The Possibilities of Creativity

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Edited by

Peter O'Connor

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Dedicated to the O’Connors of and from Cordal

TABLE OF CONTENTS

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CHAPTER ONE

INTRODUCTION: WHEN THE RAIN IS BLOWIN' IN YOUR FACE

PETER O'CONNOR

Learning from Children

As a teacher I know I have learnt most richly from the children I teach. There is much for us to learn about creativity by wondering about what children know intuitively about it. I often work with young children (four- to six-year-olds). Together we make pretend worlds in drama. I begin by asking them to "warm up their imaginations" by rubbing their hands together and placing their warmed hands where their imaginations live. Many put their hands on their heads. Others choose their hearts. Some place one hand on each. Once I watched a four-year-old boy put his hands on his legs. When I asked "why did you put your hands on your legs?" he responded: "that's where I keep my imagination, because I dance a lot." Some children whirl their hands in the air, showing that, to them, creativity is not *in* them, but *around* them.

Though the exercise is simple, the questions it raises are profound. Where does creativity come from? Where do we keep our creativity? Can you really "warm up" creativity? Are there places where creativity gets cold and therefore cannot be used? Beyond the individual, where do we keep creativity as a community? A society? A nation? A world? Who keeps collective creativity warm? What happens if we do not keep it warm? What do we risk losing?

This book attempts to answer some of these questions, understanding that creativity is something we might talk a great deal about, but we are still seeking to find ways to capture it, to understand and represent it. And to begin to understand creativity, there is perhaps no better place to start this book than to talk about the central importance of play in the creative process.

Children think and learn through their bodies. We adults call it "play." They think of it as their work. They independently demonstrate this embodied learning from a young age. A three-year-old boy who wants to understand his mother does not Google the term "mum." He does not conduct an enquiry project, or use any technique resembling traditional academic "research." He does something far simpler, but also more richly complex: he goes to his mother's wardrobe, pulls out his mother's shoes and walks around in them. This process is not only active, but involves the entire body. That little boy does not sit off in the corner and *think* about what his mother might be; he recreates her, using every part of his own small self. By literally putting themselves in someone else's shoes, children embody that other person mentally and physically. Pretending to be mum allows a child to explore how—and who—"mum" really is and, perhaps more importantly, to think about his relationship to her.

A little boy enacting his mother's role begins to experience things from her point of view. This ability to see from different perspectives is important to developing understanding of the world. Recent research into creative enactment indicates that the imaginative projection of putting yourself in someone else's place is central to learning. It is through playing at being that we learn how to be. Such play also helps children define themselves in relation to others. From "being" his mother, the small boy can imagine how his mother might see him, which expands his self-awareness.

Play as a form of creative work is vital to human survival, both at an individual and social level. I understand this from my own personal experience. When my own daughter was three, she had a particularly bad winter. She was hospitalised more than 30 times because of severe attacks of asthma. In the early hours of the morning, she woke and was unable to breathe: it was terrifying for her and for us as her parents. We would ring the ambulance to collect her (and us) and deliver us to the hospital, where the medical staff would work their magic. They would put an adrenaline drip into her little hand, and we would wait. And wait. When the adrenaline began to kick in, my little girl would start to breathe easy again. And so would we. When we passed the longest night of the year, we were touched by the hopeful thought: "spring is on its way. Everything will be better; it will get warmer and be better for her lungs." Indeed, that is what happened. My daughter's physical health improved, and we learnt to sleep again.

In the middle of spring, I passed my daughter's room and saw her sitting with her favourite toy rabbit. She was holding its paw in her hand, and I heard her say, "it's okay, rabbit. I'll put this in your paw and that

will make you better." She needed to process the trauma of the previous months and the best tool available to her was creative play. The scene she created was not simply cerebrally "thought out" inside her head, but enacted with her whole being. Significantly, when she re-envisioned her experience, she also revised it: she was no longer the patient, but the doctor. Through switching roles, she empowered herself and gained control of the situation that had scared her.

That moment was a revelation to me of the strong connection between play and creativity. My daughter, like all children, knew instinctively that imagination offered a way of making sense of the world that was confusing and frightening to her. Once she had processed those anxieties, she was able to move on from the game. Her response to that experience illustrated that playing out and 'reordering' experience is a key way for humanity to make sense of the world, especially in times of hardship and hurt.

Creativity for Survival

The 21st century world is, for many of us, a place that does not make a lot of sense. That being the case, the creative thinking process becomes vital. Creative play, as my daughter illustrates, is an enabling process. It allows people to "recast" themselves, both perceiving and projecting themselves differently. In imagination, anyone can be a judge, a sculptor, or an All Black. Experience can be broadened beyond our physical skills or circumstances to allow us to move outside standard expectations of what is possible or permissible. At times when the world is at its most threatening we see time and time again that creativity provides a way to cope, to manage to survive.

