
Introduction to the chapters

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Recent decades have seen a resurgence of interest in creativity and innovation in the public sphere. Although the link between the two has not really been explored until recently (see Mann and Chan 2011), their reappearance, at least to a significant degree, can be attributed to a new global recognition that national, regional, corporate and commercial competitiveness now requires innovation more than ever (see Menger; De Cock, Rehn and Berry, this volume). From this perspective it is expected that creativity will spark innovation, which in turn will create a competitive edge for business (Pink 2004). Creative workers in creative industries are seen as ‘agents of urban regeneration’ while creative ideas ‘have become economically vital in late capitalism, both as products in themselves . . . and as a means of stimulating new demand through advertising and branding’ (Taylor, this volume, p. 176).¹ Yet, the ‘new’ may not always be as promising as expected nor associated with the good or a more just and equitable society, as a number of authors in this Handbook suggest (e.g., see the authors above and McGuigan; Cropley, Kaufman and Cropley; jagodzinski, this volume). Nor may it enhance democracy and freedom, historically cherished concepts associated with creativity, in the perpetual abolition and replacement of markets (Pope 2005).

This resurgence of interest in creativity and innovation in contemporary cultures, while often politically contingent, nonetheless coheres with, transforms and transcends narrowly defined or tightly measured business explanations. The recognition that education is significant in fostering creative achievements is a central concern for many governments and schooling systems even though their equivocation and its effects on students’ learning at different historical moments is also noteworthy (e.g. see Steers; Taylor; Zimmerman; Banaji, Cranmer, Perrotta; Burnard and Power; Cropley and Kaufman, this volume). The rise of networked societies and the unprecedented use of digital technologies; self branding efforts; cultural exchanges between different groups in time and across time; and artists’, designers’, performers’ and audiences’ desire for new experiences fuel surprising symbolic and material outcomes as evidenced in, for instance, the spectacle of large scale cultural performances, events and ‘bricolage’ culture (see Levi-Strauss 1966; Deleuze and Guattari 1984; Derrida 1978; and Oiyama; Smith; Scheer, this volume) or ‘remix’ culture (Lessig, 2008; see also Kawashima on contemporary copyright, this volume). This widespread interest is contributing to the creative realization of imaginative performances and artefacts and a greater differentiation and representation of political, cultural and personal voices and identities (Johnson, this volume; Brown, 2006). It occurs at a time when the forces of globalization might predict otherwise. At the same time, there is an increasing obsession with the designed and aestheticized environment which causes and results in contradictory effects (jagodzinski, this volume; Brown 2006). There is also an insatiable appetite amongst the public for Romantic images of individual geniuses or famous artists, writers, scientists, musicians, designers and chefs amongst others who have acquired the status of celebrities (Van

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Krieken 2012; see Bilton, this volume, who shows how creativity myths are appropriated by the cultural industries for their own purposes). A voracious fascination about the mystery that surrounds child prodigies in the arts, and ‘breakthroughs’ in science, engineering, design and technology also retains potency.

Though creativity research was not officially considered as a stream of research until recently, there has been a long-term fascination amongst researchers and the public more broadly about questions that concern the ‘causes’ of creativity or how creativity is manifest. Such questions repeatedly stem from Kantian and Romantic traditions (see McIntyre; McGuigan this volume), the far-reaching effects of modernity and psychological approaches to identifying and enhancing the abilities of creative persons and their processes. For instance, many old chestnuts retain some currency: is creativity a spiritual gift, a natural talent, or an ability to think laterally? However, more pressing today are questions around issues that include: How can we improve cognitive capacities to enhance creative achievement? (Mumford, Giogini, Gibson and Mecca, this volume) and ‘spread activation’? (Schubert, this volume). What *is* a creative idea? (Simonton, this volume), and how are ideas generated in groups, in particular with long-term collaboration or innovation in teams? (Paulus and Korde, this volume). How can research and development contribute to enhancing the solving of complex problems in academia and industrial environments? (Hemlin, Olsson and Denti, this volume). And to what extent does expertise matter in the rating of creative products, and can product criteria be precisely identified? (Cropley and Kaufman, this volume).

There is also a growing interest in socio-cultural causes and explanations of creativity beyond the control of the individual or groups in the production of creative performances and artefacts. For instance, in the tradition of the ancient Greeks, and again relevant today, how is an audience or spectator’s judgment exercised in deciding on whether an artefact or performance is creative? Given the opportunities that new technologies afford, to what extent does available technology and/or the *zeitgeist* of the time matter to how the creative product or performance is understood? How can works which were considered creative at one point in history have their value so radically revised at another point in time? (See Brown, this volume). Examining historical and cultural conditions and traditions provides useful ways of extending causes and explanations of creativity (see e.g. Smith; Miller; Harnow Klausen; Johnson; Chan; Gonsalves and Chan; Barker; Quemin, this volume). Linked to this research is another stream wherein the detail of contradiction, self-mythologizing, rivalry, manipulation, conflict, contingency, denial assuring actions and interactive emergences are variously recognized for their agency in real life, social practices of creativity and cultural work (e.g. see Bilton; Menger; Miller; de Cock, Rehn and Berry; Miettinen; Quemin; jagodzinski; Brown; McGuigan; Thomas, this volume).

