p. 7). However, noting the quite common connection between hypomania and bipolar disorder and artistic and literary creativity, Furnham (et. al., 2008) conclude that satisfied contentment could even have an inhibiting effect on the emergence of creative ideas. Recognising the quite frequent connection between forms of depressive illness and prolific artistic creativity—from Beethoven to Van Gogh, Plath to Milligan—creative activity in the context of often quite debilitating personal circumstances is a common occurrence. Indeed, exploring the biographies of great composers or artists, you can be hard pressed to locate many examples of creativity emerging from anything other than challenging and compromised circumstances. Whilst many transitions in the development of human consciousness and evidence of increasing ingenuity and expression are often characterised anthropologically as being possible due to the alleviation of other pressures (domestication of fire, development of language and writing, the emergence of agriculture), creativity can emerge, and indeed routinely does so, from hostile, difficult, and essentially unexpected places as demonstrated throughout all human history (see Figure 3 on the next page).

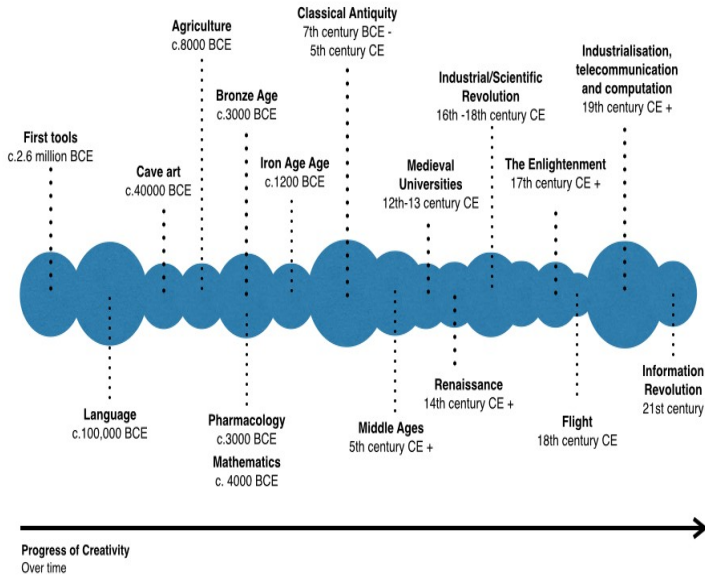


Figure 3: *The anthropology of human creativity*

There are many factors determining the level to which concepts, ideas, artefacts and actions are interpreted and recorded and creative. Some emerge ‘ahead of their time’ as with the artistic work of Vincent Van Gogh or many of the scientific developments of Nikola Tesla and become reliant on subsequent recognition and ‘impact’ as ‘prescient creativity’. Others can be forgotten and rediscovered as exemplified by the Renaissance and the resurgent interest in classical antiquity, or the later marginalisation and later re-popularisation and ‘rediscovery’ of the technically brilliant and visionary work of Bach. The Antikythera Mechanism presents an intriguing example of ‘recovered creativity’. In this case, the apparent analog computer incorporating sophisticated gear mechanisms and recording complex astrological data dating from the second century BCE is thought to represent a peak of creative scientific endeavour—potentially of the hands of Archimedes himself—at first lost through the destruction of conflict, the related knowledge was later remodelled and reintroduced through adaptation in the Middle Ages leading ultimately to the birth of the industrial age.

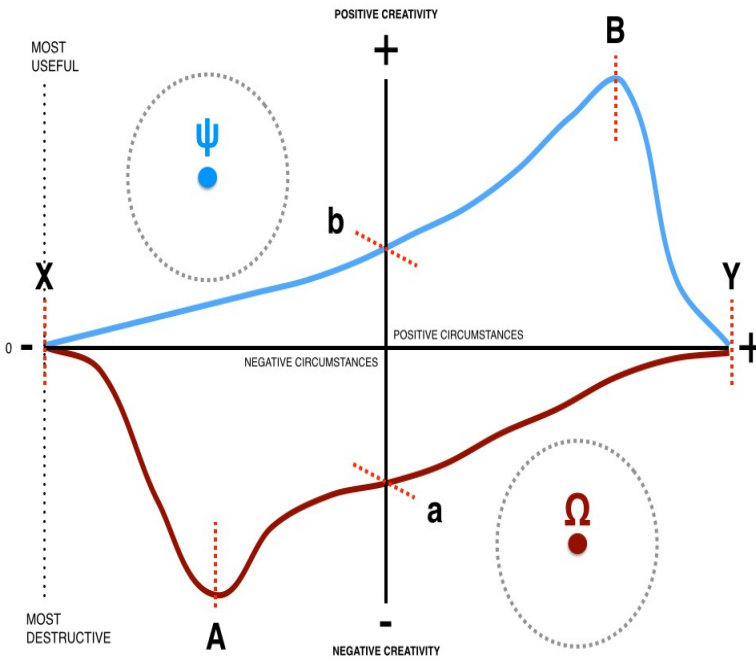


Figure 3: Mapping perspectives of creativity

Whilst positive creativity can emerge from difficult circumstances, negative creativity and the often ingenious activity of those seeking to exploit favourable circumstances for nefarious ends presents an intriguing insight as to what lies beyond a notional zero-point of creative value. Whilst global crime figures and general trends of human violence are demonstrably on a declining trend (Pinker, 2011), there remains clear evidence that an underlying section of human populations seemingly engage in broadly destructive and illegal activity to the detriment of fellow human beings no matter how favourable their own circumstances. The diagram in Figure 3 above represents a theoretical 'zero creativity' along the X-Y axis, with 'X' representing a point of complete creative inhibition, and 'Y' representing an opposing polarity of extreme creative freedom and opportunity and a position where creativity becomes unnecessary or conceptually impossible as 'everything has been created'. The vertical +/- axis represents positive and negative creativity; the former being synonymous with wider cultural definitions of positive creativity, and the latter indicative of creative endeavour designed for or culminating