BIRDSONG
He doesn't know the world at all
Who stays in his nest and doesn't go out.
He doesn't know what birds know best
Nor what I want to sing about,
That the world is full of loveliness.

When dewdrops sparkle in the grass
And earth's aflood with morning light,
A blackbird sings upon a bush
To greet the dawning after night.
Then I know how fine it is to live.

Hey, try to open up your heart
To beauty; go to the woods someday
And weave a wreath of memory there.
Then if the tears obscure your way
You'll know how wonderful it is
To be alive.

(Anonymous, 1941)

This simple text contains several ideas relevant to the creative process. The poem implies that the more experience people have, and the greater their engagement with the world, the more open they will be to new prospects. From the confines of the nest it is impossible to know what is to be found out in the world. Because the end point is not necessarily evident at the beginning of the journey, the only way to move forward is to embark and allow insight to occur through the process of exploration. The key to discovery is really engaging with what is there – noticing the detail, marvelling at the extraordinary miracle of a sunrise. The poem seems to suggest experiencing each day fully and joyfully is the ultimate act of creation.

Contextualising this poem adds further richness to its message. The author was a child, writing in 1941 in Terezin, a small town in the former Czechoslovakia. Between 1938 and 1945, Terezin housed more than 160,000 Jewish people in a concentration camp. One hundred and thirty thousand of the camp's inmates were children, so Terezin became known as the "children's concentration camp." Only 116 children imprisoned in Terezin survived.

During those years, people managed to smuggle art materials into the camp so that the children could paint, draw and write. This anonymous child, given the chance to create something while inside a concentration camp, wrote that "the world is full of loveliness." What prompts a child in that set of circumstances to turn away from documenting what they are seeing and experiencing, and focus on the loveliness beyond? It can only be the knowledge (conscious or otherwise) that creative thinking is not peripheral or optional, but central and vital to human experience. The child's poem asserts the existence of life outside the horrors of the concentration camp, and the continued existence of love, joy and celebration of life within the occupants of that camp.

The child's refusal to allow context to dictate the nature of their creative response resonates with the words of Viktor Frankl, who also experienced the horrors of Nazi concentration camps first hand. In *Man's Search for Meaning,* Frankl wrote, "Everything can be taken from a man

but one thing: the last of the human freedoms – to choose one's attitude in any given set of circumstances, to choose one's own way."(2006, 74).

The anonymous author of *Birdsong* shows that power of choice. In writing, the young author privileges the role of "poet" over the role of "prisoner," and exercises the right to speak from within a situation that seeks to silence. It is unclear to whom the poet is speaking (perhaps the guards? the other children?) but the poem's plea is clear: use your creative capacity to see the miraculous beauty of life, wherever you are.

In a place of chaos, creative thinking becomes a tool for survival. The act of making asserts humanity. Moreover, the product made survives beyond the maker. Though the young writer of *Birdsong* died anonymous, his or her voice can still be heard through the poem. Thus creativity—particularly in the arts—provides a link between humanity and immortality. As Shakespeare says in the final line of Sonnet 18: "So long lives this, and this gives life to thee." Here he shows the poet's power: while the sonnet exists, the woman who is its subject (along with the poet who penned it) remains alive in memory. Five hundred years after her death, the woman's temperance and loveliness are still as evident as the day the sonnet was written. The author illustrates—through choosing to write, and through the choice of message—that creative thinking can be a kind of salvation.

This suggests the important link between creativity and spirituality. The act of creativity usually presumes a creator. Human origin stories all work on this principle: the world began with a divine spark that brought something new and extraordinary into being. On the Sistine Chapel ceiling Michelangelo depicted this in the touching of God's finger to Adam's, showing the spark being passed to a mortal man.

Creativity and Hope

Within today's confused and challenging global context, new instruments are crucial to achieve social and political change. In his article entitled "Welcome to postnormal times" (2011) Muslim leader, academic and journalist Ziauddin Sardar writes:

> The *espiritu del tiempo*, the spirit of our age, is characterised by uncertainty, rapid change, realignment of power, upheaval and chaotic behaviour. We live in an in-between period where old orthodoxies are dying, new ones have yet to be born, and very few things seem to make sense. Ours is a transitional age, a time without the confidence that we can return to any past we have known and with no confidence in any path to a desirable, attainable or sustainable future.