Researchers in this volume often refer to those authors who are widely recognized for their experimental studies and theory building in creativity research and who have over time strengthened and adapted their own positions, such as Csikszentmihalyi, Sawyer, Gardner, Sternberg, Boden, Amabile, Weisberg, and, fortunately for us, Simonton, Mumford, Paulus and Kaufman, who showcase their approaches in this volume. Yet, they also repeatedly reveal the value of the importation of theories from areas as diverse as philosophy, aesthetics, literary theory and sociology into their studies of creativity. Such importations of intellectual ‘capital’ contribute to opening up the conceptual

space of possibilities while facilitating the reframing of more or less coherent or ruined orthodoxies. Authors in this volume refer to theorists including Plato (McIntyre, this volume); Descartes (Harnow Klausen); Marx (McGuigan, this volume); Kuhn (Chan; Harnow Klausen, this volume); Foucault (McIntyre; Gonsalves and Chan, this volume); Williams (Bilton; this volume); Lacan, Boyd and Searle (Brown, this volume), Bourdieu (e.g., McIntyre; Thomas; Chan; Gonsalves and Chan; Oiyama); Deleuze and Guattari (Jagodzinski, this volume); along with theorists variously associated with cultural theory, media theory, new media theory (e.g. Scheer; Barker this volume), and literary theory (McIntyre, this volume) amongst others.

This volume is in the genre of the Handbook, but it is not an encyclopaedia. It should become clear to readers, as the chapters themselves reveal, that research on creativity takes place in many overlapping disciplines. There are many researchers in diverse fields investigating and writing about creativity related topics, but they don't necessarily see themselves as 'creativity researchers'. Creativity research is evolving, not necessarily in a linear fashion with an ever-expanding pool of knowledge that converges on some 'truth'. Rather, the research area is diverse, porous, and reconfiguring itself constantly as it works with and against previous traditions theoretically and methodologically and in and across different fields of knowledge and practice (see Chan, Chapter 1, this volume).

It is the new energy and edge that makes the research area interesting to capture. It is our intention in this Handbook to showcase the diversity of creativity research at the beginning of the 21st century and the contributions these diverse approaches can make to our understanding of creativity. The authors demonstrate that the study of creativity is rich with conceptual and contextual detail, full of debate and counter-intuitive findings, and oftentimes they show evidence of contradictory outcomes and values.

Nonetheless, as McIntyre (this volume) points out, researchers often remain 'largely unaware' of how creativity research figures in other fields. As Gruber and Wallace prophetically proclaimed, what is pertinent and rare in a domain may be 'irrelevant or commonplace elsewhere' at any point in history (Gruber and Wallace 1989, p. 5). It is anticipated that this Handbook will provide a significant contribution to the literature and what we understand of creative practice in diverse fields, disciplines and domains committed to the cultivation of creative ends while also offering a springboard and trajectory for future research. It is hoped that such an eclectic approach will contribute to the exchange of ideas between researchers and those interested in different fields of creative endeavour who are committed to uncovering the 'truth' of practice, however explained.

STRUCTURE OF THE HANDBOOK

This Handbook is organized into six parts, each addressing an aspect of creativity research or a set of related research questions.

Part I: Research on Creativity

Part I provides a broad overview of the diversity and richness of creativity research. In 'Researching creativity and creativity research', Janet Chan discusses the rationale for

researching creativity, the evolutionary and contested nature of the meaning of creativity, and the variety of theoretical and methodological approaches used for researching creativity. This chapter provides both the historical context and a conceptual guide to the chapters in this volume. In analysing research as a social practice, Chan suggests that the future of creativity research lies in maintaining discipline-based research on creativity while establishing a dynamic interdisciplinary space for creativity research.

Søren Harnow Klausen's chapter 'Sources and conditions of scientific creativity' provides an overview of research on scientific creativity which involves examining the correlation of a range of personal, psychological, processual, and contextual/ environmental factors with scientific achievements. Research in scientific creativity usually involves case studies and quantitative analysis such as the historiometric approach 'championed' by Simonton (2004), (p. 34). Harnow Klausen distinguishes between different types of scientific creativity from incremental to radical breakthroughs. He calls for researchers to move 'beyond both the study of famous cases of spectacular discoveries and the conceptually indiscriminate quantitative studies'; instead researchers should conduct 'in-depth qualitative studies of the formation and development of new scientific ideas, from a wide range of disciplines' as well as 'theoretically informed and sensibly interpreted quantitative studies of the impact of organizational settings' (p. 45).

Enid Zimmerman's chapter 'Presences and absences: a critical analysis of recent research about creativity in visual arts education' provides a brief history of creativity research in visual arts education. Her account indicates that while there was international interest in creativity research in art education from the late 1930s to the 1970s, this interest subsided in the 1980s, replaced by research topics such as 'subject-matter-centered pedagogy' in the early 1980s, 'community based, multicultural art education' in the late 1980s and early 1990s, and 'global, intercultural, visual culture and arts-based practices' in the late 1990s. Although there has been renewed interest in creativity in recent years, Zimmerman suggests that there is a need for the development of a common language and diverse rigorous approaches to build a rich body of creativity research for art education.

Part II: Ways of Conceptualizing and Assessing Creativity

Part II includes 13 chapters that examine how creativity is conceptualized, represented or constructed, and how it can be assessed.

What is creativity?

Dean Simonton's chapter 'What is a creative idea? Little-c versus Big-C creativity' tries to grapple with the meaning of creativity logically by focusing on the notion of a creative 'idea', the definition of which he regards as crucial to all creativity research. A 'precise' definition of a creative idea, as Simonton points out, would require a clear definition of the criteria for judging the creativity of an idea, a valid indicator or scale for measuring each of the criteria, a formula for combining these criteria and a decision regarding who would apply these criteria (an individual or the field). To provide such a formal definition, Simonton has to distinguish between the so-called 'little-c creativity' and 'Big-C Creativity' or what Boden (2004) calls P-creative and H-creative ideas, i.e. between 'everyday creativity of the home and workplace' and 'creativity that affects a whole discipline or culture' (p. 71). In the end he decides to adopt a two-level (individual and field),

three-criterion (originality, utility and surprisingness) definition which distinguishes between fields with high consensus regarding the judgment criteria (e.g. the ‘hard’ natural sciences) and those with low consensus (e.g., the ‘soft’ social sciences, humanities and the arts). As Simonton admits, this serious attempt at formalizing the meaning of creativity still requires a great deal more conceptual development in relation to the connection between a creative idea and creativity (in terms of person, product or process), the relative weights to be assigned to the three criteria, the time lapse between an idea and its recognition as creative by the field, the dynamic nature of such judgments, and the problem of choosing appropriate judges for evaluation of creativity in some fields.

