Acknowledging Creative Thinking Skills

EDUCATING FOR A CREATIVE FUTURE

Elaine Holt

www.acts.cloud | 2018

Acknowledging Creative Thinking Skills

EDUCATING FOR A CREATIVE FUTURE

Funded by

Erasmus+

And

Steiner Waldorf Education

The Steiner Waldorf Schools Fellowship

Published 2018

Grateful acknowledgement is given for permission
to reproduce the following:

Front Cover: Pastel Water Drop (2009) © Blomerus Calitz,
https://www.flickr.com/photos/blomeruscalitz/

Figures 1 & 7: Steiner Waldorf Schools Fellowship;
Figure 8: Blomerus Calitz;
Figures 4 & 14: Getty images;
Figure 15: London Transport Museum
Figure 26: Science Photo (Gonville and Caius College, Cambridge)
Figure 34: The Waldorf School of Baltimore;
Figure 41: Graham Holt;
Figure 49: The National Gallery;
Figure 86: Crossfields Institute;
Figures 56, 64, 72, 76, 77, 87 & 88: Gottfried Straube Fjeldså;
Figures 32, 36, 37, 38, 44, 50, 52, 54, 57, 60, 61, 62, 65, 67, 70, 74 & 78:
Ringwood Waldorf School
Appendix 1: Michael Hall School
Appendix 2: The Journal of Philosophy for Children

For the future

Contents

Preface

'Our highest endeavour must be to develop free human beings who are able of themselves to impart purpose and direction to their lives. The need for imagination, a sense of truth and a feeling of responsibility – these three forces are the very nerve of education.'

Marie Steiner

This book sets out to explain the capacities, or creative thinking skills, that experience has shown are central to creativity across the disciplines. Creativity is an elusive jewel that is often overlooked or misunderstood, even when it lies in plain sight, just waiting to be raised up - or trodden down into the mud.

The idea to define a spectrum of creative thinking skills arose initially out of a talk I was asked to give to school parents and teachers in the spring of 2014, and it was first described in terms of layers of thinking - like an onion! The purpose of the talk was to try to explain the close relationship between a broad, creative curriculum and the development of the natural capacities necessary for creative thinking and autonomy of action, across all disciplines. This approach is central to Steiner Education but increasingly at odds with an exam-driven wider educational context. When understood, the difference is stark: it is the difference between lighting inner fires or simply filling buckets. It struck a chord.

The parents present felt that it helped to articulate their inner disquiet with the general direction of education nationally, and how pressure to pass exams was even beginning to impact the younger years. Teachers also felt that focusing on creative thinking skills and how they can be developed throughout childhood articulated, in a new way, the joyous adventure that teaching could, and should, be when not stifled by the requirement to force-feed knowledge to stressed and fatigued students. It provided the means to acknowledge and champion the full range of capacities. These capacities had already been anecdotally observed, in Steiner Waldorf pupils by parents, teachers and in feedback from higher education and business. This was across the full range of relative abilities and interests.

I had also been asked, the previous year, to look into the possibility of developing valid alternative qualifications to the standard UK possibilities. Upper school teachers were increasingly desperate because of the detrimental impact that the existing standard qualifications were having on their ability to educate and, more importantly, upon their students' potential and outlook. Much had been said publicly, in all walks of life, about the general need for change, but nothing positive had been achieved. We realised that we could not rely upon others to make the necessary change and so thought, in the words of Sarah Henderson:

'Don't wait for a light to appear at the end of the tunnel,
stride down there and light the bloody thing yourself!'[1]

[1] Australian, Northern Territory cattle station manager and author of *From Strength to Strength* (1993)

It was shortly after this that I came across an article in *New Scientist,* written by Michael Brooks, called *Invest in Minds, Not Maths to Boost the Economy*. I shall be eternally grateful for his courage and insight to articulate so clearly what many suspected: the system was broken. This provided the confirmation of what we intuitively felt, and passed on to us, as teachers, the courage to find a solution and resolve the problem ourselves. It seemed to me that a pragmatic approach would be the most effective in providing a workable possibility that offered real benefits to all, and the potential to be further improved upon, rather than aiming for an impossible perfection. The result has far exceeded my initial expectations and appears to have far-reaching potential, even beyond the scope of the current project.

Research into available educational grants that might assist a project to research and develop more suitable qualifications threw up some very interesting points: the funding streams available to education were heavily influenced by national and international goals that were themselves informed by UN goals encapsulated in the document *Transforming our world: the 2030 Agenda for Sustainable Development.* It seemed prudent to take a closer look at those goals and objectives, with surprising results.[2]

The most suitable grant appeared to be the Erasmus+. The broader aims of this grant scheme seemed to describe the best practice in Steiner Education and the capacities within the Creative Thinking Skills Spectrum that can be developed universally through this approach, alongside the integration of formal, non-formal and informal learning within a truly broad and balanced curriculum. It also presented the possibility of translating these principles into a workable set of qualifications that would then be able to articulate and recognise transdisciplinary creativity in a practically tangible way for all.

School Associations from Norway, Finland and Denmark were invited to join the project as partners and did so in a glorious spirit of earnest endeavour, adventure and trust. The partners were: The Steiner Waldorf Schools Fellowship (UK and Ireland) as the project lead, and the Steiner Associations of Finland, Norway and Denmark. The fifth partner was Crossfields Institute (UK), which was our essential awarding body that would design the qualification specifications for us and navigate its progress onto the UK framework. This international partnership around a creative project has forged lasting relationships of mutual respect and friendship alongside the tangible success of the project itself. The first elements of the school leaving suite of qualifications are in process of registration with UK Ofqual and will be available internationally from November 1st, 2018, with the full core and extended diplomas following shortly thereafter. The first teacher training postgraduate certificate to include the Creative Thinking Skills Spectrum has also now been launched by Crossfields Institute. The hope is that what we have developed will continue to grow and be of lasting and widespread use to both this and future generations.

It seemed timely to make a more formal presentation, in the form of a book for parents, teachers, policy-makers and the general reader. This book is intended to identify where the current problems originate, what the point of education is, in its essence, and how this can be practically achieved. These aspects are outlined in Part One of the book. Part Two outlines each of the creative thinking skills in terms of background and context, and how they can be supported throughout school life and beyond. The Creative Thinking Skills Spectrum has the

[2] The United Nations, 2015. *Transforming Our World: the 2030 Agenda for Sustainable Development,* New York, The United Nations

flexibility to be applicable in any teaching context, and in any country, if so wished. It also highlights the important potential conferred by carefully integrated formal, non-formal and informal learning to support creative thinking skills, and raise attainment, for all.

Figure 1: ACTS Project Team. Oslo. Steiner Waldorf Schools Fellowship (2017).

My heartfelt thanks go out to Rudolf Steiner for his inspiration and foresight, to the Erasmus+ funding programme for its trust and vision, to all the wonderful academics, qualification developers, teachers and educators who so generously gave their time and invaluable advice, and to Dawn Perkins for her eagle eye and unfailing support. Also, special thanks go to Michael Brooks and Mark Runco for their help and for believing that we could do it, and most particularly to Thomas Südhof for agreeing to be our project patron.

Thank you all.

Part One

"The question is," said Humpty Dumpty,

"which is to be master – that's all!"

Lewis Carroll
Through the Looking Glass

Introduction: The Crisis in Education

'How do we equip the next generation of learners
to think creatively, independently, and collaboratively
in full awareness of themselves
and their social context?'

Waterloo Global Science Initiative 2030

A crisis has been looming in education for a number of years.[3] The current system of testing has antiquated roots going back to the 19th century and is increasingly failing to meet the real needs of the students, higher education or the workplace. At the SOU Creativity Conference in 2018 the renowned psychologist, Robert Sternberg[4], called for change, 'Something is very wrong,' he said. Endless testing is simply, 'running the wrong race.' Knowledge is not the only fruit and if we are to solve serious global problems, 'we should also value wisdom'.

With the dawn of information technology, we have witnessed the greatest revolution in knowledge transfer since the invention of the printing press, and yet education struggles increasingly to meet the needs of its students or to adequately prepare them for the world that they will inherit. The Waterloo Global Science Initiative *Learning 2030*, highlighted the concerns raised by Higher Education and Industry, as follows:

> *'Global reports indicate a persistent and complex shortfall in education: high school is the phase of education when students report the least engagement in learning and question the relevance of what they are learning. Whereas early childhood education and post-secondary education have been the subjects of much debate and change, high school – where children become young adults and determine their future paths – is a comparatively neglected piece of the puzzle.*
>
> *High school is often perceived as a means to an end – a pipeline through which the highest-scoring students are funnelled toward post-secondary institutions or careers – rather than a crucial period of a person's intellectual, emotional, and ethical development.*
>
> *Even our most capable and committed teachers are sometimes struggling to prepare students for the 21st century while working within an educational model developed for the 19th century. The antiquated nature of this model is clearly causing problems for students. Today, about a third of the world's children never begin high school, and many of those who do start will drop out before the end. Even those who finish often end up disengaged from learning. This represents an enormous loss of human potential – and a huge cost to society.'* [5]

There is a growing need for creative solutions to meet an ever increasing array of social, political, economic and natural challenges, from disaffected youth to climate change, and yet

[3] The Waterloo Global Science Initiative, 2013. *Learning 2030*. [online] Available at: http://www.wgsi.org/learning-2030

[4] Sternberg, R., 2018. *Save the World!: We Don't Just Need Smarter or Even More Creative Kids—We Need Wiser Ones Too,* Presentation at the Creativity Conference, University of Southern Oregon, Oregon.

[5] The Waterloo Global Science Initiative, 2013.

there are fewer and fewer opportunities for students to practise the necessary skillset they will need within the current assessment system.

The Creative Thinking Skills Spectrum outlined in this book proposes to meet that need in a practical and pragmatic way. It sets out the possibility of raising attainment for all secondary school students and reducing the numbers of early school-leavers. Steiner schools typically experience a high number of these students, who arrive feeling disaffected by their previous education system and in need of a more integrated, holistic educational approach; one that recognises them as individuals within a full experience of context. This was the starting point for this research.

Having to focus so heavily on formal learning for summative, exam-based assessment to achieve a qualification, means that many schools currently find that their students are not being best served. The pressures to achieve within an exam-based system inevitably devalue time spent on integrating other important learning opportunities. Those students whose learning styles do not sit well with formal learning and summative exam assessments are at greater risk of becoming disillusioned, disengaged, stressed and even disruptive.

Even those who *are* well-suited to formal learning in the teenage years are not best served in an exam-driven environment that is necessarily backward-looking and based upon what was important some years previously when the exam criteria were set, rather than providing preparation for acting in an increasingly complex and uncertain world. More damaging still is the way the current system places undue stress upon finite fact regurgitation and training to pass exams, rather than creative understanding and engagement with principles as continually developing concepts. A modern, forward-thinking educational approach and assessment method is needed.

This problem is part of a wider global issue which has been further highlighted by leading universities such as the Perimeter Institute for Theoretical Physics, as reported by Michael Brooks in his article for the New Scientist, *Invest in Minds Not Maths*.[6] The Waterloo Global Science Initiative *Learning* 2030 Summit in Ontario, Canada, on the future of secondary education, concluded that "Creating students that can think broadly will not be easy. It will involve abandoning the culture of grades and exams and moving to assessments centred on a student's portfolio of projects...letting the students find and study what they are good at, once they have mastered a broad range of basic competencies".[7]

What is essential now is a broadly relevant and internationally portable qualification supported by curriculum development and Continual Professional Development (CPD) that recognises and enhances all learning and thinking styles. This would offer real mobility opportunities and a sense of educational community across borders, whether geographical or social. To achieve this, the founding principles of the current assessment system need revisiting.

It is very clear that the time has come for an integrated approach to educating our children: educating for creative adaptability and compassion that is firmly rooted in a perceptive understanding of themselves and the situations they encounter. The young people of today and tomorrow will need this sophisticated creativity to begin to address, in a positive and

[6] Brooks, M., 2013. Invest in Minds Not Maths. *New Scientist*, 220, pp.38-39.
[7] Brooks, M., 2013. pp.38-39.

sustainable way, the 'super-complex' global issues[8] that they will inherit from our generation: from Global Warming to mass migrations and from the challenge of finding sustainable energy and food supplies to addressing escalating mental health issues. We need to make an investment of effort now, so that young people will have the inner tools that they need to meet these challenges.

Steiner Waldorf Education has an established international record of enabling key skills in a wide range of educational settings. It has positively dealt with post-conflict trauma and war-affected or displaced communities, who often used the word 'healing' in relation to the benefit and potential they see in Waldorf Education. This success is based upon human values and an understanding of child and adolescent development that transcends race, creed, wealth or relative academic abilities. This is why it is equally relevant, for example, to Israel, Palestine, Haiti, Russia, the USA, China, India, Sierra Leone and the United Kingdom. There are now over one thousand Steiner Schools across the world, with schools found on every inhabited continent and hundreds of early learning centres springing up.[9] These schools are not restricted to affluent societies or individuals. The key spectrum of creative thinking skills that may be successfully developed, for example, through the integrated approach found in Steiner Schools, are articulated in the following chapters in a manner that can be internationally relevant, attainable and assessable.

In an increasingly mobile world, we now have the inspiring possibility of an internationally available suite of qualifications to recognise creative thinking skills in a portable way that could enable students from any situation, who experience relocation for whatever reason, to have the possibility of continuing their studies with minimal disruption and go on to make a positive societal contribution in whatever context they ultimately find themselves.

Accepting and working with different thinking and learning styles helps students engage with education again and achieve their potential in a way that makes their learning visible and able to be evaluated - whatever their learning or thinking style. Facilitating creative thinking and maximising potential in all students through a holistic approach to curriculum development and implementation is possible. It can be achieved through combining the highly-focused, analytical thinking and memory training involved in formal education with the softer focus, non-verbal experience of interconnections and context that is often found in non-formal and informal learning.[10] By integrating these learning opportunities within a broad curriculum, free of unduly premature specialisation, students can be assessed within the context of a broader range of learning styles and make visible the key creative thinking skills that are of increasing importance in higher education and the workplace.

Once identified, the Creative Thinking Skills Spectrum can be practised throughout schooling, and beyond. In this way, the ACTS project offers something to the education sector that can be a reference point for integrated creativity. But first we must consider where the problems with the current systems may lie, or we risk falling into the same trap.

---

[8] Barnett, R., 2014. Learning for an Unknown Future. In: *Thinking and Rethinking the University: The selected works of Ronald Barnett*. Abingdon: Routledge. pp.219-234.

[9] Freunde der Erziehungskunst, 2018. *Waldorf Worldwide* [Online] http://www.freunde-waldorf.de/en/home/

[10] The European Centre for the Development of Vocational Training, 2007. Recognition and validation of non-formal and informal learning for VET teachers and trainers in the EU Member States, pp.32-33.

Chapter 1:

The Search for Creative Solutions

'The song that I came to sing remains unsung.
I have spent my days in stringing and unstringing my instrument.
The time has not come true; the words have not been rightly set;
only there is the agony of wishing in my heart.'

Rabindranath Tagore (1861-1941)

In September 2015, the UN Agenda for *Transforming our world: the 2030 Agenda for Sustainable Development* was agreed. It was a plan of action for people, planet and prosperity, with seventeen identified goals to address the most pressing global problems facing both the current and future generations.[11] It informs educational policies.

Within this document, the words 'innovation' and 'innovative' appear twenty-six times, particularly in relation to the needs of science, technology, infrastructure and economic growth. But, curiously, these words do not appear anywhere in Goal 4: education provision or aims. Instead, Goal 4 calls only for unspecified 'relevant skills'. Creativity is considered as lying beyond job-related skills, as something of an add-on for technical and vocational education, in target 4.4 of supporting documentation only. [12]

In order to monitor progress in Goal 4 (education), governments turned to the Programme for International Student Achievement (PISA) offered by the Organisation for Economic Cooperation and Development (OECD). PISA is a global survey conducted every three years, which has been testing the knowledge and skills of fifteen-year-olds since 2000, using a traditional testing and ranking approach. The results are then presented as an international benchmark, providing indicators for the success of national education policies within participating states. PISA currently tests student achievement specifically in science, maths, reading, with the more recent addition of collaborative problem solving and financial literacy. These areas are seen to be necessary to support the STEM subjects of Science, Technology, Engineering and Maths. They also reflect the literacy and numeracy imperatives of target 4.6, which supplements Goal 4.

The wider educational aim of Goal 4 is to 'ensure inclusive and quality education for all' and promote 'lifelong learning'. But the PISA approach being taken to achieve STEM skills would seem to be simultaneously narrowing the scope of our possibilities to meet that wider aim. The very act of focusing so surgically on a specific set of elevated subjects causes nations and the education systems they govern to devalue other equally valuable and interrelated skills -

[11] United Nations General Assembly, 2015. *Transforming our world: the 2030 Agenda for Sustainable Development,* New York: United Nations.
[12] Section of Partnerships Cooperation and Research, 2017. *Unpacking Sustainable Development Goal 4 Education 2030* [online] Available at: http://unesdoc.unesco.org/images/0024/002463/246300E.pdf

skills which include the precursors to creativity. While it was heartening to see the additional element of 'Global Competence' being added to PISA in 2018 in an attempt to redress concerns, unfortunately the underlying problem with the narrow approach and the effect of that upon teaching practice, remains unchanged and the ultimate effect upon global competence is likely to be the same as that upon STEM subjects. In this they appear somewhat blinded to the deeper malaise in education whilst simultaneously alienating many of those students that they aspire to 'inspire and include', whose interest and hook into education lie outside pure STEM subjects, with or without additions, but may creatively lead there, given due time.

Michael Brooks, curator of the WGSI 2030 Learning summit, reported in *New Scientist* (2013) that the heads of both the Perimeter Institute for Theoretical Physics and the Waterloo University Ontario, 'explicitly told me they don't want any focus on STEM education (science, technology, engineering and maths). They wanted a future where students are able to think creatively'. He also highlighted a glut of PhDs who don't want to think. 'The summit concluded with the view that high school is often perceived as a means to an end, a pipeline through which the highest-scoring students are funnelled toward post-secondary institutions or careers – rather than a crucial period of a person's intellectual, emotional, and ethical development.'

The most insidious problem facing education is that PISA produces several key side-effects that influence global education, which are currently presented as benign or even positive developments but may not be correct in that assessment. These effects were highlighted in the OECD Education Working Paper 71 (2012) and include:

- A crisis or 'PISA Shock', experienced by governments when their scores fall relative to other countries, as happened to Japan in 2003. This directly resulted in a move to increase assessment and reverse the Yutori (low pressure) curriculum policy
- An influential normative effect on the direction of national education policies, where the prioritised norms that are used to measure success or failure in education are influenced by PISA indicators.
- A convergence between the education policies of countries, in line with PISA targets
- A trajectory where PISA may come to increasingly shape, define and evaluate the key goals of the national/federal education systems[13]

The overall effect is one of global educational homogenisation around the prioritising of a narrow range of skills. If we consider that the traditional testing and ranking approach adopted by PISA (to assess knowledge within the narrow STEM range of learning) may not be wide enough to fully encompass the healthy development and recognition of effective and transferrable creative thinking skills, then this method, for raising 'suitable skills' for

[13] Breakspeare, S., 2012. OECD Education Working Paper 71 [Online] www.oecd-ilibrary.org/docserver/5k9fdfqffr28-en.pdf?expires=1524688017&id=id&accname=guest&checksum=DBD48EF65E2E1FDDC6ECB67236C883B9

'innovation' under Goal 4, is flawed.[14] This focus and method of assessment which informs national policy for education is rooted in a world of the industrial revolution; it is a world that no longer exists. As Brooks reported[15], the WGSI Learning 2030 Summit concluded that *'Even our most capable and committed teachers are sometimes struggling to prepare students for the 21st century while working within an educational model developed for the 19th century'*. Herein lies the first problem.

The second problem lies with identifying what creativity actually is - even though it is experienced by all of us to some degree, for good or ill. Briefly, there are four definitions:

- Creativity as Product – This is subjective and can be a matter of personal taste or popular trend: what is magnificently creative to me, might appear to you to be more of an unfortunate accident in the kitchen! It can have an arts or professional recognition bias, where certain things are seen as inherently creative and others are not. This may be based upon their use or rarity in society, or an economic investment value.

- Creativity as Person – Again, this is subjective, often favouring a 'someone like me' bias, either explicitly through seeking out similar skillsets to our own, or implicitly through the choices we make when designing creativity tests. These tests often use printed or computer-generated delivery with problem-solving as a focus, solving short term problems. As Mark Runco points out in his book 'Creativity', these types of test are given 'in a test-like, academic atmosphere' particularly favouring those who perform well in test conditions as, presumably, the testers themselves did.[16] There appears to be less emphasis on those creative 'slow-cookers'.

- Creativity as Behaviour – Again, this can be subjective in a traditional teaching environment, where compliance is required for management purposes and seen as a key indicator for the 'ideal student'[17] and where a disruptive, uncooperative and unsuitable candidate, from the teacher's perspective, might actually turn out to be another Richard Branson, Thomas Edison or Orville Wright!

- Creativity as an Event – This is described as the moment of problem-solving, insight or 'A-ha' moment. The research is generally short term as studies cannot be conducted indefinitely, creating bias against the longer term, complex creation that may be 'incubated' for decades, as described by Wallas in *The Art of Thought*.[18]

While all these elements are intrinsically connected to the working of creativity within the human being, they do not in themselves provide a sufficiently coherent picture to allow

[14] Holt, E., 2018. Educating for a Creative Future? *Steinerkasvatus,* [online] Available at: https://peda.net/steinerkasvatus/verkkolehti/tlk4l/lt

[15] Brooks, M., 2013, pp.38-39.

[16] Runco, M., 2014. *Creativity Theories and Themes: Research, Development and Practice*. London: Academic Press. Elsevier: London. p.4.

[17] Runco, M., 2014. p.173.

[18] Wallas, G., 1926. *The Art of Thought.* Reprint 2015. Tunbridge Wells: Solis

educators to comprehensively support the development of this key human potential. For that, a pragmatic workable overview is needed. Here we encounter the third basic problem in working with creativity: time.

We are fixed in time in the present, and our world views are informed by the past. Creativity exists in an unknown future state, living in the present only as potential. It is the emergence of the new, from the existing order. If we can predict or predicate creativity, then it is not truly creative. This makes the grading or attribution of 'creativity' especially problematic: if we know what we are looking for, then we have essentially thought of it first in some way and guided the thinking of others along that route. Many great innovations were 'ahead of their time' like the first hybrid car developed by Lohner-Porsche in 1900 and William Blackstone's washing machine in 1874. The success or not of these innovations would appear to lie more in market readiness than in creativity and potential. Business is increasingly informing governmental views of innovative needs through bodies such as OECD, which also informs education through the choice of testing that informs PISA statistics. Technological innovation is currently easy to patent for market and so more profitable for companies. This may explain, in part, the particular emphasis on technological innovation in the UN goals and the funding sources that derive from this. However, innovation without circumspection can be dangerous: Thomas Midgley's well-intentioned and, at the time, award-winning innovations that contributed chemical additives to improve car engine performance and refrigeration – through lead and CFCs - though highly profitable, were both later identified as major environmental pollutants with global impact.

Time is also a keen motivator for governments. Most governments are relatively short-lived and need quick results to show improvements in education to an often fickle electorate. Researchers also need to show results relatively quickly due to funding imperatives or to progress their future research possibilities. Although educators may be teaching many generations of students over decades, that work is ultimately governed by the shorter-term priorities of others at national level. This can all lead to confusion and pendulum swings in policy.

If, however, we instead consider the long-term observations and understanding gained through the practical experience of teachers across a variety of countries, this can offer valuable insights into the conditions needed to enable emerging creative capacities in students without predicating – and so constraining – the creative output of those students. This may offer students, and the world they will inherit, greater creative potential. However, it will require courageous rethinking of the parameters for national assessment systems and the definitions of 'relevant skills' in the UN Goal 4.

Chapter 2:

Identifying Creative Thinking Skills

'On with the dance, let joy be unconfined,
is my motto;
whether there's any dance to dance
or joy to unconfine.'

Mark Twain

Creativity is clearly a complex process which often seems mysterious to the observer, or even an unusual 'gift' of the few. It is therefore useful to remind ourselves that creativity is the natural state of the human being: from the earliest age, a child will begin to experiment with the world around and find alternative uses for virtually every household item. They view their world as extensions of themselves.

How many of us have experienced the baby's 'food bomb' exploding across the room, as they thump the painstakingly prepared porridge with the back of their spoon? Endless fun. How many of us have searched for a pan lid, only to find that it is actually the '*Shield of Truth'* and the only protection strong enough to withstand the *'Duvet Dragon of Disaster!'*? Obviously.

Who has watched in quiet dread and exhilaration, as a young adolescent, uses a rudimentary, home-made trebuchet (a medieval catapult), to fling half bricks into a neighbouring field with variable degrees of accuracy? The distant thuds – clearly satisfying beyond measure – raising the memory of the day to epic proportions.

None of these might be considered original in the wider sense, but rather to be recapitulating the inventions of the past. Nevertheless, there are three elements that always seem to accompany this childhood activity: self-directed intent, imagination and fun. In each case, they have created a new thing from the existing order, but with differing levels of consciousness according to age. In the baby, the first instance might be accidental, but the surprising result has been different and entertaining enough to notice, remember – and repeat! It is an accidental discovery through interaction with the real world that is noted through curiosity and remembered through joyful repetition. A few years later, in the young child, the imagination may carry a remembered image or description of a shield, so that memory can search for and identify something handy that 'might do'. Often a number of items are tried and somewhat randomly discarded as the child searches for the desired characteristic. Alternatively, it may be that noticing a characteristic in the pan lid may evoke a train of thought that inspires the child's whole game and so generate the image of the dragon. This creative activity is based upon an imaginative association of ideas magnified by feelings and intent. The child's everyday world providing the potential props.

In the young adolescent – let us say about 14 years old - a degree of planning might accompany the imagined potential and emotional engagement, along with the growing need to test the practical (and unequivocal) forces of nature. The imagination to comprehend the possibility of the new is now combined with the capacity to practically understand the existing forces and plan accordingly, resolving more complex technical setbacks than the-wrong-

sized-pan-lid equivalent of earlier years. Emotional engagement, however, is still involved in inspiring the intent to take on a more involved practical challenge.

Although these examples in no way represent, in themselves, entirely new creations, the capacities that enable them, if sufficiently exercised (as you might exercise muscles), will provide some of the key capacities, emotional engagement and will necessary for effective innovation in older life, and their importance in this cannot be overstated. Unused muscles wither.

When considering how, as the child grows towards adulthood, these and other elements coordinate to enable creativity and creative thinking, it is useful to consider the helpful picture offered by Mark Runco in his book *Creativity*. In this book he presents the image of an ecosystem of mind.[19] Within such an ecosystem, creative thoughts can flourish or shrivel according to the health of the physical mental environment and the atmosphere within it. Intent, imagination and planning are intrinsic forces at work within this ecosystem, but there are others, too, perhaps at first harder to identify. As Runco points out, within this ecosystem, as in any, there is a vast diversity of content and processes, where differentiated levels of movement and speed are active, both systematically and independently. Within this context, we might consider one creative train of thought to appear as a flock (or 'murmuration') of starlings, perhaps in the warm evening light of a still summer's day; pulsing and turning in ever-changing, dream-like formations that break and reform repeatedly. Perhaps a few birds become separated and fly away then turn and re-join the flock. Suddenly, and without warning, the cloud melts onto the trees in noisy celebration as the last rays of sun dip below the horizon.

The psychologist, Lev Vygotsky might consider this metaphor of the ecosystem and starlings to be an example of the imaginative component of creativity.[20] The flock of starlings was a memory of evenings spent watching them in my childhood. That memory is generated, whether clearly or faintly, as a simple repetition of the past. That is, until I place it in my mind, into Runco's ecosystem metaphor, which is a remembered description from a book. Suddenly the combination takes on new life and significance for me: it is no longer a pair of memories but is now an imagined new idea in symbolic form, which though lacking direct information has the capacity to encompass new and yet unknown information that I feel is near at hand and that I experience as perhaps a whole-body sense of expectation. It is the transformation of the memories into a new thing – in this case the development of a metaphoric concept – that marks the thought out as creative. It is immaterial at this point, to the creativity of the thought process in question, that my new personal metaphor may seem meaningless to the rest of the world. Creating small, personally meaningful thoughts are the building blocks of bigger ideas. Whether they are ultimately considered creative by others is a function of societal creativity and what we chose to collectively appreciate, financially, politically or culturally. Small creative thoughts can become shared and formed cultural thoughts on a smaller scale, too. Timing is important in collective creativity. As Victor Hugo put it, '*Greater than the tread of mighty armies is an idea whose time has come.*'

Creativity, therefore, involves the ability to generate, manipulate and refine an imagination with the capacity for that change to be retained as a new memory, just as a finger pressed into

[19] Runco, M. A., 2014. p.37.

[20] Vygotsky, L.S., 2004. [reprint of 1930] English translation of Russian published in 1967) Imagination and Creativity in Childhood, *Journal of Russia and East European Psychology*. 42(1) pp. 7-10.

modelling clay leaves a lasting impression. This is called plasticity and builds brain connections through use. The manipulation or transformation of an imagination is the creative process which may, but need not necessarily, be translated into external actions. The raw material for that creative imagination can be drawn from memory, immediate perception of internal or external sources, and a multitude of collected associations, including emotional responses which, in my ecosystem example, would include a childhood sense of awe. In fact, anything that can be 'called to mind' is raw material for creative imagination. Unaltered, it is uncreative information: perception, memory or fact-regurgitation. Transformation is key.

Clearly, if memory, perceptions, experiences and associations contribute so directly to creative imagination, then the greater the number of these available to us, the richer and more fertile the mental environment in which creative thoughts develop, will be. A hundred years ago Rudolf Steiner wrote in *Philosophy of Freedom*[21] on the value of banking direct experiences from early childhood onwards and recognised the intrinsic value of these seemingly unstructured associations. When the key factor of imagination, founded upon rich experience, is combined with emotional engagement and self-directed intent, the capacity for effective creativity is enhanced.

Recent advances in neuroscience have confirmed that brain cells grow when exercised within varied experience that is fortified with intent (paying attention) – particularly when in relation to the natural world and movement - adding more connections and so more surface area with which to form new connections. Susan Greenfield elaborates on this in her book, '*A day in the Life of the Brain',* where she explains how neuroimaging has shown that infants under six months particularly grow connections, while young children grow cortex and then experience a gradual synaptic pruning up until puberty. During this time, thinking becomes 'less unconditionally open to any possibility and more tailored to individual needs'. There is also greater (if initially somewhat exuberant) functioning in the prefrontal cortex, with the onset of puberty, through its extensive networking with other brain regions. But even in adulthood, learning and practice especially in enriched environments grow brain, as neurons are added and connections made, through the quality of plasticity and a process called neurogenesis. [22] The physical brain is shaped by daily life and chosen activities: mathematicians were shown to grow larger parietal lobe density, and taxi drivers exhibited an enlarged hippocampus.[23] [24] It is important to note that our environment and experiences affect our thinking, and our thinking changes our brain.

If daily activity builds brain and mind, then parents and educators are effectively the gardeners of that mental ecosystem and its pervading atmosphere, through the plasticity of the brain. This is a significant responsibility, with the potential to nurture or suppress, and it would seem sensible to work with the natural processes of growth, rather than against them. It is unlikely that there is anything to be gained, for example, by accelerating the onset of puberty in the young child in order to achieve adult thought, and yet in other ways, this is exactly the approach often taken in education - not least in the STEM subjects. The demands of

[21] Steiner, R., 1894. *Philosophy of Freedom.* Revised edition 1918. Translated by Rita Stebbling, 1988. London: Rudolf Steiner Press, p. 68.

[22] Greenfield, S., 2016. A *Day in the Life of the Brain,* Oxford: Oxford University Press, p.63-64 and 134-5.

[23] McGuire et al., 2000. Navigation-related structural change in the hippocampi of taxi drivers, PNAS, 97(8) pp.4398-4403 available at https://doi.org/10.1073/pnas.070039597

[24] Aydin, K. et al., 2007. Increased grey matter density in the parietal cortex of mathematicians: a voxel-based morphometry study, *American Journal of Neuroradiology*, 28 (10), pp. 1859-1864 available at https://doi.org/10.3174/ajnr.A0696

assessment in high school are increasingly driving the ‘productivity’ priorities in the younger years. This impinges upon the time and opportunity available to the child and adolescent for other vital activities that provide the enriched compost, light and air of a healthy ecosystem capable of growing a healthy creativity. One that naturally blooms, in its own way, in high school.

So how do we garden with integrity in the mental ecosystems of our students? How do we meet their developmental needs and support that innate creativity and self-knowledge that may one day enable them to shape their futures in this, at times, bewilderingly complex and uncertain world? How do we protect the joyful, physical interaction with the everyday world of the growing child in a meaningful and practically self-directed way? How do we nurture their seedling imaginative interactions and maintain the joy and awe that drives them? And perhaps most overlooked of all, how do we support the paradigm change of puberty? Do we inspire diversity and abundance, or do we dig up creative variety and plant a cash monocrop of cramming for exams?