The article goes on to detail the three key issues humanity faces today: *complexity*, *chaos/crisis*, and *contradictions*. Sardar says, "complexity, which has as much impact on physics and biology as on ecology, economics, security and international relations, teaches us an important lesson: the notions of control and certainty are becoming obsolete. There is no single model of behaviour, mode of thought, or method that can provide an answer to all our interconnected, complex ills." Chaos is clearly evident in everything from the knock-on effect of terror attacks to the global financial implications of share-market fluctuations. The third c, contradiction, is "the natural product of numerous antagonistic social and cultural networks jostling for dominance." It includes the ironies of modern global society: increasing ignorance despite unprecedented access to knowledge and information; increasing social inequity as societies get wealthier; 850,000 people going to bed hungry in a world of superabundant food. Having outlined this trifecta of human issues, Sardar goes on to argue that:

> The most important ingredients for coping with post-normal times… are imagination and creativity. Why? Because we have no other way of dealing with complexity, contradictions and chaos. Imagination is the main tool, indeed I would suggest the only tool, which takes us from simple reasoned analysis to higher synthesis. While imagination is intangible, it creates and shapes our reality; while a mental tool, it affects our behaviour and expectations. We will have to imagine our way out of the postnormal times.(2011).

Creative thinking sits at the heart of hope. Whenever we work creatively—in any aspect of human endeavour—we are engaged in a process of reimagining the world. Because of this, creativity is therefore a tool of political resistance. In fact, creative thinking IS resistance: it insists on the existence of beauty, of imagination, of possibility, beyond an existent order. When a dictatorship wants to shut down political opposition and resistance, the first people they silence are the artists. Why? The artists—the creative thinkers—are those who can move beyond the world as it is, and imagine it as different and better. The first people who speak out are the artists. This makes them dangerous people. Political resistance is the impetus (that is, the creative force) behind a great deal of modern music. Scientists likewise challenge the status quo, imagining "what if…?" and moving beyond the sphere of the known and accepted. All progress hinges on creative thinking, because creative thinking is resistance to the way things are.

Creative thinking belongs to us all. Human beings do not have to be taught how to create, imagine or pretend—those skills are innate, and

evident from a very young age. Creativity is not just the domain of "creatives." We all improvise our lives every day. When we wake up in the morning, we have no idea what lies ahead of us; we make it up as we go along. Creative engagement offers an active and embodied thinking practice that fosters empathy and understanding, allows transcendence, encourages novelty, sets up surprising combinations, and enables change and development at every level from the personal to the global.

Creative thinking is not peripheral to human experience. It is crucial to every aspect of human endeavour, and the responsibility for "keeping it warm" falls to us all.

Introducing the Book

The writers of this book have all been intimately involved with the Creative Thinking Project (CTP) at The University of Auckland. Professor Jenny Dixon, in chapter one, details the history of the project and contextualises this book as a significant development in a unique project that has placed creative thinking into the centre of national debates. Each author was given a wide brief: to write as they were moved to by the title of the book. The end result is a multi-disciplinary view of creativity. Not surprisingly there is much the writers agree on. Yet within the book the different nuanced answers to the key questions about creativity surface. The wonder of books that cross disciplinary boundaries is that these different ways of knowing the world present different ways of considering and responding to different questions.

The book opens with three chapters by University of Auckland Creative Fellows. Emeritus Professor Michael Corballis's chapter helps to explain neuroscience in easily accessible language and to consider the relationship between the brain and creativity. His ideas around mind wandering and creativity challenge much of the orthodoxy about mindfulness. Professor Janis Jefferies' chapter attempts to answer three difficult questions about creativity: Why is creativity at the heart of everything we do? What is creativity in the first place? What does it mean to live a creative life?

Curt Tofteland shifts the debate to poetically consider the manner in which creativity might make a difference to those incarcerated. He considers how Shakespeare behind prison bars might ultimately be liberating of the human spirit.

Dr. Peter V. Rajsingh's chapter eloquently stretches across many of the current debates in creativity. He suggests that "creativity is exploration and it is through exploring creativity's many facets and tributaries that we

come to know creativity and ultimately ourselves and others more fully and completely. Therein lies creativity's extraordinary potency and value."

Associate Professor Peter Shand's accounts of three separate performance arts events and what they tell us about contemporary art remind us that, although creative thinking exists across all disciplines, it finds a particular home in the arts. Rob Gardiner's chapter then delicately explores the manner in which drawing provides a way for creative thinking to be realised in, and through, the body. His final comment, that access to creative thinking only requires a pencil and paper, is a challenge to us all to play again.

Dr Molly Mullen and Katherine Yearbury's chapter reminds us that creativity is not solely an individual process aligned to the production of goods for sale, but is central to how communities might begin to question and create themselves.