In ‘Creativity as a system in action’, Phillip McIntyre traces the development of the ‘systems model’ (Csikszentmihalyi 1988) of creativity by reviewing research approaches in different schools of psychology, sociology, philosophy and literary theory. He has demonstrated through his research and others’ in diverse areas of creativity including songwriting, creative writing and documentary production, that creativity is shaped by three main forces: the field (social institutions), the domain (knowledge system) and the individual.

In his chapter ‘Marxism and creativity’, McGuigan argues that the ubiquity of the use of the term ‘creativity’ in contemporary business and cultural policy is not only ‘empty’, but also misleading in its ‘ideological work’ to reduce culture to economy and disguise the ‘true state’ of social and economic problems under capitalism (p. 107). He is particularly critical of the renaming of ‘cultural industries’ to ‘creative industries’ and its impact on public policy in the form of ‘false promises’ to ‘de-industrialised local, regional and national economies that are desperately searching for solutions to their problems’ (p. 108). Young people who are drawn to the ostensibly glamorous and ‘cool’ lifestyle of working in creative industries are particularly vulnerable, as only a select few succeed while the vast majority are left to fend for themselves in a precarious state of employment (see also Menger, Bilton, Taylor, Eikhof, this volume). To undertake this analysis McGuigan reconsiders the value of Marx’s theories, identifying why he should be taken seriously, and considers his little known writings on Humanism and Romanticism which prove instructive for the problem at hand.

In his controversial chapter ‘Creativity as designer capitalism: Deleuze|Guattarian interventions’, Jan Jagodzinski examines creativity as practiced today under ‘designer capitalism’, arguing that the turn to creativity is a globalist ploy as disseminated by the creative industries. Using a Deleuze|Guattarian framework, Jagodzinski examines a range of cases where the contradictory and paradoxical meaning of contemporary creativity is questioned. These include consideration of the ‘liquid’ self (p. 113), where market labels and customers’ loyalty act as ways to brand an individual which can be exchanged for other labels and makeovers, like an avatar; the exercise of micro-power and surveillance post 9/11 with implications for ‘indesigned’ (p. 114) spaces including refugee camps and shanty towns where social cooperation and resistance make them ‘dangerous’ (p. 114); and the concept of Third Culture where indeterminacy becomes imbued with a spiritual self. Jagodzinski identifies how under designer capitalism ‘no longer do the few watch the many, but the many watch the few on screens that pervade our lives’ (p. 115) while raising the pressing issue of how contemporary subjects are no longer in control of their representation and where ‘the control of the technology of the image becomes a political, moral and ethical concern’.

A similar theme is pursued by David Cropley, James Kaufman and Arthur Cropley in their chapter 'Understanding malevolent creativity', which demonstrates that our conception of creativity has been tinged with a 'creativity is good' bias (p. 186), but the benevolence of creativity is by no means assured even if the original intentions were benign. Their discussion of research on laypersons' beliefs about creativity provides some thought-provoking results on teachers' attitudes towards creative students (e.g., that teachers used 'well-behaved' or 'conforming' to define creativity in students), and the relationship between tolerance of uncertainty and attitudes towards creativity (e.g., that people 'primed to be tolerant of uncertainty showed positive implicit attitudes toward creativity' and vice versa) (p. 191).

How is creativity constructed/represented?

Chris Bilton's chapter 'Playing to the gallery: myth, method and complexity in the creative process' describes how the myth of the individual genius is constructed and sustained by the art market, culture institutions, and artists themselves in contemporary societies dominated by neoliberal rationalities and commercial interests. This new cult of the celebrity artist distorts the field of cultural production by effacing 'horizontal' networks of friends, peers and collaborators and placing reliance on the 'vertical' relationships of markets, curators and collectors. Governments, markets and the public are consequently driven to invest in individual creativity rather than supporting a creative culture. Bilton provides a provocative analysis of how the label 'creative industries', which replaced the 'cultural industries' in the UK and elsewhere, has valorized the individuality of creative products through branding and the severing of artists from their social and cultural contexts. To establish a viable creative career, artists themselves are often complicit in this process of 'self-mythologizing' and commodification of their work.

David Miller, in his chapter 'Attributing creativity in science and engineering: the discourses of discovery, invention and breakthrough', cites historical and sociological studies to demonstrate how the attribution of discovery and invention in science is not a straightforward and objective process; there is much interpretation, negotiation and at times even manipulation involved in identifying the inventor/discoverer and reaching a consensus about the significance or validity of the discovery/invention. Miller also analyses the shifting language of scientific creativity. Since the late 1950s, the term 'discovery' is increasingly replaced by 'breakthrough'. The rhetoric of breakthrough is, according to Brown (2000, cited in Miller, this volume), 'a discourse co-produced by the scientific and journalistic communities' (Miller, this volume, p. 146). As this rhetoric becomes ubiquitous, Miller suggests that researchers should look beyond the role of the media to identify institutional changes in the practice and political economy of scientific research that underlie the emergence of this way of representing scientific creativity. Thus, creativity research may investigate the extent to which the funding environment for science, the audit culture, and the competition for resources may have contributed to the popularity of the future-focused and attention-grabbing breakthrough metaphor.