If creativity is not just a product, a person, a behaviour or an event, but something far more complex that develops as we grow, then that makes assessment and developmental support harder for education to achieve as a single aim or within the standard knowledge-based approach informed by external imperatives like PISA rankings. Perhaps our attention should instead be directed towards the necessary capacities that are capable of generating creative thinking in conjunction with imagination, emotional engagement and intent: it may be more profitable to see how these capacities can be practically enabled and acknowledged, and then allow creativity the freedom to express itself in due course. However, the majority of tests and exams conducted in schools are based on writing or have a large written component. Other key capacities are missing; capacities which are direct contributors to effective creativity, and potential for the future. These could be expected to be viewed as of comparatively equal weight and worth within teaching and assessment strategies. Currently they are not. The reason for this, and its origin, is illuminating.

Chapter 3:

Defining Success: The Origins and Purpose of Standardised Testing

'A man who reviews the old so as to find out the new,
is qualified to teach.'

Confucius
Analects, 2, 11

Over the past one hundred and fifty years, and particularly with the dawn of the internet, the speed and extent of knowledge transfer has grown exponentially. Most of the exams in schools are written exercises. Written articulation is the pre-eminent means of knowledge transfer both geographically and across time. The internet has widened the scope to the point where written information and documentation proliferate in what Ronald Barnett called an 'information overload' that is so vast, it is beyond human comprehension and creates its own, equally expanding, uncertainty and feeling of ignorance.[25] This proliferation should not be unexpected, since written articulation, be it word or number, has long been the main route to academic achievement in the West. Free education has drilled this skill into generations of children. It is increasingly the educational measure of academic, employment and even societal worth. This, in turn, has generated societal enchantment with national and international league tables of standardised tests and assessments to evidence that learning. The results have somewhat eclipsed the value of wider, contextual learning and novel interests.

Standardised testing is now so much a part of both school and work life that it is hard to imagine anything other. School exams are followed up by further or higher education exam regimes and continual professional development in the workplace. The majority have a written basis of some form – be it a doctorate in medicine or a certificate for a labourer on a building site in the UK. The phrase 'standardised test' is embedded in our global culture as a measure of fairness. The UN's PISA rankings assume this fairness in their tests given to fifteen-year-olds the world over. We assume that these tests measure merit against regulated norms to maintain that fairness – but on what basis? When did we start to measure normality and merit so exclusively in this way, and for what purpose?

To answer this question, we must travel back in time to China in the 7th century, where a minor fifth level consort, or concubine, to the Chinese Emperor Taizong (598-649 CE) was about to set in motion the mechanism that would help shape our modern world.

[25] Barnett, R., 2014. pp.219-234.

Figure 2: Empress Wu (Wu Zetian). By unknown, (18th Century).

Born in c. 624 CE, Wu Zetian was unusual for a 7th century Chinese girl in that she was well and widely educated. This was a conscious decision on the part of her father, who was a wealthy government minister called Duke Ding of Ying. He actively encouraged her love of learning. She was also an adept horsewoman.

In 636 CE, at the age of about thirteen, Wu was taken to the imperial palace to become a concubine to the Emperor Taizong. When he died, in 649 CE, she was sent to a monastery, as was customary, to live out the remaining years of her life in seclusion as a nun - but she did not remain there, returning to court later as consort to Taizong's son, Emperor Gaozong.

Her influence and authority grew steadily, particularly after Gaozong suffered a stroke. Until his death, she increasingly took on imperial duties, including traditionally male religious rites. During official audiences with Emperor Gaozong, she sat with him, on an equal throne, albeit behind a pearl screen. This was extraordinary for a woman at this time. Following Gaozong's death in 683 CE, the now dowager duchess ruled through her sons before ordering the last to abdicate in 690 CE. From then on, she ruled until 705 CE in her own right as the only female Emperor in over 3000 years of Chinese history. She wielded unprecedented power as consort, empress and empress regnant for over 50 years.

Empress Wu met considerable opposition from the established patriarchal aristocracy and was considered a usurper by many within the extended royal family. Despite this, she strove to stabilise and expand a fading Tang dynasty, weakened by 400 years of infighting. This first and only female emperor met revolt and insurrection as ruthlessly as her male predecessors, but perhaps more effectively. She eliminated opposition within the aristocracy by executing or requiring suicide from 36 officials and enslaving 1000 of their relatives during the 'Reign of Terror'. Yet at the same time, she protected the rights of the bedrock peasant farmers, ensuring fair land distribution, reducing taxes and encouraging productivity by giving over the royal lands to farming.

Copper boxes were installed outside the palace for the people to report wrongdoing. Her secret police were her long arm and eyes over the population. She expanded and consolidated the empire while reducing military taxation and presided over an extended period of peace, prosperity and openness to the outside world. The Tang dynasty became known as the 'golden age' of Chinese civilisation.

Wu replaced Confucianism with Buddhism as the State religion and improved the status of women, who had previously suffered bias, by ordering that both parents should be mourned by their children, not just the fathers. She published a book on *The Lives of Famous Women*, the first of its kind, and elevated gifted women to high office as in the case of the thirteen-year-old Shangguan Wan'er. Although her reforms and innovations were often met with horror and she was mocked by officials as 'the hen that crows' or as a witch causing all to 'fall before her moth brows', Wu nevertheless held China in her grip until she was in her eighties. She accomplished this through her administrative innovation which held the whole, vast empire secure and brought it to a sense of unity under her. From this point, any revolt or challenge from the aristocracy was increasingly destined to fail. To ensure this, Wu replaced the hereditary system of appointment to government with a meritocratic public exam system; opened it up to all men; extended it across the empire and sharply increased the frequency of the multi-layered exams. [2627]

The system proved so successful in homogenising a vast and disparate empire of peoples that it subsequently became institutionalised and lasted for over 1300 years. It conferred an unprecedented level of national standardization and, thereby, a new means of social control that 'restructured the complex relations between social status, political power and cultural prestige'. It was based upon Confucian texts which encoded a clear moral philosophy and consistently produced 'well-trained and loyal officials' whose guiding principle included an important emphasis on 'patient obedience'. These men shared a common official language (Mandarin) and a route to local importance for the lucky few. But over succeeding centuries, this system was also to become a slowly ossifying influence. It did not enliven the arts, science, or innovation. The high-pressure, high-stakes and exhausting demands of the examination system did, however, succeed in producing compliant subjects, as the will of the individual was subsumed to the collective will, focused upon unquestioning duty to the emperor.[28]

Ambitious parents, who could afford it, secured special tutors to increase their sons' chances. Those students who could not train their memory used their ingenuity to save face and cheat in a variety of ways. Parents also colluded, and bribery became rife as desperation to succeed, in the only significant route to social advancement available, grew to unbearable proportions. Evidence of more direct cheating is seen in the cribbers' underwear to be found in the Ban Po Museum, Xi'an. It appears that unchanneled individual creativity was reduced to finding ever more elaborate methods to cheat the system.

[26] Dash, M., 2012. The Demonisation of Empress Wu [online] https://www.smithsonianmag.com/history/the-demonization-of-empress-wu-20743091/

[27] Woon-Kwong, L., 2016. Empress Wu Zetian: an example of female power which remains relevant today. [online] https://www.scmp.com/news/hong-kong/article/2054886/empress-wu-zetian-example-female-power-which-remains-relevant-today

[28] Elam, B., 1989. Imperial Politics and Confucian Societies in Late Imperial China: The Hanlin and Donglin Academies, *Modern China*, 15(4), pp.39-384.

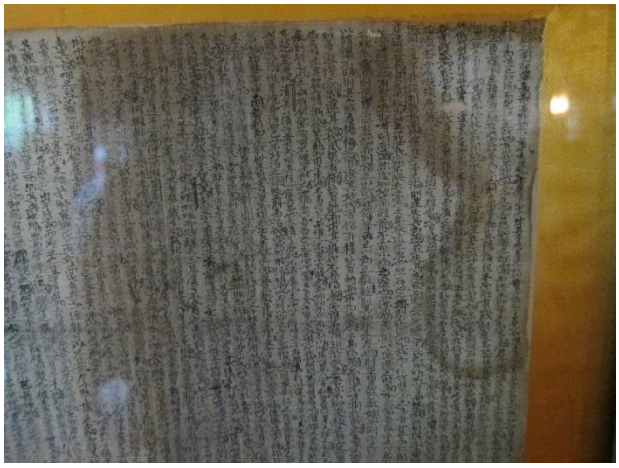


Figure 3: Cribbing garment worn as underwear into examination. By Jack No1, (2012).

State schools that had tried to offer an alternative route, through a school graduation process, were soon absorbed into the examination system, with an ever-narrowing scope of Confucian learning and prepping needed to pass the exam. This involved memorising vast tracts of texts in order to fill in the blanks on the exam papers. Rote learning replaced enquiry and discourse. For a while, some private academies offered an alternative to those students who wanted more than just 'rote mental preparation and a cutthroat examination system', but this was not to last. Wider learning was seen as a threat to the established order and increasingly suppressed until the abolition of the private academies in 1579, when their lands were seized by the government, gatherings banned, and political censorship of education begun in earnest. Further attempts by the literati to avoid despotism were met with purge and torture in 1625, including the burning of non-approved Confucian texts. By 1733, the State exerted total control over the education of 100,000,000 population amidst a climate of suffocating bureaucracy. This process gradually stifled the creativity that might once have been exercised through the *Six Arts* of education, with ripple effects far beyond the subjects themselves, until 'no one dared to live for himself…The ruler thereby made his own great selfishness the great commonality for all in the empire'.[29] [30]

The British Consul to China, Thomas Taylor Meadows, writing in 1847, took great interest in the Chinese examination system. In his book *Desultory Notes on the Government and People of China*, he reports enthusiastically about the internal stability that the imperial examination system conferred upon the Chinese State, noting that,

> '*…the long duration of the Chinese empire is solely and altogether owing to a principle…that good government consists in the advancement of men of talent and merit only, to rank and power conferred by official posts'*.

He observed that the examination system, linked to ambition, made insurrection in the face of oppression and cruelty, ineffectual: those able to lead were elevated to *Mandarins*, the rest were left '*ignorant, poor, leaderless or too few*'. He went even further to stress:

> *'England will certainly lose every colony it possesses unless she adopts some system of impartial elevation of colonists to the posts and honours at the disposal of the crown; and she will then become a secondary power in relation with states of larger territory and greater resources, as the United States of North America, as Russia and as the larger of her colonies'.*

[29] Elam, B., 1989. pp. 379-418

[30] Huang Zongxi in Elam, B. Imperial Politics and Confucian Societies in Late Imperial China: The Hanlin and Donglin Academies, *Modern China*, 15(4), p. 400

Meadows went on to observe that:

> *'The injustice of making colonists contribute to honours in which they have no participation and pay for a set of rulers in whom they have no interest, in whom, too, they will not fail to discover a latent assumption of personal superiority; the injustice of this is too glaring and too aggravating'.*[31]

Meadows proposed that if the British made use of this system of examination for entry to the ranks of the Civil Service, then the beneficial mediation of the British jury system, Parliament and the free press – all elements missing in China at that time - would protect the British people from the negative aspects of the system. He also advocated for prompt and severe punishment for misuse of position or corruption within the Civil Service alongside the simplification of official roles to make the tasks achievable.

The British government was convinced and adopted a similar system for the Civil Service in 1855 after first rolling out the system with the British East India Company in 1853, in India. British civil servants became known colloquially as 'Mandarins' and often studied the classics (Greek and Roman rather than Confucian) as part of their education. These eventually became the officials who implemented state education within, at that time, the largest empire on Earth.

Other European countries attempting to manage their own empires also copied the idea. In 19th century Prussia, these new high-stakes exams came to the notice of the Prussian government, which was facing rapid socio-political changes with the final abolition of serfdom in 1820, land reform and a rising populace that was questioning the absolute right of monarchs. A system modelled upon the Chinese system, through the Jesuit missionary to China, Matteo Ricci, was introduced in universities for entrance to the civil service. Subsequently, the written academic Abitur qualification was introduced as an entrance exam for university. This is still required to enter university in Germany. The government maintained direct control of content.[32] From the mid-eighteenth century, the Prussian education system had also offered free school education for five to thirteen-year-olds, allowing a strong overall control of education.

At a time when France was in revolutionary chaos, Prussia achieved a peaceful transition to a new social circumstance. This in turn caught the eye of an American – Horace Mann – who had a different social problem on his mind in the form of a multitude of immigrant families with children from diverse backgrounds and origins (including Prussia) coming to the US and needing to be governed. He lobbied hard, winning free, meritocratic and universal education for all children through the *Common Schools.* He also instigated the *Normal Schools*, where teachers were trained to uphold specific sociological and ideological norms. Meritocracy in

[31] Meadows, T.T., 1847. *Desultory Notes on the Government and People of China.* Wm. H. Allen & Co: London [online] Available at : https://archive.org/details/desultorynoteson00mead/page/n5

[32] Usher, A.,2016. Higher Education Strategy Associates - A Brief History of Exams [online] available at http://higheredstrategy.com/a-brief-history-of-exams/

the students was measured against these norms. US school education became compulsory in 1891 and proved a successful unifying factor.[33] Britain followed suit in 1918.

We can conclude from this that the purpose and success of the Chinese imperial examination system was primarily socio-political restructuring and control within the context of empire and that this was seen as of greater importance than any free-thinking creativity or innovation. The evidence for the assessment of merit in this context was the written word, used primarily to demonstrate memory training. This influenced civil service appointment systems in the West and eventually, just as in China, the schools that also fed into that system. Tiered systems for schools soon segregated the academic from the rest, based upon the meritocracy and norms first crafted in Imperial China.

In the end, though, the Imperial examination system of China became an inexorable process of diminishing returns, contributing to the decline and collapse of an ultimately jaded society that was rooted in the past and lacking innovation. It was abandoned in 1905 shortly before the fall of the last imperial dynasty in 1912. But, by this point, the particularly focused ideas of meritocracy and standardized testing that underpinned the Chinese imperial education system had become, for good or ill, an unstoppable force that had already taken hold in Europe, America and India.

[33] Warder, G., 2018. VCU Libraries - Social Welfare History Project: Horace Mann and the Creation of the Common School [online] available at https://socialwelfare.library.vcu.edu/programs/education/horace-mann-creation-common-school/

Chapter 4: An Exclusive Meritocracy

'Let there be spaces in your togetherness.'

Kahlil Gibran (1883-1931)
Lebanese poet

Concerns raised in Imperial China in the centuries following the introduction of standardised testing resonate with concerns increasingly voiced in modern times.

In 2014, over one hundred academics wrote an open letter to Andreas Schleicher of the OECD to express their frustration and concern surrounding the global implementation of the 'meritocratic' PISA tests (outlined in Chapter 1). They were concerned that while PISA showed little regard for diverse cultural or social factors, there did seem to be an undue commercial interest in the provision and findings of PISA through public-private partnerships within the OECD. They stressed the dangers of escalating an already flawed system of assessment; its tendency to lead to short-term policy fixes; a narrowing in the scope of assessment leading inevitably to a narrowing in the *'collective imagination regarding what education is and ought to be about'*; and, most alarmingly, the heightened levels of stress they observed affecting students and their teachers.[34]

Stress is one of the most pernicious scourges of modern life. It strikes across all social and economic boundaries and respects no distinction between age or circumstance. And it is on the increase. A Norwegian educator working with school dropouts suffering eating disorders, self-harm, addiction and attempted suicide observed that of the girls he worked with, *all did well at school*. Boys fared little better emotionally, although they are perhaps more inclined to rebel against a misplaced assessment system in school than try to fulfil it. This may be a kind of self-preservation. Even those who manage to do well in the 'cut-throat' exams system are not immune from its longer-term effects with the relentless pressure to succeed. An article in *The Times*, in August 2017, reported one tragic example out of too many[35]. His name was Rafael Ochoa and he was 'an excellent student' with a first-class degree in engineering from Cambridge and a first-class master's from Oxford, where he was working on his PhD. He was the captain of a golf team, cox for the boat club and sang in the choir. He developed significant anxiety about his academic work and an upcoming sporting event and had been repeatedly prescribed anti-depressants since his days in Cambridge. He threw himself in front of a train. He was 23.

According to that same article, the UK Office of National Statistics recorded 134 full time university students took their own lives in the year 2015, 'the highest since records began' Half the ambulance call outs to York University in 2015 were for self-harm or suicide attempts. The demand for mental health services continues to rise. This would suggest that

[34] Meyer, H., Zahedi, K. *et al*. 2014. Open Letter to Andreas Schleicher, *Policy Futures in Education*, 12(7) pp.827-877.
[35] Keate, G., 2017. Oxford student Rafael Ochoa killed himself amid worries over degree and golf, *The Times, August 23,* p.17.

the system is too brutal, even at the top, or that the students are not learning those other skills that helped previous generations fare better emotionally. It is well known that stress generates the elevated levels of cortisol that interfere with memory and learning, creating a toxic cycle. This is not a sustainable situation in education.

It is interesting to note that teachers from four countries in Europe reported students increasingly interested in 'what will get them the grades' and unwilling or unable to give other essential learning the space and attention it needed.[36] If the inner tools to combat mental stress are learned outside the current focus of standardised tests, and if there is a connection between inner, personal problem-solving and outer innovative potential, then this trend in behaviour is also worth noting.

There is another ethical issue connected to modern standardised testing that appears to be somewhat side-stepped at present: since the standardised test was adopted in the West, dyslexics have suffered because the assessment is based upon meritocratic norms that effectively exclude them. The level of discrimination has been, frankly, shocking with students being labelled over the years as 'slow' and 'in need of remedial help' or even 'backward'. Many succeeded in life despite their education rather than because of it, often in business, innovation or the creative arts; their undoubted abilities and capacities clearly arranged in a different constellation. Richard Branson is a notable case in point. Many other dyslexics did not, however, succeed to their full potential, and quietly resigned themselves to the labels given them. They were failed by a flawed system. Even today dyslexics are helped to 'manage' within the antiquated notions of merit and, in the UK, must register it as a disability. It is less clear how many other learning or thinking differences exist, with affected students experiencing the 'norms' of standardised testing in a way that future generations will find equally troubling. Dyslexics often have other capacities equal to, and greater than, their non-dyslexic peers, often with particularly innovative qualities, but these are undervalued in comparison to the tyranny of the written word and number.

Unchannelled creativity and innovation will wither or, like water, find its own path. The problem of cheating in exams is now a global phenomenon, particularly with the introduction of near invisible earpieces and similar innovations from the dark world. As fast as exam

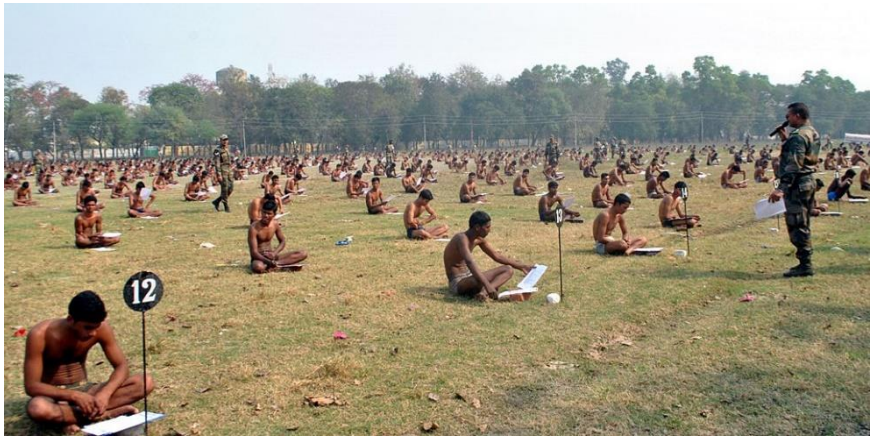


Figure 4: Indian army candidates sit in their underwear in a field as they take a written exam after being asked to remove their clothing to deter cheating during a recruitment day in Muzaffarpur in 2016. Getty Images, (2016).

[36] Holt, E., 2015. What are Creative Thinking Skills? *ACTS conference C1*, Copenhagen, Denmark.

boards and invigilators identify and mitigate for improper exam behaviour, so the cribbers become ever more devious.

The resulting extremes that assessors can be driven to, may be seen in the army cadets forced to take an entrance exam while sitting in their underpants in the middle of a field (*Figure 4)* and in the students attending university in Thailand being required to wear large cardboard boxes on their heads - all to avoid cheating.[37] This can, on one level, appear to be ridiculous extremes but, on another level, they speak of the fundamental affront to the dignity of the human being generated by this method of assessment, and send a bizarre counter-message to exam participants alongside the official image of civic virtue through education.

It should, of course, be noted that written communication (whether in word or number) is a wonderfully useful tool and not, in itself, the problem. The problem appears to be the degree of weight given to this skill at the expense of other vital skills, and this is perhaps why we see the current shortfall in creativity and rising levels of disengagement in schools, alongside escalating stress and disaffected youth.

If creativity is, as described in Chapter 2, not dependent upon written academic ability and memory alone, then we are faced with the possibility that a flawed system of assessing meritocracy may be discouraging those very creative capacities so needed in the current maelstrom that is the modern world. The question then arises: if the system is flawed, what do we replace it with?

Perhaps it would help to take a creative, fresh look at what, in the field of education, is practicable, healthy and helpful to all: what is the individual, national and international best interest in education for a creative future for all?

[37] Daily Telegraph reporter (2013) University students 'made to wear anti-cheating helmets'. Daily Telegraph [online] available from: https://www.telegraph.co.uk/news/newsvideo/weirdnewsvideo/10246867/University-students-made-to-wear-anti-cheating-helmets.html

Chapter 5: True and False Autonomy

'If I am like you
- who will be like me?'

Jewish Proverb

'What is the point of education?' That is the key question that is asked (often rather more bluntly) by most teenagers, as they begin to view the adult world with the newly reconfigured insight and judgement that comes with puberty. Their own answer to this question will often dictate the course of the rest of their lives. So, in order to objectively redesign high school assessment in a way that is practicable, healthy and meaningful to all, we must also address the question: 'What is the point?'.

Educators will often answer this fundamental question with power phrases like 'fulfilling each student's potential'. But although there is often an earnest wish behind this educational mantra, there is less clarity around what it actually means, especially when viewed in terms of the questionable meritocratic norms discussed previously. Those 19th century goals for assessment still continue to inform and direct what is to be considered 'fulfilment' of individual potential towards meeting those equally antiquated goals and norms.

Educators working with disaffected, damaged and self-destructive young people in Norway have noticed a recurring theme brought up in counselling sessions. This related to a point in high school where each one realised that they did not truly understand, on any meaningful level, *why* they were required to learn *what* they were required to learn and, crucially, it seemed to them, *neither did their teachers.*[38]

Pressure, stress, inadequate opportunities to develop meaningful creative habits alongside a sense of being processed has become a significant international problem. Early school leaving is another. Schools across Europe have reported difficulties regarding student disengagement from standard high school learning.[39] These students may then present as 'disruptive, uncooperative and unsuitable candidates'.[40] While some go on to thrive, and creatively so, in more favourable conditions, others drop out or remain and suffer in silence. The collateral damage to society as a whole can be seen in the dearth of effective creative solutions in the face of mounting global problems.

There is a general awareness of the value of creative thinking and its underrepresentation in education, but there is less clarity over what it might be and how it functions. Various attempts have been made to express the missing qualities that are so highly sought, from vague notions of 'thinking outside the box' to specific theories such as the framework of emotional intelligence competencies[41]. The danger with both of these starting points, is the very real risk

[38] Keller, G., 2016. The World Needs Originals Not Copies, *ACTS conference C3,* Oslo.

[39] Holt, E., 2015. ACTS Project Handbook, [online] file:///C:/Users/elain/Downloads/ACTS-SWSF-Project-Handbook%20(3).pdf

[40] Runco, M., 2014. *Creativity.*

[41] Weissberg, J. W. et al., 2000. 'Social and Emotional Learning: A Framework for Promoting Health and Reducing Risk Behaviour in Children and Youth', *Journal of School Health,* 70(5), pp.179-185.

of manipulation or 'people like us' bias.[42] If we take the *'responsible* (or indeed, '*ethical') decision-making'* competency, for example, we can see that, though a noble and important aspiration, it is entirely a value judgement of a desirable moral quality that – like beauty - is entirely within the eye of the beholder and could mean something quite different to different people. 'Responsible decision-making' has been alluded to in justifying some of the most cruel practices in modern times, including numerous incidents of ethnic cleansing and the recent separation of child immigrants from their parents at the US/Mexican border. Emotional intelligence competencies may be very fine ideals as part of a cultural identity or aspiration but are dispositional and confuse morals with skills.[43] They are not sufficiently objective to be assessed universally without falling into the 'people like me' trap. Something more objective is needed: something that would provide a precursor to responsible decision-making; something that enables it without dictating it. And so with all the other thinking skills. This is no small task. However, what is clear is that whatever informs the education of our children dictates the future.

This unsatisfactory situation in education was questioned as early as 1919, when the philosopher Rudolf Steiner wrote the following:

> *'The notion that education is the state's business is deeply rooted. Governments having liberated schools from religious dogma, stifled it with complete dependence upon themselves…*
>
> *At every level, schools mould human beings into the form the state requires for doing what the state deems necessary. Arrangements in the schools reflect the government's requirements. There is much talk, certainly, of striving to achieve an all-around development of the person, and so on; but the modern person unconsciously feels so completely a part of the whole order of the state that he does not even notice, when talking about the all-around development of the human being, that what is meant is moulding the human being into a useful servant of the state.'*

Steiner went on to found a new school movement in response to the carnage of the First World War and to explore a better way of living together in peace. He did so at the request of Emil Molt, the owner of the Waldorf Astoria cigarette factory in Stuttgart, and designed a system for the children of the owner and his workers with equality and autonomy at its heart. Steiner's answer to the question, 'What is the point of education?' was unequivocal:

> *'The question should not be: 'What does a human being need to know and be able to do for the social order that now exists?', but rather: 'What capacities are latent within, that can be developed?' Then it will be possible to bring ever new forces into the social order from the rising generations. The life of the social order will be what is made of it by a succession of fully developed human*

[42] Grant, A., 2014. The Dark Side of Emotional Intelligence, *The Atlantic. Available at: https://www.theatlantic.com/health/archive/2014/01/the-dark-side-of-emotional-intelligence/282720/*
[43] Grant, A., 2014.

beings who take their places in the social order. The rising generation should not be moulded into what the existing social order chooses to make of it.' [44]

The system of education that was developed by Steiner has grown and developed over the subsequent 100 years and is now to be found in schools on every inhabited continent the World over. But although the original school was requested by a businessman, Steiner also observed the dangers of relying too heavily upon economic drivers in education, as they carried similar dangers to those of state control and direction. The rise of European fascism and its economic ties would later confirm both of these concerns in the catastrophically damaging events of the mid-20th century. Instead, Steiner advocated that education be guided by those who are actively engaged in teaching and based solely upon knowledge of the growing human being and the enabling of individual capacities.

Truly fulfilling one's potential, rather than fulfilling the preferences of others, requires a sophisticated degree of autonomy. This takes time to develop. It requires a variety of skills to develop and hone over the course of childhood and beyond. Autonomy then gives the individual the ability to discover for themselves where their potential lies. And potential, of course, lies beyond the known or it is simply fulfilling the vision of others. In this respect, autonomy shares common ground with creativity.

Modern creativity research has pointed to the importance of autonomy. Runco observes in his book, *Creativity*:

'Autonomy in its various manifestations may play a pivotal role in all creative work. This may be because autonomy is functionally related to creativity. It is functional and necessary for all creativity.' [45]

But it is important at this point to note that the autonomy referred to here is not the false autonomy of mere choice. Choice without understanding is not autonomous but is instead manipulated by the manner of the choices offered, pre-existing prejudice, or ignorance. Commerce and politics are particularly adept at manipulating 'free' choice in this way. As Sheena Iyengar, author of '*The Art of Choosing'*, observed in her TED Talk[46], the concepts of norms within both individual and social choice vary dramatically across the world and are highly subjective. She gave a charming illustration taken from her first day in Kyoto, Japan:

'I went to a restaurant and I ordered a cup of green tea with sugar. After a pause, the waiter said,

"One does not put sugar in green tea."

"I know," I said. "I'm aware of this custom, but I like my tea sweet."

In response he gave me an even more courteous version of the same explanation,

"One does not put sugar in green tea."

---

[44] Steiner, R. (1919) The Threefold Social order and Educational Freedom*, The Threefold Social Order,* 14. [online] Available at: https://wn.rsarchive.org/Books/GA024/English/AP1985/GA024_c04.html

[45] Runco, M., 2014. Creativity, p. 274

[46] Iyengar, S., 2010. *The Art of Choosing,* TED Talk. Oxford, England, [online] Available at: https://www.ted.com/talks/sheena_iyengar_on_the_art_of_choosing/discussion?quote=787

"I understand," I said, "that the Japanese do not put sugar in their green tea, but I'd like to put some sugar in my green tea."

Surprised by my insistence, the waiter took up the issue with the manager. Pretty soon, a lengthy discussion ensued, and finally the manager came over to me and said,

"I am very sorry. We do not have sugar."

Well, since I couldn't have my tea the way I wanted it, I ordered a cup of coffee, which the waiter brought over promptly - resting on the saucer were two packets of sugar!'

This is an immensely useful illustration. Iyengar goes on to point out that it was not a misunderstanding, but a difference in ideas about choice. Her American tradition was to expect whatever you want; however you want it. The Japanese perspective was, by contrast, a 'duty to protect those who don't know any better' from making the wrong choice and help them 'save face' when they transgress cultural standards. Iyengar's research has shown that in Asia, a culture of collective choice is the norm. [47]

Figure 5: Japanese Tea Ceremony, by Reinhold Möller (2009).

This story also illustrates beautifully that autonomy requires informed freedom in thinking or it is not autonomy. If Iyengar were to return to the restaurant, she would now have a more informed basis upon which to choose. She could demand sugar in her green tea and argue the point, refusing to accept that there is no sugar. She could drink coffee. She could drink green tea without sugar and join the collective cultural choice of her hosts, out of a sense of respect. She could even order both and surreptitiously slip the coffee's sugar into her tea! However, other factors might affect which choice she would make. For example, if she now understood that the staff identified so closely with green tea that she would be attacking everything they held dear if she put sugar in it, then that might inform her choice. But if, on the other hand, Japan had become a totalitarian state where the blind were banned from drinking green tea with sugar, then that may influence the choice differently - and so forth. Knowing the difference is the key.

Without informed free thinking we simply parrot, consciously or unconsciously, the thoughts or choices of our parents, teachers or other figures of accepted authority, be they politicians, news reporters, advertisers or bloggers. Choice is only autonomous if it is fully and freely informed.

[47] Iyengar, S., (2010) *The Art of Choosing,*

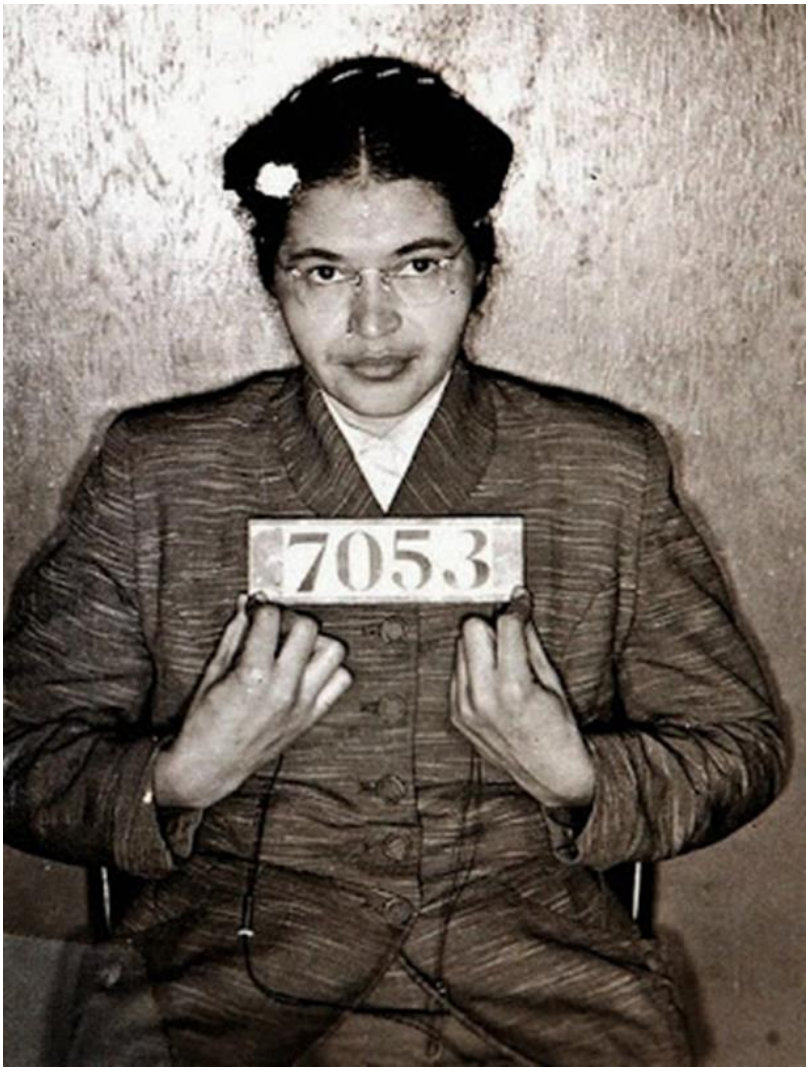


Figure 6: : Booking photo of Rosa Parks, following her arrest for Civil Disobedience after taking a seat on a segregated bus. By Alabama Law Enforcement, (1955).