Bruce Sheridan leads us into a discussion about the role and nature of education in the creative process. His optimism for creativity and the human spirit is found in the closing sentences of his chapter: "it is our creativity, the least algorithmic force in the known universe, and its myriad manifestations, that will continue to guarantee our place, our purpose, and our power."

Professor Michael Anderson and Dr Miranda Jefferson provide some answers as to how creativity might be actively taught in classrooms. They challenge the notion that creativity cannot be taught and they offer a meaning marker, the "creativity cascade", as a way to understand how classrooms might be transformed into places where creativity thrives. Novelist, short-story writer and academic, Dr Paula Morris wonderfully subverts the whole book by suggesting that the way to creativity is not through ideas. We are back to mind wandering. We are reminded in her playful writing that our quest to unravel the mystery of creativity does not need to be a solemn and serious affair. There is always time and a need to be playful.

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CHAPTER TWO

IN THE BEGINNING… THE EVOLUTION OF THE CREATIVE THINKING PROJECT

JENNY DIXON

The Creative Idea

The Creative Thinking Project (CTP) was born over brunch. At an event hosted by the University of Auckland's National Institute of Creative Arts and Industries (NICAI) in November 2010, an art aficionado and advocate, Robert Gardiner (ONZM; CNZM), had a conversation with Amy Malcolm, the University's Development Manager (Special Projects).

As a founding trustee of the Chartwell Trust and a life-long supporter of the visual arts, Robert has ever been passionately committed to disseminating information about the personal and social value of creative practice. He and Amy discussed a dream scenario for communicating that passion: an international conversation about the nature and meaning of creativity, and how creative thinking could be fostered in individuals and society. The pair brainstormed ideas and questions about how this initiative could be realised. Further, how would one position creative thinking as central to education and business?; how may creativity be enhanced by research into creative thinking processes and practice; and how can creativity be fostered across multiple disciplines and areas of endeavour?

That conversation continued over the following months, initiating several years of challenging and exciting work. Robert and Amy honed their vision and brought in like-minded people from the University and beyond to contribute to their discussion and plans. This burgeoning team began trying to define "creativity" and "creative thinking" and delineate parameters for a potential project. Eventually, the group decided it did not need to have all the answers before launching its initiative; it resolved to

begin a project of exploration that could grow organically and be refined during the process of discovery. The Chartwell Charitable Trust offered financial support to fund the requisite infrastructure.

In 2011, the CTP was formally established. A Board was set up with Robert Gardiner as Patron. The Board aspired to highlight and explore creative thinking in its myriad manifestations and demonstrate the social and economic benefits of creativity. Three specific aims/goals were identified:

- to deepen current understanding of the creative process so everyone can engage in it;
- to promote creativity as central to an individual's wellbeing and development; and
- to promote creativity as central to a community's wellbeing and development.

Three streams of activity were set up to begin progressing toward these goals. The first was a Creative Fellows programme which would bring internationally acclaimed experts from various fields to inform New Zealand audiences about creative thinking relative to their field of expertise. The second stream was to foster research with the assistance of the Creative Fellows who would help to identify potential research topics. The third was to introduce creative thinking as a general education course in the University's curriculum.

The CTP drew together committed philanthropists, academics from a broad range of science and humanities disciplines and other, forward-thinking individuals in the private and government sectors. The group includes:

Professor Jenny Dixon (University of Auckland) – Board Chair and Deputy Vice Chancelor (Strategic Engagement)
Robert Gardiner ONZM;CNZM (Chartwell Trust) – Patron
Amy Malcolm (University of Auckland) – Director of the Creative Thinking Project
Pip Anderson (University of Auckland) – Creative Thinking Project Administrator
Christine Fernyhough, CNZM (Fernyhough Visual Arts and Education Trust)
Sue Gardiner (Chartwell Trust)
Professor Peter O'Connor (Faculty of Education and Social Work, University of Auckland)

Professor Michael Parekowhai (National Institute of Creative Arts and Industries, University of Auckland)
Dr Mark Sagar (Auckland Bioengineering Institute, University of Auckland)
Dr Peter Shand (National Institute of Creative Arts and Industries, University of Auckland)
Associate Professor Cathy Stinear (Centre for Brain Research, University of Auckland)
Associate Professor Nuala Gregory (National Institute of Creative Arts and Industries, University of Auckland)
Chris Williams (King Street Advertising)
Louise Callan (researcher/writer) and Amber McWilliams (writer).

Wider support networks include: partnerships with Auckland Art Gallery; Auckland War Memorial Museum; Te Papa: Museum of New Zealand; Creative Waikato; Govett-Brewster Art Gallery; Puke Ariki; Saatchi & Saatchi New York; and Arts Access Aotearoa. Without the commitment and support of the above individuals and organisations, the CTP would not have gained the traction and profile it now enjoys.