In their chapter 'For a critical creativity: the radical imagination of Cornelius Castoriadis', Christian De Cock, Alf Rehn and David Berry show that the meaning of creativity is a dynamic one, not simply about the nature of a product, but also a rhetoric serving certain political, economic or organizational interests. The authors contest the accepted concept of creativity as a 'socio-economic "good"', revealing how it 'has been

colonized by the cultural matrixes of power relations' (p. 150, see also Rehn and De Cock 2009). Through an analysis of the evolution of notions of creation and imagination and drawing on Castoriadis's writings, the authors advocate a more critical approach to creativity research, one that counterbalances 'the prevailing bias of optimism and even messianism' in current writing about creativity through recognizing the cultural and political contingency of creativity while working to open up its transformative and liberating potentials. De Cock, Rehn and Berry investigate how, historically, notions about creativity and the imagination are repeatedly 'subjugated or forgotten' (p. 153), but how eventually creativity moved from its earlier inferior position subordinate to reason to one 'intimately bound up with freedom' (p. 154). In both deconstructing and reimagining notions of creativity, the authors advocate a critical approach to creativity research, one that 'could develop our understanding of how creativity affects contemporary society both through its own functioning and in being marshalled by other societal forces (such as institutional, political, or corporate ones)' (p. 160).

In 'Creativity in schools: delusions, realities and challenges', John Steers documents how creativity in educational discourse has become a 'political football' in the UK. Under the Blair government, creativity became a national aspiration and its promises were far reaching: creativity, coupled with critical thinking, would 'develop young people's capacity for original ideas and purposeful action' and 'spark individual enthusiasms that contribute to personal fulfilment'; it was 'essential for the future wellbeing of society and the economy'; it could 'unlock the potential of individuals and communities to solve personal, local and global problems' (Qualification and Curriculum Authority 2007, quoted by Steers, p. 163). But by 2010, the new Coalition Government had denounced the National Secondary Curriculum and announced a new curriculum review, aimed at bringing back a cannon of 'core knowledge'. Creativity lost its centre-stage position in UK education policy discourse, but Steers questions whether creativity was ever encouraged or nurtured in schools. As Steers points out, 'in a high stakes education system with all the pressure to conform created by a standardized curriculum, standard assessment tasks, examination targets, school league tables, constant initiatives to raise standards, intimidating inspection regimes, scarce resources and limited subject-based professional development', there was in fact a tendency for teachers to play it safe rather than take risks by introducing creative learning and teaching (p. 166).

In 'The lived experience of contemporary creative identification', Stephanie Taylor cites the results of a series of interview-based studies in the UK that examines the perceived meanings of creativity and creative work among workers in the 'creative industries'. These studies found that while creative workers drew on the 'romantic image of the creative artist' as a solitary individual being totally immersed in the creative process, with 'an indefinite large commitment' of time and hard work but with 'limited reward', they also 'referred tacitly to an alternative, possibly more contemporary image, of the creative as working in connection with others, utilizing contacts and networks, continuously engaged in ongoing shared activities with other creatives and audiences' (p. 180). There was an emphasis on difference from conventional work: creative work is 'not academic', not technical or scientific, not routine or repetitive, and creative careers do not follow an 'age-stage' trajectory in terms of recognition and rewards (p. 180). For some creative workers, a 'reshaping of their creative ambition and career' into a personal project

of self-actualization or the ‘repairing the supposedly deficient self’ became the ultimate focus (p. 182).

How to evaluate creativity

The chapter by David H. Cropley and James C. Kaufman, ‘Rating the creativity of products’, provides a useful survey of the various scales and techniques that have been used for measuring creativity. Their chapter focuses on how the creativity of outcomes such as products, services and processes can be systematically and reliably measured. Using novelty, high quality and appropriateness as general features of creativity, measurements of product creativity often involve the use of expert raters or some criterion-based assessment. Products are judged according to novelty, internal criteria such as ‘elegance, complexity or logic’ or their external impact on the field (the ‘propulsion model’) (p. 198). Cropley and Kaufman are interested in whether expert raters are essential, given the time, logistics and costs involved. Results of two case studies based on Cropley and Cropley’s (2005) Creative Solution Diagnosis Scale (CSDS)—which uses 30 items to measure the relevance and effectiveness, novelty, elegance, and genesis of the product—suggest that novice raters can ‘achieve a satisfactory level of agreement’ on the creativity of a product (p. 201). However, their research and other studies have shown that correlations between novices’ and experts’ ratings were generally not high, while quasi-experts ‘were poor substitutes for experts for the purpose of evaluating overall creativity’ of technological products (p. 205). The authors conclude that when creativity is broken down into different components, the expertise of the rater is less important for recognizing a product’s novelty and appropriateness, but much more important for evaluating its elegance and genesis.

Pamela Burnard and Anne Power’s chapter ‘Issues in conceptions of creativity and creativity assessment in music education’ explores how teachers’ conceptions of creativity in music impact on their approaches to the assessment of creativity in music in schools. The authors note that while assessment is subject to different values and serves the purposes of various interested parties, including teachers, parents, and educational systems, students themselves are keenly interested in how they are assessed both formatively and summatively. Burnard and Power observe that creativity assessment is often crude in education, and particularly in music education. They outline some of the reasons why, including the ambiguity that surrounds the term creativity in education and historical precedents that link musical creativity with an individual’s (oftentimes genius’s) compositional and improvisational abilities. The authors identify how assessment can be extended to include practices that focus more on sociocultural perspectives. They examine a range of cases in the UK and Australia that includes research undertaken in small group, classroom, and community settings and acknowledge how digital technologies are changing the landscape of creativity and its assessment in music (see also Essl; Barker, this volume). They point to the need for assessment in music to be negotiated between teachers and students in ‘sensitive dialogue’ and where ‘creating and appraising become inseparable’ (p. 225).