The honing of civil liberties and rights have in large part been down to the independent action of the few - like Rosa Parks, who refused to be segregated on the basis of her colour. But that goes on to *inspire* the many. Injustice relies upon blind compliance or fear in both the favoured and the oppressed. It cannot abide true autonomy.

Rudolf Steiner, writing in 1894, emphasised the need for ethical individualism in free thinkers who understand their own thought processes.[48] This ethical individualism involves understanding not only the context, but also our own responses devoid of assumptions. And for that to be achieved, we must look to strengthen our muscles of observation and direct them towards understanding our own thinking. However, understanding ourselves within the context of real life situations actually requires complex layers of thinking that have the capacity to encompass and reflect upon complex human experience. The old adage, 'Know Thyself!' may be a sentiment going back to the Temple of Apollo at Delphi or the Temple of Luxor on the banks of the Nile, but it is no less significant today, to teacher and student alike. It does not rest upon fact regurgitation and external performance targets, but on perception and objective

[48] Steiner, R., 1894. p.137-8.

observation leading to thoughts and feelings that are then also reflected upon in a cyclic process, bringing together the widest possible connections, motives and implications. It is a personal activity that can be enabled but not directed.

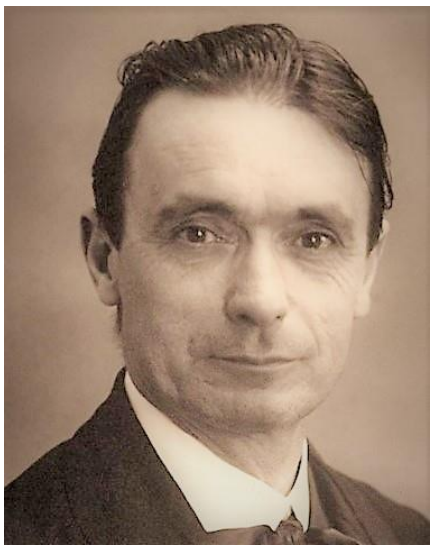


Figure 7: Rudolf Steiner (1861-1925). By unknown. Steiner Waldorf Schools Fellowship (n/d).

In the words of Rudolf Steiner,

'The need for imagination, a sense of truth, a feeling of responsibility - these are the three forces which are the very nerves of pedagogy. And whoever will receive pedagogy into himself, let him inscribe the following as a motto for his teaching:

Imbue thyself with the power of imagination,
Have courage for the truth,
Sharpen thy feeling for responsibility of soul.'[49]

Then, like Archimedes, we will have found that sure footing, that firm place on which to stand from where we can observe the world.[50] Only then can we hope to understand the external phenomena of the world in freedom and have the opportunity to respond creatively with ethical autonomy. This is, therefore, not the false freedom to randomly make selfish or careless choices, but the freedom that stems from understanding and deciding for ourselves the *motives* of our own actions. This, according to Steiner was the only true freedom and of the greatest importance to humanity. [51] The choices are still there, but they can now be fully informed of both external and internal considerations and furnished with the capacity to act effectively and responsibly.

This is obviously more difficult to achieve if individuals have been educated in systems with closed social drivers that have shaped their thinking processes. Educational, political, religious, economic or academic dogma will all similarly diminish free thinking. The next question then arises: how do we achieve as full as possible an understanding of ourselves in context - and identify, for ourselves, when we do indeed have it?

Autonomy is key to creativity. However, Torrance's findings (1972) indicated that this goes against the unconscious preference of teachers for compliant students who are 'punctual, courteous and follow assignments'. [52] We might now add social and emotional competencies to the list. Yet this is also how the existing order attempts to 'mould' the young people. This causes educators to misread and, more destructively, to misdirect students who appear less cooperative, but are not being given the tools to engage with their autonomy in a positive way. Mark Runco observed in 2014:

> *Autonomy may also underlie and explain a range of other correlates of creativity. Creativity has been related to non-conformity, rebelliousness and unconventionality.*[53]

[49] Steiner, R., 1919. Lecture XIV. *In: The Study of Man.* Reprinted 2004. Rudolf Steiner Press: London.
[50] Steiner, R., 1894. p.25.
[51] Steiner, R., 1894. p.138
[52] Torrance, E. P., 1972. Can We Teach Children to Think Creatively? *Journal of Creative Behaviour,* (6) pp.114-143.
[53] Runco, M., 2014. p.274

If we instead trust the autonomy of the individual and the wisdom of nature in the stages of human development, we may then guide the development of individual capacities within that. It is then possible for young people to achieve a self-generated balance. This is what Barron describes as *'controlled weirdness'*[54] and Carlsson as *'controlled imagination'*.[55] It is the essence of true autonomy: the informed freedom to choose from a place of self-control - and the bastion against manipulation by others.

Creativity is not a destination in itself but an approach, an habitual process of working within a multitude of living possibilities. It requires the development and exercise of senses and skills, not just eyes to see, ears to hear, skin to feel, but inner eyes to imagine, inner ears to recognise potential harmony and resonance or discord, and so forth. Education needs to awaken and enliven these inner senses to enable an autonomy of perception. These then inform and build the component thinking processes that will serve the human being in finding that firm place from which to observe external phenomena and the potential within that. For if the full range of thinking processes are engaged and owned by the individual, meaningful creative action follows, as surely as night follows day. Moreover:

> *'It is through the unbiased self-observation that the human being comes to realise that it is in his nature to progress along the path of bringing to realisation ethical intuitions.'*[56] [57]

What is needed is a paradigm shift in education towards recognising and enabling multi-layered creative thinking skills on an international scale if we are to hope to address multi-layered and complex global problems with long term success. In a pluralist world, singular viewpoints will no longer suffice.

In the following chapters, eleven key thinking skills will be outlined and explored. These skills, in concert, provide the opportunity for informed autonomy and effective, ethical creativity. Neither creativity nor autonomy can be bought or taught. They cannot become embedded habit simply through a weekly lesson on a Thursday afternoon or an occasional enrichment trip to a gallery. It must be lived in education from early years through to higher education and beyond if we are to achieve that creative, happier future for all.

---

[54] Barron, F., 1993. Controllable Oddness as a Resource in Creativity. *Psychological Inquiry*, Volume 4, 182-184.

[55] Carlsson, I., 2002. Anxiety and Flexibility of Defence Related to High or Low Creativity. *Creativity Research Journal*, Volume 14, 341-349.

[56] Steiner, R. (1917) *The Philosophy of Freedom, p.175*

[57] It is important to note that the philosophy and views of Rudolf Steiner are presented here to give background context to the spectrum of Creative Skills that will be outlined in detail in the following chapters. However, the intention is that the explanations and characterisations within the book, as with the associated suites of qualifications, are designed to be as practically useful to as wide and diverse a demographic as possible. It is not intended as eulogising. As Steiner wrote of his book Philosophy of Freedom, *'it does not indicate the only possible approach to truth: what is described is rather a path taken by one whose heart is set on truth'.*

Part Two

'A Genius!

For thirty-seven years I've practised fourteen hours a day,

and now they call me a genius!'

Pablo Sarasate (1844 – 1908)
Spanish violinist and composer

Chapter 6: The Creative Thinking Skills Spectrum

'The whole is greater than the sum of its parts.'

Aristotle

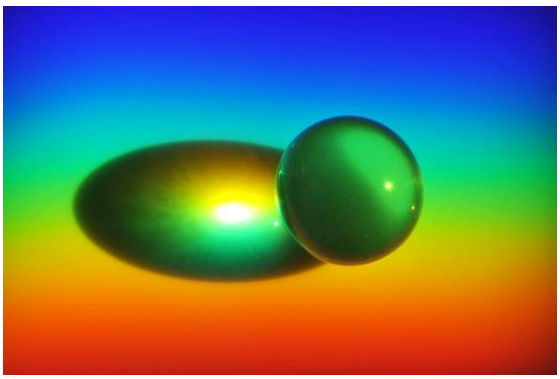


Figure 8: Full Spectrum by Blomerus Calitz (2010).

Creative Thinking Skills are presented here as a unified spectrum of thought.[58] They can, however, be made visible just as unified light may be refracted into the colours of the rainbow. But we cannot see the coloured light from a prism until the world provides something for it to reflect upon. Then we infer the presence of the light spectrum, which is still a single light manifesting in different ways. It might be helpful, to consider the Creative Thinking Skills Spectrum in this way rather than as fragmented, which implies a permanent, singular and destructive event. The reality is far more diverse and fluid because of the subtle interactions between thinking skills, just as light does not exist rigidly in spectrum colours but can reunite or manifest in a myriad of subtle hues and shades when interacting with the world of matter. Just take a walk and look at the colour that surrounds us. The presence, extent of, and the relationships between each of the Creative Thinking Skills outlined below may be similarly inferred from their reflection as action in the outer world.

The Creative Thinking Skills Spectrum facilitates the ability to generate, manipulate and refine, an imagination. They may be practised like any other skill. The manipulation or transformation of an imagination is the creative thought process.

The raw material for an imagination can be drawn from immediate perception, memory and a multitude of collected associations including emotional responses. The greater the number of associations, understandings and experiences available, the richer and more fertile the mental environment in which a creative thought develops.

Written Linguistic Articulation – is the ability to formulate appropriate written structure as a coherent whole using appropriate vocabulary.

[58] Holt, E., 2017. *What are Creative Thinking Skills?* [online] Available at: https://acts.cloud/what-are-creative-thinking-skills/

Verbal Linguistic Articulation – is the ability to formulate appropriate spoken structure and coherence as a monologue and in reciprocal conversation using appropriate vocabulary and expression.

Imaginative, Non-Linguistic Thought Pictures in Two Dimensions – is the ability to generate original two-dimensional pictorial imaginations that are available to be translated externally, for example into images or linguistic descriptions.

Imagined Inner Structure/Systems in Three Dimensions and Over Time – is the ability to maintain, in thought, an overview of three-dimensional physical or conceptual mechanisms, systems, forms, structures or metamorphoses. It is also the ability to co-ordinate a variety of perspectives including the ability to represent the point of view or experience of another person.

Resonance and Pattern in Thinking – is the ability to represent and place memories, experiences and associations into meaningful relationships, whether visual or in terms of movement, music, mathematical ideas or related concepts.

Heuristic Thinking/Improvisation – is the ability to use common sense when working with unknowns. The thinker uses trial-and-error. Heuristic thinking is often an inspired attempt and, most importantly, it entails being willing to fail. It may involve thinking through the practical application of the hands/body or whole-body thinking.

Observational Thinking: the commonplace in novel terms – is the ability to produce an innovative approach or insight into the unfamiliar, as well as common problems or accepted wisdom. It involves seeing beyond the obvious, to reach the essence, the reality or the unseen potential.

Contemplation – is the ability to refrain from judgement or prejudice when considering, for example, information or experiences and to maintain that position for a sustained period to achieve a full, objective overview.

Critical Analysis – is the ability to make reasoned and coherent judgements on the basis of an informed understanding.

Co-ordinated Thinking – is the ability to co-ordinate ideas, concepts, strategies and approaches, and manage the synergy between them, while keeping an eye on deadlines, personal organisation and needs, and the associated internal and external ethical considerations associated with any potential action.

Reflection on Perception – is the ability to objectively compare and contrast a new perception with a previously held view, experience or understanding and support or adapt one or the other. This includes perception of the thinker's own thought processes. Where this presents a paradox, the thinker uses his/her perceptive ability to recognise it.

These thought processes, in combination, will help pave the way to the 'a-ha' moment; to insight, or to a personal conviction based upon objective understanding and self-understanding. They can also enable and enhance meaningful creative action.

****

Creativity is the natural state of the human being whereby, from the micro level, things called to mind, or perceptions are transformed into new symbolic understandings (concepts) with the assistance of feelings and intent. Understanding this marks the difference between simply filling knowledge buckets or lighting the fires of imagination. This was outlined in Chapter 2 and will be further explored in later chapters.

It should be noted that thoughts and thought processes are not isolated or linear: the process of thinking is cyclic, from the simple perception to concept, then on to complex thought as simple concepts are brought to mind as perceived material for further thinking and transformation into further concepts. The creative thinking skills outlined above describe collectively and in various permutations the practical vehicle for this process.

This Creative Thinking Skills Spectrum theory is a pragmatic attempt to encompass the full range of skills and capacities that are beneficial to meaningful creative action. It builds upon Steiner's ideas about thought and is expected to support creative action within the context of responsibility and self-knowledge.[59]

It is hoped that this proposition gives sufficient context and framework for practical use in the short term, alongside food for thought and further investigation in the longer term. The specific definitions for imagination, creative thought and each creative thinking skill are offered in the context of the theory as a whole. Each specific skill will be further explored and explained in the following chapters alongside indications for how they may act, each upon the others.

Additional indications for possible methods of assessment of the Creative Thinking Skills Spectrum is included in Appendix 3. The reader is warmly invited to suggest further ideas or improvements for future editions of this book.

[59] Steiner, R., 1894.

Chapter 7: Written Articulation

'All I need is a sheet of paper and something to write with,
and then I can turn the world upside down.'

Friedrich Nietzsche

The creative thinking skill of written linguistic articulation is defined as the ability to formulate appropriate written structure as a coherent whole using appropriate vocabulary.

It may seem strange, having spent six chapters bemoaning the apparently inflated importance of the written word, to now list it as the first of the eleven essential creative thinking skills! There are two reasons for this. Firstly, the problem has not been the written word itself, but the manner of assessment and the teaching that that assessment inevitably informs. Secondly, the learning of written language confers an important forming quality to the thinking of the individual, if developed in the right way. This begins with the child's very first encounter with the written word.

7.1: Background and Context

Written articulation is a record of language and is built upon an experience of language from birth. It is well known that if children experience stories being told or read to them in a relaxed and positive environment, then they are more likely to become interested in reading.

Figure 9: Visit from ITESM Campus Ciudad de México students to a foster home for girls (Casa Hogar de las Niñas) in Tlahuac, Mexico City. By Monterrey Institute of Technology and Higher Education, Mexico City, (2012).

But it is less widely known that the physical act of writing, and the introduction of the letters through this medium of forming the letters by hand, actually stimulates the capacity for reading. Very often, children are taught by parents or teachers to read first and then to write and it seems counter-intuitive to instead *create* writing and only then understand the written word. However, a study by neuroscientists James and Engelhardt has revealed that the external activity of handwriting in pre-literate five-year-old children, engages and integrates greater letter-processing capacity in brain regions directly linked to later successful reading. [60] It significantly activates the 'reading circuit' of linked neural regions, when reading what they have written. This was not found to have occurred in those who typed or traced the letters. It also appeared to be far more enhanced and adult-like in structure than those who only observed letters but did not write. This important neural network is exercised and developed (through the process described in Chapter 2) so that it is also stimulating other key neural networks that are then available to assist with, for example, making or breaking other codes, or for generating creative thought. This is very significant to those concerned with effective and economic teaching practice: to teaching which allows time and energy for the full spectrum of essential faculties to also be developed alongside reading and writing skills: faculties that have impact throughout life and beyond school.

The field of 'haptics'[61] is providing increasing insight into the intimate relationship between hand movement and brain development.[62] The process of learning to write a letter involves spacial awareness in two dimensions for encoding a fragment of speech onto the surface of the paper. It also involves fine motor skills and the orientation of straight and curved strokes within this. Many areas in both hemispheres of the brain are further activated and exercised if the letters are learned in a meaningful context. This might involve an association with the sound and meaning in each case, as part of a word within a natural sentence. This can then be deepened if the sentence is a key part of an imaginative story.

The transition from *things* to the concept of symbols that *stand for* things can then be made gently, joyfully and in a way that is imbued with colour, games and songs that engage the essential feelings and intent identified in detail in Chapter 2. The resulting experience builds multitudes of nuanced associations and mental connections. These, in turn, generate neural depth and complexity around what the child writes. The fact that the pictogram 'creations' and the letters extracted from them are simply recapitulating the discovery of writing, is beside the essential point. The creative potential is slowly being primed. To the child, they are creating new meaning of deep significance for their world when they discover the hidden letters in their pictures. The world of fairy stories is ideal for this development of thinking because the stories are free from the laws of nature but carry symbolic meaning suited to the young child. They offer a limitless world to imaginatively play in.

When the growing child moves on to cursive writing, the more complex and variable encoding makes more complex recognition and association demands. The University of Washington discovered that children across the whole of primary school age wrote more, faster and were

[60] James, K. H. and Engelhardt, L., 2012. The effects of handwriting experience on functional brain development in pre-literate children*, Trends in Neuroscience and Education,* 1(1), pp.32-42.

[61] Haptics is the study of how we explore the world through touch and its relationship to perception via an internal mental model of our bodies.

[62] Mangen, A., and Velay, J. L., 2010. Digitizing literacy: reflections on the haptics of writing. In M. H,. Zadeh, ed. *Advances in Haptics*, edited by M. H. Zadeh

able to express more ideas when writing by hand versus typing on a keyboard.[63] Cursive writing helps train the brain to integrate visual and tactile information with fine motor dexterity.[64] It encourages thinking in complete sentences.

William Klemm, a senior professor of Neuroscience at Texas A&M University, writing in *Psychology Today*, noted the importance of cursive handwriting and that:

> *'School systems, driven by ill-informed ideologues and federal mandate, are becoming obsessed with testing knowledge at the expense of training kids to develop better capacity for acquiring knowledge. The benefits* [of cursive handwriting] *to brain development are similar to what you get with learning an instrument. Not everybody can afford music lessons, but everyone has access to paper and pencil. Not everybody can afford a computer for their kids – but maybe such kids are not as deprived as we would think.'* [65]

In addition to the obvious benefits of handwriting, the relationship between encoding, decoding and meaning in spelling – especially when encountering the vagaries of English - builds in flexibility of thinking alongside the very formal requirements of written language. When the student's native tongue is compared with other languages, rich opportunities arise to integrate a geographic relationship to words and phrases. This may be expanded to the historic routes that words have taken, for example from Norse, Sanskrit, Arabic, Latin, Greek and so forth. A relationship to the history of the world is available through the fabric of the written word. English as a language is highly eclectic in this way and currently has more words than any other language.

Comparing written languages brings out nuances and complexity relating to identity. In the 1990s, a number of Nigerian poets preferred to use English for love poems because of the wider scope of expression available. Other languages, including German and French - in an effort to protect the purity of their languages and to prevent Anglicisation - began constructing compound words from their pre-existing language and passed laws regarding the usage of foreign words. In France, this responsibility currently resides with the Académie Française. For example, *email* became *courriel*, a portmanteau word combining the two existing words, *courrier* and *electronique*. Studying this relationship of the written word and spellings within each language to cultural identity and feelings of international relevance, deepens still further the level of neural associations brought to the discipline of constructing written articulation. This is especially relevant when considering a range of viewpoints.

For example, the German language is famous for including the compound construction of nouns. The word 'Rechtsschutzversicherungsgesellschaften', which translates as 'insurance companies providing legal protection', is apparently the longest German word in everyday use, but not the longest overall.

---

[63] Berninger, V*., 2012.* Evidence-Based, Developmentally Appropriate Writing Skills K–5: Teaching the Orthographic Loop of Working Memory to Write Letters So Developing Writers Can Spell Words and Express Ideas. *Presented at Handwriting in the 21st Century?: An Educational Summit, Washington, D.C.*

[64] Mangen, A., and Velay*, J. L., 2010.*

[65] Klemm, W. R., 2013. Why Handwriting by Hand Could Make You Smarter in *Psychology Today* [online] https://www.psychologytoday.com/us/blog/memory-medic/201303/why-writing-hand-could-make-you-smarter

'Rindfleischetikettierungsüberwachungsaufgabenübertragungsgesetz', which refers to the now (thankfully) repealed 'law for the delegation of monitoring beef labelling' was even longer at sixty-three letters.[66] As the American author Mark Twain famously observed:

'*Some German words are so long that they have a perspective*.'

There is also the direct effect of grammar upon thinking, and vice versa, through the categorising and characterising of the words and phrases that is required. Steiner viewed grammar as a building block of thinking, based upon an innate sense of language. Avram Noam Chomsky (1928 -) has also long argued that we have an inherent grammar in our mind that underlies all language processing. [67] This is why the nonsense that is *Jabberwocky*, by Lewis Carroll, makes perfect sense.

A collaboration between the Max Planck Institute for Empirical Aesthetics and New York University found that words, phrases and whole sentences were simultaneously processed, at differing speeds, when reading nonsense of this kind, proving that the thought processes involved were grammar-based.[68] This grammar-like, abstract and hierarchical construction that the mind embarks upon when faced with linguistic nonsense works with categorisation and characterisation of words alongside inference of meaning. It does so using neural networks operating simultaneously at different speeds. This faculty also strengthens the capacity needed for the precise construction of complex relationships between ideas or concepts.

We can observe the direct correlation between grammar and conceptual thinking if we consider the work of Flecken et al (2015), again from the Max Plank Institute for Psycholinguistics. They observed English and German speakers in a non-linguistic image tracking experiment. To simplify, the subjects watched an object move towards a shape. They discovered that the German participants' attention was directed to the endpoint whereas the English participants' attention showed no difference between trajectory or endpoint. This correlated to the position of the verb in the sentences of the respective languages. The structure of the native speaker's grammar influenced their conceptualising of non-linguistic movement.[69] Studying and writing within a variety of languages brings experience of different ways of conceptualising.

In High school, the objective study of the written form is focused upon its specific syntax forms, which can be fully understood and utilised at this period of development. These complex forms have evolved to offer diversity of expression and yet avoid confusion in the absence of body-language or verbal intonation clues. They inevitably make written articulation a slower and more conscious activity. Researchers will spend time honing the order of points they wish to make, while lawyers will be painfully aware of the potential impact of a misplaced comma! Authors like to use structure to evoke an alternative reality. In the case of Joseph Conrad, *'My task, which I am trying to achieve is, by the power of the written word, to make you hear, to make you feel - it is, before all, to make you see.'*

---

[66] Vasagar, J., 2013. *Germany drops its longest word: Rindfleischeti…*in the Daily Telegraph [online] available at https://www.telegraph.co.uk/news/worldnews/europe/germany/10095976/Germany-drops-its-longest-word-Rindfleischeti....html

[67] Chomsky, A. N., 1957. *Syntactic Structures.* 2nd edition. Reprinted 2015. Eastford: Martino Fine Books.

[68] Ding et al., 2015. *Cortical Tracking of Hierarchical Linguistic Structures in Connected Speech*, in Nature Neuroscience (19)1. Advance publication [online] http://psych.nyu.edu/clash/dp_papers/Ding_nn2015.pdf

[69] Flecken et al., 2015. *On the road to somewhere: Brain potentials reflect language effects on motion event perception* In Cognition, Volume 141, 41-51.

Poets like to subvert structure in the written form - for enlivening effect or to capitalise upon the resulting ambiguity or feelings that are then evoked in the reader by unusual juxtapositions. Yet in all cases, we use a specific set of skills and those skills are founded upon grammar and allow us to articulate innovative thoughts and ideas in a way that can be understood in a wide range of circumstances, in our absence.

7.2: How is Written Articulation Developed?

7.2.1 The Early Years Setting

In the early years setting (age 3-6) written articulation is best introduced by not introducing it, but by developing the faculties that are needed to inform it. The child will need, on a practical level, fine motor skills to form the letters and gain the greatest benefit from the physical act of writing the letters. Also, developing an experience and awareness of well-formed, precise speech in adults will assist in understanding of the overall structure. Ideally, very young children should experience succinct nuggets of natural, positive speech related to the world that they inhabit, to the objects around them and to the everyday tasks of life that they can relate to in a concrete way. Stories can also be told precisely and repeated each day - perhaps for a week - to develop a sense of artistic and expressive language. Social free play offers plenty of opportunity for simple tasks and conversation pursued within a communicative group of peers. This develops a context for speech and, later, for writing. This is the best use of the developing child's energy in the early years. The key theme here is the goodness in the world that will go on to frame the learning of writing.

7.2.2 The Lower School

If the letters are then formally introduced in the Lower school, at age 6 to 7, and through the medium of an ongoing story, then this efficiently engages the feelings of the child within the child's evolving capacity for linear memory and encoding. In Steiner schools, this continuous narrative is seen as a natural progression from the repetitive simplicity of kindergarten storytelling in the Early Years. A continuous daily narrative can now awaken the child's capacity for more detailed inner picturing of images from the story within imagined and real timelines. The story can then be transformed into meaningful outer pictures from which the two-dimensional letter signs may be extracted by the child, following the natural development of writing from pictograms. A few simple examples are given below.

Figure 10: Blackboard drawing for letter "E" extracted from the Brothers Grimm's story of the eagle in "The Crystal Ball", (for age 6). By Elaine Holt, (2012).

The joyful intent evoked within the children by the story content and excitement of discovery, alongside the simple physical repetition of practising the letter forms, on paper, modelled in clay and walked on the floor, are key in terms of the neurogenesis of growing brain mass and connections. This has two direct benefits. Firstly, it embeds a living relationship to the letters and words which remain with the child through to adulthood. And secondly, the neural networks that are created through this process have potential and capacity far beyond the words or letters alone.

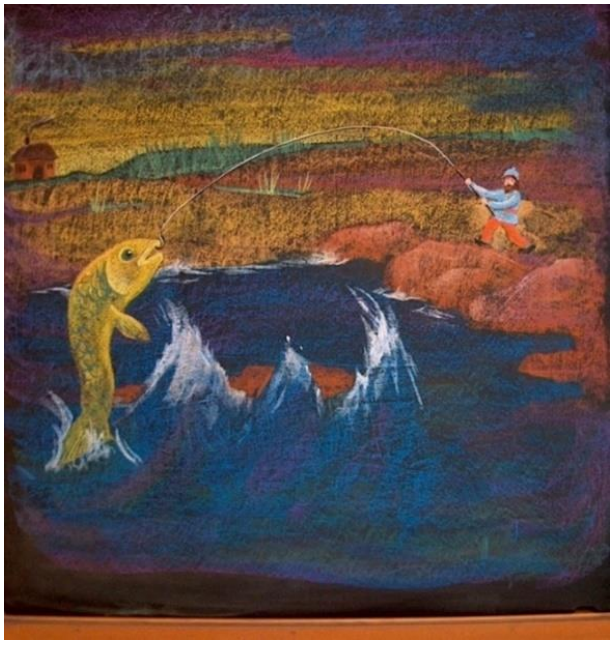


Figure 11: Blackboard drawing for "The Fisherman's Wife" by the Brothers Grimm. Two letters are hidden in this picture, (for age 6). By Elaine Holt, (2012).

Significant predispositions for encoding and decoding are also made available for building yet further connections and assimilating later learning across the disciplines. Drawing the letters out of imaginative pictures enlivens and ensouls the experience for the child, so that writing is not seen as a chore, but as a joyful mystery and adventure. This is not to be underestimated.

Figure 12: Blackboard drawing for Russian fairy tale of "Baba Yaga". Two letters are hidden in this picture, (for age 6).By Elaine Holt, (2012).

Once the letters are learned, time spent on the craft of cursive handwriting and, through that, the revelation of meaning in sentences, develops an open relationship to the written word that can encompass and nourish all that follows. Simple observations and succinct images portrayed in words, phrases and sentences that are already known by heart, are the best writing activities for the growing young child.

Alongside the development of writing, it is helpful to begin a simple exploration of basic grammar, beginning with the nouns – naming things – following the course of the learning of verbal language, along with awareness of spelling patterns arising from the written sentences. This is best begun at about age nine when the growing child becomes more aware

of their being separate from other aspects within the world that had previously appeared to be more of an extension of themselves.[70]

7.2.3 The Middle School

In the middle school, from about the age of 10-11, the practice of writing in contrasting styles brings precision to the work, a sense for the beauty in words and a new awareness of the anticipated reader's needs. Here, syntax becomes the nuanced means of transferring expression onto the paper. A great deal can also be done at this time in relation to exploring different approaches and viewpoints to a single event or observation through the medium of writing. It is also helpful at this age to explore a variety of different genres of writing: for example, poetry, thriller, comedy, historical tragedy, closely observed scientific descriptions, newspaper reports or theatrical dialogue. Science offers the opportunity for succinct, objectively unemotional and precise writing. Business Maths offers the opportunity for proposals, evaluations, persuasive writing and formal letters. Poetry can explore wonder and emotions. In the middle school, the experience of beauty in a variety of texts from across the ages will enliven and inform the written word. Wherever possible, these should include first-hand accounts - as in the detailed and harrowing description of the eruption of Vesuvius by Pliny the Younger - as these add the experience of personal language over time.

From about the age of ten, the focus on spelling and grammar can become more advanced. This continues to enhance the natural development of a grammar of thinking. The comparisons between languages, where second and third languages are learned, enable a flexibility and perspective within that innate grammar. This then further enables an awareness of the potential to operate otherwise. Observing the similarities and differences between written languages is equally beneficial at this time. This work exercises the coordination of perceptions.

I remember a lad of about twelve years, in an English class, who exemplified for me the conceptually formative potential of grammar. He was Icelandic. The class was at that time working through an English creative writing exercise exploring the difference between a selection of concrete and abstract nouns of their own devising. Often given to announcing his thoughts in real time, he suddenly and urgently called out:

'Elaine…is God a concrete or an abstract noun?'

I turned, expecting the usual cheeky grin, but instead saw the glazed eyes and the stunned expression of a student randomly encountering a fundamental existential question – on this occasion at 11.30am on a very normal Monday morning. The practice of grammar and the capacities that it develops were also informing his conception of, in this case, the divine.

7.2.4 The High School

Reassessing written forms and developing a philosophic understanding for truth in writing is the guiding principle for high school, from the age of 14-15. The restrictive forms within diverse styles of written poetry can provide fruitful opportunity for creativity with the maturing ideas and concepts that also build capacity of mind as they physically build the fabric of the brain in puberty. It is the beauty of the brain that it can continually build itself from the activity

[70] Avison, K and Rawson, M. 2000).*The Tasks and Content of the Steiner-Waldorf Curriculum*. 2nd ed. Edinburgh: Floris Books

of thought. In this, the brain shows a fundamental difference to computers, which acquire and produce knowledge (and to which the brain is often compared). But that knowledge, or the software that stores it, cannot build the hardware - even in Artificial Intelligence - in the way a well-exercised brain can do. It is limited by the limitations of the human software architect. It may have answers, but it cannot find the questions alone. Writing software is a useful means of comparison at this age and meaningfully compliments the disassembly and reassembly of a computer or laptop.

As the student matures towards adulthood, changing the structure of a single piece of writing to serve a variety of needs, from business letters to reports, lines of a play, philosophical argument or poetry, generates flexibility within the skill of written articulation and the associated thinking processes. Stylistic comparisons of texts across languages, time and disciplines is beneficial - for example, comparing the written styles of Continental and English philosophy alongside their conceptual differences.[71]

****

Clearly, if you wish to disseminate a creative idea to the widest possible audience and over time, then written articulation is invaluable to that. The creative word can have huge impact alone: many have been moved by it. It can enable the understanding of complex problems and illuminate the potential solutions. It can motivate creative action and innovation. The book *Rights of Man* was the reason that vast numbers of people gathered in secret and learned to read the prohibited text.[72] John Locke's *An Essay Concerning Human Understanding*[73] inspired the evolution of modern psychology as a discipline as well as many aspects of education.

But finally, we must recognise that the conversation between writer and their reader is always a one to one, private conversation, though it be separated by perhaps two thousand years and viewed by millions. The habit of forming appropriate written structure as a coherent whole, using appropriate language, is a habit that asks to be developed more carefully than swiftly.

Verbal articulation works in a qualitatively different way. This is why students can do so well in one area without doing well in the other. Both are important and inextricably linked but orientated differently, as are the two sides of a coin. In the next chapter, we shall take a closer look at verbal articulation and how that contributes equally positively to the spectrum of creative thinking skills.

[71] Additional examples of good classroom practice and descriptions of specialist activities can be found in: Avison, K. and Rawson, M. eds., 2016.
[72] Paine, T., 1792. *Rights of Man* . Reprinted 1984. Penguin Classics, London
[73] Locke, J., 1690. An *Essay Concerning Human Understanding*. Reprinted 1998. Penguin Classics, London

Chapter 8: Verbal Articulation

'I have a dream….'

Martin Luther King Jr

Verbal Linguistic Articulation is the ability to formulate appropriate spoken structure and coherence as a monologue and in reciprocal conversation using appropriate vocabulary and expression.