in negative impact over time (immediately or consequently recognisable as both negative and creative). Examples of positive creativity in this analysis are considered to occupy a spectrum from the small scale 'Little-c' (Kaufman & Beghetto, 2009), to the profound and transformational. Negative creativity is considered to range from the relatively benign but nevertheless spontaneously creative construction of interpersonal white lies approaching the +/- intersection, to the creatively Machiavellian, sociopathic, genocidal and ultimately destructive at the opposite extreme nevertheless involving creative activity to achieve the negative ends.

Point 'B' represents a theoretical position of peak creative productivity and the ideal balance of creative opportunity. This undoubtedly varies by individual; subject to innumerable psychological, social, cultural and environmental influences, and history records a rich record of social conditions through which ideas flourish and invention is more notable and more common (Johnson, 2010). There are definable and often remarkable periods during which creativity appears to be concentrated and a confluence of creative achievements evident across numerous fields of activity (see Figure 3 above). Often synonymous with favourable socio-political structures and cultural environments, the industrial and scientific revolution following the Renaissance as well as the rapid scientific and cultural developments of the late 19th and early 20th centuries represent examples of point 'B' conditions.

Point 'A' denotes peak (or trough) negative creativity and reflects ambiguity in terms of the interpretation of the ethics of creativity in different social contexts. The use of technique and dexterity to effect the pick pocketing of members of the public driven by personal survival needs is arguably very different from the perpetuation of the same act simply for pure financial gain. In other words, actions and motivations are significant in determining the creative value of individual events or at least the interpretive positioning of the act in the context of the diagram in figure 3. Nevertheless, considering any calibration of a declining scale of creative circumstances, there is a point at which possibilities reduce to a point where capacity for any form of creativity moves towards zero. Point 'a' being the point at which individual circumstances enter the positive, most sociological studies indicate that socially destructive behaviour and illegality in particular declines as social opportunities and financial security increase.

Perhaps the two key points on the diagram are the outliers ' ψ ' (Psi) and Ω (Omega). Whilst any form of creativity represents a form of outlier for previous conventions or thought, there are nevertheless numerous examples of extraordinary creativity, both in positive and negative terms, that transcend their circumstances and force reassessment of what might be determined as creatively possible. ' ψ ' (Psi) represents those examples of socially beneficial creativity that emerge despite negative circumstances. Examples of such occasions exist in nearly every area of human endeavour and encompass a range of examples from the prodigious intellect and focused contributions to disciplines from socially unexpected backgrounds through to the emergence of

significant breakthroughs in the understanding and systemisation of mathematical or scientific knowledge.

Ω (Omega) reflects the opposite and the darker side to human intelligence and ingenuity and the Machiavellian potential of human beings towards activity and behaviours designed with negative impact on others. Leaving to one side the complexity of the issue of psychology, there being significant factors underpinning many known cases of negative creativity, there is nevertheless a clear human potential for negative creativity even under positive conditions. The tendency to disturb the status quo, even under stable conditions and when harm to others may be a consequence is an aspect of humanity that could be argued to have performed a significant role in the development of humanity and civilisation over time.

“A critic is a bunch of biases held loosely together by a sense of taste” (Witney Balliett in Barber, 1998)

Creative ethology

That creativity is ultimately a natural phenomenon is clear. Indeed, “nearly all of the interesting features of biological agents, including intelligence, have arisen through roughly Darwinian evolutionary processes” (Spector, 2006). There are numerous examples of animal behaviour, ingenuity and craft that demonstrate creativity from any standard definition in addition to the innumerable natural phenomenon considered to be aesthetically pleasing to all the senses and consequently of ‘creative value’. More importantly, the fundamental nature of genetics and evolutionary biology, and indeed particle physics, is increasingly demonstrating that spontaneous variation and generation are themselves natural phenomenon from the cosmic to the neurological scale. Whilst this position is undoubtedly subject to challenge from a theological perspective, from a scientific perspective, there is no requirement to call upon the supernatural or divine in order to account for the presence of creativity in the natural realm. Indeed, as argued by David Bohm (1996), creativity appears to be merely a natural extension of creative patterns evident in all aspects of reality distinct only by a specific level of awareness. To paraphrase Niels Bohr, humanity may simply be creativity’s way of looking at itself.