Alain Quemin’s chapter ‘From “national creativity” to social recognition and success in the visual arts: a sociological perspective on rankings of the “top 100 artists in the world”’ examines how artists are ranked internationally in two popular publications. He draws on Heinich’s (1998) typology which characterizes contemporary art as the ‘third

paradigm' (after 'classic' or 'academic' art and modern art) where innovations such as 'playing with the frontiers of art and non-art' and transgressions are highly valued (p. 231). International rankings of artists, which began in 1970, are based on the visibility of artists as judged by their presence in prestigious exhibitions and influential reviews. Quemín describes the methodologies used in the two publications and analyses their outcomes in terms of national distribution. Both ranking systems show a high concentration of 'top artists' in Western Europe (especially Germany) and the United States. These results suggest that the power to 'consecrate' artists is still concentrated within a small number of (mainly Western) institutions.

Part III: The Creative Process

Part III consists of five chapters covering a range of research questions relating to understanding the creative process.

Michael D. Mumford, Vincent Giorgini, Carter Gibson, and Jensen Mecca's chapter 'Creative thinking: processes, strategies and knowledge' provides a summary of decades of psychological research on the effect of critical cognitive processes, strategies and knowledge on creative problem solving. The authors describe a dynamic individual process model (noting the possibility that it may apply to group creativity) that consists of eight steps: problem definition, information gathering, information organization, conceptual combination, idea generation, idea evaluation, implementation planning and solution monitoring. The model is based on the assumption that 'the combination and/or reorganization of existing knowledge structures provides the basis for the generation of new ideas that are thought to be the distinguishing feature of creativity' (p. 250). In a series of experiments predominantly using undergraduate students, Mumford and colleagues have over three decades provided a wealth of information on the complexity of creative thinking processes and the importance of 'applying requisite strategies and having available requisite knowledge' for effective creative thinking (p. 261). While acknowledging some limitations of the studies (e.g., the use of 'low-fidelity simulation tasks' such as marketing and education problems, and the lack of attention to group processes), the authors demonstrate the practical implications of this body of research for creativity training and leadership strategies for improving creative thinking.

In 'Time and the composition: creativity in modern and contemporary works of art', Terry Smith singles out three works of art that span modern and contemporary art and which he shows function as the artists' reflections of the creative process. Gertrude Stein's 1926 essay 'Composition as explanation', in Smith's view, 'not only articulates a modernist argument about what it is to compose, but it also becomes, in itself, a model of a modernist literary composition' (p. 266). Similarly, Jean-Luc Godard's *Histoire(s) du cinéma* (1988–97) presents 'a compelling visual argument about the history and nature of film' which registers as a change from modern to contemporary media and by the late 1980s is already recognized as 'the most ambitious film about film made to date' (p. 270). Finally, Smith identifies how Christian Marclay's *The Clock* (2010), a 24-hour video collage of film and television clips that tell the exact time synchronized with the viewers' real time, echoes 'the reflexivity at the core of modernist art—that form and content be one, that subject matter show itself as form. But it does this in a way that prioritizes the contemporaneity of spectatorship' (p. 273). Smith shows how *The Clock*

makes transparent Marclay's creative process—the methodical editing and remixing of thousands of digital clips about precise times (see Zalewski 2012)—but its impact is a 'derangement' of both time and consciousness. Smith's examples provide an intricate puzzle of how three artists—as highly respected individuals and practitioners working in different historical epochs—negotiate the subject of time in their creative projects by composing an experience that would 'fill their reader's, spectator's, and viewer's present with layered, jostling temporalities, with pasts, presence, and possibility' (p. 279) while drawing on their 'contemporary social composition, itself a unique conjunction', that 'compelled everyone within it to create differently than before or since' (p. 279).

Tim Barker's chapter 'Experimental research in the digital media arts' compares creative practices in digital media arts with experimental practices in science by examining three projects that apply digital technologies beyond their everyday use. The first, *Scenario*, developed by the iCinema Research Centre at UNSW, facilitates users' exploration of cinematic images and interactive narratives which takes place in a 360-degree virtual environment; the second, the compositional practice of Nick Fells, a UK based composer and academic; and the third, a 'unique environmental sensing device' by Reiko Goto and Tim Collins. For Barker, creativity and experimentalism can be considered as 'two sides of the same coin'. Experimental art is both research and art, it 'involves an artistic practice that explores, analyses, or tests aesthetic problems and concepts by experimentally applying techniques and technologies' (p. 286). However, unlike scientific experiments, experiments in the arts are more interested in providing 'a context to better understand the question, rather than providing a set of steps designed to answer the question' (p. 290). They 'create new sensory experiences that create new modes of engagement with objects' (p. 292). In this way, creativity is understood as the outcome of interactions between human and non-human agents.

An experimental approach to creativity is also found in Karlheinz Essl's 'The chances of chance – challenging creativity by chance and collaboration', where he describes his own creative process that includes engagement with chance, interaction with computer software, and improvisation with both human and non-human agents. Inspired by John Cage's concept of chance, Essl consciously relinquishes control over some artistic decisions by opening his composition process to the use of algorithms (cf. Amabile's 1996 definition of creativity which precludes the use of algorithms) such as 'automatisms, random operations, rule-based systems and autopoietic strategies' in order to 'gain new dimensions that expand investigation beyond a limited personal horizon' (p. 299). This aspect of Essl's process exemplifies what is known as the 'combinatory' approach to creativity (Boden 1999; Schubert, this volume), but he goes on to explore and exploit both social and material dimensions of the creative process (cf. Chan, Bruce and Gonsalves, unpublished) by sharing his compositional program as an open-source package on the Internet, designing his own electronic and analogue instruments, interacting with other composers and musicians, and responding creatively to serendipitous encounters. By abandoning the stereotype of the 'godlike' creator-genius, Essl's process both recognizes and institutionalizes the social and material contributions to creativity.