8.1: Background and Context

In distant prehistory, the ability to conjure images, memories and experiences by means of the spoken word alone was the province of shamen, priest-kings and sorcerers. In India, *Vac* was the ancient goddess of speech personified, the mother of the Vedas and the poet's inspiration. Vac comes from the Sanskrit '*to speak'. Brahman* was the eternal unchanging truth that is the source of all change. Together they brought the world into being through the power of speech. The Vedas were originally 'heard' in the oral tradition, then later written down. *Brhaspati* was the *'Lord of Sacred Speech'* and the patron of speakers and inspired poets. The oldest surviving Vedic copies, from the first and second millennium BCE, include the following lines:

1. *'Brhaspati! When the wise ones set in motion the first beginning of speech, giving names, their most pure and perfectly guarded secret was revealed through love.*
2. *When the wise ones fashioned speech with their thought, sifting it as grain is sifted through a sieve, then friends recognised their friendships. A good sign was placed upon their speech.'*

In another hymn, Vac (Speech) herself speaks, saying:

8. '*I am the one who blows like the wind, embracing all creatures. Beyond the sky beyond this earth, so much I have become in my greatness.'* [74]

The power of speech to grasp and synthesise even the most abstract unknowns by naming them was clearly understood from earliest times, alongside the creative power of speech to bring about action with substance.

In other cultures, it was understood that knowing the right sacred words conveyed power over even the gods themselves - as the Egyptian god *Ra* found out to his cost when he told *Isis* his secret name. The right word, spoken in the right way, was understood as a magical, controlling force. In the ancient Jewish scriptures, discord is sown by fragmenting one language into many, in order to punish the arrogance of Nebuchadnezzar, in the story of the *Tower of Babel*. This described the devastating effect that the lack of clear and mutually understood verbal language has on an (albeit misguided) creative project.

[74] Doniger O'Flaherty, W., ed., 1981. *The Rig Veda: an anthology,* [Trans.] Penguin Group, London.

Later in history, the great literary epics including Homer and the Kalevala remind us of times when speaking carried the collective memory, guiding principles and history of a people. This, too, has roots in the distant past where rhythmical, musical speech carried cultural concepts of wisdom and identity.

With the Greeks, we have written records of the art of speaking, in debate and in rhetoric, alongside contemporary accounts of the effect that the invention of writing had upon the established art of speech. This was perhaps most directly expressed by the Greek orator Alcidamas when he wrote:

> *'I do not think it is right that speeches written down should even be called speeches, but should be thought of as images, patterns and imitations of speeches and we could reasonably have the same opinion about them as we have about bronze statues, stone monuments and depictions of animals. For, just as these are imitations of real bodies and give delight to the view but offer no use in human life, in the same way the written speech, having a single form and arrangement, produces certain striking effects when it is conned from the book, but, being fixedly unable to respond to critical moments, is of no use to those who have got hold of it. Just as real bodies present an appearance far inferior to that of fine statues but yet are many times more useful for getting things done so, too, the speech spoken straight from the heart on the spur of the moment has a soul in it and is alive and follows upon events and is like those real bodies, while the written speech whose nature corresponds to a representation of the real thing lacks any kind of living power.'* [75]

The key difference here is that speech is seen as ensouled. The teacher and philosopher, Socrates, was an inspiration to Alcidamas, Plato and to many others. He was one of the great founders of western philosophy and held that the spoken word was fundamentally superior to the written word. He felt this was because the process of speech is more important than the product. It was the ability to say the right thing at the right time in the right way, taking account of the listener and allowing for either, or both, to adapt their views and together craft a shared understanding. Also, this activity within the moment-to-moment discourse was seen to develop both short and long term memory, alongside a flexibility and adaptability in thinking. These were seen to have profound benefits for both the individual and for society at large. [76]

Socrates used verbal articulation extensively in teaching, in what is known as the Socratic method. In this method, the teacher helps the student to bring forth their ideas and beliefs, 'as a midwife would assist in the birth of a child'. [77] The scrutiny that the student is able to apply to their own thoughts, during this process, enables them to find out the truth about those thoughts and about knowledge itself. For Socrates, dialogue and verbal articulation was the only real route to truth, knowledge and ethical action.

Plato explored Socrates' ideas through the *Dialogues* where the character Socrates says, 'by learning through reading alone, rather than in conversation with a learned teacher, we will lose the substance of wisdom', indicating that wisdom cannot be found in isolation from other

[75] McCoy, M., 2009). Alcidamas, Isocrates, and Plato on Speech, Writing, and Philosophical Rhetoric. In *Ancient Philosophy*, 29(1), pp. 45-66.

[76] Fisher, R., 1995. Socratic Education. In *The Journal of Philosophy for Children*, pp.23-29. [online] Available at https://dlib.bc.edu/islandora/object/bc-ir:100196/datastream/PDF/view

[77] Fisher, R., 1995. p.25

human beings. The character Socrates also says that writings are only useful as a 'garden of letters' against a 'forgetful of old age,' indicating their role as record rather than creative force.[78]

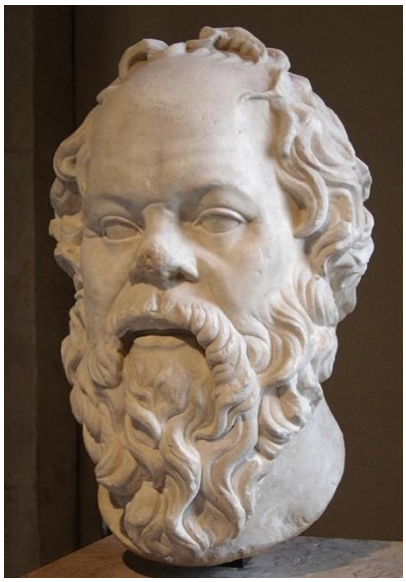


Figure 13: Marble bust of Socrates, 1st Century Roman artwork, perhaps a copy of a lost bronze statue made by Lysippos. Located in the Louvre Museum. By Eric Gaba (2005).

Plato himself advocated that there was beauty, truth and wisdom in the love of philosophy and rhetoric. He felt that writing eroded that love and the powers of memory it cultivated: if you can look it up, he argues, you don't have to remember it, you don't have to love it. Nevertheless, it was his own Academy in Athens that really took the new tool of writing to its heart, with Plato perhaps attempting to bridge the gap with speech by writing his *Dialogues* in the form of conversations.

It is perhaps a supreme irony that we only know any of this because of the written accounts of Plato and others, in records that have withstood war, natural disasters and the deaths of all those who spoke directly with Socrates, or knew those who knew someone who spoke with him. Without writers like Plato, the echoes of Socrates' voice would be lost to us forever.

By contrast, much later, in eighteenth century Europe, despite ever-increasing levels of literacy, degrees were traditionally still taken verbally, viva voce. But by the time John Scott, 1st Earl of Eldon, took his degree at Oxford in 1770, this practice had become completely corrupted by the forces of patronage and favour. He described his oral examination as follows:

> *'I was examined in Hebrew and History:*
>
> *"What is the Hebrew for the place of a skull?"*
>
> *I replied, "Golgotha",*
>
> *"Who founded University College?"*
>
> *I stated,*
>
> *"King Alfred founded it."*
>
> *"Very well, sir," said the examiner, "you are competent for your degree."'* [79]

The 'examination' was conducted entirely on horseback. John Scott called it 'a farce' - and it was. The introduction of the written Chinese-style examination system, a century later, secured the primacy of the written word to avoid such corruption in Europe, just as it had done in China.

Today we say, 'talk is cheap.' There is certainly still a cultural memory of the power of spoken words in phrases like 'I give you my word' or 'my word is my bond' and in the swearing of

[78] McCoy, M., 2009. p.23.
[79] Twiss, H., 1844. Lord Chancellor Eldon in *The Anglo-American,* Volumes 3-4, p.376

courtroom oaths. But even here, verbal contracts carry less weight than written contracts and slander is viewed less seriously than libel. Nevertheless, the governance of the world, at both national and international levels, still rests upon the medium of the spoken word. Diplomacy requires careful speech.

On the everyday level, the mundane immediacy of the smartphone and web has placed the art of verbal articulation under further assault, with a corresponding pandemic of texting, tweeting and addictive overuse of social media. It does this by reducing the amount of direct personal interaction with another human being, face-to-face, in real time and space. The psychologist, Sherry Turkle, in her book *Reclaiming Conversation*, noted a worrying trend in twelve-year-old girls, reported by teachers in New York, in connection with the increased use of social media by school children:

> *'These kids aren't cruel. But they are not emotionally developed. Twelve-year-olds play on the playground like eight-year-olds. The way they exclude one another is the way eight-year-olds would play. They don't seem to be able to put themselves in the place of other children. They say to other students: "You can't play with us."*
>
> *They are not developing that way of relating where they listen and learn how to look at each other and hear each other.'* [80]

Girls become more articulate as they approach puberty, and can use words as incising weapons, whereas boys tend to become less articulate for a while. This observation of girls in the playground indicates a hardening in their interactions, made permissible because these behaviours are practised repeatedly in a digital environment that distances the impact of message from the speaker, who need never see the tears they cause. It seems strange that the girls or their families would permit this.

Susan Greenfield gave a chilling reason for the overwhelming allure of social media and the consequent entrenching of the problem beyond the ability of parents to deal with it. In her book *Mind Change* [81] she explains, in terms of neuroscience, how our children's minds are being rewired through the chemistry of the brain and the addictive quality of sharing personal information online. Sharing a little personal information is a natural bonding mechanism in human beings linked to speech and conversation. It builds healthy community feeling and triggers a biochemical feel-good cycle involving the release of dopamine when we share personal information with friends and acquaintances. But sharing is also dangerous to our privacy and sense of personal identity. The thing that protects us, in face-to-face encounters, and inhibits unsuitable sharing, is body language and the little unspoken cues that tell us not to get too close yet – or indeed at all. Greenfield calls the current situation with social media overuse 'a potentially vicious biochemical cycle,' where we become addicted to the feel-good rush after sharing information on social media. Even though we may guess it is not good for us, we are hooked on it, like 'junk food for the brain'. Then, just as junk food changes our bodies, so social media changes our minds. Our loss of privacy causes our sense of self, our sense of our own, vulnerable and private identity to become externally and publicly constructed

[80] Turkle, S., 2016. *Reclaiming Conversation: The Power of Talk in a Digital Age.* 2nd ed. New York: Penguin, pp.5-6.
[81] Greenfield, S., 2015. *Mind Change.* 1st ed. London: Rider

– and potentially airbrushed into a fiction - while the real individual is lost.[82] This makes it even harder to find that firm mental place of self-understanding from which to properly understand external influences and judge the speech or motives of others. Twelve-year-old girls are particularly vulnerable to this phenomenon as they feel a need to know who 'wants' or 'likes' them, and social media offers the promise of instant gratification to that.

Manipulation via social media is rife, but false speech has always been known, even when the Psalms were first written:

> *'His speech was smoother than butter, but his heart was war; his words were softer than oil, yet they were drawn swords.'* [83]

Of course, there are laws to protect users of social media, but legislation against the crimes of liars will never be as effective as being able to spot one from the start. It is far harder to deceive an experienced speaker face-to-face than a less practised person in a text.

Figure 14: Social focus in the 21st century
Image Source: Getty images

As the Greeks explained, it is the eye-to-eye contact associated with speech that builds understanding and offers a route to wisdom, truth and the resolution of differences. And the practice of living speech hones not only the art of speaking but also the essential skill of perceptive listening that allows us to differentiate fair comment from nonsense. These skills are developed throughout childhood and adolescence - if given the space to do so.

8.2: How is Verbal Articulation Developed?

8.2.1 The Early Years Setting

Verbal articulation is first developed through the natural interactions of the family, then the wider community and school. The quality of the articulation developed will be dependent upon the quality of the experience of interaction. If a child hears little language or mainly through the unresponsive medium of the television, their articulation will be limited by that. If the conversation is overly complex, overlong, too adult or abusive, the child may have to use too much energy trying to understand the context and miss out on other important learning opportunities or may even just 'switch off'. Clear, precise and loving language will assist language development especially if spoken gently and appreciatively of the world and its simple pleasures: a beautiful day, the first flowers in spring, the feel of soft rain, wild winds or the smile of a friend. Language about the positive realities around the child will bring a positive

[82] Greenfield, S., 2015. *Mind Change*. *p.115.*
[83] Psalm 55:20-21

relationship to speech. In the early years at school, speech is best developed within supervised free play in small groups. Here the child can exercise polite negotiation, clarifying needs and wishes as well as showing understanding and sympathy. All these can be encouraged in simple form by the example of the adults using precise, well-structured and caring language.

Self-speech is another essential ingredient in the creative thinking toolbox that emerges first in the early years. This is the speaking that the child will do when playing alone (even in a group setting) and instructing itself, in a sometimes comical way, of what it needs and what each object is going to become, and what they see in their imagination and a running commentary on the process for achieving that. Although it does appear charming it is an essential element of thinking because the self-speech that begins as external vocalisation becomes, over time, a whisper as the child grows. The whisper becomes gradually quieter and less frequent and finally is internalised as a thought process. This will form the foundation of the Co-ordinated Thinking that emerges in adolescence and permits the higher levels of complex thinking possible in the adult. It is for this reason that educators should be mindful of the potentially negative impact they can cause by placing a child into a classroom setting too soon: to begin formal education (where they must sit behind a desk and still that voice for much of the time) before self-speech has been fully internalised.

8.2.2 The Lower School

In the Lower school, the development of verbal articulation has two clear strands as the growing child becomes more aware of others as separate from themselves. There is the speaking, but now also the conscious effort to listen. And this means not just the absence of speaking, but the active 'attending to' the speech of others, to entertain the ideas of others - without necessarily agreeing with them, but without dismissing them, either. This allows them to properly experience the view of another and articulate clearly and precisely and in well-structured sentences, their own thoughts. It is important at this time to allow sufficient time for all to express themselves and feel heard, including those with speech impediments like stutters. Many great orators and speakers began life with a stutter, including the Greek orator Demosthenes and the British wartime Prime Minister, Winston Churchill.

8.2.3 The Middle School

In the Middle school, the capacity to develop a full picture of a phenomenon through the use of verbal articulation both individually and in groups can develop. This involves the ability to ask the right questions in order to find out the missing information and jointly create a more accurate understanding, and is built upon the skill of listening through the social aspect of verbal articulation.

A Socratic approach in the modern classroom could involve asking open questions that draw out verbal articulation, through conversation, debate and counter-arguments, within a class. In this way, each child's relationship to the topic under discussion could be explored individually and within a group structure. The use of open questions has been used successfully in all subjects in Steiner school classrooms and found to develop, through the art of verbal articulation: self-knowledge, astute observation and creative proposals. Example questions for use in any schools, devised by Fisher, are reproduced in Appendix 2 at the end of this book.[84]

[84] Fisher, R., 1995. p.28.

8.2.4 The High School

As we move towards the end of the middle school and towards High school, the capacity for well-expressed proposal, argument, counter-argument, debate and discussion can be built upon the skills of speaking, listening, questioning and proposing. A group of teenagers are often given to full and frank disclosure of their opinions on practically any subject as they begin to practise more adult articulation. They are prone to instant and not always fully-informed judgements. From this age, it is particularly beneficial to explore the art of debate where the students are given a statement such as 'Athenians should erect a statue to Pericles' as part of the study of History or Art History, before debating the issue as follows:

- Without speaking, the students vote 'yes' or 'no' for the proposition, using black or white stones
- The students are then randomly divided into groups of four - two will argue in favour and two against the proposition, in turn. They are free to express any consideration when speaking but may not interrupt when someone else is speaking.
- The first speaker sets out the main issues on either side and the second speaker responds likewise, in turn.
- Then they swap sides and repeat the task, but this time arguing the opposing view.
- Finally, a new vote is conducted.

Generally, you will find that the most adamant and entrenched speakers will have qualified - and very often changed - their perspective entirely by the act of speaking and listening. The quiet ones are equally attended to and the unexpected idea has had the space to form and be heard.

Group problem-solving in a permissive, light-hearted and non-judgemental environment is very useful to developing negotiation skills, drama and the verbal presentation of project work develops individual presence within a group endeavour, alongside experience of judging the mood in an audience.[85]

****

The art of speech, whether in monologue, reciprocal conversation, group negotiation or debate, is essential to creative thinking. It needs practice over time. It allows knowledge or opinion within society to become a meaningful, shared understanding or idea. It has the adaptability to entertain and perhaps, but not necessarily, accommodate the counter-ideas of others. And all potentially within a short period of time.

Verbal articulation is the vehicle for social life, and social life has the capacity for enlivening creativity. Any performance activity be it a play, opera, ballet or installation event requires a

[85] Additional examples of good classroom practice and descriptions of specialist activities can be found in: Avison, K. and Rawson, M. eds., 2016. *The Tasks and Content of the Steiner Waldorf Curriculum.* Edinburgh: Floris.

great deal of clear and appropriate verbal articulation in the organisation and co-ordination, as does engineering and construction. The skill of verbal articulation greatly increases the chances of an innovative idea to come to fruition because it engages the will and the hearts of others. It can clarify, explain and negotiate in the moment, in a way that the written word could never do. It can bring others on board and inspire action. Just as Socrates said that his questions were the 'midwife' of understanding, so in creativity, it is verbal articulation that is often the 'midwife' to action.

International crisis management requires the ability to hear and communicate solutions clearly, succinctly and in a way that cannot be misinterpreted, responding in the moment to changing demands in dangerous situations. Diplomats require highly developed verbal articulation if they are to achieve creative solutions to entrenched international conflicts. Engaging and inspiring to action in both monologue and dialogue is essential in times of difficulty or danger. Finding common cause, which is the precursor to motivation for change is generally articulated verbally - at first, at least.

When practised externally, verbal articulation can inform and provide the template for inner conversations between different thinking processes and conscience. It needs practice over time in a manner that suits each stage of development. Indeed, there is an element of speech development in the early years that plays a crucial part in the development of Co-ordinated Thinking in the young adult. This development is essential to effective creative action and is explored further in Chapter 14.

Chapter 9: Non-linguistic Thought Pictures in Two Dimensions

'The only thing worse than being blind
is having sight but no vision.'
Helen Keller (1880-1968)

Imaginative, Non-Linguistic Thought Pictures in Two Dimensions is the ability to generate original, two-dimensional pictorial imaginations that are available to be translated externally, for example into images or linguistic descriptions.

How many of us have had cause to wonder, at some point, why artists will stretch out their arm and hold their thumb vertically or horizontally, as if communicating with the objects they are drawing or painting? Others may be seen forming a rectangle with their thumbs and forefingers, or using two cardboard 'L' shapes to form the rectangle through which they peer quizzically. This strange behaviour, often seen as part of the arcane craft of the creative, is actually quite simple and yet awesome at the same time. The key to this is how the artist views the thumb or rectangle, and this is easy for you to experience for yourself. With arms outstretched, simply make a rectangular 'frame' with your hands where each of your thumbs touches the forefinger of the other hand. Now look through the space that you have created, with both eyes open. Next, close one eye and look again. What do you see? You can do the same with an outstretched thumb.

In both cases – the rectangle and the outstretched thumb - you will see the world change fundamentally in front of you from a world of depth and perspective to a world of shapes, colour and shade. With both eyes open, you simply cannot focus on all the elements simultaneously. With one eye closed, reality is flattened out and all is equally in focus within your central vision. Something is lost in translation, of course (my grandmother had only one eye and struggled to judge the speed of oncoming vehicles), but something is also gained: by removing the relativity of distance, the shapes of things – including shadows – becomes clearer, as does the relative appearance of size. The rectangle facilitates choosing a pleasing array of shapes, while the thumb helps measure the appearance of size. This facilitates translating a reality with three dimensions into a representation with two dimensions. Art practises this capacity continually and, in doing so, exercises the muscles that also generate thought pictures in two dimensions. The simplicity offered by this capacity to translate complex realities into a single viewpoint of abstracted shapes is useful to many areas beyond art. An example of this is the London Underground Tube Map designed by Harry Beck in 1931*(Figure 15)*.

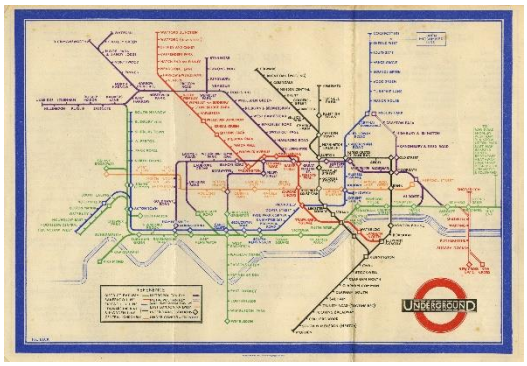


Figure 15: Tube Map, Harry Beck (1933).

This is a plain schematic design that does not indicate geographic positions but, instead, describes the relative three-dimensional positions of stations and lines in two dimensions - rather like an electric circuit board. This approach has been widely copied around the world ever since for complex relationships, both real and conceptual. The imagined scheme or image is an important precursor to the external rendering of a goal or discovery. One of the reasons for the usefulness of these thought pictures is the all-encompassing potential capacity of the image. Just as creative language is based upon known elements which are then transcended[86], so thought pictures are based upon known elements, but can creatively transcend them in similar fashion through manipulation and combination, and build a vision of the as yet unknown[87]. This possibility is especially so when combined with the driving and fixing forces of emotion and intent[88]. It is interesting in this context to note that Harry Beck was an ordinary underground worker who came up with the idea and pursued it, in his own time, because he cared. The two-dimensional result was meaningful without being literal and has demonstrated long-lasting relevance and adaptability.

9.1 Background and Context

The Roman historian, Pliny, wrote that the first artist was a woman who drew her husband's shadow. Evidence for the ability to translate the world into two dimensional images can be traced back to prehistory and the earliest cave art. The earliest known cave art appears to be a single red dot painted in a Spanish Cave approximately 40,800 years ago, which is about the same time as the earliest known image - that of a human hand, which was stencilled onto the wall of a cave in Borneo.[89] Other similar cave art of the Palaeolithic period has been found in South Africa and Australia.

The later and more sophisticated Palaeolithic rock paintings of Chauvet-Pont-d'Arc cave in France *(Figure 16)* are now thought to date back to 30,000 BCE. Whether it was the shape or shadows on the rock wall, the rock itself inspiring the drawings - or the memory of a creative or shamanic vision - in all cases, the image is successfully translated into a two-dimensional, stylised expression with elements that appear meaningful.

[86] See *Jabberwocky* by Lewis Carrol in Chapter 7
[87] Runco, M., 2014. p.392
[88] See Chapter 2.
[89] Cyranoski, D., 2014. 'World's oldest art found in Indonesian cave', *Nature* [online] https://www.nature.com/news/world-s-oldest-art-found-in-indonesian-cave-1.16100

Figure 16: Rhino Drawings from the Chauvet-Pont -d'Arc Cave, France (c.30,000 BCE) Screenshot from the film "Cave of Forgotten Dreams", (2010).

The pattern of artistic cultural development appears to be global. South America appears to follow a similar pattern of artistic development, although considerably later, corresponding to the later inhabitation of that continent, with early human hand stencils in an Argentinian cave dating back to 9100 BCE.

Figure 17: Hands (c. 9100 BCE) at the Cuevas de las Manos, Santa Cruz Province, Argentina. By Mariano Cecowski (2005).

The human hand carries significance with regard to both personal and cultural development. From these earliest times, it has been reshaping our world. These hand stencils, in the Cuevas de las Mannos (Figure 17), are created using ochre. Red ochre is one of the first four archetypal colours to come into use as pigments and appears to have done so across the globe. The other colours are black, white and yellow. Dug from the earth and ground to powder, the method of application was to spit the pigment, with a binder, onto the hand and rock, then remove the hand to leave the image.

Figure 18: Ochre Pits in Central Australia. By Toby Hudson (2009).

Red ochre is a naturally occurring iron oxide which tastes of blood when chewed. This almost certainly added to its symbolic significance, as would the breath that carried it and the distant, dark recesses of the subterranean cave where it was applied. This is the strength of the thought picture: it can be very simple yet carry much greater symbolic meaning that is further enhanced by the form, material, site and process of creative action. Red ochre is a particularly enduring pigment, remaining vibrant over tens of thousands of years. What is lost, though, is the shared knowledge of

symbolic meaning. We sense it, in the very personal nature of the handprint, and find it fascinating, but can now only glimpse the faint fragments of symbolic meaning, imperfectly, as if through frosted glass. However, the degree with which the present day aboriginal peoples of Australasia value and guard their natural sources of red ochre, and the details of its relationship to their rites of passage, is an echo of that profound symbolic meaning.[90]

Colour fills our world with beauty. We rejoice in a magnificent sunset, glorious flowers or crimson leaves. We often choose clothes and decorate our homes to create restful or enlivening colour effects. If our surroundings are drab or the weather persistently overcast, we may mourn the loss of colour. We use colours to describe feelings: we may feel 'blue'[91], be 'green' with envy, see 'red' or view the world through 'rose-coloured' spectacles. Colour is laden with emotional communication.

Dante once wrote that colours 'smile.' In this, he was expressing the ability of colour to speak straight to the heart and resonate as a totality there, bypassing the intellect. When someone smiles at us, we do not usually itemise the muscular movements, we simply respond by smiling back. Line, by contrast, guides the eye along particular paths and speaks more to the mind as a series of parts.[92]

Just as grammar in language has been shown to affect concepts of movement, so the creation of internal thought pictures, externally expressed, has affected our conceptual outlook, in that the words for colours have come into language alongside the introduction and use of the pigments. This signifies another way of seeing. The anthropologist, Victoria Finlay, observes that blue, being the hardest pigment to naturally source, is often the last colour to enter language.[93] Some remote tribespeople have no indigenous words for blue, as is the case with certain Thai languages. The Bolivian Amazonian language, Tsimané, has only three words for colour, corresponding to black, white and red.[94]

As with colour, the conception of two-dimensional representations of form also has its roots in the distant past that predates even the earliest rock paintings. The introduction of spear throwing, and then archery, involved learning to look with one eye closed in order to still the competing perspective and allow calm focus. It is therefore not surprising that early line drawing images are of animals and are connected to hunting. A study by Richard Coss, in the journal *Evolutionary Studies in Imaginative Culture*, observes that the mental imagery that is required to generate the 'targeted arm movements' in the drawings at sites such as Chauvet-Pont-d' Arc *(Figure 16)*, was 'analogous to the mental imagery needed when hunters assessed the trajectories of spears about to be thrown at animal targets.'[95]

---

[90] Tweedie, P., 2001. *Aboriginal Australians: Spirit of Arnhem Land.* London: New Holland Publishers.

[91] Ward-Jones, J., 2018. Decreased Perception of Color in Depression. In *Psych Central* [online] Available at: https://psychcentral.com/news/2010/07/21/decreased-perception-of-color-in-depression/15826.html

[92] Bucklow, S., 2010. *The Alchemy of Paint,* Marion Boyars, London, p.222

[93] Finlay, V., 2003. *Colour: Travels Through the Paintbox,* Hodder and Stoughton, London

[94] Gibson, T. and Conway, B.R (2017) Languages don't all have the same number of terms for colours – scientists have a new theory why. In *The Conversation* [online] https://theconversation.com/languages-dont-all-have-the-same-number-of-terms-for-colors-scientists-have-a-new-theory-why-84117

[95] Coss, R., 2017. Drawings of Representational Images by Upper Palaeolithic Humans and their Absence in Neanderthals Reflect Historical Differences in Hunting Wary Game. *Evolutionary Studies in Imaginative Culture,* 1(2), pp. 15-38

The grace and stylistic skill in the sinuous lines of the Chauvet-Pont-d' Arc rhinos is undeniable. The symbolic content in regard to what must have been a dangerous relationship with those rhinos can only now be guessed at, but the human inheritance derived from this global phenomenon of cave art is daily before our eyes in the letters we use to form words. Letters which derive from pictograms like those found in caves.[96]

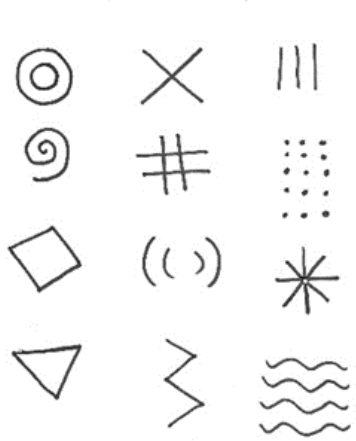


Figure 19: Simulated appearance of a representative selection of phosphene forms. By Elaine Holt (2018).

Alongside colour and linear form or shape, there are also other self-generated perceptions that have contributed to the development of thought images in two-dimensions. These are called entoptic phenomena and include *phosphenes,* from the Greek *phos* (light) and *phainein* (to show). Some colourful geometric pattern effects occur when we rub our eyes when tired. Other effects are bright pinpoints of light or colour, lines, circles or zig-zags and so forth. A phosphene with a distinguishable geometric pattern like a checkerboard may arise in a section of the retina where millions of light-receptive cells are arranged in a similar pattern. Different areas of the brain's visual cortex create specific types of phosphene.[97]

Figure 20: Simulated appearance of Haidinger's Brush. By Daniel P.B. Smith (2006).

One particularly interesting entoptic phenomenon is called *Haidinger's Brush*[98]. This is the appearance of a yellow bow-tie, or hourglass shape, when gazing into a clear blue sky, with the effect of the long central axis pointing towards the sun – even when the sun itself is not visible. Recent research has suggested that this was used by the Vikings as a navigational tool.[99] It is interesting to note that the bow-tie form or double-headed axe motif is a common early archaeological motif, as in Çatalhöyük (7500 BCE) and Minoan Crete (2700 – 1600 BCE).

[96] Von Petzinger, G., 2015.*Why are these 32 Symbols Found in Caves All Over Europe?* In TED Fellows Retreat

[97] Editorial (2003) 'Neurogeometry and Entopic Visions of the Functional Geometry of the Brain', Journal of Physiology, (97) 87–92

[98] Misson, G. P., 1993. Form and behaviour of Haidinger's brushes. *Ophthalmic and Physiological Optics,* (13)4, pp. 392-396.

[99] Horváth, G. et al., 2017. Celestial polarization patterns sufficient for Viking navigation with the naked eye: detectability of Haidinger's brushes on the sky versus meteorological conditions. *The Royal Society Open Science* [online] http://rsos.royalsocietypublishing.org/content/4/2/160688

The Haidinger's brush effect is also strikingly similar to the Wandjina rock art in Kimberley, Australia, which is thought to depict a god of rain and clouds.

Figure 21 Indigenous Australian rock art in the Wandjina style, (2000 BCE), Kimberley, Australia. By Claire Taylor (2007).

Children have an ability, which diminishes with adolescence, to view phosphenes quite easily. They are more integrated into the child's reality. This fades as the child approaches adolescence. As we mature, we rationalise away these random light shows but can still see them with a little practice. The developmental significance of phosphenes is highlighted in a study, conducted by Rhoda Kellogg at the Golden Gate Nursery School in San Francisco. Three hundred thousand drawings made by young children of different ethnic origins were collected. The children were between the ages of two and four and capable of using a pencil but not of making naturalistic pictures. They consistently drew figures of a distinct phosphene character. She identified a sequence of basic forms from dots to lines, spirals and circles. [100] She understood this sequence of forms as 'Gestalts' that were complete, coherent wholes, according to the Gestalt theory. It is also interesting to note again that these motifs are also common motifs in Palaeolithic rock art, known as *geometric signs*, and actually outnumber the figurative drawings by 2:1.[101] [102]The relevance of this will be explored further in Chapter 11: Resonance and Pattern in Thinking.

Figure 22: Milton Dictating 'Paradise Lost' to his Daughters (c.1826), Eugene Delacroix. The Yorcke Project (2005).

Since phosphenes are not dependent upon sight, the blind can still experience two-dimensional images and colours generated in the visual cortex of the brain. These phenomena are now being utilised to help the blind see again, using electrical impulses.[103] Those who were sighted, until approximately the age of seven, will also have remembered images and still 'see' in their

[100] *Rhoda Kellogg Child Art Collection Handbook*. Available at http://www.early-pictures.ch/kellogg/archive/en/categories?allStats=1&expandAll=1#e20

[101] Von Petzinger, G., 2015.

[102] Lewis-Williams, J. D., 1988. The signs of all times: entoptic phenomena in Upper Palaeolithic art. *Current Anthropology*, 29 (2): 201–45.

[103] Researchers, Various, 2014. The Bionic Eye. *The Scientist* [online] www.the-scientist.com/features/the-bionic-eye-36747

dreams.[104] When Milton wrote, *'The stars, that nature hung in heaven, and filled their lamps with everlasting oil, give due light to the misled and lonely traveller,'* he was blind.

Figure 23: Helen Keller, Library of Congress, (1905).

Hellen Keller, who wrote the quote included at the beginning of this chapter, had been blind, deaf and (initially) dumb from the age of nineteen months. She would therefore not have carried visual memories in the way that Milton did. Yet she still had a vivid concept of both sight and creative vision, which she articulated to great effect in words. Her language can also engender a vision in others that she herself cannot see:

'Love is like a beautiful flower that I may not touch,
but whose fragrance makes the garden a place of delight
all the same.'