To advance its aims, the CTP established a Creative Research Fund to support selected initiatives undertaking research into creativity in a variety of contexts. The fund thus serves to bring philanthropists into contact with scientists, philosophers, educators and artists.

The use of social media has allowed the CTP to spread its message nationally and internationally. The CTP website (www.creativethinking project.org.nz) (launched in May 2014) and a Facebook page (launched a year later) have been key communication channels. Facebook followers can find out about events, access a curated collection of international stories about creative practice, and contribute to the discussion by posting comments and content. The CTP website provides formal event details, articles about each Creative Fellow, research findings, and video interviews. These online "creative conversations" offer engaging insights from the Creative Fellows and other practitioners in diverse fields. These include Anthony Hoy-Fong (New York based celebrity chef), Dick Frizzell (New Zealand artist), Roseanne Liang (playwright and University of Auckland Young Distinguished Alumna), Julie Maxton (Director of the Royal Society) and Kevin Roberts (Worldwide CEO of Saatchi & Saatchi).

The CTP has also provided a theme for the University's alumni events programme in New Zealand and abroad. University academics on the Board and Creative Fellows have fostered inspiration in alumni and

friends in locations such as London, New York, Sydney and Melbourne, as well as a raft of New Zealand cities.

Contribution from creative communities has been central to the success of the Project. Through professional networks, Dr Peter Rajsingh (Chair, Board of the Friends of The University of Auckland in the United States) connected with the world-famous singer/songwriter Bob Dylan. In October 2014, at a glittering launch event at Saatchi & Saatchi's New York offices, organised by the University and New Zealander Jane Sutherland (Arts Advocate for Saatchi & Saatchi Worldwide), Dylan was announced as Patron of the Creative Research Fund. He was also honoured as the Project's inaugural Creative Laureate. In Dr Rajsingh's words at the launch, "Bob Dylan has been a transformative figure while remaining outside the mainstream. In this regard, he parallels the ethos of New Zealand, a country that has made significant contributions to the world by 'leading from the edge (2013: pg number).'"

The Creative Fellows

The Creative Fellows programme was initiated to launch an international, cross-disciplinary conversation exploring creativity as a fundamental human capacity. Each Fellow gives public lectures, presented in partnership with major New Zealand art galleries, museums and community groups, which broadens the audience base and brings new people into the Project. The Fellows also record interviews with the CTP, offering their key ideas and findings for wider public dissemination via the CTP website. Broadcast media have interviewed the various Fellows, which has provided further valuable nationwide exposure. Workshops enable members of academic and creative communities to work directly with the Fellows. Creative Fellows are selected because they are leaders in their fields, with an established body of transformative work relevant to the CTP.

Six Creative Fellows have contributed their diverse experiences to the Project to date—three in 2014, three in 2015. The inaugural Creative Fellow was University of Iowa Professor, **Nancy Andreasen (MD, PhD),** who visited New Zealand in October 2014. As a world-renowned neuroscientist, psychiatrist and creative thinking expert, Professor Andreasen discussed the functions of the creative brain. Her visit helped initiate a CTP research project to study the mental processes of some of New Zealand's most famous creative thinkers.

Michael Corballis (PhD, HonLLD) was the CTP's second Creative Fellow. He is Emeritus Professor of Psychology in the University of

Auckland's Faculty of Science. Professor Corballis is a specialist in cognitive neuroscience in the areas of visual perception, visual imagery, attention and memory. He spoke to audiences around New Zealand about the creativity of the wandering mind.

The third Creative Fellow was artist, writer and curator **Professor Janis Jefferies**. Professor Jefferies works for Goldsmiths, University of London. Her portfolios include Professor of Visual Arts, Director of Goldsmiths Digital Studios, and Senior Research Fellow at the Constance Howard Resource and Research Centre in Textiles. She spoke on the topic of "Cooperation, Collaboration and Creativity."

The fourth Creative Fellow, **Professor Bruce Sheridan,** hails from Colombia College, Chicago (the largest film school in the USA) where he is Chair of Cinema Art + Science. As an educator and film-maker with 30 years' experience, Professor Sheridan is a leader in the move to redesign film and media education for the 21st century. He addressed the issue of enabling creativity to thrive within formal education systems.

Curt Tofteland, the CTP's fifth Creative Fellow, founded "Shakespeare Behind Bars," an internationally acclaimed personal transformation programme which combines art, theatre, and the works of William Shakespeare to create Restorative Circles of Reconciliation in prisons. Mr Tofteland gave public lectures in Auckland, Wellington and Christchurch, and also conducted workshops with prisoners in Northland, alongside Professor Peter O'Connor.