In Arthur C. Clarke’s 1962 short story ‘An Ape About the House’, Dorcas, a genetically engineered chimpanzee, ultimately becomes recognised as a portrait and landscape painter of creative acclaim. Initially manipulated by a human ‘superior’ to play an unwitting part in a complex social subterfuge through public demonstration of fabricated ‘chimpanzee art’, when freed from human control and the attempt to draw the hyper intelligent chimpanzee into human cultural practices, Dorcas eventually manifests independent creativity and craft. Recognising the increasing extent to which intelligence and

imagination can be attributed to non-human animals, Clarke highlights the key questions that relate to art as an aspect of exclusively human experience and, in the context of natural phenomenon and the aesthetics of nature, the extent to which natural phenomenon can be considered creative when divorced from conceptions of human endeavour.

The debate as to whether non-human animals have consciousness or imagination developing through the work of scientists including Don Griffin who coined the term ‘cognitive ethology’ to refer to what has become more widely established as the study of animal cognition and the nature of conscious awareness (Ristau, 2014). First publishing ‘The Question of Animal Awareness’ in 1976, Griffin began to identify numerous markers of intelligence, imagination and indicators of creativity. Research continues to identify and document in more detail examples of sophisticated cognition and innovation in the natural world. Tool use of primate species including chimpanzee manufacture and use of spears in the Fongoli savannah representing amongst the most immediately identifiable in terms of human parallels, the remarkable adaptability and ingenuity of the Caledonian Crow (Hunt, 1996), the basic mastery of sign language by great apes, puzzle solving by octopi, dolphins and squirrels, and feats of human-like memory and self-recognition in magpies, dolphins and elephants (Low, 2012) all continue to overturn traditional conceptions of a human preserve of certain psychological capacities and capabilities.

The Cambridge Declaration of Consciousness (Low, 2012) recognises “near human-like levels of consciousness”, in many animals and that:

“The absence of a neocortex does not appear to preclude an organism from experiencing affective states. Convergent evidence indicates that non-human animals have the neuroanatomical, neurochemical, and neurophysiological substrates of conscious states along with the capacity to exhibit intentional behaviors. Consequently, the weight of evidence indicates that humans are not unique in possessing the neurological substrates that generate consciousness. Non-human animals, including all mammals and birds, and many other creatures, including octopuses, also possess these neurological substrates” (Low, 2012).

Amongst the innumerable examples of craft and ingenuity in the animal kingdom (at the scale of intelligent action), the Vogelkop Bowerbird (*Amblyornis inornata*), and the Little Puffer Fish represent significant examples from an aesthetic and creative perspective. Constructing elaborate structures or ‘bowers’ in the former case and highly decorative and geometrically patterned sea bed structures in the latter, both for the purposes of attracting a female mate, the development of complex engineered structures that serve aesthetic or sensory as well as practical purposes involve aspects of novelty and adaptation synonymous with definitions of creativity, there being a

marked distinction between structures with inherent aesthetic principles over those for which aesthetic qualities are more of a consequence of other factors. Incorporating not merely the demonstration of fruit gathering prowess but also highly ornate approaches to the presentation of nuts and berries arranged by colour as decoration in addition to more straightforward scale of construction ability, bowers embody the fundamental principles of sustainable art and exhibit clear aesthetic qualities beyond the practical context involved. Equally, the structures developed by Puffer fish embody aspects of symmetry, shape and form indicative of pattern-based decorative art. Whilst the development of attentional biases or priming relating to human evolution and psychology, and the mechanisms by which creativity emerges through different contexts and conditions become increasingly well understood, if simply defined as problem solving (as it is by many), then it could be argued that the purest form of creativity is as a survival mechanism in the natural realm and the most valuable simply that which proves most effective in this respect.

Artificial creativity

Accepting, as far as the observable universe is concerned, that everything is a consequence of natural processes, the very concept of the ‘un-natural’ or ‘artificial’ represents a slight ontological challenge. Leaving aside the fact that the ‘supernatural’ remains a prevalent feature of many popular characterizations and explanations of creativity, the emotional as well as practical boundaries between humanity and technology are melting away and are subject to an increasing volume and tempo of debate. From the emerging potential for genetic pharmacology and increasing intervention into ‘natural’ processes, modern technology continues to challenge basic ethical assumptions about the boundary between the ‘real’ and the ‘synthetic’ or ‘artificial’. The biomedical sciences are embroiled in almost continued ethical debate relating to the implications of new genetic treatments whilst mechanical and pharmaceutical interventions altering the human body and human experience are becoming increasingly sophisticated and common. From the sophisticated modelling, reproduction and application of physical parts, limbs and artificial organs, the very fabric of human genetics and even consciousness are becoming more readily manipulated and altered. Perhaps most fundamentally, functioning artificial intelligence approaching is now approaching levels of human sophistication and capability including the potential to create and to originate independently.

The history of artificial creativity can be classified in several different ways. Scientific and philosophical debates about the underlying notion of creativity and design and the distinction between supernatural and natural creativity have taken place for centuries if not millennia. From William Paley’s arguments for the necessity of an intelligent designer for “complex adaptive systems” (Spector, 2006), exemplified by the history of automata

and machines imitating life as corollaries of “god the divine watchmaker who constructed them and set them in motion” (Williams, 1978), through to Darwin’s demonstration of complexity emerging through simple processes over time, and changes in scientific perspective resulting from the emergence of computation and psychology, conceptions of real and artificial continue a dynamic arena of discourse. The term ‘artificial creativity’ itself emerged through the field of computing in the 1950s and is now well established. Boden (1998), highlights the significance of artificial intelligence in creativity research, most notably in terms of the potential for increased levels of scientific objectivity and control, an example of which being the work of Saunders and Gero (2006a/b/c) who, drawing from Csikszentmihalyi’s systems view of creativity, study the dynamics of novelty selection through controlled computer algorithms.