In 'The role of inhibition and perception in artistic creativity: a cognitive explanation', Emery Schubert proposes a cognitive model to explain the creative process of solving ill-defined problems in musical composition. His model is based on 'cognitive

units' (mental representations) and links (connections between these units) as building blocks, so that creativity is defined as 'the activation of existing mental representations via new pathways (links)' (p. 311). For ill-defined problems, Schubert hypothesizes that a creative solution involves 'the combination of activations that produces the largest possible amount of activation via the novel path', while the dissociation cognitive unit is activated to inhibit pain circuits. However, to avoid 'reinventing an existing solution to a problem', there must be within the creative process a way of checking the novelty of the solution and inhibiting the activation of unsuccessful pathways. Schubert uses four case studies (based on 'pre-existing or plausible real-life situations' p. 319) to illustrate the working of the model, which also accords with a socio-cultural concept of creativity in that the judgment of creativity is also dependent on this type of cognitive process. Schubert emphasizes that his 'metaphorical' model is focused on the cognitive rather than neurophysiological or artificial intelligence (computing) explanations of creativity.

Part IV: Practices of Creativity

Part IV consists of seven chapters that conceive of creativity as a form of practice and investigate the practices of creativity in different areas.

Neil Brown's chapter 'The ontology of creative performance and the aesthetics of design' discusses a philosophical framework for understanding creativity as a kind of performance. Brown distinguishes between different levels of performance: *protocols* (rule-following performances with the lowest level of professional autonomy), *conventional performances* (with some allowance for 'strategic and stylistic variations' to achieve practical ends, p. 327), *innovative practices* (where discoveries or designs are judged to be novel and useful by the relevant community), and *creative performances* (which often involve a 'radical reinterpretation of a field including the criteria against which the performance is judged', p. 328). The ground-breaking nature of creative performances often implies that their significance or creativity is not recognized by the community until there has been a revolutionary change in the institutional basis of judgment. In spite of the implicit hierarchy in placing creativity as the most valued type of performance, Brown notes that this is a product of the 'politics of practice' rather than a measure of some historically or culturally invariant worth. In fact, all performances take place at a particular time and place, but the attribution of a performance as creative comes after the event, and bears no necessary connection with the intentions of the performers (creators) nor the means or process of their production. Brown devotes a section to the arts as a creative performance, highlighting the historically and culturally contingent nature of the link between artmaking and creativity. The aesthetics of automotive design provides examples of how the imputation of creativity is dependent on (market and professional) judgments rather than the creative intentions of designers.

Vivien Johnson's chapter 'How to start an art centre' presents an insightful and important story of how—against all odds—Papunya Tjupi, the community-based Aboriginal-owned and directed art centre and organization based at Papunya (roughly 240 kms northwest of Alice Springs, Northern Territory (NT), Australia), became a reality. Johnson acknowledges that the case can be viewed in various ways: as 'the struggle of a creative community against bureaucratic obstacles', 'a lesson in community building at personal, social and institutional levels' (p. 340) and an expose of how art simultaneously

reactivates traditions while transforming them. One of her insights is that many key people, both within the small Indigenous community at Papunya and beyond it, shared a trust and common belief, desire and commitment to the realization of the art centre which would provide the opportunity for artists in the community to make and exhibit their artworks in this inaccessible place. By the late 1980s Papunya and the Papunya Tula artist co-operative was nationally and internationally known as the ‘birthplace of the world renowned desert art movement’, but it had declined as a centre of art production over the years despite its reputation. Johnson’s story reveals the importance of agency in creative endeavours including how she seized the opportunity of her position as a university professor to build a partnership between the College of Fine Arts UNSW and the Papunya artists and community. This partnership lent leverage for workshop and exhibition opportunities for the artists and government funding used in the building of the art centre and financing its operation. As an account by an art historian and curator who herself made art history, this chapter is a rare example of creativity research that is based on the first-hand experience of the author.

In ‘The “illutio” of the creative life: case studies of emerging artists’ Kerry Thomas examines how two art students in a university seek to reconcile their obligations to the contradictory demands of the ‘truth’ of the creative process in the institutional constraints of the art school and build their investment or ‘illutio’ in the creative life. Her study is informed by Bourdieu’s theory of practice, most particularly his concepts of habitus, capital and field. Using reconstructed narratives, which offer the reader a vicarious experience of the life of the students, she shows how they tacitly or more openly reveal conflicts between their beliefs about their creative autonomy and their actions in the often disguised but competitive struggle for scarce resources in the art school. Thomas uncovers the contradictory logics of what goes on, identifying the importance of smokescreens and compromise formations, expressions of gratitude and debts of honour and how the students’ own histories act as hallucinatory mis-en-scène taking on charismatic effects in their identities as artists. Keeping up appearances in their belief in creative autonomy becomes, along with other forms of social tact, a key marker and ubiquitous form of social knowledge that structures and orientates the students’ future actions, expectations and investment in the creative life.