Professor Jonothan Neelands (PhD, DSc) visited NZ in December 2015 as the sixth Creative Fellow. He is a Professor of Creative Education at the Warwick Business School (WBS) and Chair of Drama and Theatre Education at the University of Warwick. Professor Neelands discussed the findings of the 2015 Warwick Commission Report on the Future of Cultural Value, examining "why the Arts matter."

The Creativity Course

In July 2015, the University of Auckland launched its first course in creative thinking. "The Creative Process" is a Stage One General Education course, convened by Professor Peter O'Connor, Director of the Critical Research Unit in Applied Theatre at the Faculty of Education and Social Work. In the opening lecture, O'Connor argued that:

> Creativity is increasingly being recognised as central to our humanity and to the ways in which we go about our personal and work lives throughout our entire lives [and that this] is an exciting addition to the suite of

subjects on offer, adding an important dimension for students pursuing undergraduate university study.

Lecturers for the course included highly regarded academics from a range of disciplines that include: Associate Professor Mark Sagar, Director of the Laboratory for Animate Technologies at the Auckland Bioengineering Institute, widely known for his Oscar-winning animation work on movies such as *Avatar*; Professor Donna Rose Addis, who leads the Memory Lab at the School of Psychology, and award-winning New Zealand author, Paula Morris, who convenes the Faculty of Arts' Master of Creative Writing programme. International contributors in 2015 included Professor Michael Anderson, Professor of Education (Arts and Creativity) at the University of Sydney. The inaugural Creative Process lecture was held on 22 July 2015, a date that also marked Patron Robert Gardiner's 82nd birthday.

The Creative Future

The CTP seeks to enhance creativity through investment in appropriate people and projects that will add value to existing fields of knowledge and practice. All the groups the Project has worked with—academics, philanthropists, entrepreneurs and leaders in national and local government—have indicated there is strong will to make this happen. Donors and partners are interested in taking the CTP to the next level through educational initiatives, research programmes, and external partnerships to make New Zealand a leader in the rapidly expanding field of creative thinking and processes. As a longstanding laboratory for the integration of art and science, New Zealand is poised to capitalise on this advantage—and the CTP, based at the University of Auckland, is strongly positioned to lead the way to a more creative future.

CHAPTER THREE

THE ACTS OF CREATION: MEMORY, MENTAL TIME TRAVEL, MIND WANDERING, AND FICTION

MICHAEL C. CORBALLIS

Memory

Let's start with memory. We have long known that memory evolved not so much to enable nostalgic trips into the past as to help future survival and reproductive success. Memory is complex, with different systems for different purposes, ranging from imprinting in birds to our own ability to remember events. We humans have at least three different memory systems: the skills we acquire, the knowledge we accumulate, and the particular experiences we've had. Acquiring skill depends on what is called procedural memory, which is inaccessible to consciousness or language. We learn to type, ride a bike, and even talk, without any awareness of the process of learning itself. Our knowledge about the world is semantic memory, which can be brought into consciousness when required, and articulated. This includes the meanings of words, knowing the capital of France or the boiling point of water. And this kind of memory seems to be somewhat independent of the third memory system, our memories of individual experiences—I know the capital of France, but I have no memory of how or when I acquired this knowledge.

It is this third kind of memory, termed "episodic memory," that is closest to what we normally think of as "memory" in the everyday sense of the word. I might remember what I did yesterday, or a recent cycling tour in France, or meeting a friend for lunch. Through episodic memory we can mentally replay past events in our lives, albeit with varying degrees of accuracy. It is largely through episodic memory, combined with semantic memory, that we can compile autobiographies of what we have done and where we have been. Episodic memory contributes to our sense

of personal identity through time, and provides material for future planning.

The adaptiveness of memory lies not so much in how accurate it is but in how useful. Remembering past experiences is often not so much a record of what actually happened more as an act of creation. We tend to embellish our memories, fill in where there are gaps, and sometimes construct entire "memories" for events that didn't actually happen. Even our basic knowledge can warp over time, but episodic memory seems especially susceptible to change, and can even be entirely fabricated. Elizabeth Loftus (Loftus & Ketchum, 1994) recounts studies in which people gave detailed answers when asked to describe being lost in a mall, or being taken for a ride in a hot-air balloon, or being nearly drowned and rescued by a lifeguard, even though these events never happened. The memories were entirely fabricated—and were indeed testimony to the creativity of memory.

Loftus (Loftus & Ketchum, 1994) also describes a vivid false memory of her own. She was 14 years old, and was visiting her aunt and uncle. She recalls getting up one morning to find her mother dead in the swimming pool. She remembers the fateful day as bright and sunny, and recaptures the sight and smell of cool pine trees, the taste of iced tea. She sees her mother in her nightgown, floating face down, drowned in the pool. She cries out in terror, screams, sees police cars with lights flashing, and watches her mother's body being carried out on a stretcher. But the memory is false. She was, in fact, asleep when the body was found, not by her, but by her Aunt Pearl.