In addition to the study of creativity through artificial systems as a means of better understanding human creativity, the level of sophistication being reached by leading AI systems is presenting a new field of anthropological research. In June 2014 it was widely reported that a computer had finally passed the Turing test and had successfully demonstrated responses indistinguishable from human intelligence under laboratory circumstances. The Turing test itself, or ‘Imitation Game’ as originally coined by Turing in his 1950 paper *Computing Machinery and Intelligence*, establishes a premise by which computing technology can be judged to have achieved a level of intelligence indistinguishable from human intelligence in controlled contexts of communication.

In many respects the readiness for human acceptance of artificial intelligence is culturally hard-wired. The humanisation of technology and capacity for emotional connection with technology is a common theme in popular culture from Baum’s eponymous *Tinman* from *The Wizard of Oz*, Robby the Robot from the 1956 MGM classic, *Forbidden Planet*, through to the significant example of R2D2 and C3PO from the Star Wars films series. Nevertheless, the underlying questions of ownership, authorship and attribution in the digital arts (what is human, what is machine?) continue to present significant challenges in the interpretation and determination of creative quality and value. Whilst the development of artificial intelligence represents a remarkable feat of creativity in and of itself, as does the considerable technical sophistication of modern computer-based tools routinely involved in the creative manipulation of media, the questions of how the presence of machinery and technology impacts on the authenticity or creative value associated with a given example can vary significantly. On the one hand, creativity emerging authentically from an AI source would undoubtedly be accepted, however ultimately interpreted, whereas where origination or attribution becomes complex or difficult to define, the attribution of creativity can become a speculative if not entirely unstable process.

The artist Vermeer presents an intriguing case with respect to the model introduced in Figure 1 considering creative lifecycles as an artist and points

of creative value. On the one hand only modestly successful as an artist during his 17th century lifetime, Vermeer was given little consideration for over two centuries before being later rediscovered as popularised in the 19th century, and, as documented by David Hockney, himself an artist who advocates the use of technology in artistic practice, identified as almost undoubtedly amongst the first to make use of optics in the achievement of photorealism in painting. For many, the use of camera obscura and inventive positioning of a mirror for the production of photorealism reduces the notion of craft and artistry associated with traditional associations of vision and artistic interpretation. With the translation to a two dimensional plane achieved via obscura and projection enabled over canvas, painting simply, albeit painstakingly, becomes a matter of mere color matching, and, as observed in the documentary 'Tim's Vermeer' (2013), a technique capable of quite accurate and credible reproduction even by an amateur such as Tim Jenner in the documentary in question. As with the issue of aesthetics, the integrity of Vermeer's work is unclear and even the attribution of techniques potentially used by Vermeer does not mitigate for the sense that perceived artistic qualities relating to his abilities have been compromised. In any form of artistic expression to which technology plays even a residual role, there will always be an element of doubt and an element of ambiguity and potential for a sense of what Osborne (2010) describes as the "fictionalization of artistic authority". The augmentation of artistic ability and the continual definition of craft and technique through technology undoubtedly involves significant and readily identifiable human expertise and creativity but also draws from the capabilities of mass produced engineering and design expertise itself a myriad of contributory components and separate creative acts.

The amazing prospect of what creativity could emerge via second-generation creativity through artificial intelligence may present challenges to traditionally humanised values of creativity. However, the concept that machine could replace humanity in the generation of the aesthetic and the artistic is clearly overly pessimistic. Technology has only ever led to a proliferation of artistic practices, never to the redundancy of practices. Furthermore, whilst many algorithms emulating the style of great musical composers continue to reach levels of sophistication indistinguishable from the 'real thing', artistic disciplines remain domains of call and response, of sharing and replication as well as innovation. That the product of interaction with technology has been absorbed in artistic practice is clear, the impact of artificial creativity would undoubtedly be an equivalent response; potentially subject to treatment as novelty at least initially, but the speed by which technological ideas can be absorbed and accommodated is generally very rapid with the sound of technology being grasped by every musician that has ever lived. The fundamentally technological nature of music extends through codification (notation), tool manufacture (organology), architecture (sound chambers), replication and reproduction (sound recording, broadcast and distribution), through which music has been an early adopter if not key driver influencing second-

dary innovations and human developments. Whilst there is a tendency to consider music and the wider arts as ‘becoming’ technological, in reality that is what they have always ever been. Ultimately, to compose beautiful music for the piano, one does not need to invent a piano or play the piano. But somebody does.

Creative integrity: Fakery, forgery and serendipity

Provenance and the origination and historical significance of artwork remains critical to at least commercial value; the death of the artist and consequent inability for continued production plus the passage of time and consequent antique status elevating certain individual paintings to auctions values exceeding \$179 Million as with Picasso’s *Woman of Algiers* in May 2015. Provenance is crucial and related discourse can work down to the very hairs on the artists’ head, the fabric of their activity and their mentality significant in the cultural decoding of their work. For example, whilst fake paintings auctioned in 2013 by what was fraudulently established as the ‘Titans of Modernism’, originally sold for over \$80 Million in New York (Cohen and Rashbaum, 2013) before later discovery of their lack of authenticity legally reduced at least their commercial value to zero.