In ‘Making a living from creativity: careers, employment and work in the creative industries’, Doris Eikhof provides an overview of research into the careers, employment and work in the creative industries and identifies some common patterns in employment conditions and career trajectories of creative workers. For example, the production processes of creative industries are typically project-based, where formal and informal evaluations on a project-by-project basis by industry insiders and critics ‘transform individual artistic capability into a marketable commodity’ (p. 383). The lack of employment security and fiercely competitive labour markets have led to the adoption of a range of coping strategies by creative workers, including ‘branding the self, networking and portfolio working’ (working on multiple projects or in multiple jobs) to avoid ‘famines’ (p. 385). To cope with the ‘feasts’ of work demands of ‘intensive, long and exhausting working days’ (p. 386), unsociable hours and geographical mobility, creative workers adapt by allowing life to accommodate work, often citing ‘bohemian ideals and values’—artistic freedom, work as personal fulfilment, and the desirability of being in a community of peers, etc.—as part of their aspirations. Such modes of practising creativity are not

without costs: women, older people, and those who prefer or need to support a family tend to leave the industries. The resultant narrowing of diversity and the inherent challenges of making a living from creativity belie the optimistic and glowing picture of the creative industries as promoted by governments and businesses.

In ‘Authorship and collaborative creativity in new media art’, Roanna Gonsalves and Janet Chan discuss the thorny issue of authorship in creative work that involves collaboration, in this case between artists and scientists to create new media art. The chapter describes, through the voices of interviewees from three case studies, the attractions and challenges of art-science collaborations and how expectations about authorship attribution are managed and, in one case, contested and negotiated. Authorship is a type of ‘symbolic capital’ that has widely varied meanings for participants in different contexts. Art-science collaborations occupy an emerging, hybrid field (between the arts and the sciences) where authorship conventions are ambiguous. Controversies over authorship raise fundamental questions about how authorship attributions relate to the nature of the creative process, structural inequalities between collaborators and the ethics of collaboration.

Toshiko Oiyama’s *‘Dochaku: artistic evolution at the confluence of cultures’* presents two case studies of artists—the architect Frank Lloyd Wright and the calligrapher Pierre Alechinsky—whose practices have evolved through a process of *dochaku*, i.e. adopting and adapting elements of traditional Japanese aesthetics to different cultural contexts. Using a range of secondary and visual sources, Oiyama reconstructs the processes through which Wright and Alechinsky, in their own distinctive ways, ‘exploit and explore the potentiality of foreign aesthetic elements by ceaseless experimentation, recontextualization, and eventual “indigenization” of the elements into their art, facilitating an evolution of their practice over time’ (p. 420). Oiyama’s analysis provides a nuanced framework and a refreshing perspective on how intercultural influences take place and how such influences evolve and manifest in the practice of artists.

Edward Scheer’s ‘Re-creating performance art: the rise of re-enactment’ investigates the recent history and meaning of re-creating works of art as re-enactments in performance art, or what Scheer describes as the ‘bastard child of the previous generations of the art world’ (p. 422). The chapter examines how re-enactments ‘as appropriations of appropriations’ (p. 424) from the past are framed as creative and artistic actions that can be simultaneously both different and the same as their original productions. Scheer’s analysis tests whether authenticity and originality remain central values in creative practice. He takes a range of cases including Iain Forsyth and Jane Pollard’s rock music re-enactments of the Smiths as ‘mock gigs’ (p. 425) and their *A Rock ‘N’ Roll Suicide*, a re-enactment of David Bowie’s legendary farewell performance as Ziggy Stardust; the series of performance events staged at the Whitechapel Gallery in London in the early to mid 2000s; and other recent composite performances where movements from different video/performance works take place in live re-enactments. Scheer identifies varying effects on spectators when the ‘authenticating’ presence of the original artists is missing including their incomprehension, disappointment, and emotional disengagement, but explains that ‘ultimately the post-postmodern moment in culture is not marked by a return to presence but a dispersal of presence across the acts and archives’ (p. 430).

Part V: Conditions for Creativity

Part V consists of three chapters examining the conditions that engender creativity and those that impede its development.

Reijo Miettinen's chapter 'Creative encounters and collaborative agency in science, technology and innovation' reviews the literature on innovations and presents a model of collaborative creativity focused on creative encounters in product development. A creative encounter is 'an event or process in which two or more persons representing different organizations meet face to face and recognize the complementarity of their expertise and resources for the creation of a new artifact that can solve a contradiction in a human activity' (p. 439). His model, which is 'simultaneously structural and processual' (p. 439), consists of three components: (1) the source of change is the development of a contradiction or dilemma in relation to an activity, (2) an encounter with a partner then leads to the formation of a 'shared object idea as a solution' and the emergence of a joint project, and (3) this partnership is made possible by the 'complementarity of the expertise, resources and interests of the partners' (p. 439). Miettinen illustrates his model by presenting a case study of how problems with an immunodiagnostic method using radioactive isotopes led to a collaboration between the research manager of a manufacturing company and a university medical professor, and the eventual development of a new method using fluorescence compounds instead of radioisotopes. The process required a great deal of experimentation and the mobilization of knowledge and resources of the two partner organizations. Miettinen suggests that this type of 'interactive emergence' or 'generative relationships' is central to innovations in the knowledge-based economy. In his view theories of creativity need to move away from explanations that are based on individual motivation and a static conception of social networks. Creative collaborations are more likely to be motivated by the development of objects or techniques than individual intrinsic motivation. Similarly, social networks are dynamic and mobile, sustained by 'historical layers of product-specific collaborative relationships' rather than some fixed links and positions (p. 446).

In their chapter 'What's stopping us? Barriers to creativity and innovation in schooling across Europe' Banaji, Cranmer and Perrotta provide a litany of what 81 educational experts from 27 European countries reported in interviews as barriers to creativity in school education. These barriers include a range of structural factors such as lack of funding, poor remuneration for teachers, inappropriate learning and assessment regimes and inadequate support for technology. They also involve some philosophical or ideological assumptions about the importance of individual assessments using knowledge-based tasks, the obsession with 'league tables' (see also Steers, this volume) that compare school performance based on standardized examination results, and the belief that creativity is only relevant for elite students or for arts-related subjects. The authors conclude that to foster creativity and innovation in formal schooling requires increasing government funding, improving education curricula and reforming teacher training so that the practice of school education is better aligned with the rhetoric of creative learning and innovative teaching. The impediments to such reforms are formidable, especially among countries with precarious economic conditions and cultures that value 'transmission' modes of teaching.