Hillary Clinton, First Lady of the United States in 1996, told of visiting Bosnia, heroically risking her life as she disembarked from the plane and ran for cover under sniper fire. The television cameras, though, recorded a peaceful arrival in which she was met by a smiling child, whom she kissed. Ronald Reagan told tales of heroism during World War II, but later admitted that many of them derived from war movies. Perhaps he was deliberately making them up, although he may well have come to believe them to be true (Corballis, 2015).

False memories may seem like an aberration, a malfunctioning of the brain. But they may well be adaptive, at least in some cases. Loftus's traumatic memory may perhaps have prepared her for the possibility of dealing with more acute trauma should it occur in the future—and if nothing else, it spurred her to a productive career in memory research. False memories such as hers may even have a psychological link to our general fascination with the fictional murder and violence that we encounter in movies, crime novels, or murder mysteries on television.

Remembered acts of heroism or triumph may serve to enhance our self-esteem, even if they are false. False or inaccurate memories may be the bane of courts of law and, indeed, may cause inconvenience in our private lives, but may also enrich our imaginations and add coherence to our sense of self.

In any case, we almost certainly forget much more than we remember. We may have the illusion of good memory, but of course we don't know how much we have forgotten precisely because we have forgotten it! Even our skills decline with lack of use—I doubt I could swing a cricket bat with even the mediocre skill I once possessed. Semantic memory is less robust; most of us have forgotten much of what we learned in school, or in Physics 101, but I discovered I could still ride a bike after many years off the saddle. Episodic memory, though, is especially fragile and often fleeting, and probably holds only a tiny fraction of our experiences. With some exaggeration, the émigré Czech writer Milan Kundera (2002) put it like this:

> The fundamental given is the ratio between the amount of time in the lived life and the amount of time from that life that is stored in memory. No one has ever tried to calculate this ratio, and in fact there exists no technique for doing so; yet without much risk of error I could assume that the memory retains no more than a millionth, a hundred-millionth, in short an utterly infinitesimal bit of the lived life. That fact too is part of the essence of man. If someone could retain in his memory everything he had experienced, if he could at any time call up any fragment of his past, he would be nothing like human beings: neither his loves nor his friendships nor his angers nor his capacity to forgive or avenge would resemble ours. (As cited in Corballis, 2014, p. 83)

It is indeed an impediment to remember too much. The best-known case of super-memory involves Solomon Shereshevskii, whose remarkable ability was intensively studied by the great Russian neuropsychologist Alexander Romanovich (Luria, 1968). Shereshevskii was able to repeat back long lists of digits, nonsense syllables, poetry in unknown languages, even elaborate scientific formulae, and do so perfectly even years after they were presented to him. He could even repeat them in reverse order. His technique was to convert words into graphic images, and distribute them in different mental locations, typically along Gorky Street in Moscow. He could then retrieve them by repeating his mental walk—in either direction. But his remarkable memory was also a burden. He had difficulty reading even simple sentences, because images would appear and crowd in on each other. Reading stories was next to impossible, because images would surface from other things he had read. He did find

one solution, though, which was to imagine information he encountered written on a blackboard, and then imagine erasing it!

Episodic memories are really little more than fragmented traces of the past, from which we construct scenarios. We use them not so much to visit the past as to mentally construct possible futures, perhaps rearranging the people, places, and things of our episodic memories to create new combinations for some planned event, such as a dinner party or a picnic with friends. Such constructions depend also on semantic memory—our knowledge of how the world works—so that we can set our future imaginings in known real-world contexts. The flexibility of memory allows us to generate different options, so that we might choose the most suitable or appropriate course of action. But memory goes further than allowing the construction of possible futures—it also allows us to tell stories, and generate scenarios that are purely imaginary and even unrealistic, as in the fairy stories of childhood.

Mental Time Travel and the Hippocampus

The ability to mentally project ourselves into both past and future, albeit incompletely, has been dubbed "mental time travel," and depends critically on a seahorse-shaped brain structure called the hippocampus, located on the inner surface of the temporal lobe, roughly behind the ears. Although memory calls on many parts of the brain, the hippocampus is the hub of the system—the Grand Central Station—and its destruction causes severe loss of episodic memory, as well as failure to imagine possible future events. That is, it seems to abolish the possibility of travelling mentally in time.