9.2 How are Imaginative, Non-Linguistic Thought Pictures in Two-Dimensions Developed?

The capacity to generate, manipulate and refine imaginative non-linguistic thought pictures in two dimensions may be enabled and enhanced throughout school life from the early years setting through to high school, adapting activities to suit the developmental stage of the growing child or young person. There are three main areas that are particularly useful for developing this capacity: speech, line and colour.

9.2.1 The Early Years Setting

In the Early Years, as with written articulation and verbal articulation, the ability to form imaginative non-linguistic thought pictures in two dimensions is best enabled by not directly teaching it but instead providing conditions that support its natural emergence by exercising the three key elements. This is because in the very young child the capacity, as with language, is not yet fully formed and is somewhat chaotic, so they will not see inner pictures in the way an adult does, any more than they can speak as an adult does.

Narrative can help the very young child build inner pictures through hearing careful daily repetition of simple stories using well-chosen repeated phrases, given through direct story-telling rather than lifeless recordings. The repetition of a simple story, daily, will gradually improve both the recall of the seedling thought picture associated with each stage of the story, and to build upon that with added detail. This inner activity is what builds the imaginative muscles for inner picturing. Simpler fairy stories or cultural equivalents are ideal for this because of their uncluttered gestures and clear story arcs, alongside profound resonance that

[104] Greenfield, S., 2016. p.164

engage the feelings of the child. The relationship of this inner picturing to sleep and dreaming will be explored in Chapter 11: Resonance and Pattern in Thinking.

With regard to the use of line, all young children love to draw and, as outlined above, the first images are often related to entoptic visions, which may be some of the first inner pictures experienced by the child. The key in the early years, is to guide the child through the example of the teacher for the child to imitate. In this case, it would start with the teacher displaying a good grip and position in relation to the drawing material and paper along with a gentle focus on the activity. These linear forms, being closely associated with visual and neurological patterns, can be usefully expressed as colourful external forms and will soon begin to naturally coalesce into more recognisably representational, composite forms as the child grows towards lower school age. The circle, dots and lines will perhaps form a rudimentary head with limbs that will go on to grow hands, feet, a trunk, clothes and ground itself, over time. The archetypal patterns will also remain and develop complexity if allowed to do so and form the basis of geometric thinking through the continued practice of patterns and forms.

In the early years, the exploration of areas of colour directly complements the practice of linear forms. The experience of using high quality pigments can substantially enhance the way colour imbues inner picturing. A specific range of pigments for this use has been developed that has the glowing translucency of watercolour alongside the strength and consistency of hue found in more tempera-like paints.[105] The result, when used on dampened paper is a growing area of nuanced glowing colour that can be used singly or in simple combinations, avoiding form and allowing the child to concentrate on the particular nature of each colour. A restricted palette of a few colours that mix well is a rewarding experience that brings a sense of mood or warmth to their work that is entirely subjective in the child and may be different on different days, even though the same colour has been used. This relationship to feelings will also enhance subsequent inner picturing through imagined colour.

9.2.2 The Lower School

In the lower school, the narrative content extends to continuous narrative, which moves on daily. The muscles of recall and inner picturing can then be further strengthened with the added, on-going timeline. There is also the need for the greater detail of more complex fairy tales with more characters, alongside myths and legends from around the world. Stories like Aesop's fables allow more subtle and diverse qualities of character to be added to the repertory of inner picturing and so forth. Greater artistic description of place or event can further enliven inner picturing through, for example, the depiction of Muspell, Niffleheim and Ginnungagap in the Norse creation myth or the biblical story of the Ark. Even practical activities such as building and farming can be presented with a narrative content that builds inner picturing while engaging the feelings for the subject. These inner pictures can then be expressed by the children in their own words or images the following day, inspired by open-ended tasks and questions.

Alongside verbally given images, it is also important to be aware that music and movement can contribute to the building of inner pictures: as a child I remember experiencing music as colours and gesture, where one sound would generate a clarion call red and another a soft murmuring lilac. There is a degree of neural crossover that contributes to creativity.

[105] Stockmar paints – they also produce a suitable paper.

Synaesthesia is a well-known condition that is experienced by many creative people, which Susan Greenfield describes as an 'exuberant' connectivity.[106]

The line can be explicitly developed further in the lower school through the practice of Form Drawing. This is a specific discipline developed by Steiner Education that practises a step series of running forms, symmetry and woven forms or knotwork. Leading directly on from phosphenes forms, this activity strengthens and expands the vocabulary and grammar of linear forms. It is fundamentally supported by the movement art of Eurythmy and the crafts practised in handwork lessons, which also enable the capacities explored in Chapter 10. It is essentially translated movement, just as in the Palaeolithic rock art.

Colour experience can be developed in the lower school through daily drawing with areas of colour and weekly painting lessons in the wet-on-wet technique. In drawing, it is important to avoid outlines that are filled in and, instead, build form from coloured areas. At this age, this can and should be demonstrated for various example representational drawings. Simplified animals drawn with a single coloured wax block[107]- perhaps the frog from the story of *The Golden Ball* or, a few years later, a chicken from the farming lesson in several colours. This gradually builds a spatial quality, connected to colour and the dynamic interplay between colours, into inner picturing. It is best achieved through the children observing the practised artistry of the teacher, in process, with only minimal external pictures or prints to begin with. The teacher's striving will have a particularly beneficial effect upon the children and reflect the child's own inner striving to build imaginative inner pictures.

Initially, at about age seven, the children are eager to learn the skills necessary to explore the world of colour and the world of line, but line can quickly become something of a tyrant and reduce the role of colour. In the Painting lessons, the wet-on-wet technique opens up the possibilities of the world of colour for the children. By painting on wet paper with a limited palette that is capable of producing jewel-like colours, and focussing mainly on primary and secondary colours, the children's inner experience is both nourished and given a means to articulate that experience. Guided exercises may be used to teach the techniques of blending and keeping colours apart. These colours can interact dynamically in the watery element, which keeps them mobile and allows the light to reflect up through them from the paper beneath, rather like a stained glass window.

The colour stories that inspire these paintings articulate colour without indicating form: a 'delicate golden yellow' can nestle 'snug and secure,' guarded by a 'protective brown,' only at the very end perhaps reminding the class of the seed in a nature story they have recently heard. The colours are not stereotyped: on another occasion, yellow may go exploring, beginning at the same point each time, but then changing the journey a little and inviting a little red to come along too (if she is not too bossy!), while blue looks quietly on. This one reminded one class of seven-year-olds of a fire.

Forms that arise out of colour interactions are flexible and can be different things to different eyes – like castles in the clouds – and as such have infinite possibilities. When the guided paintings are put up on the wall, their similarity draws out from the children a more objective noticing of subtle differences, where perhaps one fire is giggling, another is raging and a third

[106] Greenfield, S., 2016. p.83

[107] Stockmar wax blocks – approximately 2.5 x 3.5 x 0.75 mms

may be quite timid. In this way the children become aware of the gesture and dynamic within form that can be expressed through colour. They will then have developed the technical skills, inner sensitivity and visual vocabulary to express their own colour experiences in free exercises. These techniques will become the basis for the nuanced description and manipulation of form out of colour from the age of about 9 years-old and up.

9.2.3 The Middle School

In the middle school, verbal images given by the teacher are still the key building blocks of inner picturing linked to feelings, but now with the added practical information and understanding of the world, suited to the developmental stage of the child. Here the beauty and aptness of language is the enlivening force. The image is then the key stone for the associated learning. The beauty of the inner thought picture is its capacity to hold and connect an infinitely constituted collection of information and ideas in symbolic picture form. This is further reinforced through daily verbal recall of the previous day's work led by open questions. The use of carefully chosen images should be gradually increased to nourish the visual vocabulary of the growing child - as with language. This will further inform the inner picturing skill.

The form drawing skills of earlier years transforms, during middle school, into geometry. Initially freehand, it quickly evolves into formal constructions. This is best developed through plenty of individual inquiry alongside formal instruction of technique. The link to phosphenes and our inherent human neurogeometry[108] emphasises the importance of this discipline to the development of thought. As the student matures towards puberty, the transition in two-dimensions to technical drawing, perspective drawing and projective geometry is helpful. Alongside this area of formal construction, and by way of a counter-balance, it is also helpful to develop the looser variant of the line found in sketching techniques, in order to provide a more free experience, which can resonate with the joyful oddness and chaos in the world. These then jointly contribute to the skill of inner picturing.

Colour work in the middle school can become ever more nuanced with the exploration of tertiary colours and beyond – still in the wet-on-wet form, but also introducing watercolour techniques onto dry paper. This allows imaginative expression of mood and gesture through colour to be increasingly co-ordinated with form through the meeting of colour transitions (not lines). The disciplined practice of describing form with line does, however, helpfully influence the understanding of form within painting, when exercised in parallel at this time. The work with areas and transitions in colour also inform and support the learning of light and shade in tonal drawing.[109] Drawings also become far more nuanced and expert in middle school as colour expertise informs illustration and design. This is greatly assisted by the use of high quality artists' coloured pencils.[110] Now the detailed fruits of inner picturing really begin to become visible in the children's written and illustrative work.

---

[108] Petitot, J., 2017. *Elements of Neurogeometry: Functional Architectures of Vision*, Springer International Publishers. This book introduces and clarifies neurogeometry in relation to mathematics.

[109] Shaded drawing using areas of graduated tones rather than line or colour – usually black and white but could be sepia etc.

[110] Any reasonably good quality colouring set with good depth of colours, soft enough to use in blending, will suffice.

9.2.4 The High School

In high school, the feeding of inner picturing through language with images continues but is more succinct, pithy and often with a philosophical quality linked to the search for truth. The disciplined inquiry of teacher and student in this search for truth fortifies the honing of symbolic inner pictures and the clarity and integrity of their expression. Creative writing and poetry, at this age, will quickly expand the art of inner picturing, as will broadening horizons and outlooks, through global awareness, if these are explored through the experience of others rather than simply learning dry facts alone.

The line, colour and form are now fully integrated in high school and refined through studying - and the experience of replicating - art across time and cultures, using a variety of media from silverpoint to stone-carving. Drawing, sketching and painting are all helpfully honed at this age in a variety of media. Design styles are usefully studied. Copying the artistic or design styles of others across media and approaches allows the students to identify their own style and consciously work with dynamics within that, which will then go on to enhance embodied inner picturing capacities. Personal projects can provide an excellent vehicle for the expression of their vision, be it written, verbal or visual, or a combination of all three.

It is particularly beneficial at this stage to reconsider pigment. The jewel-like paints of middle school will have been replaced by oils and acrylics, but these will still arrive fully formed out of a tube or pot. It can be very helpful, in the course of Art History, to consider the evolution of pigments. It is one thing to take red ochre from a tube, but quite another to go down into an ochre mine and source the iron oxide material yourself, grind it, prepare it and paint with it – especially when you realise that every seam in the ochre mine is a slightly different shade, from yellow through to red, purple and even almost black. No two will be identical. It is worth finding a direct source.[111] Studying the rock art mentioned above or the aboriginal rituals today will deepen the experience, as will reading the words of ancient people such as Pliny the Elder. He wrote of the deadly Roman iron sword:

> *'The same benevolence of nature has limited the power of iron itself by inflicting upon it the penalty of rust, and the same foresight by making nothing in the world more mortal than that which is most hostile to mortality.'*

Yellow ochre can also be sourced and, using ancient technological processes, heated until it turns orange then red. This simple exercise can link history, art history, geography, geomorphology, archaeology, anthropology, chemistry and art in an inner thought picture of the colour red ochre. Similar activities can be repeated with other pigments through history. This opens another door onto the students' accepted understanding of colour and deepens the inner picturing experience of it.[112]

****

[111] For example, the Clearwell Caves in the Forest of Dean, UK, where Michelangelo reputedly sourced the purples for the Sistine chapel.

[112] Additional examples of good classroom practice and descriptions of specialist subjects like Eurythmy and Form Drawing can be found in: Avison, K. and Rawson, M. eds., 2016. *The Tasks and Content of the Steiner Waldorf Curriculum.* Edinburgh: Floris.

Having been a Steiner teacher trainer for some years, teaching adults - from all walks of life across the globe - to explore their creativity through art, I have been continually overwhelmed by the destructive impact upon some when, in their childhood, a well-meaning parent or teacher told them that their 'cat' did not look like a 'cat.' Invariably, a door closed for them at that point. This is the danger with art. It can have the same prejudices that have been explored in relation to the written word. In my experience, many of these people have gone on to be very able and enthused artists with a renewed energy and confidence. They are able to imbue their teaching with this energy and artistry for the benefit of their students. If they have experienced creating and using the pigments from history, learning about the historical and cultural artistic context, then without fail they view the images in the museums and galleries very differently afterwards.

Additionally, it should be noted that some students and adults are colour blind. Total colour blindness is rare but there are usually a number of (particularly) boys with partial red-green colour blindness or similar in each school year. They should be supported in expressing the colours that they experience, rather than what the teacher or other students experience. Some classroom tips are included in Appendix 3 but, in the context of inner picturing, it is worth noting that there are now special glasses available that stimulate the affected areas of the retina and allow the partially colour blind child to see colours that were previously denied to them[113]. I mention it because in a class with three such boys, aged about eleven, a parent bought a pair of these glasses and kindly let all three boys share them in class. The effect was astonishing. They were delighted but, more importantly, their overall confidence blossomed because they could now name, and identify with, that thing that others had previously understood while they could only guess at. Like Isis, they were empowered. After a while, they did not always choose to wear the glasses, but their confidence remained elevated. They had an inner picture to carry with them to compare with what others said they saw. Interestingly, I also noticed that their ability to identify the subtle differences between colours improved generally after that – even without glasses.[114]

The importance of making the ability to generate original two-dimensional pictorial imaginations fully accessible to all, and to fulfil their potential in this, lies in the way two-dimensional inner picturing can link the specific with the general. It opens the ability to envision in these terms that which does not yet exist, as a totality.

[113] EnChroma glasses.

[114] I have not found any research into this phenomenon, but felt it was important to include this observation.

Chapter 10: Imagined Structure or Systems in Three-Dimensions and Over Time

'Carving is easy,
you just go down to the skin and stop'

Michelangelo

Imagined inner structure and systems in three dimensions and over time is the ability to maintain, in thought, an overview of three-dimensional physical or conceptual mechanisms, systems, forms, structures or metamorphoses. It is also the ability to co-ordinate a variety of perspectives, including the ability to represent the point of view or experience of another person.

Just as imaginative, non-linguistic thought pictures in two dimensions facilitate the conception of images that may be represented as a collection of shapes and lines, so imagined inner structure and systems permit the conception of position and relationship in space - or even to transcend space. The two are naturally closely related, both experientially and neurologically, and this has understandably led to the conflation of the two. However, it is important to recognise the difference because three-dimensional and related metamorphic relationships are, together, perhaps the most important building agent in thought and yet this aspect is often overlooked.

10.1: Background and Context

Vision is initially received as a two-dimensional image on the retina of the eye. This is decoded as shapes that are recognised. Binocular vision provides small variations between these singular views and deeper processing of the information allows us to infer depth.[115] Interestingly, this is not only the relative position of things within, for example, a landscape, but the presence of unseen elements of objects within that.[116] For example, if we see a copse of trees in front of a building, we can infer not only their relative positions and distances but also the back of the trees even though they are out of sight. The trees may be more predictable than the building in this respect as we may have encountered trees from various angles but will only know most buildings, other than our own, from one façade. Familiarity is built from direct interaction with the material world and this informs what we will infer.

[115] Finlayson, N., Zhang, X. and Golomb, J., 2017. Abstract for Differential patterns of 2D location versus depth decoding along the visual hierarchy. *NeuroImage*.

[116] Yamane, Y. et al., 2009. A neural code for three-dimensional object shape in macaque inferotemporal cortex. *Nature Neuroscience,* 11(11) pp.1352-60. This paper has presented an interesting ethical question – although the monkeys were trained using rewards for the purpose of the experiment, it would be better not to use animals. However, it is hoped that the creativity enabled by this book may help science find more suitable alternatives for investigating neural decoding in the future.

In healthy human beings, this element of positional and three-dimensional thinking is based largely upon the visual observation of external features - for example, the light and shade indicating the curvature of the tree trunk - but there is another element of this thought picture that can inhabit the internal structure of the tree, even though it is something that is entirely out of sight.

In the previous chapter, it was noted that reading Braille activated elements in the visual cortex of the blind, through touch, as the fingers move over the pattern of dots.[117] It is likely to be the same when touching a face or the bark of the tree. My great-uncle was blind, and I remember as a child being fascinated with the way his fingertips fluttered about each new environment. If we consider again Helen Keller's quote, below, it becomes clear that this is a sophisticated picture built from touch and movement:

> *'Love is like a beautiful flower that I may not touch, but whose fragrance makes the garden a place of delight all the same.'*

Helen Keller's experience of the world was entirely kinaesthetic as she was deaf, dumb and blind from the age of nineteen months, only later learning to speak. She describes the kinaesthetic element of thinking, experienced in isolation, in her autobiography, as follows:

> *'Cut off as I am, it is inevitable that I should sometimes feel like a shadow walking in a shadowy world. When this happens, I ask to be taken to New York City. Always I return home weary, but I have the comforting certainty that mankind is real flesh and I myself am not a dream.' [118]*

The neurologist, Oliver Sacks, gives us a possible glimpse into this world of form in his book *An Anthropologist on Mars*, where he describes a painter who, following a car accident, loses all colour vision and some associated shape differentiations, but not sight. What the painter described is not a black and white film effect but a harshly lit, leaden world of mass that was even devoid of the gentle gradations of grey. To him, it was not even grey but 'perceptual qualities for which ordinary experience, ordinary language, had no equivalent'.[119]

While the above examples are extreme cases of injury, which reveal to us something of the world of positional form that we experience, there are many other naturally occurring instances that can illuminate the three-dimensional imagination of structure. This is the experience of engineers, sculptors, carpenters and so forth who, through practice and use, develop a keen inner eye for three-dimensional form and intrinsic structure and mechanisms.

The ability to imagine the inner structure of things is possible because it is founded upon the sense of touch and movement within our own body. If you close your eyes and raise your hand high, you will easily sense where your hand will be when you open your eyes. This is called proprioception, or kinaesthesia, and it also tells you where the tensions in your body are – particularly if you keep your hand raised for too long. You may also imagine that your hand is raised, and experience it as such, when it is actually at your side. It is even possible to convince

---

[117] Reich, L. et al., 2011. A Ventral Visual Stream Reading Centre Independent of Visual Experience. *Current Biology,* (2)1, pp. 363-8.
[118] Keller, H., 1929. *Midstream: My later Life.* New York: Doubleday, Doran and co. p.339
[119] Sacks, O., 2012. *An Anthropologist on Mars.* London: Picador. p.8

people to experience a rubber hand as their own to the extent that it affects their sense of where their own hand is, so powerful is the potential of imagination. [120]

In the same way that seeing one side of a tree allows us to infer the presence and nature of the unseen side, so experiencing position, balance, tension, movement and centre of gravity in our own bodies can, likewise, help us imagine similar attributes elsewhere. This can then be developed into an imagined structure, system or metamorphosis.

Carpenters and builders have long known about the natural curve to be found within the fibres of the straightest wooden beams. They will use the resulting micro-arch, of a few millimetres bending upwards, to assist load-bearing capacity and help the beam support itself. This is even now built into new laminated beams that would otherwise have no such bow. Carpenters also know that to cut a natural beam down its length the wrong way will make it clamp together and pinch the saw but, cut the right way, the wood will naturally pull apart as it is cut.

Builders and architects, when they look at our trees and building example, will be better able to 'see' beyond the building's façade and infer the rooms, layout, services and drains associated with it. Such people who work in construction and engineering will look at a space and be able to 'see' and 'feel' the construction possibilities within it – be it a set of stairs fitted into a challenging position or a bridge across a gorge. They may draw and calculate afterwards to clarify their vision, but they imagine it first, in both its external appearance and internal stresses and strains, both as a whole and within each component, in a way that others often cannot.

Figure 24: Atlas Slave (1520-23) by Michelangelo. Located in the Galleria dell' Accademia, Florence. By Jörg Bittner Unna, (2011).

Figure 25: Bearded Slave (1520-2) by Michelangelo, Located in the Galleria dell' Accademia, Florence. By Jörg Bittner Unna (2011).

[120] Blanke, O., 2015. Multisensory brain mechanisms of bodily self-consciousness. *Nature.* (13), pp.556-571

A sculptor will often draw an outline of the intended work on the profiles of the stone and then carve until they meet at the desired place. This is the hard bit. The sculptor, Michelangelo, was intimately familiar with the grain and structure of the stone he worked with and how to get the best out of it, famously saying, '*Carving is easy, you just go down to the skin and stop.'* It is particularly interesting to see the reality of this statement in his unfinished works *Atlas* and *The Bearded Slave (Figures 24 & 25)* . Here we see the figures emerge not as rough estimations but in the detail of muscles and the striking eyes that peer out of the coarse stone on the left.

The Renaissance artist and writer, Cennino d'Andrea Cennini (c. 1360 – 1427), wrote in *Il Libro dell' Arte*[121], one of the earliest handbooks written for artists, that the skill of the artist:

> *'…calls for imagination and skill of hand, in order to discover things not seen, hiding themselves under the shadow of natural objects, and to fix them with the hand, presenting to plain sight what does not actually exist. And it justly deserves to be enthroned next to theory and to be crowned with poetry.'*

Wordless thought pictures, with or without images, allow us to discover those 'things not seen' that are hiding 'under the shadows' and, in this, the artist is not so very different from the carpenter, engineer or scientist. It is what allowed the visualisation of the double helix for DNA which could then be 'fixed' by Crick and Watson, using the metal structures in *Figure 26*, which could then be verbally explained.

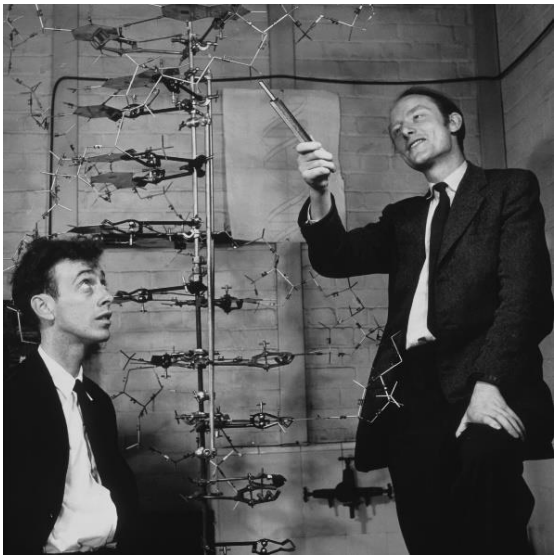


Figure 24: Watson and Crick with their DNA model by A. Barrington Brown (1953)

Other scientists have been explicit in attributing their discoveries to non-verbal experience, including structure. Albert Einstein (1879 – 1955) is a particularly famous example of this. When answering the mathematician, Jaques Hadamard, who had asked him, in 1945, about his mathematical thought processes, he replied,

> *'(A) The words or the language, as they are written or spoken do not seem to play any role in my mechanism of thought. The psychical entities which seem to serve as elements in thought are certain signs and more or less clear images which can be "voluntarily" reproduced and combined….*
>
> *There is, of course, a certain connection between those elements and relevant logical concepts. It is also clear that the desire to arrive finally at logically connected concepts is the emotional basis of this rather vague play with the above-mentioned elements. But taken from a psychological viewpoint, this combinatory play seems to be the essential feature in productive thought — before there is any connection with*

[121] Cennini, C., 15th Century. *Il Libro dell' Arte*, Translated by D. V. Thompson, 1960. New York: Dover, p.1.

logical construction in words or other kinds of signs which can be communicated to others.

(B) The above-mentioned elements are, in my case, of visual and some of muscular type….' [122]

Einstein's General Theory of Relativity actually plays with the established notions of three-dimensional space and time, showing that these are distorted in the presence of massive objects, causing gravity. He predicted that the space-time around Earth would be not only warped, but also twisted by the planet's rotation. Gravity Probe B, launched in 2004, proved this prediction.

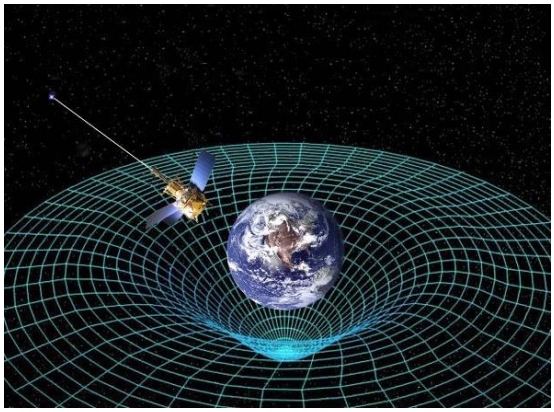


Figure 25: Simulation of Gravity Probe B and the distortion and twisting of time and space around the Earth. NASA (n/d).

Even as a visual picture, *Figure 27* may be indicative but cannot fully capture the reality, which can be felt as a structure and metamorphosis of things not seen, building upon imagined structure in three-dimensions and over time. Finding the right words was challenging but Einstein did, however, debate at length with his lifelong friend, Neils Bohr, on matters of quantum physics. The images that Neils Bohr has given us are also indicative of the internal view that three-dimensional thinking offers, and the efforts needed for them to be translated externally into verbal or pictorial images for others to share. One quote by Neils Bohr that particularly stands out is as follows:

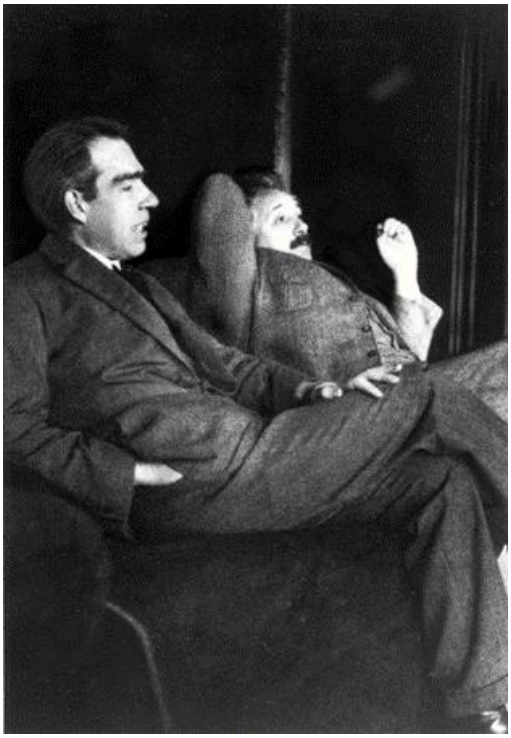


Figure 26: Niels Bohr and Albert Einstein by Paul Ehrenfest, (1925).

'*We must be clear that when it comes to atoms, language can be used only as in poetry. The poet, too, is not nearly so concerned with describing facts as with creating images and establishing mental connections.'* [123]

The ability of the human being to conceptualise the complexity of structures and mechanisms not seen, which lie hidden 'beneath the shadows' of things, is where perhaps the greatest adventures of discovery also lie, although it requires some courage to 'nail one's colours' to that particular mast, since trying to explain those visions afterwards in words is harder. It

[122] Einstein, A. (1954) *Ideas and Opinions.* Reprint 1997, London, Random House. P.26.
[123] Giles, S. ed., 1993. *Theorizing Modernism: Essays in Critical Theory*. London: Routledge. p. 28

may explain why this vital thinking skill is generally somewhat overlooked and undervalued at present.

Being able to mentally inhabit the structure or mechanisms within things outside ourselves, be it a tree, building or space-time distortion, also permits us to view the world and even ourselves from that other vantage point, if we choose. This is where three-dimensional thinking is related to empathy because if I cannot imagine the world from your viewpoint, if I could not 'walk in your shoes' and imagine how that felt, then I would struggle to empathise with your experience beyond the 'me too', 'I' perspective of similar events or experience. As an experiment, you might imagine walking in Helen Keller's shoes for a while. This would involve moving your imagination outside yourself and across space and time. You might consider what you physically feel as you do so.

10.2: How is Imagined Structure or Systems in Three-Dimensions and Over Time Developed?

This skill is founded upon healthy physical interaction with the physical world. The more varied and contrasting experiences, the better. It is the experience of the external world and one's own physicality within that. It is the province of childhood.

10.2.1 The Early Years Setting

Play. This is how we develop three-dimensional thinking in the early years. Exploring, for fun, the natural environment - with all its potentials and limitations, alongside our own. Playing in the sand pit – especially a big one with planks and water pails or small watering cans is perfect. Also, mud. Children need mud. It has such different properties to sand but can achieve similar things. The differences make themselves quickly clear, especially in the presence of water! If there is the opportunity to dig the mud, going down to the clay or the water-table so much the better. Sticks, both green and dry, for den-building. Logs and planks for building – perhaps a stall to sell mud pies with a hazel leaf side-salad. This kind of symbolic play is possible after about two years of age when the child can start to translate a symbol into a meaning.[124] Gardening and walks are also excellent activities. Movement develops our sense of ourselves from which, in older life, we can explore other viewpoints.

Indoors, more play. This is best achieved with simple multi-purpose props (like the pan lid and duvet in Chapter 2). Imaginative worlds can emerge from a few cloths and stands to hold them. In the same way that self-speech in the early years, which is created in the moment, sows the seeds for the emergence of co-ordinated thinking in puberty, so simple imaginative play in the early years can lead to 'world play' in later childhood, peaking at about age nine.

[124] Runco, M., 2014. p.391

Figure 27: Weaving in the Kindergarten (age 6) Image Source: Courtesy of Ringwood Waldorf School (c.2015)

Practical and craft activities exercise the experience of a wide variety of materials and processes from simple woodwork to baking, weaving, modelling or sewing, even simple household tasks like folding a cloth teaches the properties of the materials. The more natural the product, the more direct and archetypal the property or characteristic discovered.

10.2.2 The Lower School

In the lower school, both formal and informal movement are important. Formal movement comes in the playing of class games with a narrative image and strict rules to play by, bringing control into the limbs, and also through the carefully realised artistic movement of the Eurythmy lesson. Both are realised within the context of a social activity. This, in particular, gently brings consciousness into the limbs and awareness of others.

Figure 29: Trees are to be climbed! (age 10) by Elaine Holt (2009).

Informal movement could include climbing trees. How better to experience the relative springiness of different branches or different species of tree; which ones are scratchy and which ones are smooth. Also, at this age, bigger and more robust props including planks, ropes and guttering permit more elaborate play. Mud and sand are still important, and I have seen children up to nine years old (and occasional older visitors) thoroughly engrossed in constructing highly complex water systems of dams, waterfalls and moats. Small raw materials for constructing waterwheels can provide additional fun.

Figure 28: Plasticine modelling (age 8) Photo by Elaine Holt (2007).

This can develop into long-running 'world play' either at home or in the school sand pit. World play has been shown to be 'a significant factor in the development of effective creativity and innovation in adulthood'.[125] Terry Pratchett famously created the Discworld 'Carpet People' in his youth and

[125] Root-Bernstein, M and Root-Bernstein, R., 2006. Imaginary World-play in Childhood and Maturity and its Impact on Adult Creativity. *Creativity Research Journal*, (18), pp. 405-425

developed it from there into a best-selling career as an author. World play is important because it can involve complex ideas of language and customs. This capacity for imagined structures and systems is immensely valuable far beyond the storytelling and can inform creativity across the disciplines.

Craft lessons, including knitting and clay or Plasticine modelling, not only improve fine motor dexterity but also develop the sense of inner substance and structure: whether it is best pressed, pulled or gently slid into position, and whether it has greater strength when modelled from one piece or constructed from parts stuck together, for each material. Form Drawing, as mentioned in the previous chapter, is essentially a record of movement and can be developed from running the shapes with the feet to describing the form with a finger, nose or indeed backside on the chair! Over the course of the lower school, greater complexity, particularly in knot forms, link the three dimensional experience of knitting or weaving to the two-dimensions of drawing.

Practical building and farming are excellent experiences for children of about nine. Both activities inform their practical understanding of the world about them. The strength of the triangle formed by a piece of wood acting as a brace across an otherwise unstable square or rectangle is a fundamental principle that can be physically experienced and carried as body memory.

Figure 30: Farming (age 9) Ringwood Waldorf School (2007)

10.2.3 The Middle School

In the middle school, movement through formal games and gymnastics practises and hones the body consciousness of the individual in a social, non-competitive group. Playfulness can also be brought to learning. As part of a study of Alexander the Great of the Hellenic world in high school, twelve-year-olds (up to adults) enjoy playing the Gordian Knot game. For this, in groups of about 8-10, you take hands across the circle and then untie the knot. The numbers can be increased as confidence grows. Activities like this are too complex for vision alone to solve. They have to be felt and, more importantly, that feeling has to be inferred into the rest of the tangle of arms and legs for the resolution to be achieved. This is the best game I know of for practising three-dimensional thinking with a group in five minutes.