As well as overt fakery, there is also the intriguing question of subconscious fakery and the phenomenon of serendipity and accidental discovery in consideration of creative value. From Paul McCartney’s ‘discovery’ of Rolling Stone magazine’s all time number one pop song in a dream (Cross, 2005) to Luigi Galvani’s chance observation and interpretation of twitching frog legs in 1791 most probably directly responsible for the current field of neurophysiology, and the eponymous eureka moment itself attributed to Archimedes, effortless and often mysterious insight represents a common feature of creativity and creative experience. From the unforeseen side-effects of medicines such as Viagra, originally developed as an angina treatment, to the origins of many artificial sweeteners including aspartame, saccharin, and cyclamate, and Fleming’s famous observations of the penicillium mould leading to the development of penicillin, many creative ideas and insights emerge from hidden places and unconscious processes as well as unforeseen circumstances and accidental discoveries. How might we account for creative value if even the originator doesn’t feel particularly involved in the creative act?

Characterised as the “clear and sudden understanding of how to solve a problem” (Bowden et al., 2005), insight tends to occur relative to specific domains of practice. Clarifying the preeminent position regarding expertise and creativity on any given field, Robert Sternberg observed that “one needs to know enough about a field to move it forward. One can’t move beyond where a field is if one doesn’t know where it is” (Sternberg, 2006). Implying that a certain level of creativity can only emerge with a base level of expertise whilst also recognising the inhibiting factor of routine, there is a clear case

that each of the serendipitous examples introduced earlier in this section emerge at least from their home domains and each with strong foundation knowledge and practical expertise. The inability to articulate the reasons for creative decisions, and indeed even to know in a real sense, is an experience common to all practitioners of creative disciplines. Euphemistically defining artistic vision as simply that of ‘seeing what others don’t’ (Gary Klein), intuitive creativity can often be as difficult to deconstruct or rationalize as dreaming.

“The English may not like music--but they absolutely love the noise it makes” (Sir Thomas Beecham in Barber, 1998)

Measuring and evaluating creative value

Evaluation is an inherent part of recognition in the appreciation of creativity. Ultimately, for something to be identified as creative, some recognition of creative value must be evident to the perceiver, either individual to collective. Whilst full consideration may require either time (such as for literature) or specific underpinning expertise (as with complex scientific or mathematical theorem), creativity is only creative if valuable in some respect and is creative because it is, ultimately, observed to be so.

Nevertheless, whilst recognition is significant, impact or popularity can be a questionable factor in and of itself in determining creative value given the significant level to which bad ideas have a tendency thrive. According to the most recent statistics published by Google, the top 40 most viewed YouTube videos are all commercial popular music videos with ‘Gangnam Style’ by Psi and ‘Baby’ by Justin Bieber recorded as the first to achieve over a billion views in each case. Without wanting to open a substantive debate about the aesthetic and creative value of either musical example, suffice as to say I suspect most would agree that these particular musical examples do not represent the best two examples of music available on YouTube at least, and perhaps more significantly, do not represent even closely the best of musical values produced by humanity on almost any level despite there being every potential for such a platform to provide such an output. The derision of Theodor Adorno and the Frankfurt School for the perceived qualities of the emerging youth music during the 20th century was a stark and uncompromising critique of the very aesthetic of the rapidly popularising popular song form. Aesthetics and the questioning of the integrity of artworks provides a distinctive case for considering creative value as something that can transcend impact or even operate entirely independently of reception and validation. Identifying a profoundly negative interpretation of the industrialisation of cultural production and the emergence of the ‘culture industries’, Adorno and his contemporaries developed significant arguments for the potential for and even inevitability of

the systemic suppression of creativity and originality representing the very antithesis of artistic freedom and expression. As observed by Tony Palmer, "The popular music industry has tried, repeatedly, to do with music what Ford attempts to do with cars. It works better with cars" (in Barber, 1998). Whilst there are counter-arguments to Adorno's critique and indeed numerous examples of music emerging through the commercial sector of definable musicological value and integrity, ultimately, as observed by Mencken, "No one ever went broke underestimating the taste of the American public" (in Barber, 1998).

Correspondingly, there are fields of creative activity where recognition and any meaningful appreciation of creative value requires such high levels of technical expertise or contextual knowledge that an example might be considered acutely specialised. Whilst contextual explanation and education may extend understanding over time, the pace at which creative knowledge or insight can be superseded can result in a sphere of relative isolation for creativity in certain fields. As with other examples in this text, there are again parallels between the most technical and complex in science and the artistic avant-garde. From the leading edge of theoretical physics to the most innovative and radical in art, there is a present novelty or complexity that limits or at least serves to dissipate scope for appreciation and understanding. Impact can be a challengeable basis for determination of creative value at best, and perhaps the worst indicator of related creative values in many significant cases.