A classic example is Henry Molaison (see Squire, 2009), better known in the scientific and medical literature as "H. M.", whose hippocampus was removed as a result of temporal-lobe surgery for the relief of intractable epilepsy. Henry's operation took place when he was 27, and he died in 2008 at the age of 82, but he was unable to remember anything of his personal life after the operation, and only snatches from before. He was always a willing volunteer for research, perhaps because each session seemed novel to him, even though he repeatedly underwent memory testing for most of his post-operative life. His condition was captured in a book appropriately entitled *Permanent Present Tense*, by Suzanne Corkin (2013). A similar case is the English musician, Clive Wearing, who suffered hippocampal loss as result of a viral infection. His plight is described in a book entitled *Forever Today,* also aptly titled, and written by his wife Deborah (2005). She wrote that, "by the time they had figured

out what was wrong with Clive and started pumping the anti-viral drugs into him, all he had left were seahorse-shaped-scars where his memory used to be" (as cited in *The Telegraph*, 2005, p. 1).

These individuals, though, did not lose their basic skills or semantic memories. Both could speak coherently, and Clive Wearing retains an ability to play the piano. But each of them was stuck in the present—or at least in a narrow window of time in which access to memory of events that occurred more than a few seconds ago is lost. An ITV television (2006) programme described Clive as "The man with the seven-second memory." Clive and Henry can project a few seconds into the future in order to finish a sentence, or perhaps plan a new one, and so maintain the semblance of conversation, but the thread is quickly lost. Clive often describes his experience as perpetually having been woken from the dead.

We can also see how the hippocampus functions in normal individuals through brain imaging. Functional magnetic resonance imaging (fMRI) shows that the hippocampus is active when people recall past events, and also when asked to imagine future events based on new combinations of the elements of past episodes. Different regions of the hippocampus appear to be involved in the different aspects of retrieving, constructing, and encoding events, and hippocampal activity is stronger when people construct future episodes than when they re-experience past ones, in part because imagining future events requires the extra demands of adding disparate details into a coherent scenario not previously encountered. In other words, imagining future episodes requires an act of creativity—although as we have seen our memories, too, are not devoid of the creative.

What about animals?

It has been widely assumed that only we humans are capable of mental time travel away from the present, or of creating fiction; indeed it is often suggested that this capacity is the mark of humanity. Robert Browning's poem *A Grammarian's Funeral,* includes the following lines: "He said, 'What's time? Leave Now for dogs and apes! Man has Forever!'" (as cited in Stopford, 2012).

The poet W. H. Auden is only slightly more generous to animals, although less so to humans, in a poem ironically entitled *Progress?* (as cited in Fraser, 1999, pp. 33–34):

Sessile, unseeing,
the Plant is wholly content
with the Adjacent.

Mobilized, sighted,
the Beast can tell Here from There
and Now from Not-Yet.
Talkative, anxious,
Man can picture the Absent
and Non-Existent.

Many psychologists and scientists, too, have insisted that only humans can mentally relive past episodes or imagine future ones. Wolfgang Kohler (1925), famous for his studies of chimpanzees while stationed at Tenerife in the Canary Islands during World War I, was impressed by the ability of the animals to solve mechanical problems, but nonetheless wrote that, "The time in which the chimpanzee lives is limited in past and future"—shades of Clive and Henry. Jane Goodall, who undertook a 55-year study of chimps in the wild at Gombe National Park in Tanzania, has been quoted as saying that " … in the wild, as far as we know, [chimps] are unable to communicate about things that aren't present."[1] My one-time PhD student Thomas Suddendorf and I once also contributed to the chorus: "Humans, unlike animals, have the ability to travel mentally in time" (Suddendorf & Corballis, 1997, p. 133).

But maybe the problem lies more in communication than in the thoughts themselves. Chimpanzees appear to be incapable of anything resembling human speech, but do have some capacity to communicate through gestures or the use of specially designed keyboards, although even this seems to fall well short of any ability to tell us their thoughts, or describe their experiences or plans. Despite this, there are some studies suggesting that other species may well remember past episodes or even imagine future ones, but do not have the facility to tell us about them. Nicola Clayton (Clayton, Bussey, & Dickinson, 2003) and her colleagues at the University of Cambridge have shown that scrub jays seem to remember not only where they have cached items of food, but also when they cached them, suggesting that they actually recall the act of caching itself. If watched by another bird while caching, they later surreptitiously re-cache the food elsewhere, perhaps anticipating a future event in which the watching bird might steal the food. They will only do this if they themselves have stolen food—even among scrub jays, it takes a thief to know a thief.

Santino is a chimpanzee at the Furuvik Zoo in Sweden who likes to throw stones and other missiles at visitors to the zoo. He prepares in advance, collecting assemblages of missiles in locations hidden from the

[1] In conversation with Freddy Gray in *The Spectator* 10 April, 2010.