Figure 31: Gordian Knot exercise at Southern Oregon University Creativity Conference by Michael Davis (2018)

Eurythmy can involve increasingly more complex forms and patterns in space, with some forms created by the children themselves. Social precision and timing are usefully honed at this age through Eurythmy. Yearly whole-class plays also embed three-dimensional thinking in social contexts.

Crafts are equally valuable in middle school, particularly constructing objects and manufacturing materials. This can take the form of, perhaps, felting wool and creating an animal or a pair of slippers, after first designing and cutting the two-dimensional pattern. Another excellent activity is origami which again transforms a two-dimensional design into a three-dimensional form. The algorithmic process in origami has a relationship to mathematical geometry. All these processes transform two dimensions into three-dimensions and complement the reciprocal process of drawing or painting, which transform movement and three-dimensions into two dimensions.

Figure 32: Middle School girls winning 'The Tower of Power in Half an Hour', National Engineer Week Challenge, USA, beating the John Hopkins Engineers and Alumni. Waldorf School of Baltimore (2014)

The value of all this practical work is seen in the mental flexibility and considerate resourcefulness of students as they mature. This was exemplified by students from the Waldorf School of Baltimore who won the USA National Engineer Week challenge to build the tallest spaghetti tower, despite finding that the number of marshmallows was halved and another teammate was needed for the final. Teamwork, practical skill and three-dimensional geometry all were enabled by three-dimensional thinking skills.

10.2.4 The High School

All of the above continue to develop and be expressed in age appropriate activities in high school: Bothmer Gym is a precision movement lesson that consciously explores the three planes in three-dimensions. It complements Eurythmy in this respect. Sports now replaces games. Full scale plays are performed, with all aspects from lighting to costumes and scenery accomplished by the class, developing the confidence and ability to bring a complex creative idea to fruition, in partnership, from the ground up.

Figure 33: Bothmer Gym lesson at the Goderich Waldorf School, Freetown, Sierra Leone, by Elaine Holt (2007).

Crafts become more physical in high school, with the introduction of green wood-working, stone carving, copper work, basketry, blacksmithing, joinery and so forth. The practical application of surveying and trigonometry expands the relationship to the material world, alongside practical land work experiences.

Figure 34: Copper work. Ringwood Waldorf School (2017).

Figure 35: Green Wood Working, Ringwood Waldorf School (c.2013)

Figure 36: Paper Costume Designs. Ringwood Waldorf School (2017).

Design of patterns could evolve into more challenging three-dimensional costume design tasks. Designing wearable costumes to be made out of fragile paper only - and worn to prove it – adds new demands of precision and judgement as the tasks become more exacting and complex. Increasing freedom, and responsibility within that, challenges the independence and creativity of the students as they mature. But it is the practical, hands-on experience of materials and processes that gives confidence to the endeavour, even when attempting something entirely new.

Art can use three-dimensional thinking to explore a well-known scene – perhaps a painting from history. First, a straight copy of the painting will help to get the feel of the style of the artist, but then another painting of the same scene in the same style may be painted, but as if from another angle entirely. You may try something of this yourself if you imagine a well-known image such as the Christmas card nativity scene (but any similar arrangement will do). This scene is usually portrayed front on. If you bring that to your mind for a while you can try to see some detail in it, some colour and definition to the stable and figures. Then imagine that you are a mouse and you run under the stall. What do you see from there? Or if you climb up onto a rafter, how does that change the specific view of the scene? As a teacher trainer, I have found that many people find this hard at first because they

have never tried. Seeing the accepted view from a different angle is what gives creativity the antidote to dogma.

The practical exploration of form informs and strengthens all disciplines, including mathematical and written work. The structure of complex philosophical and ethical concepts can be offered imaginative templates inspired by the natural world. At this age, a good exercise in empathy can involve working in pairs – perhaps in relation to a class dispute – listening to the views or experience of the other, after which each student will take on to represent, as faithfully and exactly as possible, the views of the other person rather than their own. This is not easy empathy, but real and useful, and it builds upon good practice of restorative mediation. There is also the social practical work which can be undertaken in the community at this age, with the homeless, elderly or disadvantaged, where they should have the opportunity to take responsibility for ethical action, and so build a broader capacity to their social three-dimensional thinking.

By spending time on developing this elusive and hard-to-express, three-dimensional thinking, you offer the students substance to their thinking in that it can build a conceptual architecture that is a coherent totality based upon direct experience, and which they can then view from within and without. It offers a framework that associations and connections can build upon meaningfully.[126]

****

Three-dimensional structure offers the framework for integrity. It is how we construct that firm place from which we can view both ourselves and the external phenomena that we encounter.

[126] Additional examples of good classroom practice and descriptions of specialist activities can be found in: Avison, K. and Rawson, M. eds., 2016.

Chapter 11: Resonance and Pattern in Thinking

'Creativity is more than just being different.
Anybody can plan weird; that's easy.
What's hard is to be as simple as Bach.
Making the simple, awesomely simple,
that's creativity.'
Charles Mingus

Resonance and Pattern in Thinking is the ability to represent and place memories, experiences and associations into meaningful relationships, whether visual or in terms of movement, music, mathematical ideas or related concepts.

Making associations is the fundamental unit of thinking. The three-dimensional thinking, explored in Chapter 10, provides the structure on to which we build these associations, for more complex thought. Each association begins as things called to mind through the senses or perceived thought, and these things are then transformed into a symbol, with meaning for us, which may go on to be recalled to mind, at a later date, for further development.

11.1: Background and Context

In order to understand how we make, keep and amend mental associations, experiences and memories, whether in patterns or resonant groupings within thought, we need to understand symbol. This is because it is through symbols that we can encapsulate the whole, rather than list the constituent parts, which would be cumbersome and limiting. Symbols allow unlimited storage capacity and flexibility of use.

Figure 37: Good Luck Horseshoe. by Graham Holt (2018).

According to the Indologist and South Asian historian, Heinrich Zimmer, symbols '*hold the mind to the truth but are not themselves the truth'*.[127] They take on a variety of forms but share the unifying quality of 'standing for' something. They may be gestures as simple as pointing, or concepts as complex as ∞. They may be physical in nature as in the horseshoe placed upon, or above, a door as a symbol of good luck, or

[127] Zimmer, H.,1969. *Philosophies of India,* Princeton University Press, Princeton, New Jersey, p.2

they may be ritualistic as when we 'knock on wood' to avert harm. Many are surprisingly persistent - particularly when in relation to personal protection - even long after their original meanings are lost.

One particular two-dimensional symbol has become ubiquitous and is found, for example, on many flags. But while many people will salute the flags, the exact origins of the form are unclear for them. It has roots in the earliest civilisations of the Middle East, and shines in the heavens as the brightest star, Venus. It is related by some to Ishtar the goddess of love and war, to the golden section, to the associated ratio of 13:8 and to mankind, among many other rich and diverse associations. It is the five-pointed star. It is also an excellent example of resonance because not all the connections are fully explained or entirely precise but are meaningful for us. For example, the ratio of 13:8 relates to the orbital relationship of Venus with the Earth. This means that the two planets coincide in the same area of the solar system every eight years with a small degree of difference. The satellites, Ganymede, Europa and Io similarly resonate in their orbits of Jupiter. The ratios in each case are approximate, but close enough for the repetition to catch our attention. We then turn it into a pattern of our own making, rather like the baby with the porridge in Chapter 2. The path of the planet Venus in a perfect 13:8 ratio would describe the pattern in *Figure 40*, from which we can derive a set of nested pentagrams, pentagons and five-pointed stars. The realisation of this pattern also marks the point when ancient people realised that *Phospheros* (the Morning Star), and *Hesperos* (the Evening Star) were one and the same celestial object that disappeared behind the Sun before reappearing again. This made the pattern even more significant to understanding the concept.

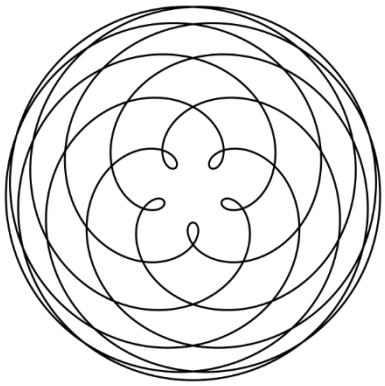


Figure 38: Simulated path of Venus as seen from Earth. By AnonMoos (2012).

The geometric description of the transit of the planet Venus as seen from Earth transforms the resonance of the ideas into a repeating pattern, from which we can extract an over-riding principle that allows calculated predictions to be made. This is the specific benefit of pattern over resonance.

Figure 39: Divje Babe Flute made from Cave Bear Femur (c.41,100 BCE) Neanderthal or Cro-Magnon, National Museum of Slovenia. By Jean-Pierre Dalbera (2013).

Music is the area where we find the resonance of sound within physical materials. The first instruments may initially have produced noises like the wind or birdsong and gone on to acquire a multitude of symbolic or shamanic associations. The earliest known musical instrument, to date, is a flute made by our Neanderthal or Cro-Magnon ancestors and carved from the bone of a cave bear more than 43,000 years ago.

Music is fundamental to being human. It is, and has been, practised by every human culture known, as melody and rhythm.[128] The drum, the flute and the harp have a long history with us. Music is so close to us that we perhaps do not recognise its significance in expressing our affinity for pattern. Over time, music became expressed as a series of intervals, following Pythagoras' theory, and notation was developed to describe the pattern. That notation takes the form of signs which mean specific notes at specific frequencies. Musical notation is comprised of signs that 'stand for' sound, but have, like the alphabet, a strictly limited scope of authority. A sign lacks the limitless associations of a symbol. Signs denote or signify specifics: smoke signifies a fire; sunlight signifies day; the letter 'a' signifies the indefinite article in a sentence; thunder denotes lightning.

Being able to extract reliable patterns from resonances, and express them in signs, brings great benefits, not least in ensuring that all the members of the orchestra are playing in the same key! However, as something is gained, so something is lost. I remember in my youth seeing an experiment where a group of choristers were challenged to sing any melody played on the piano. The pieces became increasingly complex, but they managed every time to replicate the melody exactly. Then an Indonesian gentleman played another melody on his xylophone, and the boys were left in stunned silence. The xylophone contained the quarter notes of Southeast Asian music, which the boys struggled to hear, or if they did hear, they felt that the notes sounded flat and unreachable for their perfectly trained ears and voices. The boys had not realised that their choices of notes to sing were so deeply affected by cultural patterns. Knowing the difference then allowed them to explore both traditions, if they so wished.

To summarize, we can say that while signs are also symbols, which stand for something else, they are more specific and tied to one thing by common consent and usage. This is particularly useful where clarity and shared understanding is important. They lend themselves to pattern that explains vast concepts in shorthand as is found in music, mathematics and physics. Verbal and written signs also serve language, alongside the associated spelling and grammar patterns. There is a slight difference in the way linguistic signs are used in that poets, for example, delight in taking liberties with grammar, and spellings are known to morph over time, whereas mathematical meaning of signs seem to remain far more robust. Symbols, conversely, remain entirely open and fluid. They can remain personal or become shared with a wider society. How they are applied can also change, over time, for the individual or culturally.

There is some crossover between signs and symbols, as signs can acquire additional symbolic value as is the case with the planetary glyphs in medieval alchemy. Also, some symbolic ideas acquire a sign, such as the Red Cross or Red Crescent that is often seen in a war zone. The copyrighting of logos is a commercial extension of this application of signs, but these can be launched fully-formed into society to advertise a product and have no real symbolic meaning.

However, it is fair to say that no shared symbol ever emerges fully-formed into society. It will first occur within an individual, privately, and then be shared. If it resonates with others, it will spread and become embedded in culture. Some things appear to us to be shared, but actually are not, as was seen in the green tea preferences in Chapter 5. It is also not possible to foist a symbol randomly onto others. The attempt to invade one's personal symbolic understanding is experienced as an affront to identity. This was clearly exemplified in 2016 when the United

[128] Greenfield, S., 2016. p.99

Nations announced that its new honorary ambassador for women was the fictional character, *Wonder Woman*. There were, of course, logical arguments for this, but symbols are not logical constructs. They are part of our identity. Many women were astounded and, when the official announcement was made in the UN chamber, large numbers of female staff members and others turned their backs in demonstration. So, while symbol can incorporate diverse ideas, in limitless fashion, it is highly contextual and cannot be arbitrarily supplanted.

Symbol can, however be subverted. This is how indoctrination works. But that relies upon a slow drip feed of malevolent or subversive symbolism to engage the essential emotional relationship that embeds these false ideas. This is why extremist groups seize upon fears and emotional vulnerabilities. As with the choices we make (see Chapter 5), understanding the context of our own motives, and the scope of our choices within that, is key to maintaining our integrity of action in the face of attempted indoctrination.

Our emotions, or feelings, prime our personal symbolic understanding of meaning, and neuroimaging has recently given us a glimpse of how this works. Susan Greenfield describes fountains of neurotransmitters flooding broad areas of our brains and priming these areas for action. Greenfield compares this effect to the rumour of a pay rise going around the office: it does not make you do anything specific, but if the phone rings, you are more likely to pick it up.[129] According to Greenfield, these neural events can be seen as 'transient configurations of large scale neural assemblies' throughout the brain which 'correlated with varying degrees of consciousness at any one moment'.[130] They may indicate the activity of searching for symbolic resonance through shared characteristics found in each memory or concept.

Rudolf Steiner observed that new meaning was created when perceptions became concepts (symbols) through the activation of feelings and application of intent or will.[131] It is at this moment of creation of the new that we meet the quality of spirit within, as a self-existing entity.[132] This may be experienced as our inner voice, conscience, inspiration, intuition, scientific conviction, or spiritual experience. It is also where we may experience discord or incongruity.

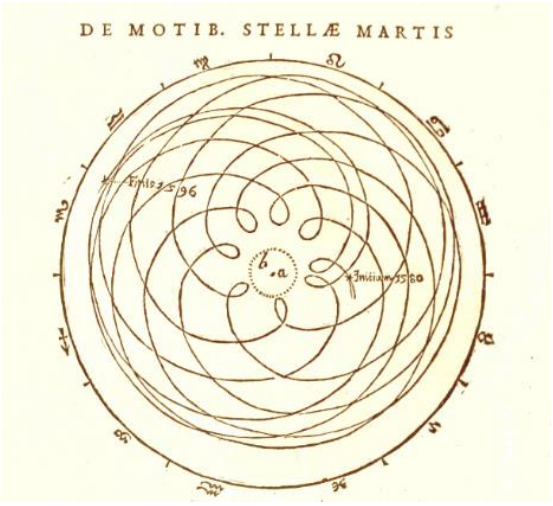


Figure 42: Diagram of the geocentric trajectory of Mars through several periods of apparent retrograde motion Astronomia. Nova by Johannes Kepler (1609).

This was the case for Johannes Kepler when comparing the apparent movement of the planet Mars with that of the planet Venus. He found that the apparent celestial pattern was not consistent, and was not comfortable with leaving the matter unresolved. He realised that something was wrong with the established understanding and

[129] Greenfield, S., 2016. p. 34
[130] Greenfield, S., 2016. p. 50
[131] Steiner, R., 1984. pp. 69-71
[132] Steiner, R., 1984. p.

that his of Mars only worked if that planet followed an eliptical path around the Sun. This led to his first law of planetary motion.

Kepler is an example of pattern in thinking. Mark Runco describes this kind of thinking as algorithmic:

> *This is not merely the identification of patterns. It is instead the creation of new concepts, new classes, new information.'* [133]

But it is interesting to note that Kepler also needed to include and assimilate his religious beliefs into his astronomical observations. To do this he had to encapsulate the 'ineffable of the unknowable' and this is the province of symbol.[134] This kind of thinking is best described as analogic thinking, where similar characteristics create connections or combinations.[135] In the astronomical example above, Kepler sees his new law governing the planetary motion of Venus as related to, and compatible with, a divine creation. The two together allow him to create the larger framework of understanding for himself. Other scientists have similarly used analogy in order to discover useful properties in nature, as in the case of the Velcro touch fastener, which was inspired by the seeds on a burdock plant sticking to a coat. [136]

To summarise, we have signs that are linked to pattern and algorithmic processes in thinking, and symbols which are variably connected ideas and memories, or perceptions linked through clear or subtle characteristics and associations. Signs are culturally shared, as are patterns generally, if only in informal conversations, but symbols, especially when non-linguistic, can equally remain more private. Signs may be related to the neurogeometry found in the physical organisation of the brain processes, and symbols appear to be closely connected to the feelings expressed physically perhaps through the neurotransmitter fountains. Both are invaluable to creativity as two sides of the same coin.

In his book, *The Symbol Without Meaning*, Joseph Campbell described symbol as follows:

> *'It seems to me perfectly clear that all the great and little symbolical systems of the past functioned simultaneously on three levels: the corporeal of waking consciousness, the spiritual of dream, and the ineffable of the absolutely unknowable.'*[137]

It is interesting to note that both pattern and symbolic resonance appear to feature significantly in dreaming. A recent study led by Shahab Vahdat at Stanford University in California, as reported in the *New Scientist*[138], noted an interesting phenomenon of sleep. Thirteen individuals learned a sequencing task, pressing keys. Their brains were scanned while they performed the task, once it was mastered. Then they went to sleep. It was found that the pattern of brain activity when performing the task was centred in the cortex and continued into sleep. This is interesting in itself, but then, when the subjects went into deeper, non-REM sleep, the pattern

[133] Runco, M., 2014. p.13
[134] Campbell, J., 2013. *The Symbol Without Meaning,* Joseph Campbell Foundation, San Anselmo, p.53
[135] Runco, M., 2014. p.13
[136] Dunbar, K., 1997. How Scientists Think: On-line Creativity and Conceptual Change in Science, in T.T.B. Ward, S. M. Smith and S. Vaid, eds. *Conceptual structures and processes: Emergence, Discovery and Change. Washington D. C.: Am Psych Press (pp. 461-493)*
[137] Campbell, J., 2013. P.53
[138] Hamzelou, J., 2017. 'How our sleeping brain stores away memories', *New Scientist,* (3146), p11.

faded in the cortex and a similar pattern took over in a deeper region of the brain called the putamen. This is thought to be involved in long-term storage. The pattern had evolved and changed. It is thought that movement-related memories are stored in this way. It also points to the importance of uninterrupted sleep.

If we look now at dreaming, which is well known to be connected to REM[139] sleep, we see how familiar symbolic resonances give a picture, or narrative, to our dreams although, in this instance, the associations can appear quite random and the laws governing them somewhat bizarre. I recall becoming suspicious during a dream, that it was indeed a dream, and reached out to feel a piece of velour fabric. It felt like gravel, 'proving' to me that it was reality. Bizarre. However, the interesting thing about REM sleep is that it begins before we are born, in the womb.[140] It would be interesting to know what dreams the unborn dream. It is likely that phosphenes play a part, given their experiential strength in very young children.

What is now suspected is that REM sleep involves mainly the type of experiences that occur during the waking hours of and daily life, but without the control of governing natural laws and structures or patterns of time and space.[141] Logic takes a rest and it becomes natural for fabric to feel like gravel. A key feature of dreams is, therefore, a marked disconnect from context, whether structural or emotional, and this is reflected in the presence of small neural assemblies (rather than the large scale assemblies recorded in the waking presence of neurotransmitters associated with emotions).[142] This gives our dreams a 'powerful force' of unfettered imagination.[143] In this environment, symbols can form more marginal connections, which may or may not become useful in the future. I have never had cause to utilise the 'gravel' connection, until now, but have in my youth generated the seedling ideas for paintings, sculptures, narrative and poetry during sleep, as do many other people. It can be very useful. This again indicates the importance of investing in good sleep, particularly in childhood.

Oliver Sacks highlights the way that the unfettered and childlike, symbolic association of ideas is also revealed through illness, in this case in an adult with 'mania'.[144] This person was asked to copy a drawing of a square containing a circle with a cross inside it. The man drew a 3D box of oranges with open flaps. When asked again he drew a kite with a string. He was joyful and delighted in his work. It transpired that the origin of his condition was neurosyphilis and this was dampening his previously learned inhibitions. The images he was seeing and using were his own but would not normally be permitted to come to the surface. After treatment for the neurosyphilis, he was asked to perform the same task again and drew a meagre square with a limp circle and a small cross inside it, as asked. Something was regained, but something briefly glimpsed was also lost.

If we are to make productive and sustainable use of symbolic resonance and pattern, then their careful development, in balance, is the key.

[139] Rapid Eye Movement
[140] Greenfield, S., 2016. p.160
[141] Greenfield, S., 2016. pp.164-168
[142] Greenfield, S., 2014. p.80
[143] Greenfield, S., 2016. pp.168-70
[144] Sacks, O., 1985. *The Man Who Mistook His Wife for a Hat, Picador, London, pp. 110-113*

11.2: How is Resonance and Pattern Developed?

Resonance and Pattern in thinking are the building blocks with which we construct new meaning from the world around us, and from introspection upon our own thought. They provide the inspiration and discipline for meaningful creativity. Pattern is strongly related to quantitative rhythm and interval, while resonance is related to qualitative symbolic relationships linked to feelings

These capacities can be developed in the classroom through healthy related activities that remain open for the child or young person to construct new meaning themselves, in an age-appropriate way. This leads naturally to creativity.

As Mark Runco clarifies:

> *Educators and others working with children should define creativity in very literal terms, as thinking or problem-solving that involves the construction of new meaning. This in turn relies on personal interpretations, and these are personal and new for the individual, not on any larger scale.*[145]

In this way the creative muscles are enabled and exercised so that they are fully fit and developed for later life.

11.2.1 The Early Years Setting

The child is born with rhythm, and into rhythm, through the heart-beat and the first breath. We naturally rock our baby gently from the start, often singing softly in time to the movement. This is beneficial to parent and to child. It is also entirely natural and part of the wisdom of parents that nursery rhymes and simple movement games are employed with the very young from infancy. The half-sung or chanted words, in time with the movements, stimulates a motor, language and interpersonal interaction. [146] This is considered to assist in the natural development of integrated thinking skills, through the combination of symbolic images, language and movement, in a pleasing social setting. [147]

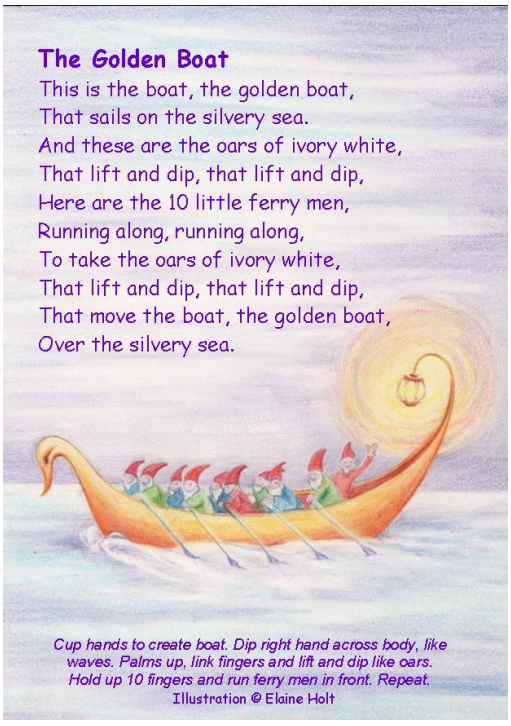


Figure 40: The Golden Boat. Illustration by Elaine Holt (2008)

[145] Runco, R., 2003. p.317
[146] Greenfield, S., 2016. p.100
[147] Vallotton, C. D. and Ayoub, C. C., 2010. Symbols Build Communication and Thought: The Role of Gestures and Words in the Development of Engagement Skills and Social-Emotional Concepts during Toddlerhood. *Social Development,* 19(3): 601–626.

There is a documented relationship between pre-language symbolic gesture in toddlerhood and the development of social skills in later life[148]. This means that the gesture of the teacher, both physically and in words, will have profound potential for good. As the child's visual inner picturing skills, along with language, are still forming in the early years, then the role of physical gesture is particularly important. Gentle, calm and predictable movements and gestures for imitation in relation to daily life are particularly beneficial, especially when related to simple practical tasks, play and imagination. Here a wider set of gestures may be practised by the child. For example, the simple gesture of a child's finger in front of their lips and 'Shh!' when pointing to a toy lying on a bench (pretend baby asleep) is an archetypal gesture that links to empathy and the development of symbolic thought.[149] Pointing is another archetypal gesture that triangulates the view of the child with that of others. It will become part of the internalised dialogue of the child, in time, as with self-speech (see Chapter 8). These simple connections, if nurtured, become available to be built upon further as the child grows towards adulthood, and integrated into their framework of thought, as outlined in Chapter 10. They are the symbolic seeds sown in the light, warmth, air and compost of the child's mental ecosystem when nurtured in the warmth of a supportive kindergarten or early years setting.[150]

As the child grows, rhythmic activities and outer regular habits assist the further development of inner pattern and order in thought. Regularity in daily and weekly school routines - baking day on a Wednesday, for example - and routine within the activities of each school day, can be equally predictable without becoming stale. Play time, tidying away, snack time, craft time, outdoor play time, story time and so forth.

Alongside this, songs and rhymes give an artistic quality to pattern, swings and see-saws help bring self-direction and intent into rhythmic activity. Carefully repeated stories over the course of a week bring language and image into symbolic relationship within the pattern of the day. All contribute in different ways to the enabling of resonance and pattern in thinking. [151]

11.2.2 The Lower School

In the lower school, weekly routine is best preserved with regular lesson times. Within the lessons themselves, it is now useful to introduce a slow transition from an emphasis on regular practice of songs, speech, movement and play, to introducing the new elements of continuous narrative alongside recall and expression of the previous day's activities (as described in previous chapters).

This new element of recall and the outer expression of that, can be achieved through a variety of activities from mime to modelling, drawing and later writing. This makes healthy and economic use of the effects of sleep, as described above. The use of sleep assists the child's deeper development of symbolic relationships and connections to a variety of associations over a two or three day period in a layering effect. This is especially beneficial where other lessons

[148] Vallotton, C. D. and Ayoub, C. C. (2010)
[149] Vallotton, C. D. and Ayoub, C. C. (2010)
[150] See Chapter 2
[151] We cannot of course predict how each child will benefit from this: as part of my research for the book, I asked one of my grown sons what he thought was the most important thing he had learned while in kindergarten. He thought for a minute and said: *'He who carries a folded blanket, is not asked to tidy away.'* While not at all what I had been expecting, it was certainly an inventive use of observation of other people's pattern of behaviour!

sow complementary seeds over the same time period. On the other hand, this aspect is lost in situations where the taught elements are also recalled and expressed, all in one day.

Activities, including skipping and clapping games and country dancing, are helpful, as is Eurythmy, which is particularly beneficial for orientating the child within artistic pattern and form. Learning the mathematical tables through movement, is also particularly beneficial here. Alongside this, practical skills such as knitting and crochet bring the physical experience of strength and form developed through the building of an additive pattern of stitches in multiplied rows. Later on in lower school, learning about the laying of bricks, for example, through the patterns of various brick bonds, picks up the thread and adds another host of practical associations onto the knitting experience.

Figure 41: Maypole Dancing. Ringwood Waldorf School (2015)

11.2.3 The Middle School

Middle school is a time where important symbolic cultural resonances can be explored that will have a huge impact on later social understanding. This can be achieved through the exploration of the myths and legends of a variety of cultures from Norse mythology to the ancient Indian, Sumerian, Persian, Babylonian, Egyptian and Greek myths and legends. Many similarities and echoes, rippling through the stories, can be discovered by the students as they listen. The pattern of human endeavour, hopes and beliefs are held in these stories alongside fundamental stages in social development, as seen, for example in the first laws of Hammurabi and the notion of kingship and the mastery over others. Through these rippling patterns of the distant past, the child can form a symbolic picture of the shared anthropological roots of humankind, and potential expression of purpose and individuality, within that. As the anthropologist, Ruth Benedict, put it, '*The purpose of anthropology is to make the world safe for human differences'.*

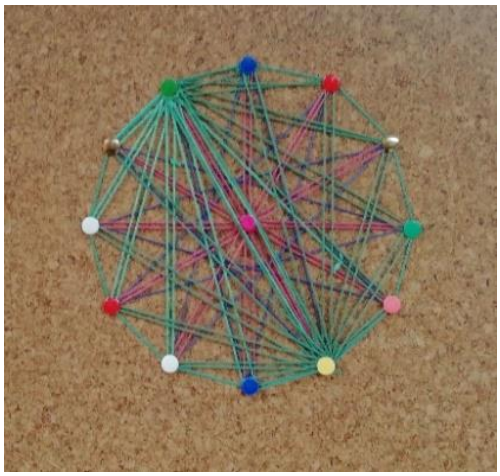


Figure 42: Geometry (age 11). Photo by Elaine Holt (2017)

Figure 43: Geometry (age 12). Photo by Elaine Holt (2017)

Pattern can be more formally studied at this time through algebra, the introduction of the sciences and through geometry. Alongside formal constructions and design, simple tasks, such as giving the students a cork board, pins and coloured thread and asking them to design a pattern, can produce very satisfying and surprising results that they will remember. A few examples are included in Figures 45-47.

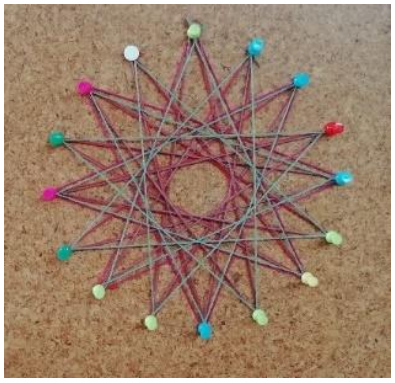


Figure 44: Geometry (age 11) Photo by Elaine Holt (2017)

Another excellent activity for developing a keen sense of pattern linked to the symbolic images of ancient epochs, is code making and breaking. This can be done at about age nine to ten, by studying the runes of Norse origin, translating simple phrases then making up their own system of runes. This activity can then be picked up within studies of other ancient civilisations. The story of the Rosetta Stone can further give a symbolic association with decoding and a community of languages. This oldest written song – the Song of Seikilos – can be learnt alongside the sad tale of its origin during the study of Ancient Greece. Once the song is learned, if the Greek words are written on the blackboard, it is quite possible for the eleven-year-olds to decode all the characters by a process of elimination. This is an example of finding resonance and then looking for a pattern. In doing so they will find some that share similarities with the English alphabet and also one letter that catches them out for a while (the letter π) which can then, once discovered, be used in Pythagoras' theorem in Maths. It will have a different and more enduring resonance for them than a simple sign.

Music theory and practice is an important means of developing pattern, both musical and social. A useful exercise is the development of multiple overlaying drum rhythms. This may utilise wheeled recycling bins for the base notes and empty plastic drums of various sizes carried on straps. This has been highly effective as a carnival marching drum group with fourteen-year-olds. Their ability to remember complex overlaying rhythms and follow the simple hand gesture instructions without missing a beat is something to see – and hear! Most impressive for them and those watching. It elicits an excellent capacity for complex patterns in a public, social situation.

11.2.4 The High School

Resonance and pattern in thinking comes into its own in high school with the emergence of all the thinking skills. If care is taken to enliven and update the symbolic associations, forged in previous years, with the new capacities for interrogation and evaluation, then a great deal may be envisioned and achieved by the young person in hgh school.

The recapitulation of history through Art History is particularly helpful in this, bringing as it does, fresh eyes on a familiar subject in a holistic overview. The links between culture and style, style and substance, are also usefully explored. There is also the opportunity to reevaluate materials through the eyes of artists from the past. Sourcing pigments and making paints has been discussed in Chapter 9. This could be further linked to symbolic resonance through the study of perhaps Van Gough's *Night Café* alongside his own words and rationale, recorded in a letter to his brother:

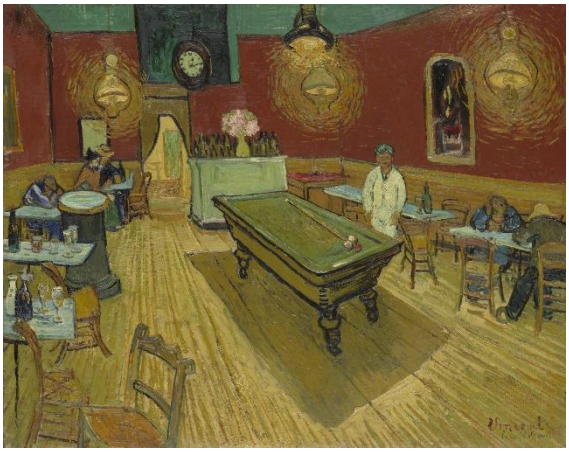


Figure 45: The Night Café, by Vincent Van Gogh (1888).