There are hundreds of established tests for creativity, creative fluency, problem solving, divergent thinking, and creative value, and an increasing amount of research exploring the efficacy of different models (Cropley, 2010). Silvia et al (2012) demonstrate the integrity of self-report mechanisms including the Creative Achievement Questionnaire, the Biographical Inventory of Creative Behaviours, the revised Creative Behaviour Inventory and the Creative Domain Questionnaire, in determining creative value, whilst Plucker and Makel (in Kaufman & Sternberg, 2010) highlight the general reliability of psychometric and psychological measures. Whilst the criterion problem in any study of creativity and the inevitable paradox of novelty presents a challenge in general terms, it is possible to determine at least broad frameworks around which to approach the determination of creative value. From Boden's (1998) characterisation of three types of creativity in the improbable (1), exploratory (2) and the transformational (3), to Kaufman and Beghetto's (2009) '4C' model comprising 'mini-c', 'little-c', 'pro-c', and 'Big-C' creativity across the intuitive and everyday activity of new ideas (mini-c), development of competence in domains or fields through education and practice (little-c), professional competence (Pro-C), there are broad categories to which creative value can be related in any given context. As outlined by Amabile (1996), citing Jackson and Messick (1965), the essential nature of 'outstanding creativity' is essentially a combination of four key aesthetic responses: 1) Surprise (novelty); 2) Satisfaction (suitability); 3) Stimulation (breaking the boundaries); and, 4) Savoring (elegance and emotional

meaning).

Creativity, by definition, inherently defies complete understanding or definition and is subject to continual reinterpretation and creative value is determined by intrinsic and extrinsic factors ranging from the practical to the esoteric. As such, the determination of creative value relies upon consensual approaches where shared understanding and appreciation is to take place and the measurement of creativity is ultimately intuitive; filtered by context and experience.

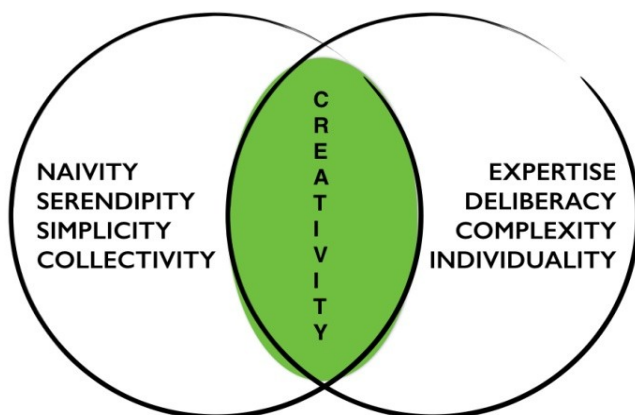
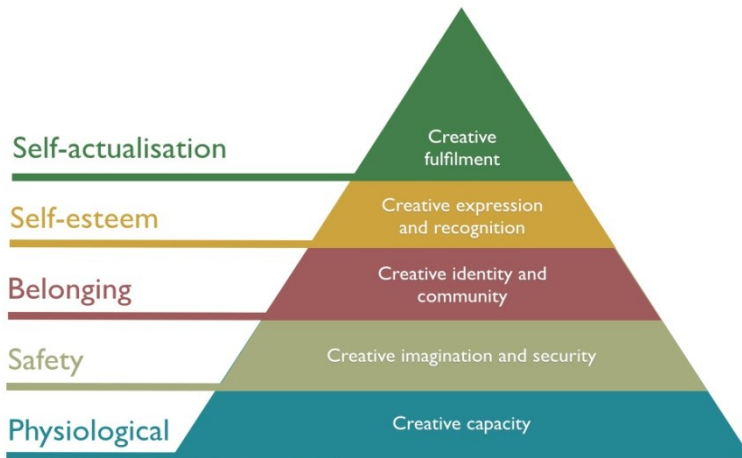


Figure 5: Considering creativity as the intersection of creative states.

For the purposes of establishing a framework for the support of creative practice in music and the development of authentic creative experience, there are number of factors that inform specific pedagogical approaches at the authors' own institution. Considering figure 5 above, In music, there is an evident and often highly dynamic relationship between technical knowledge and creative ability, with intuition, successful error and accidental discovery proving as, if not more, successful than technical grounding in the development of successful musical ideas. Rarely does prior experience with composing in a particular idiom prove a necessary condition for creative success. Pedagogic practice therefore needs to be designed in such a way as to support intuitive practice through the development of technical competence without the former becoming compromised in the context of an increasing focus on both group-based creative practice in the arts and co-creation using online tools across a range of formats and disciplines. Evident qualities can emerge through group creation and the synergies apparent in many examples difficult to attribute clearly. Nevertheless, where the objective is to involve learners with successful crea-

tive experience, collective activity can be highly successful allowing for a level of flexibility and specialisation in combination with exposure to new experiences and insights; the common experience of identifying particular features of musical compositions with students only to discover that these were unintended, unconscious, or accidental. The stunning use of block chords and harmonies can be interpreted very differently when it becomes clear this was the consequence of a cat sitting on a keyboard. The discovered and the embraced remain significant features of artistic practice and whilst overall control over a creative process will always remain the responsibility of the artist, frameworks that encourage deviation from planned courses of action or lines of enquiry need to be matched with frameworks for the acknowledgement of the unintended in creative practice. Finally, technical complexity and sophistication provide objective frameworks for the judgement at least of creative dexterity and related insight, but the quality associated with simplicity of form, of knowing what not to include, is as important in the art of composition as in any artistic domain. Recognising this, narrative about what is abandoned or precluded can also provide for an important basis by which to consider the resulting form. Less can be more.