Nobuko Kawashima's chapter 'Copyright as an incentive system for creativity? The

case of contemporary visual arts' examines the rationale behind copyright laws and explains why they may be inappropriate for visual arts. Unlike reproducible mass-marketed products such as music and literature, visual arts objects are valued for their uniqueness. Contemporary visual art practices such as site-specific installations, conceptual art and collective/interactive works are also unlikely to be protected by copyright. Citing recent research data that showed that UK visual artists earned around £60 in median royalties income per year, Kawashima suggests that copyright does not provide economic incentives for visual artists and may even impede creative expressions in contemporary practices that involve appropriation. In her view, the design of effective policy for supporting visual artists requires a deeper understanding of how artists make their living and further investigations into how different types of incentives interact with each other.

Part VI: Leading/Managing Creativity

Part VI consists of four chapters that continue the theme of how creativity can be fostered by examining the role of policymakers, research leaders and managers.

In 'European cultural policies and the "creative industries" turn', Pierre-Michel Menger traces the evolution of cultural policies in Europe from their origins in the doctrine of the welfare state to their current dual emphasis on 'preserving and promoting heritage' and 'bringing the creative industries at the core of the so-called knowledge society' (p. 479). Cultural policies are defined as 'a systematic collection of actions and measures taken under ministerial authority and under the aegis of a specialized administration, and associated with local and regional authority action' (p. 479). While there have been variations in how such policies are administered, Menger suggests that the broad aims of cultural policy in European countries have been similar. The evolution of cultural policy generally follows four distinct phases from a universalist definition of culture (associated with 'high culture') and the principles of excellence and democratization (equal access) in the 1950s, through gradual decentralization of administration and pluralization of the definition of culture (towards cultural identity and community-based culture) in the 1960s to mid 1970s, to the acceptance of free-market 'new public management' strategy for supporting culture in the UK (noting, however, a more protectionist trend in French cultural policy) through the 1980s, and finally the shift to justify cultural policy in terms of economic growth and technological innovation under, for example, the 'creative nation' idea of the Keating government in Australia in the 1990s. With the emergence of 'creative industries' came the 'consecration of key values associated with creativity: a flexible and compliant personal approach, an appetite for risk, the ability to cope with the unexpected, lateral and intuitive thinking, the championing of diversity within teams', together with a Paretian profile of earnings: 'four fifths of earnings and amounts of work are enjoyed by less than one fifth of professionals' (p. 488; see also Eikhof, this volume).

Paul Paulus and Runa Korde's chapter 'How to get the most creativity and innovation out of groups and teams' investigates creativity and innovation at the group or team level. Their research evidence suggests that creative collaboration can have negative as well as positive effects on creativity: while 'production blocking' and 'evaluation apprehension' can block creativity, allowing more time, mixing group sessions with individual

ideation sessions, using computers for larger groups or ‘brainwriting’ (exchange of ideas by writing) can all provide benefits for the generation of creative ideas. Paulus and Korde’s results have implications for strategies to increase group creativity. In general, research on group creativity has highlighted the cognitive, social and motivational processes that influence the generation of creative ideas, but, as the authors point out, this research has mostly been limited to the study of ‘ad hoc groups of students in short time periods on assigned problems’ (p. 503). The authors suggest that there is a need for longer term studies that examine team performance in natural work settings, studies that cover a range of creative domains such as engineering and the arts, and studies that evaluate the benefits of cultural diversity in teams.

In ‘Creativity in R&D’, Sven Hemlin, Lisa Olsson and Leif Denti review the research literature on how creativity in research and development (R&D) can be achieved by examining factors at three levels: individual, team and organization. Using a product-based definition of creativity and adopting an integrated approach (combining macro, meso and micro analysis), the authors summarize the findings of a diverse field of research into *individual* characteristics conducive to individual creativity in R&D environments (expertise and creative thinking and intrinsic task motivation), *team* factors predictive of team innovation (support for innovation, participatory safety, vision, task orientation, cohesion, internal and external communication, and leadership), and *organizational* preconditions for creativity (a supportive environment, including encouragement for innovation, sufficient resources, access to expertise and information, autonomy, and an empowering leadership style). Their review suggests that organizational factors are mediated by individual attributes such as creative self-efficacy and personal initiative. The authors conclude that while further research is much needed, existing research has raised a number of critical issues for understanding creativity in R&D: that R&D teams require expertise in relevant domains, that the creative process is complex (see Mumford, Giorgini, Gibson and Mecca, this volume), that personal and team motivation, team climate, and leadership are all important drivers for creative outcomes in R&D work.

In ‘Leading science: the role of research leaders in scientific creativity’, Janet Chan takes a sociological approach to the understanding of scientific creativity. The chapter draws on an empirical study of scientists working in an Australian research centre and examines how research leaders shape and negotiate the field of scientific practice—the strategic and pragmatic actions they take in establishing structures and processes that engender collaboration amid competition, maintain autonomy within a tightly controlled environment, and encourage free exploration within a highly focused research program. The case study demonstrates the importance of research leaders’ appreciation of the politics of scientific creativity and their capacity to balance freedom and constraint in managing collective creativity.

NOTE

1. The persuasive roles of technology and forms of production, education and the up-skilling of workers, collaboration and multidisciplinaryity are often considered as ‘the new’ under this corporate conception of creativity. However, it is more often than not the case that these associated concepts have long been recognised as playing a critical role in the making of creative performances and novel artefacts but perhaps in less market driven or commodified ways.

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