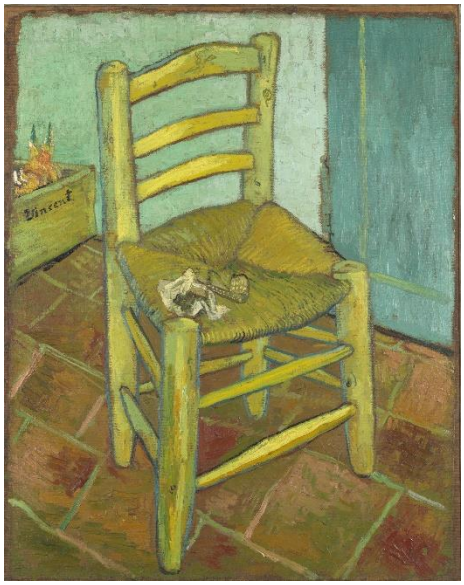
> *'Today I am probably going to begin on the interior of the cafe where I have a room, by gas light, in the evening. It is what they call here a cafe de nuit (they are fairly frequent here), staying open all night. Night prowlers can take refuge there when they have no money to pay for a lodging, or are too drunk to be taken in…*
>
> *I have tried to express the terrible passions of humanity by means of red and green. The room is blood red and dark yellow with a green billiard table in the middle; there are four lemon-yellow lamps with a glow of orange and green. Everywhere there is a clash and contrast of the most alien reds and greens, in the figures of little sleeping hooligans, in the empty dreary room, in violet and blue. The blood-red and the yellow-green of the billiard table, for instance, contrast with the soft tender Louis XV green of the counter, on which there is a rose nosegay. The white clothes of the landlord, watchful in a corner of that furnace, turn lemon-yellow, or pale luminous green.'*[152]

In the *Night Café*, the colour is consciously used as a symbolical expression of negative cultural and personal issues. Van Gogh's advice to artists about colour generally, is:

> *'An artist had better start from the colours on his palette, than from the colours of nature'*[153]

[152] Mauren, N. M., 1998. The Pursuit of Spiritual Wisdom: The Thought and Art of Vincent Van Gogh and Paul Gauguin. Vancouver: Fairleigh Dickinson University Press, pp. 73-74

[153] Mauren, N. M., 1998, p.10.



This can be the starting point for philosophical and social discussions of the artist, viewer and subject relationship.

Studying the different starting points and effects between representational and symbolic art can make useful links for the students to their own changing perspectives on self-determination and self expression as they approach adulthood and a beckoning future.

Figure 46: Van Gogh's Chair by Vincent Van Gogh (1888).

Project work can take on new depth and meaning at this age as the students utilise their capacities for resonance and pattern in transdisciplinary research and relate this to their personal interests and sense of identity.

Multidisciplinary activities and projects are particularly useful at this time. An example from Finland was a language lesson art project, where the study of English was pursued through documenting an art project.[154] This particularly engaged students and advanced skills in both disciplines. Another useful tool is the shared theme project, where all lessons link in some small way to a central theme which will form the bass of a small personal project.

Practical craft skills and exercise are also still vital, both for the very real benefits they bring and for the pause they offer from the increasingly intellectual work of the highest classes. Balance between subjects encourages personal inner balance during these turbulent years of adolescence. There are also benefits to be gained in economic teaching, since a simple non-demanding task 'stirs the pot', and enables the unpressured processing of experience and information in a temporary 'dream-like' state, similar to what happens during healthy sleep, while the hands or body are gainfully employed in a simple but engrossing task.

The complex rhythms now possible, coupled with the potential for nuanced symbolic resonance through metaphor, makes the art of poetry something of a pattern and resonance work-out. It is not surprising that Michelangelo rated it so highly amongst human achievements. Often it is poetic restrictions and rules that can bring out the greatest creativity, whether iambic, hexameter or a haiku structure. There is also the possibility and freedom here to creatively explore the nature of truth.

Figure 47: Poetry Main Lesson (age 16) Ringwood Waldorf School (2017).

[154] Brandão-Berglund, A. (2018) ACTS Transnational C6 presentation, UK

*****

Where pattern can predict and test the known, resonance, through the use of symbol in thought, can encompass the unknown and unknowable and bring that within our grasp, linking a multitude of memories, experiences and symbolic associations, which in turn trigger further associations, like ripples on the water, until new patterns emerge for us to explore and test.

Chapter 12: Heuristic Thinking

'When I was young, I found out that the big toe
always ends up making a hole in a sock.
So I stopped wearing socks.'

Albert Einstein[155]

Heuristic thinking and improvisation is the ability to use common sense when working with unknowns. The thinker uses trial-and-error. Heuristic thinking is often an inspired attempt and, most importantly, it entails being willing to fail. It may involve thinking through the practical application of the hands, body, or whole-body thinking.

The term heuristic is derived from the Greek and means, *serving discovery*.[156]

12.1: Background and Context

Heuristic thinking utilises mental shortcuts. These may be expressed as rules of thumb, or common sense. They contain the accumulated wisdom of communities and may be passed down from one generation to the next in the informal manner of day-to-day life. Some are encapsulated in proverbial sayings, such as, 'look before you leap', 'first things first' or 'forgive and forget'. These are well known and come readily to mind in the moment. They are not all necessarily consistent in theme or subject and so there is usually one to be found for any specific occasion or attitude. They are found the world over, and often travel to new countries with peoples. Indian proverbs include: 'anger has no eyes' and, 'dig your well before you're thirsty'. Many have roots back into biblical times, for example, 'for everything there is a season'.[157] In later times, the sayings and writings of more modern people have become favourite quotes that carry meaning. An example of this is the quote by Thomas Jefferson,

'Mankind would lose half its wisdom built up over centuries if it lost
its great sayings. They contain the best bits of the best books.'

To those who use them it does not matter how accurate they are or how accurate the attribution. It is how useful and pertinent they are that matters, and they generally elicit an emotional response. Heuristic thinking builds upon culturally shared patterns of behaviour, or understanding of a particular situation. The motive for this is generally symbolic in origin. Symbolic images, as described in Chapter 11, are also short cuts to encapsulating larger or complex thoughts without the need to rehearse the details.

While three-dimensional thinking may perhaps be the most significant thinking process for us, allowing us, as it does, to structure our experience and thoughts on every level, it is through

[155] To Philippe Halsman. French, A. P., 1979. *Einstein: A Centenary Volume. Portsmouth: Heinemann Educational Publishers*
[156] Chambers Etymological Dictionary, 2005. Chambers, Edinburgh, p. 479
[157] Ecclesiastes 31:8

heuristic thinking that we find our common humanity on a day-to-day level. It permits pattern and resonance in thinking to find a harmonious voice, through interaction with the cultural environment in which it finds itself. In this respect, heuristic thinking is comparable to the embodied understanding described by Mark Johnson as:

> *'…our most basic way of being in, and engaging with, our surroundings in a deep visceral manner.'* [158]

This is not to say that the rest of the Creative Thinking Skills Spectrum is not embodied in some way, as is described at length in previous chapters. However, there remains something gloriously human in heuristic thinking; human with all of its triumphs and frailties laid bare for all to see. It is an endearing skill. It tries.

The mental short cuts in heuristic thinking remove the need for long-winded consideration and allow swift action when needed. In this regard it is interesting to note a common theme among ordinary people in rescue situations: for example, in June 2017, when a mother with young children became trapped in a submerged car in a swollen river, a passer-by jumped in and rescued them, afterwards saying:

> *"I'm not a hero. I'm just a man. Anybody would have done the same thing…I didn't think, I just jumped in," he said. "I could see the small kids inside, and their eyes, and they were scratching at the window…Everybody was crying, everybody was screaming. The mother was screaming, 'Help, help, help'."*[159]

On another occasion, a mother and her sons were pulled from a flooded canal by a passing man who said, '*I didn't think anything of it really. I just saw them in trouble and I was the only one around to help*.'[160] Elsewhere, two passers-by pulled burning people from a car and lorry that were on fire and in danger of explosion[161], and on another occasion, a stranger risked his life to pull a man from a submerged car being washed out to sea.[162] These actions are spur-of-the-moment decisions and require quick thinking, as every second counts. Very often, as in the case of the man above, they will say *'I didn't think about it'* and explain it as '*Anyone else would have done the same.*' Not everyone does, of course. Some are too afraid and paralysed, while others don't know what to do, they do not have the skills. On the other hand, there are also numerous examples of dog-walkers who drown in frozen lakes attempting to rescue their dogs, (who often manage to get back to land, unaided). They, too, did not stop to think. This is a sufficiently common tragedy to need a public warning from time to time. Triumphs and frailties.

---

[158] Johnson, M., 2015. Embodied Understanding. *Frontiers in Society,* Volume 6, Article 875,

[159] English, E., 2017. 'I didn't think, I just jumped in to help,' says man who saved woman and two children from drowning in River Lee. *The Irish Examiner.* [online] Available at: https://www.irishexaminer.com/ireland/i-didnt-think-i-just-jumped-in-to-help-says-man-who-saved-woman-and-two-children-from-drowning-in-river-lee-453502.html

[160] BBC News, 2018. Passer-by saves family after Leeds canal burst its banks. [online] https://www.bbc.co.uk/news/uk-england-leeds-43640625

[161] BBC News, 2017. 'Selfless heroes' pull two people 'on fire' from car. [online] https://www.bbc.co.uk/news/uk-england-beds-bucks-herts-40364981

[162] BBC News, 2016. Jersey sea rescue: Passer-by "saves man's life". [online] https://www.bbc.co.uk/news/world-europe-jersey-36864913

Heuristic thinking built upon symbolic resonance and practical judgement provides ready-made patterns of action and gives humanity the chance to show its true colours in a crisis. It is interesting to note, in this context, the seven basic plots in narrative as described by Christopher Booker.[163] These plots feature in narratives the world over which, like proverbs, travel with peoples. The first of these key archetypes of action is the hero or heroine who faces danger, overcomes the monster and saves the helpless. These symbolic roles are a deep part of our cultural life and provide archetypal models for action in a crisis. We develop all these culturally mediated responses from early childhood. It makes us who we are and what we will do in that moment, should that moment arise.

Heuristic thinking is informed by practical, 'visceral' experience of the world along with deep-rooted, symbolic archetypes, and is fuelled by the unpredictable nature of everyday life, which calls for quick thinking skills. These rely upon simple efficient rules and tend to focus upon the most prescient part of the problem, ignoring finer subtleties. This is why we can sometimes get it wrong. But in a dangerous situation, it is often humanity's best hope.

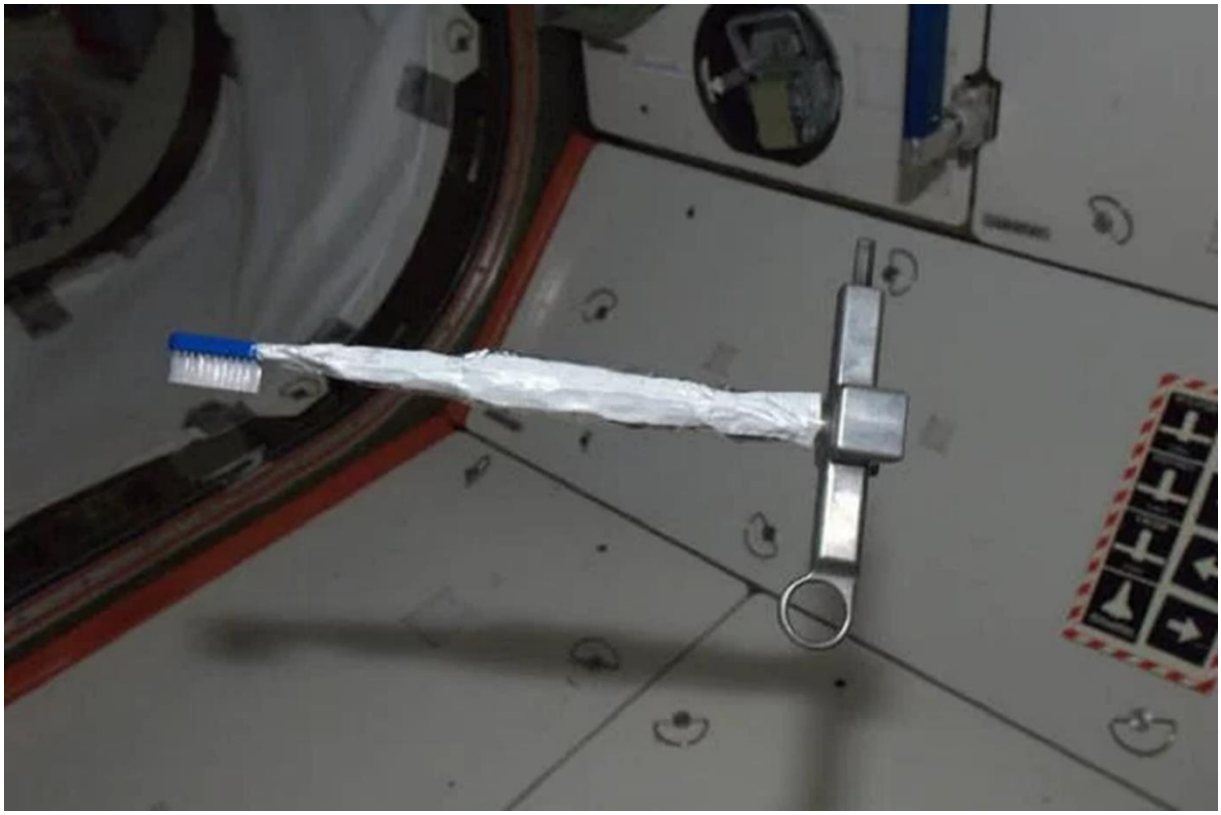


Figure 48: Space Station Repair Kit' by Sunita Williams (2012)

An example of this concerned the international space station, which suffered damage in 2012, with potentially deadly consequences. It needed a replacement part, but space grit had clogged the screw thread. When you are orbiting the Earth at some distance, your options are limited and time can be pressing. Technicians at NASA scrambled to come up with a solution that did not need to be elegant or impressive, it just had to work. It did. It was a toothbrush on a stick.

A more demanding heuristic endeavour by NASA technicians famously saved the lives of the Apollo 13 crew in 1970 and brought them safely back to Earth, in seemingly impossible

[163] Booker, C., 2004.*The Seven Basic Plots: why we tell stories.* London: Continuum.

circumstances. Here it was analogic thought, associated with symbolic meaning, which provided the 'similar to' quality that was needed and pointed to solving unexpected, real-life problems. One of the key features of heuristic thinking in these circumstances is the dogged determination not to give up if the initial attempt fails. It just moves on to the next possibility.

Even within the modern digital landscape, this analogic quality of shared characteristics in heuristic thought has also informed endeavours to thwart metamorphic computer viruses that change faster than a statistical approach can keep up with. Heuristic Analysis programs are now used to hunt for rapidly evolving metamorphic viruses that could cause great damage to critical infrastructure.[164]

It appears to be a feature of heuristic thinking that it flourishes in mishap and mayhem. Disasters generate creativity. This was seen in a recent New Zealand study into post-disaster creativity following 2010 and 2011 earthquakes.[165] Conflict can also be creative if approached in the right way. Restorative mediation is an example of this. There is also the spur to action or the raising of questions that can occur in young people in everyday difficult situations, bringing insight or creativity to the experience. This was highlighted by Simone de Beauvoir in her memoire:

> '*My father's pagan ethical standards were in complete contrast to the rigidly moral conventionalism of my mother's teaching. This disequilibrium, which made my life a kind of endless disputation, is the main reason why I became an intellectual.'* [166]

The swift adaptability of heuristic thinking and the archetypal images and ideas that generate it are learned in the day-to-day world of childhood and youth. These influences go on to have a profound effect upon life choices and approaches to problems or opportunities. Until such time as we feel comfortable with ourselves and with our fellow human beings, both inner and outer conflict will remain a fact of life but one that, if we meet it with the right inner tools, can sow the seeds of something better.

12.2: How is Heuristic Thinking Developed?

Given the relationship of heuristic thinking to discovery, embodied understanding and practical problem-solving, it would seem that engaging the body in self-directed activity would be a good place to start. Following the pattern of development seen in previous chapters, the child, at each stage of development, tends to exercise externally what will later become internalised thought process.

12.2.1: The Early Years

Playfulness in the early years is the source of a great deal of learning. This is particularly so where the child is given simple multipurpose props: cloths and something to hang them from becomes a house, for example. The simplicity requires ingenuity to turn the prop into

---

[164] Wong, W. and Stamp, M., 2006. Hunting for Metamorphic Engines. *Journal in Computer Virology*, 2(3): 211-229 https://www.researchgate.net/publication/220673431_Hunting_for_metamorphic_engines

[165] Cameron, T et al, 2018.Creative ventures and the personalities that activate them in a post-disaster setting. *Creativity and Innovation Management,* 27(3): 335-347.

[166] De Beauvoir, S., 1958. *Memoires of a Dutiful Daughter.* Translated by J. Kirkup. London: Penguin, p.41

something: a box becomes a car or boat and a rug becomes an island, and so forth. Instruction is not needed here – especially in a group of children, where negotiation and explanation among peers also feeds the growing thinking skill. Outside, logs, buckets, mud and wheelbarrows are perfect, but tin plates and spoons, bricks and spades open up a world of possibilities. And brooms! The key here is not to give solutions to the everyday challenges but, where needed, guide them to where they can discover it for themselves.

12.2.2: The Lower School

Flexibility in the teaching environment and pedagogy is beneficial in the lower school so that the children are given plenty of time and opportunity to take ownership of their playfulness and spend time working collaboratively.[167] This is not the same as highly structured group work, but less formal opportunities that offer the chance of a degree of self-direction, both individually and as a group. This, along with a variety of learning spaces and resources, can introduce the element of dealing with the unexpected that is such a feature of heuristic thinking. Walks in nature are more than exercise in this respect. Den-building in the forest will take on a different shape each week according to the materials and conditions available. Much discussion will naturally take place in finding a creative solution.

Figure 49: Constructing a tunnel needs wet sand and help (age 7) Ringwood Waldorf School (2005).

Figure 50: Sharing string games. By Elaine Holt (2005)

String games provide simple challenges of three-dimensional conception of space, learned and taught in a heuristic way from classmates. The principle here is to do, then understand through the doing. This also leads nicely into knotwork design in older classes, a variety of practical sailing (and other) knots - and Knot Theory in high school!

As the children mature, they can also experience working the land in small ways, perhaps ditch digging as part of farming lessons. Here there is endless fun to be had especially when there is water flowing. For example, they will discover the effect of a temporary soil dam across the ditch and which side is easier to dig in. Then there is the cheeky joy of catching a neighbour, who is also digging downstream, with a surprise mini-flood when the dam is released!

Figure 51: Ditch Digging on the Farm. Ringwood Waldorf School (2015)

[167] Davies, et al., 2013. Creative Learning Environments in Education. *Thinking Skills and Creativity*, (8) 80-91.

The study of building gives numerous opportunities to exercise heuristic thinking. The children can work out, in small groups, how to build an arch out of shaped blocks and a wooden former, or build real brick bonds in small practice walls (without mortar). They can build a model timber frame construction (about 1.25 metres high) with timbers and pegs, from a simple set of instructions.

The symbolic basis of heuristic thinking can be developed with the youngest through narrative, perhaps concerning the youngest son going out into the world to seek his fortune and meeting challenges along the way, or the princess risking all to save her brothers. These develop the image of courage and good judgements, often alongside the negative effects of bad or selfish decisions where perhaps an older brother will refuse to share his food with the old beggar and suffers consequences. These images are generally portrayed in classical fairy tales and fables. Aesop's fables contain enduring examples of this from antiquity. For the older child, Old Testament Stories and Norse Myths bring greater complexity within and between characters, but similar choices.

12.2.3: The Middle School

The natural exuberance of the young child is overlaid with a growing self-consciousness in the middle school that can affect the opportunities to develop heuristic thinking. The tendency is to avoid failure for fear of looking foolish - so the sillier the task, the better, to overcome this with laughter! A simple but brilliant game is the plank walk, as described in Figure 55. For this activity, the students are given two planks with ropes attached as shown, and instructed to get to the other side of the lawn without touching the grass. After much negotiations and a couple of failed attempts they will arrive at the idea of walking in step. This requires a great deal of coordination in a steady rhythm and cooperation. Hilarious!

Figure 52: Walk the plank (age 12) By Elaine Holt (2005)

Another good game for silly heuristic fun requires a slight slope in the ground, lengths of guttering and lots of tennis balls. Each student has a length of guttering, which they hold end-to-end creating a continuous gutter from the top of the slope going downhill. The balls are put into the gutter at the top. The students have to try to get as many balls as possible to the bottom of the slope only using the guttering. As soon as the balls roll out of the first length of gutter, the first student runs down to the lower end to be ready for the balls that continue rolling. The first student is soon followed by the second student, and so forth. There is lots of shouting and gesturing with the head (as the hands are busy) and a glorious chaos ensues.

Mathematics is an area designed for useful short cuts. This can be exercised in many ways. One example is to put a number (say, 243) on the blackboard then choose, as a group, another six smaller numbers (say, 5, 9, 23, 42, 8, 7, 1) and operations with some random extras, such as powers. 243 is the answer, and the children have to come up with the sum that will get them closest to the answer, using all the given elements. Even those who are not fans of Maths

become very inventive in making the sum easy for themselves, and learn important shortcuts in the process, due to the open nature of the question. Doing first, instructs.

No crisis or unexpected event should be wasted in the Middle School and, wherever possible, the children can collaborate in a resolution. At this age, they enjoy any break in the school routine, and practical problem-solving or helping others out can usefully piggy-back onto that mood. Similarly, unusual weather or events should be considered as heuristic learning opportunities. I remember one year when it snowed at school. This is very rare (a single flake can elicit dancing in the playground!). It was less than an inch deep, but the teachers decided to abandon lessons and go into the forest. We had no sledges, so the children came up with a variety of solutions. The simplest proved to be the best – binbags. So the morning was spent learning how to slide down slightly snowy slopes in bin-bags. Being the South of England, the snow had melted by break time, but it was a day fixed in the communal memory ever after. We may never need that particular piece of heuristic thinking - but if we do, it will come readily to hand.

Narrative remains important in middle school, but gradually shifts to examples of individuals from history who made significant choices. The dynamic, but flawed, character of Alexander the Great is one that captures the attention of students in the middle years and gives an insight into heuristic thinking. His impetuous actions show the achievements that can be made, alongside the potential for damage, as when he kills his best friend in a moment of thoughtless, drunken rage.

12.2.4: The High School

In high school, doing is still important and relevant to an integrated education. All disciplines benefit from a curriculum that includes hands on engagement with the materials of the natural world. Through this, the students test the limits of the materials, and of themselves against the forces of nature, often finding inner strength that they might otherwise have left latent. Blacksmithing, joinery, stone carving, silversmithing and basketry, for example, all bring different understandings of materials and properties which, by regular experience, contribute to a deeply embodied sense of heuristic competence in the world.

Figure 53: Blacksmithing in Norway (age 18). by Gottfried Straube Fjeldså (n/d)

Putting on substantial plays, where the older students take on responsibility for the practical management as well as the performance of the piece, will bring up plenty of problems – both minor and major. These will give maturing students ample opportunity for practical heuristic resolutions, particularly during performances when there is no time for prevarication. Quick thinking is developed here.

Figure 54: Basket Weaving (age 15). Ringwood Waldorf School (2014)

With adolescence, the students become acutely aware of the feet of clay in the wider world. They will increasingly see injustice and ineptitude. Their heuristic responses to 'just do something' about it, rather than wait for long-winded action from authorities, can be gainfully employed in charitable work or designing solutions themselves. This again is a good opportunity for group work and self-direction and will soon become internalised potential for heuristic responses to urgent need should that ever arise. [168]

****

As the short-hand of practical thought, the day to day usefulness of heuristic thinking is obvious, freeing up mental space for more complex activity. It is also the life-saver that does not wait to justify or check, but jumps straight in, taking its cues from deeply held symbolic resonances such as the protection of the weak. Its strength is its capacity to solve immediate problems or utilise fleeting opportunities – almost before we even realise. It makes us human. It tries. But it also makes mistakes.

[168] Additional examples of good classroom practice and descriptions of specialist activities can be found in: Avison, K. and Rawson, M. eds., 2016.

Chapter 13: Observational Thinking

'One and one is sometimes eleven.'

Indian Proverb

Observational thinking: the commonplace in novel terms, is the ability to produce an innovative approach or insight into the unfamiliar, as well as common problems or accepted wisdom. It involves seeing beyond the obvious, to reach the essence, the reality or the unseen potential.

13.1: Background and Context

It is common to hear people say, *'Seeing is believing,'* or '*I'll believe it when I see it!'* This is understandable because we make sense of the world to a very great degree through our vision, if we have it. And yet, we also say, *'My eyes deceived me'*. This is because our senses are quite direct and immediate, but they are also built upon the capacity for inference that was discussed in previous chapters. We look at the tree and infer that the other side of the tree will be there if we were to look. Observational thinking takes a step back from that and asks if we really experience as we think we do. It actually goes and has a look at the tree – and climbs it to get a better view of it from different angles.

Inference is a useful tool. If we had to be conscious of every detail of every element in our lives it would be exhausting. Riding a bike for the first time gives some indication of the sensory overload that would take place. We would 'fall off' perception a great deal. Just as we eventually learn to ride a bike without the need to concentrate on every detail, so it is with perception. It is a useful mental shorthand. We do not need to constantly feel how our socks fit on our feet, or what our hair feels like on our head - if we have it. We do not need to think about the noises in the kitchen or the street. We can block them out. Even vision is founded upon an inference of colour. This can be experienced if we look at an image created with red and grey in an unlit room. We will gradually see other colours, browns and so forth, or even a full colour picture emerge.

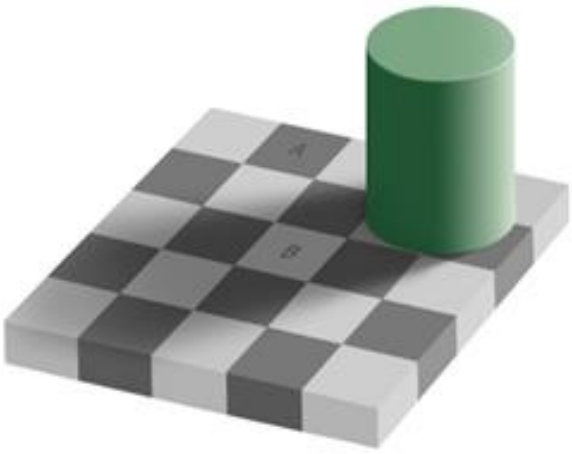


Figure 55: Grey square optical illusion by Gustavb (2004)

The image in Figure 58 gives another indication of how our eyes do indeed trick us: It is difficult to imagine that the squares A and B are actually the same shade (this is due to the shadow of the green column). The chequerboard is a well-known design and causes us

to infer that the shades of the squares are consistent with the expected shades of the chequerboard pattern. Even if we connect squares A and B with a rectangle of the same shade *(Figure 59)*, we will not want to see the truth. If you would like to check for yourself, cover the black and white squares either side of the rectangle, and the truth will come clear.

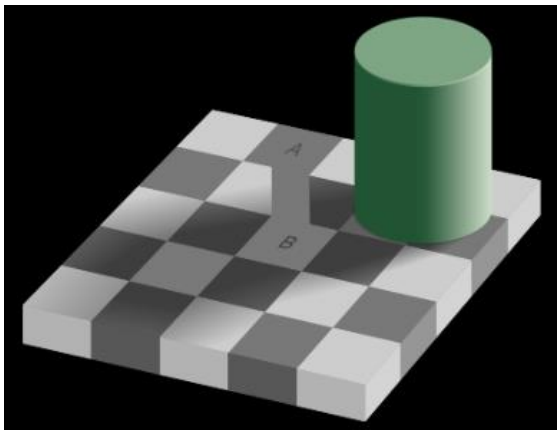


Figure 56: : Grey squares with rectangle. by Gustavb. (2004)

There are many forms of illusion that play with our senses. We enjoy them, but only if we can resolve them. There is a great discomfort before that moment comes and then a sense of release and euphoria when we can finally 'see' the trick.

The colour blind painter, described by Oliver Sacks[169] and mentioned in Chapter 10, received the light waves identified by Sir Isaac Newton that are easily demonstrated with prisms, but did not interpret them as colour, only seeing light and shade. This was very confusing for him since red appeared black but changed dramatically, for example, in fluorescent light. This was disorientating. Coloured glasses helped a little. We naturally perceive colour as constant in light or shade, even when it isn't, and this is a vital skill which allows us to keep track of things.

Goethe was convinced that the colour illusions of after images and apparent coloured shadows were the truth, but that was at odds with Newtonian truth. As Oliver Sacks put it, Goethe realised that visual illusion was neurological truth.[170] The poet-scientist was following Cennini's advice to artists, '*to discover things not seen, hiding under the shadow of natural objects'*.[171]

Observational thinking is, therefore, overcoming inference and assumption. It is not for everyday use, as that would be exhausting, but important for identifying the truth at the heart of things.

13.2: How is Observational Thinking Developed?

On the basis of the principles set out above, there are three main areas that can be developed to facilitate observational thinking. The first is overcoming inference, so that the fog of usual interpretation does not obscure the experience. The second is the desire for truth and the third is the ability to notice it.

[169] Sacks, O., 2012. p.8
[170] Sacks, O., 2012. pp. 18-22
[171] Cennini, C., 15th Century. p.1

13.2.1: The Early Years

For the very young child, every day is recreated afresh and everything within it can be wondrous and captivating. *'Out of the mouths of babes and sucklings'*, is a common saying of biblical origin.[172] In modern usage, it describes the occasions where a child points out something that adults have overlooked. This natural interest in the world around them – often little things, like a stone or a leaf - is easily nurtured by giving time for them to be engaged in observing and experiencing.

Narrative images can awaken the possibility of something that lies beyond the obvious of, for example, the rainbow. Alongside this, as always, the role and example of the teacher or parent is important. The purpose and care that they bring to observing what the child brings to their attention will go on to inform the child's own model of outer behaviour that will then become internalised as a pattern of thinking.

13.2.2: The Lower School

The process of learning by discovery, outlined in Chapter 12, is also a key method of developing observational skills. When accepting taught facts, the child is accepting on the basis of the assumption that the teacher is right. When a child discovers something for themselves, they will *know* that it is right and it will often call forth vague or even specific questions for them. They will then go on to look further. This all takes time. Walks in nature are excellent for this, especially in varied surroundings. Cultivating an interest in the world, through gentle, awe-inspiring nature stories, is also an energising experience that provides a firm foundation for observation.

Figure 57: Weekly Walk (age 8) Ringwood Waldorf School (2007)

Figure 58: Shared Snack (age 7) Ringwood Waldorf School (2006)

Even the habit of shared snacks can provide useful opportunities for developing observational thinking. This is where one child each day brings in simple food for the whole class, and offers it around to the rest, visiting each desk in turn. The food is viewed and experienced by the classmates in a more attentive mood. It is a simple social

[172] Matthew 21:16

exercise that helps the children see the truth in the gift, the giver and themselves. They will also often be more willing to try new foods in this way.

Painting lessons offer the opportunity to observe subtle differences in the effects of the colours in the work. This is done in a considerate, appreciative manner. It is best, from the start, to encourage the children to use terms such as 'this red seems timid' or 'that blue is shivering' rather than naming the painter when commenting. This stops it becoming a friendship group activity and, instead, a more engaged activity of each child with the colours on all of the paintings as a whole. Nuanced personal observations result from this.

Figure 59: Colour Exercise Paintings on Wall (age 7) Ringwood Waldorf School (2006)

13.2.3: The Middle School

In the middle school, the science lessons offer a perfect opportunity to practise observational thinking. The discipline of recording what you actually see rather than what you expect to see, or what received wisdom tells you that you ought to see, is a powerful exercise for the muscles of observation and intuition. Multiple senses can be involved. It is very reassuring to every teacher, whose carefully prepared experiments fail abysmally, that the failures are as useful as the successes in terms of observation practice.

Poetry is another area for developing observation. Here, the use of metaphor can be studied and used. This encourages imaginative close examination of characteristics and qualities in order to find the essence of the description. When applied to the mundane, metaphor can raise the simple to epic proportions. In Art, perspective drawing and aerial perspective studies awaken the understanding of how artists make the flat picture seem real occupy real space.

Drawing and sketching can hone the skill of seeing the gesture within form: the movement of growth, the tension of structure and the relationship between elements. Also the study of light and shade, where the students attempt to see beyond the colour consistency, can develop observational skills.

Photography is an excellent additional activity, especially at about thirteen years old. Black and white photography helps the student view the familiar world afresh. Here the unusual monochrome context gives a little objective distance. The students can then mount an exhibition of a limited selection of work, properly mounted and displayed (say three each). An interesting approach that could be introduced, called *Tops and Tips*, is a peer to peer feedback process where the students spend five minutes on each of their peers' work. They write a brief evaluation detailing the best aspects of each student's work and tips for the students to consider to help improve the results even further, next time.[173]

[173] Van Raemdonck, M., 2018. Portfolio Presentation, *ACTS Conference*, Finland

Figure 60: Business Maths: Sumptuous Smoothie Stall (age 13) Ringwood Waldorf School (2018)

As students begin to approach adolescence, their world view can become a little caustic and negative. At this time, Business Maths provides an excellent opportunity for an enjoyable game that refocuses observation. It is an inverted brainstorm game, where, in groups, the students come up with as many terrible ideas as they can think of for a business and describe them to their team members. [174] They then collectively choose one and make it worse. I particularly enjoyed the 'Onion-Flavoured Coffee' and the 'Tesco Express on the top of Mount Everest'. Then, after a good laugh, they think how they could turn their terrible idea into a good idea, learning many useful principles as they do so. The next day, after good use of sleep, they can begin to design a practical business of their own and actually run it for a brief period. They will view the business world with a little more insight after this exercise.