Adapted from Maslow, A., (1943) *A Theory of Human Motivation*, *Psychological Review*, 50 (4), pp. 370-396.

Figure 6: A hierarchy of creative values. Adapted from Maslow, A., (1943).

As artists, creative experience is a primary factor in determining creative value. Whilst there is satisfaction in the completion and retrospective appreciation of a particular project, the deepest fulfilment invariably falls elsewhere 'within' the process and appreciation of the opportunity for creative

activity itself. If a baseline of creative value is attached to the capacity and space to create, and creative fulfilment used to characterise the highest levels of creative experience (see Figure 6 above), the subjectivity of personal experience remains central to the continuing paradox of creativity as an unstable and contested term. Nevertheless, it is this ambiguity and mystery that highlights perhaps the most important feature of creativity and demonstrates that the fascination with mystery, novelty and the ‘new’, is both an instinctive and natural capacity of what it is to be human.

Correspondence

Michael Brown BSc(Hons), MA, PGCE, AMusLCM, FHEA

Email: m.brown2@derby.ac.uk

Email: Chris Wilson BMus(Hons), MPhil, PGCE, SFHEA

c.j.wilson@derby.ac.uk

Department of Media and Performing Arts,

College of Arts,

University of Derby,

Derby,

DE22 3AN

United Kingdom

Authors' Brief Bios

Chris Wilson

Chris holds the position of Senior Lead in Learning Enhancement at the University of Derby in the UK and is a Senior Academic in the College of Arts. He is a classically trained musician and practitioner in the technological arts and has presented and published internationally on the subjects of creativity, artistry, technology and education. An active member of the American Creativity Association, Associate of the Digital and Material Arts Research Centre in the UK, and a governor for his local primary school, Chris teaches across a number of subjects and works to actively promote creative practice in higher education.

Michael Brown

Michael is the Programme Leader for the *BA (Hons) Popular Music with Music Technology* degree in the College of Arts, at the University of Derby, UK. He holds diplomas in both Art and Music, a BSc (Hons) degree in Software Engineering, Mathematics and Music, and a Masters degree in Contemporary Composition, which combine to serve his interest in computer creativity. He is a Principal Researcher with over twenty-five years of teaching experience, an active artist, composer and musician. As well as maintaining his profes-

sional role, he is a member of the American Creativity Association and has presented his research in multimodal creativity internationally.

References

- Amabile, T., (1996). *Creativity in Context*, Westview Press, USA.
- Ayob, A, Hussain, A, Mustafa, M, M & Majid, R. A., (2012). *Assessment of creativity in electrical engineering*, *Procedia: Social and Behavioral Sciences*, Vol 60, pp. 463-467.
- Barber, D. W. ed., (1998). *Better Than It Sounds: A Dictionary of Humorous Musical Quotations*, Sound and Vision, Toronto.
- Barrow, J. D., (2005). *The Artful Universe Expanded*, Oxford University Press, London.
- Bateson, G (1972) *Steps to an ecology of mind: collected essays in anthropology, psychiatry, evolution and epistemology*, Jason Aronson Inc. <http://www.ralphmag.org/batesonP.html>
- Beghetto, R. A., (2008). *Does assessment kill creativity?* The Educational Forum, Taylor and Francis, Vol 69, Issue 3, pp. 254-263.
- Boden, M., (1998). *Creativity and Artificial Intelligence*, *Journal of Artificial Intelligence*, 103, pp. 347-356.
- Bohm, D., (Nichol, L., Ed.) (1996) *On Creativity*, Routledge, New York.
- Bowden, E., Jung-Beeman, M., Fleck, J., & Kounios, J., (2005). *New approaches to demystifying insight*, *Trends in Cognitive Sciences*, Vol.9 No.7 July 2005.
- Clark, R. E., (2002). *Performance Assessment in the Arts*, *Kappa Delta Pi Record*, Vol 39, Issue 1, Taylor and Francis.
- Clegg, P., (2008). *Creativity and critical thinking in the globalised university*, *Journal of Innovations in Education and Teaching International*, Vol. 45, No. 3, August 2008, 219-226, Routledge.
- Cohen, P & Rashbaum, W. K., (2013). *One Queens Painter Created Forger-*

ies That Sold for Millions, U.S. Says, New York Times: <http://goo.gl/EYtLQ>

Cropley, A. J., (2010). *Defining and Measuring Creativity: Are Creativity Tests Worth Using?*, Roeper Review, Issue 72, Vol 23, No. 2.

Cross, C., (2005). *The Beatles: Day-by-Day, Song-by-Song, Record-by-Record*. Lincoln, NE: iUniverse, Inc.

Dearden, L., (2014). *Loom bands: Bids for dress made from colourful rubber pass £170,000 on eBay*, The Independent Online, Friday 11 July 2014: <http://goo.gl/AsdRnO>

Eisner, E. W and Day, M. D., (2004). *Handbook of Research and Policy in Art Education*, Lawrence Erlbaum Associates, Inc.

Griffin, D., (1981). *The Question of Animal Intelligence: Evolutionary Continuity of Mental Experience*, The Rockefeller University Press.

Hockney, D., (2006). *Secret Knowledge: Rediscovering the lost techniques of the Old Masters*, Thames and Hudson, London.

Hunt, G.R., (1996). *Manufacture and use of hook-tools by New Caledonian crows*. *Nature* 379 (6562): 249–251.

Johnson, S., (2010). *Where good ideas come from: a natural history of innovation*, Penguin Books.

Kaufman, J & Kaufman, R Eds. (2010). *The Cambridge Handbook of Creativity*, Cambridge University Press.

Kaufman, J. C & Beghetto, R. A., (2009). *Beyond Big and Little: The 4C Model of Creativity*, *Review of General Psychology*, Vol. 13, No. 1, pp 1-12.

Lebuda, I & Karwowski, M., (2013). *Tell me your name and I'll tell you how creative your work is: Author's name and gender as factors influencing assessment of product's creativity in four different domains*, *Creativity Research Journal*, Vol 25, Issue 1, pp. 137-142.

Low, P., (2012). *The Cambridge Declaration on Consciousness*. Francis Crick Memorial Conference on Consciousness in Human and non-Human Animals, July 7, 2012.

Macdonald, I., (1998). *Revolution in the Head: The Beatles' Records and the*

Sixties, Pimlico, London.

Maslow, A., (1943). *A Theory of Human Motivation*, Psychological Review, 50 (4).

Nelson, B., (1986). *Sigmund Freud on Creativity and the Subconscious*, Harper Perennial, New York.

Newhouse, C. P., (2014). *using Digital Portfolios for High-Stakes Assessment in visual Arts*, Journal of Research and Practice in Technology Enhanced Learning, Vol. 9, No. 3, pp. 475-492.

Osborne, P., (2010). *Contemporary art is post-conceptual art*, Public Lecture, Fondazione Antonio Ratti Villa Sucota, Como, 9 July 2010: <http://goo.gl/196lL0>.[http://www.fondazioneratti.org/mat/mostre/Contemporary art is post-conceptual art /Leggi il testo della conferenza di Peter Osborne in PDF.pdf](http://www.fondazioneratti.org/mat/mostre/Contemporary%20art%20is%20post-conceptual%20art/Leggi%20il%20testo%20della%20conferenza%20di%20Peter%20Osborne%20in%20PDF.pdf)

Pinker, S., (2011). *The better angels of our nature: a history of violence and humanity*, Penguin Books.

Ristau, C. A. Ed., (2014; 1991). *Cognitive Ethology: The Minds of Other Animals*, Psychology Press.

Runco, M. A & Jaeger, G. J., (2012). *The Standard Definition of Creativity*, Creativity Research Journal, Vol 24, issue 1.

Saunders, R., & Giro, J. S., (2006a). *Artificial Creativity: A Synthetic Approach to the Study of Creative Behaviour*, The Key Centre of Design Computing and Cognition, Department of Architectural and Design Science, University of Sydney, NSW, 2006, Australia.

Saunders, R., & Giro, J. S., (2006b). *How to Study Artificial Creativity*, The Key Centre of Design Computing and Cognition, Department of Architectural and Design Science, University of Sydney, NSW, 2006, Australia.

Saunders, R., & Giro, J. S., (2006c). *Artificial Creativity: Emergent Notions of Creativity in Artificial Societies of Curious Agents*, Department of Architectural and Design Science, University of Sydney, NSW, 2006, Australia.

Spector, L., (2006). *Evolution of Artificial Intelligence*, Journal of Artificial Intelligence, 170 (2006), pp. 1251–1253.

Schmidhuber, J., (2006). *Developmental Robotics, Optimal Artificial Curiosity, Creativity, Music, and the Fine Arts*, Connection Science, vol. 18 (2), p 173-187.

Schmid, D. W., (2003). *Authentic Assessment in the Arts: Empowering students and Teachers*, Journal of Dance Education, Vol 3, Issue 2, Taylor and Francis.

Silvia, P. J., (2015). *Intelligence and creativity are pretty similar after all*, Educational Psychology review, Springer, US. Feb. 2015.

Silvia, P. J, Wigert, B, Reiter-Palmon, R, & Kaufman, J. C., (2012). *Assessing creativity with self-report scales: A review and empirical evaluation*, Journal of Psychology, Aesthetics, Creativity and the Arts, Vol 6(1), pp. 19-34.

Spector, L., (2006). *Evolution of Artificial Intelligence*, Journal of Artificial Intelligence, 170 (2006), pp. 1251–1253.

Sternberg, R., (2006). *Creating a Vision of Creativity: The First 25 Years*, Psychology of Aesthetics, Creativity, and the Arts, Vol. 5, No. 1, 2–12.

Teller, R. J., (2013). *Tim's Vermeer*, Sony Pictures Classics.

Tornkvist, S., (1998). *Creativity: Can It Be Taught? The Case of Engineering Education*, European Journal of Engineering Education, Vol. 23, No. 1, 1998.

Williams, Dr J. M., (1978). *Antique Mechanical Computers*, BYTE Publications.

Wilson, C. & Brown, M., (2013). *Extending Realities: Creativity, Artistry and Technology*, in Reisman, F., (Ed.) *Creativity: Process, Product, Personality, Environment & Technology*. KIE Conference book series. ISBN: 978-1-85924-202-5.

Wilson, S., (1995). *Artificial intelligence research as art*, SEHR, volume 4, issue 2: Constructions of the Mind, Updated July 22, 1995: <http://web.stanford.edu/group/SHR/4-2/text/wilson.html>