13.2.4: The High School

Truth is the guiding principle of high school. Although similar activities as listed in middle school continue into high school, there is a far greater comparative, contextual and philosophical quality to the studies. Writing short play extracts, for example, comparing comedy with tragedy by writing the same situation in both styles, requires a keen insight into social situations from more than one perspective. Comedy itself is an insightful art, showing us the painfully funny absurdities of life.

Figure 61: High School land work. By Henrik Thaulow (n/d)

Alongside traditional subjects, there is an interesting suggestion to study magic tricks at this age. But this is not presenting content as magic, or focusing on deception. It is the teaching of magic tricks as an art form. The quality of misdirection requires significant counter-intuitive movements. It challenges blind muscle memory and requires consciousness in the limbs to avoid automatic movements. Reverse thinking is also needed to design the series of steps. The relationship with the essential audience, without which magic and

[174] Onarheim, B., 2018. Frontiers in Human Neuroscience, *ACTS Conference,* Norway.

sleight of hand is meaningless, adds another layer to observe. This astute observational skill has been found to increase flexibility of thinking in the magician, alongside developing sophisticated motor skills.[175] The doing of magic tricks enables the students to explore the quality of deception and what that means in relation to truth.

Alongside conceptual investigations, keen observation of the landscape through geomorphology and practical land work keep adolescent feet firmly on the ground.

In Biology, the study of Edwin Land's colour constancy experiments could be used to reconsider perceptual experience as described previously. [176]

****

Observational thinking brings us back to the specifics of the moment and helps us identify truth. It offers us protection against illusion and self-delusion. It is often under-used.

[175] Li, T., 2018. Thinking Outside of the Box Like a Magician: A Magic-based Teaching Strategy to Facilitate Thinking Flexibility. *Southern Oregon Creativity Conference.* Ashland OR, USA

[176] Additional examples of good classroom practice and descriptions of specialist activities can be found in: Avison, K. and Rawson, M. eds., 2016.

Chapter 14: Contemplation

'It is the mark of an educated mind to be able

to entertain a thought without accepting it.'

Aristotle

Contemplation is the ability to refrain from judgement or prejudice when considering, for example, information or experiences and to maintain that position for a sustained period to achieve a full, objective overview.

The beauty of contemplation is found in the way it offers a non-judgemental wider scenery of thought and experience to consider. It brings a more objective and contextual experience of what the mind has noticed.

14.1: Background and Context

The definition of contemplation in English has roots in Latin which reflects the twofold quality of this thinking skill.

Contemplate comes from the Latin *contemplari* meaning to observe auguries, or signs, originally in the context of a sacred space or *templum*, while *contemplation* is also related to *contemplationem*, meaning the act of looking at or considering. [177]

These definitions neatly describe the two aspects of contemplation: one relates to a space to receive and review inspiration and intuition (the *templum*), the other is the act of awareness. The first is essentially passive, the second requires some level of non-disruptive, aware activity to ensure that passive receptivity. To be effective, the two must work together. The definitions also indicate why contemplation can be relevant to both religious and non-religious thought.

The scope of contemplation is total. It can include everything that we ever encountered, thought, felt or did. It can include the thoughts about thoughts and the feelings about feelings. It can include the obvious key influences on our lives and all the little incidental elements or subtle symbolic resonances that never came to full consciousness. This is its strength.

Religions have traditionally made common use of meditation and contemplation as part of their religious practices. Over the last fifty years, interest has grown in the religious practices developed in Asia, which include Buddhism. This interest has influenced ideas about contemplation. There has also been growing interest in the practice of mindfulness, inspired by a book of letters written by a Vietnamese Buddhist monk, Thich Nhat Hanh, to his fellow monks.[178] The proliferation of mindfulness, and its beneficial effects, has drawn the attention

[177] Barnhart, R. K., ed., (2005) *Chambers Dictionary of Etymology,* Chambers, Edinburgh, p. 213

[178] Hahn, T.N., (1975) *The Miracle of Mindfulness,* (reprinted 2008) Random House, London

of those responsible for high-pressure working environments and also of psychologists and neuroscientists.

The psychologist, Elizabeth Norman, has provided interesting insights about the role of fringe consciousness in the contemplative practices of mindfulness.[179] Fringe consciousness is a part of our awareness of our own thinking and, as such, part of the active mechanism that surveys our thoughts and experiences, alongside fringe feelings. They are often experienced as *vague* in that they do not link directly to subjective experience, are hard to verbalise, and will hint or point at, rather than directly represent, individual elements. This is the realm of symbolic thought and is how we may access in wakefulness those whisperings that populate our unconscious assumptions, imaginations and dreams, as described in Chapter 11. This hard-to-grasp aspect of our thought is what makes contemplation challenging at first. It takes practice.

It is essential, during contemplation, to refrain from judgement which would, if left unchecked, close off the overview by categorising and characterising elements. It is the free flow of conscious, dream-like and unconscious thoughts and feelings, without constraint or ranked influence, that allows overview. The necessary restraint of judgement requires a certain effort, while the overview of even small, wordless intimations requires relaxation of control, while maintaining a monitoring level of awareness. When that is achieved, the roots of symbolic associations can begin to be glimpsed.

This quality of a mental sacred space, or *templum,* in contemplation is where we may find unexpected intuition and encounter what Joseph Campbell referred to as the *'ineffable of the absolutely unknowable'* [180]in symbolic terms, and yet in a way that we can consciously observe. But it does not always require a banyan tree or religious rites. These may help induce the right conditions, of course, but are not always needed. Sometimes the quiet and stillness found within an activity as simple as gardening, having a shower or doing the washing up can occupy the body with a simple repetitive task and fool judgement into thinking that it is not needed! Other activities, including Art and Crafts or going for a walk, can do likewise. A voluntary break in contemplation can also serve to 'stir the pot', as can a night's sleep. In this way, contemplation relates to the incubation stage of thought identified by Graham Wallas in *The Art of Thought* which, he observed, both extended and enriched thought processes. According to Wallas, it also provides the source of an intimation that the illumination of a solution, idea or insight is near at hand so that we can then allow that solution or idea to form.[181] This would be the moment when the other Creative Thinking Skills may serve to structure, picture and express the new insight or idea.

14.2: How is Contemplation Developed?

Contemplation is the skill that requires the time, opportunity and safe mental environment for unhurried introspection and observation, accessing the contents of consciousness, dream-life and the deep-rooted unconscious simultaneously. Different elements may integrate or come

[179] Norman, E., 2017. Metacognition and Mindfulness: the Role of Fringe Consciousness. *Mindfulness,* 8(1): 95-100.
[180] Campbell, J., 2013. p. 53
[181] Wallas, G., 1926. pp. 41-42

to clarity at different stages of the process and continue throughout life, defining our evolving sense of autonomy within ourselves.

14.2.1: The Early Years

In the early years, children spend much of their time in daydream and thoughtful experience of impressions and feelings while engaged in simple activities. Household tasks, simple play, walks and repetitive engagement of the hands as in kneading bread, create good conditions for the kind of fringe thought and feelings to emerge, as described above. Also opportunities for quiet thoughtfulness. It is natural to fill a moment's boredom by reviewing their experiences and imagination, perhaps sparked by an observation of some minor detail in the world around them – as minor as a bottle top or a feather. The key is not to train the very young to expect non-stop entertainment, or to cram a school day with activity, and to instead leave room for a little reflective boredom every now and then.

At the risk of being repetitive, it is the example of the adults that is of great importance through reflective gestures and manner of considering observations brought by the children. A key aspect is not *explaining* everything the children encounter in their environment or school day, but instead *appreciating* everything in its essence, be it a puddle, a squirrel or a very big lorry. Purposeful action and calm attention, alongside gestures showing appreciation of quiet reflective moments, will all go a long way to helping the children develop a model for internalising helpful thought patterns for contemplation.

14.2.2: The Lower School

In the lower school, physical activity and playfulness – running, jumping, climbing trees and playing in the mud, sufficient to raise the heart rate and bring a healthy flush to the cheeks is an excellent precursor to a little contemplative rest that is in sympathy with the natural rhythms of a young child's day.

Figure 62: Weekly Walk (resting after den-building) (Age 7) Ringwood Waldorf School (2006)

Little symbolic, but significant, acts of contemplation can be incorporated into a daily routine. The lighting of a candle and the reciting of a morning verse; a thankful grace at mealtimes or a closing verse to the day, all give the opportunity for a moment of intentional introspection and focus.

Quiet working during Art or Form Drawing lessons can aid a contemplative mood, with other craft lessons such as Handwork being left freer for social conversation.

As in the early years, it is not necessary to explain everything, or for the children to immediately understand everything in class. But arousing their awe and wonder in connection to the subject of their lessons will sow energised seeds of understanding into the fertile ground of quiet contemplation and a good night's sleep. Recalling a lesson together, the following day will then draw out not only the content that was taught, but also evidence of additional connections - many of them creative. This should not be confused with a state of confusion: that is when

the child feels they ought to know something they don't. This is, instead, a quality of awe linked to the gesture of appreciation that generates further associations, as described in 14.4.1.

As Rudolf Steiner wrote:

> *'If the teacher engages his or her whole being in teaching, then he may safely bring the child things for which the full understanding will come when joyfully remembered in later life. There is something that constantly refreshes and strengthens the inner substance of life in this recollection… The flame enkindled in the child from the living fire of the teacher in matters that still lie, in a way, beyond his 'understanding' remains an active, awakening force throughout the child's life.'*[182]

The seedbed of this awakening force lies in the realms of symbol that may be accessed in their deepest forms, through contemplation. Thoughts and understandings may naturally rise to the surface and fade repeatedly in the mind in a cyclical pattern of growing understanding, or in a flash of integrated illumination. Contemplation is a fundamental part of this.

14.2.3: The Middle School

In the middle school, the study of ancient epochs, beginning with Ancient India, allows the students to consider more consciously the meditative practices of peoples through time in a more conscious way. They may learn and practise some Indian chants as well as cultural elements from other countries. Learning about the pantheon of Hindu gods and the life of Buddha will help bring a wider context.

Science offers excellent opportunities to practise refraining from judgement if the activities, at this age, concentrate on careful observation and asking open *'What if…'* questions instead of creating hypotheses which are closed statements. Ending any lesson with an open ended question in connection with the following day's topic, will sow an active seed for contemplation.

Figure 63: Walking into the Wild for a Class Trip (age 11) By Elaine Holt (2009)

It should come as no surprise that I include engagement with nature for the healthy development of contemplation. Gardening, walks and land work remain beneficial. Other activities can also be taken outdoors. For example, constructing a small wattle and clay lime kiln as part of the study of the lime cycle in science, will require a lot of watching and tending. There are many similar opportunities.

[182] Steiner, R., 1920. The Pedagogical Basis of the Waldorf School. *The Threefold Social Order,* 14

14.2.4: The High School

In high school, the reflective practice of keeping a personal journal alongside a piece of work or a project - especially in relation to ethics or philosophy – can stimulate a healthy intentional contemplation. Global awareness can also provide opportunities for contemplative consideration. For example, the merits or otherwise of cultural relativism. Is something wrong because it is wrong or because it is culturally incompatible? How do we know what is right? These kinds of questions link to the guiding high school theme of truth, and can be explored through contemplation. Questions asked by great thinkers from the arts, science and faith can prompt discussion and introspection. An overview of the life and work of Stephen Hawking could explore the questions that animated his mind even when his body was failing him; questions like:

> '*What is it that breathes fire into the equations and makes a universe for them to describe*?'[183]

Integrated studies, particularly with a shared theme across the curriculum, will automatically provide students with self-generated and unexpected connections and associations far beyond anything their teachers might have envisioned. This will have an enriching effect and awaken introspective contemplation which can then be recorded in a personal journal.

Figure 64: Clay Modelling (age 16). Ringwood Waldorf School (2013).

And, as with the younger students, Art and Crafts will give ample opportunity to occupy the hands and give the opportunity for quiet contemplation of something entirely other. It is important to note that quiet lessons can be as valuable as enthusiastically noisy ones.[184]

****

Ultimately, contemplation is a very personal and personalising activity that is stifled by any premature emphasis upon the requirement to provide judgements. It is enhanced by focusing upon observation in younger children alongside time for quiet introspection followed by suitably stimulating open questions in later school life.

[183] Hawking, S., 1988. *A Brief History of Time*. Cambridge: Cambridge University Press, p. 174

[184] Additional examples of good classroom practice and descriptions of specialist activities can be found in: Avison, K. and Rawson, M. eds., 2016.

Chapter 15: Critical Analysis

'They couldn't hit an elephant at this distance!'

Gen. John Sedgewick[185]

Critical analysis is the ability to make reasoned and coherent judgements on the basis of an informed understanding.

Critical analysis therefore requires, as its foundation, that informed understanding upon which reasoned judgements can be made. In previous chapters, it has been recommended that the exercising of critical judgement is reserved as far as possible until high school. This has been in order to develop the necessary skills to achieve that informed understanding, not all of which can be accessed directly by logic, as was seen in the previous chapter on contemplation. Without that firm foundation, critical analysis becomes as meaningless as superstition. With that firm foundation in place, the skill of critical analysis allows the individual to view themselves and the phenomena they encounter in freedom.

15.1: Background and Context

The roots of critical analysis go back to Ancient Greece and Socrates' establishment of the question as a means of testing validity. His main concerns were clarity and logical consistency. This set a new standard. He was followed in this approach by Plato and Aristotle, who believed in the need for going beyond the obvious; to observe the reality not the assumption. It is interesting to note the point raised by Graham Wallas in 1926, when he asked:

'If Plato were born in London or New York,
how could we help him to become a thinker? '[186]

In the Middle Ages, Thomas Aquinas developed the Socratic approach into a more systematic cross-examination, where Socrates had often used deliberately naive questions to get to the truth. Desiderius Erasmus then took the discipline further, looking to apply a clear analysis and critique.[187]

A significant change occurred with Francis Bacon, who decided that our minds were too easily tricked, and that critical analysis should rely instead upon empirical evidence. This is an interesting moment, because although the algorithmic patterns of thought outlined in Chapter 11 would be largely unaffected by this empirical approach, the effect upon the analogic experience of symbol and resonance, (so strong in the Middle Ages) was that it would increasingly be seen as superstition. During the French Enlightenment, Descartes took this even

[185] Last words, 1864. Battle of Spotsylvania. In: Knowles, E., ed., 1995. *Oxford Dictionary of Quotations,* Oxford University Press, Oxford, p.457
[186] Wallas (1926), p. xii
[187] Paul, R. W., 1997. *California Teacher Preparation for Instruction in Critical Thinking*. Tomales: Foundation for Critical Thinking.

further, arguing that our minds could be improved when 'disciplined by reason'.[188] But if this improved discipline of reason precludes, by its nature, the symbolic and analogical thought processes so resistant to being pinned down, then the secure foundation of informed understanding starts to crumble. It will then only be able to present a reflection of itself.

Figure 65: Engraving of Desiderius Erasmus of Rotterdam by Albrecht Dürer, (1526).

For critical analysis to be secure and justified, it requires three things. It needs to be based upon fully informed understanding (both self-reflective and observational); it needs us to be self-aware of what we are doing and it needs to be unemotional. If these three aspects are combined it makes for a formidable force. As George Bernard Shaw put it:

> *'One man who has a mind and knows it can always beat ten men who haven't and don't.'* [189]

But on another level, if all three aspects are truly combined then critical analysis is also well placed to serve ethical cooperative action.

15.2: How is Critical Analysis Developed?

As we have seen in previous chapters, this judgement-based skill is really only emerging in adolescence. Before this, young children and older students will not have the co-ordinated metacognition that is required to marshal all thought processes and achieve that informed understanding. Even in puberty, it remains difficult to separate out the tumultuous emotional responses that are running close to the surface at that time. Nevertheless, much can be done that will later contribute to high quality critical analysis.

15.2.1: The Early Years

The best way to support good quality critical analysis in later years is to give time in the early years to good habits and the development of practical, organised outer behaviour. If the child knows where and how to put their wellington boot away, if they know the procedure for washing hands or setting the table; if they know to put a hat on in the rain and where the play box is stored, then they will be developing externally the processes that will, when internalised, help order thoughts. Critical analysis of thoughts and information is easier to do if you know where to find them! Also, the socialisation developed in kindergarten, the negotiation and assertion of rights to, perhaps, 'the best bucket', will assist in courteous and considerate

[188] Paul, R. W., 1997.
[189] Shaw, B. (1930) The Apple Cart, Act 1

examination of another's work. The observation skills discussed in Chapter 13 also feed into later skills in critical analysis and can be developed.

15.2.2: The Lower School

Figure 66: Introduction to Numbers (age 7) Ringwood Waldorf School (2005)

The morality of mathematics is an excellent place to develop skills for critical analysis in the lower school, especially when working with more open questions. The children in the youngest classes can be given, for example, twelve beans and invited to make as many sums as they can with those beans. Similarly open questions can be asked with shapes and patterns. Mathematics reveals its inherent order and consistency with use.

Colour has its own set of rules, and experimenting in the Painting lesson with simple colour combinations and blends will contribute a non-verbal sense of order, potential and consequence. In the following lessons, when the paintings are up on the wall and reviewed, some of the colour 'stories' can be gently articulated to analyse the effects. These stories are the precursors of creative judgements. The same is seen in the drawings of the younger children.

Children naturally progress to an age when they will ask, *'Is that real?'* At this point, it is important that the teacher is truthful with themselves. If there is any doubt that it is not a universally shared truth, then the they could perhaps say, *'I believe it to be so'*. Some existential questions from a nine-year-old can be quite hard to answer in an age appropriate way in anything but symbolic terms, but there would need to be the core reality within it. The behaviour of the teacher in the presence of unknowns can have profound effects upon the children. It is helpful to try and make it a good effect!

Figure 67: Quiet Bookwork After Activities (age 8) Ringwood Waldorf School (2007)

15.2.3: The Middle School

In middle school, the tendency to want to make judgements, on often flimsy grounds, can begin to take hold and it is useful at this time to really work on the foundation skill of careful observation. Age appropriate Socratic questioning is particularly useful here and can be introduced in peer to peer situations within an appreciative mood. This is useful for the students' presentation of their personal projects. The questions arise out of genuine interest, but keenly test the true breadth of each presenter's knowledge.

Class debates that include representing the views of others, within a voting situation, can verbally exercise the skills needed for critical analysis. Geometry is also very effective, especially when the students are experimenting and finding out how they can create a form. I remember one occasion when, after teaching the construction of the first basic regular polygons, largely through discovery, I set the children who had finished the task to try and find a way to construct a regular heptagon. A little while later, one lad came and showed me his form. I had not seen anything like it before. He had managed to construct it with one less line than the instructions presented in the text books. He had started from the line rather than the circle. Because of this, we discovered, it was more accurate. The seven-sided heptagon cannot be constructed exactly: the standard method is (or was) the most accurate available. Mathematics and geometry are excellent for developing critical analysis because of their unflinching, black and white, cause and effect. Physics is also particularly good for the same reason. However, they all need to be connected to humanity and its variable shades of grey.

Figure 68: Archery (age 12) By Elaine Holt (2011)

In English, developing a newspaper reporting style around the basic 'who, where, when, why and how' questions, alongside 'what if' questions in science, helps to foster precision in research and begins to put a structure around investigation and enquiry.

Physical activities in the Games lessons, including the javelin, discus and, later, archery bring a physical gesture of focus. The difference in this experience, between the discus and javelin, can be usefully explored.

15.2.4: The High School

In high school the practice of critical analysis comes into its own and is increasingly applied to almost every aspect of work. The skill is supported by Socratic methods of verbal enquiry, which can later become written. Working collectively rather than individually will help identify more than one possible viewpoint. Dialogic research in the classroom can help the students understand potential assumptions. For example, in Finland, in a foreign language lesson, the children were asked two questions, which they answered in writing individually before discussing with a neighbour, then with the group. The first question explored in this way was, 'What is language?' and the second question was, 'What does it mean to you?' The students found that a relationship and understanding of language, which they thought was a universal experience, was actually a shared assumption. The truth for that group was, instead, highly personal and varied. For some bilingual students, it could fundamentally affect their sense of identity, depending on which language they were speaking.[190]

[190] Raunela, E., 2017. *ACTS conference,* UK

The more technical experiences of assessing found in Practical Surveying and Trigonometry are particularly helpful to the healthy development of critical analysis, in the precision they now bring to assessing the previously looser experiences of the students' physical environment. The arts can bring critical analysis and judgement into practical, creative endeavours. Science and English are also helpful in structuring a formal approach to critical analysis but in complementary ways. Global Awareness and History enable the interrogation of more complex and shifting data with a variety of viewpoints to consider. These may all lead into ethical and philosophical discussions, evaluations and reasoned positions. [191]

Figure 69: Practical Surveying (age 16). By Gottfried Straube Fjeldså (n/d)

****

Conversation and debate, in the teenage years, are key to helping students structure their thoughts, and so their work. Practical application hones these skills, but it is the exercise and development given to the whole of the Creative Thinking Skills Spectrum, both across a fully balanced curriculum and across the ages, that will ultimately dictate the quality of both the informed understanding and reasoned judgement that are fundamental to critical analysis. As Ada Lovelace put it:

'The Analytic Engine weaves algebraic patterns
just as the Jacquard loom weaves
flowers and leaves.' [192]

[191] Additional examples of good classroom practice and descriptions of specialist activities can be found in: Avison, K. and Rawson, M. eds., 2016.

[192] in Luigi Menabrea, *Sketch of the Analytical Engine Invented by Charles Babbage,* (1843) Translated and annotated by Ada Lovelace (1815-1852) [Mathematician. The daughter of Lord Byron.]

Chapter 16: Co-ordinated Thinking

'There is beauty in discovery.
There is mathematics in music, a kinship of science and poetry
in the description of nature, an exquisite form in a molecule.
Attempts to place different disciplines in different camps
are revealed as artificial in the face of the unity of knowledge.
All literate men are sustained by the philosopher, the historian, the political analyst, the economist, the scientist, the poet, the artisan and the musician.'

Glen Seaborg[193]

Co-ordinated thinking is the ability to co-ordinate ideas, concepts, strategies and approaches, and manage the synergy between them, while keeping an eye on deadlines, personal organisation and needs, alongside the internal and external ethical considerations associated with any potential action.

Thoughts are not isolated: thinking moves in a cyclical fashion. It may begin from simple perceptions, symbolic associations or categorisations of pattern, then move on to more complex combinations and permutations that will involve any number of the creative thinking skills identified in previous chapters, perhaps repeatedly. This requires organisation, or there will be nothing for critical analysis to analyse or for three-dimensional thinking to construct with. And they all need to be kept in order too, so that the still, small voice at the back can also be heard.

16.1: Background and Context

Neuroscience is beginning to offer unparalleled insights into the physical functioning of the human brain. In 2017, a study revealed:

> *'a whole-brain network associated with high-creative ability comprised of cortical hubs within default, salience and executive systems – intrinsic functional networks that tend to work in opposition – suggesting that highly creative people are characterised by the ability to simultaneously engage these large-scale brain networks.'* [194]

This study is interesting because it does seem to point to a co-ordination element and offers a possible correlation with the creative thinking skills and attributes presented in the previous chapters. Whilst not wanting to jump to premature conclusions, it is worth looking at this a little more closely in relation to these creative thinking skills and associated attributes.

- The first neural system listed above is the default brain system. If you have ever arrived at work with no memory of the journey, then it was the default system of your brain

[193] Nobel prize winner for Chemistry, 1958 address to University of California and Berkley Faculty.
[194] Beaty, R. E. et al., 2017. Robust prediction of individual creative ability from brain functional connectivity. *Proceedings of the National Academy of Sciences*, 115 (5) pp. 1087-1092

that got you there.[195] It looks after the day-to-day matters. It is responsible for general thought when at rest – not busy doing anything – and includes day-dreaming, reminiscing, thinking about the future and functioning within our technical competencies like riding a bike or driving to work. It links to accepted categorisations and body memory of the movements needed, for example, to ride a bike. It relies on rules and patterns. In this sense, it is unconscious. It is connected to heuristic thinking.[196]

- The salience network is a little more mysterious and dreamlke: it is thought to be involved in the integration of emotions, and it notices the relevance of perceptions, providing mediation between the default and executive networks.[197]

- The executive network thinks explicitly. It analyses and devises strategies, and makes judgements. It is linked to the working memory.[198] It appears to pay attention.

If the default network relies upon rules and patterns, it may also link to the tendency to assumptions and inferences discussed in previous chapters.

If the salience network integrates emotions with perceptions, then it may well be related to the symbolic resonance and the quality of the *templum*, or sacred space, where signs and omens could be observed, as described in Chapters 11 and 14. This may explain the findings of a study which noted a strong neurological link between the salience and default neural networks during mindfulness.[199] This, in turn, might correlate with the non-judgemental overview found in the contemplation described in Chapter 14.

It is important to remember that the Creative Thinking Skills Spectrum, as set out in this book so far, needs to be healthily developed as a whole, and in age-appropriate ways, to achieve a balance. This will then support and inform the coordinated thinking that emerges in adolescence.

16.2: How is Co-ordinated Thinking Developed?

Co-ordinated Thinking is not present in younger children, and its arrival signals a period of significant upheaval for the young person during adolescence.

According to Susan Greenfield, the young adolescent person experiences a growth and reorganisation of their brain at this time, with greater processing capacity coming to the prefrontal cortex. Deeper areas develop first, spurred on by a limbic system in overdrive. The

[195] Starck, E., 2016. Running on autopilot: scientists find important new role for 'daydreaming' network'. *Cambridge University Research,* [Online] https://www.cam.ac.uk/research/news/running-on-autopilot-scientists-find-important-new-role-for-daydreaming-network

[196] Hainonen, J. et al., 2016. Default Mode and Executive Networks Areas: Association with the Serial Order in Divergent Thinking. *PLoS ONE*, 11 (9)

[197] Doll, A., et al, 2015. Mindfulness is associated with intrinsic functional connectivity between default mode and salience networks. *Human Neuroscience, [online] https://doi.org/10.3389/fnhum.2015.00461*

[198] Beaty, R. E. et al., 2017.

[199] Doll, A., et al, 2015.

young person is prone to impulsive actions coupled with judgements concerning risk that can be alarming to more risk averse adults. Their focus tends to be pleasure-seeking and rooted in the present. Even when resting, there is a great deal of mental activity registering. It can be exhausting. By the later teens or early twenties, the prefrontal cortex is developed and fully engaged through *'extensive networking with all other types of brain regions.'*[200] It signals the progression towards balance and control.

It can be helpful, perhaps, to think of the development of co-ordinated thinking as a gradual process of conscious introduction and acclimatisation to all the other creative thinking skills.

16.2.1: Early Years

Self-speech in toddlerhood and the early years is a precursor to the co-ordinated thinking of adolescence. Giving time and space to allow that to naturally become internalised is an excellent start, alongside ensuring adult examples of clearly articulated, positive and gently appreciative language to model their inner voices upon. Beyond this, their outer good habits, or self-organisation, can inform later organisation of thought. Significant archetypal images within stories can contribute to characterising potential relationships within symbolic thought. Playfulness and kindness alongside appreciative interest in the outer world as described in previous chapters will help develop the precursor skills that will inform and guide future co-ordinated thinking. But at this age, the thoughts themselves will be fleeting and full of transient sensory experience.

16.2.2: The Lower School

In the lower school, self-directed or self-organised elements of a day, be it sweeping the classroom - or deciding that music sounds better on top of a climbing frame – begin to develop the idea of competent self-direction. Daily physical exercises of a rhythmic nature, perhaps with beanbags, help to integrate the hand, body and mind. Singing along with the activity will add a resonant auditory experience. All of these activities develop a solid basis that will one day facilitate the emergence of co-ordinated thinking. Music is an outer expression of order and prioritising linked to emotional expression. This is a helpful precursor to co-ordinated thinking.

Figure 70: It's Easier Up Here. (age 9) By Elaine Holt (2008)

16.2.3: The Middle School

In the middle school, a great help to the adolescent of the future is to avoid digital overload or addiction. Children of younger and younger ages are spending many hours a day looking at screens. Often more than one. At one time, this multi-screen, multi-tasking, was thought to be a measure of mental agility and researchers expected to see neural growth in the associated

[200] Greenfield, S., 2016. pp.134-5.

areas. What they found was the opposite. There was a shrinkage in an area that served self-control. This is an area that is needed to help bring the adolescent mind back into balance.[201]

Susan Greenfield has reported on a study which showed that young people aged thirteen to eighteen were using digital media for an average of eleven and a half hours every day - and over eighteen if the multi-screens were taken into account.[202] This is a huge amount. Most children start getting hooked on digital media long before their teens, in middle school and, when they reach adolescence, their self-control decreases.

Figure 71: Music Practice in Groups (age 10) Ringwood Waldorf School (2011).

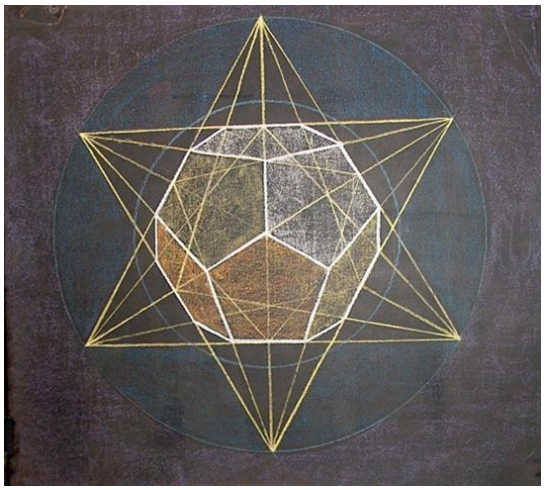


Figure 72: Blackboard Geometry (for age 14) By Elaine Holt (2004)

Instead, social artistic endeavours, healthy patterns of daily life with a good balance of academic, practical and artistic activities will provide that outer model for inner balance in co-ordinated thinking.

For example, balanced and co-ordinated forms in solid geometry bring a stillness into the growing storm and a model of that quiet place within. The different polygons, with their different gestures reflect different moods.

16.2.4: The High School

Making connections between subjects in high school, in order to bring a picture of cohesiveness, is helpful for the developing co-ordinated thinking. For this, a broad and balanced curriculum taken by all is very important. Premature specialisation can be less helpful.

At this age, the old neural associations are being disrupted and the students often appear to have forgotten all that they have learned. There is benefit in recapitulating previous experience and themes in a new, intellectual way to facilitate new age-appropriate links and bring new consciousness to existing associations.

Figure 73: Physics (age 17) By Gottfried Straube Fjeldså (n/d)

[201] Greenfield, S., 2016. pp.53
[202] Greenfield, S., 2016. p.140

It is particularly invigorating to introduce a shared theme for a period of time across the whole curriculum for each year group. The existing links between the different subjects then begin to become much clearer. There is no need for a special curriculum change. It is sufficient to just reference the theme within normal lessons, in passing. The students can then make a small project on the shared theme, centred in a subject of their choice, but referencing three others. This allows them to start from a place of strength and venture out into other areas that might interest them but where they feel less secure. This can bring a healthy refocussing for both teachers and students.

Figure 74: High School students (age 18) By Gottfried Straube Fjeldså (n/d)

Adolescents now learn well from their peers: through negotiating and planning. They enjoy sitting in huddles and talking. This informal conversation is an important means of practising externally what will become internalised co-ordinated thinking. It is important for adolescents to be allowed to talk, face-to-face, a lot, in safe and guided environments. Now is not a good time to be alone cramming for exams.[203]

The natural benefits to adolescents of social verbal experience with their peers is that it brings a nuanced perception to the self-speech that was first articulated externally in the early years and internalised within the young child, but now allows further and more complex articulation of thought processes – again externally – before that too becomes internalised as an adult expression of self-speech, conscience and autonomy.

[203] Additional examples of good classroom practice and descriptions of specialist activities can be found in: Avison, K. and Rawson, M. eds., 2016.

Chapter 17: Reflection on Perception

'One of us will have to go.'

Oscar Wilde[204]

Reflection on Perception is the ability to objectively compare and contrast a new perception with a previously held view, experience or understanding, and support or adapt one or the other. This includes perception of the thinker's own thought processes. Where this presents a paradox, the thinker uses his/her perceptive ability to recognise it.

As the definition above implies, reflection on perception is a highly sophisticated internalised activity. It involves perceiving perceptions at another level of awareness. This includes both immediate perceptions and existing thought structures. The thoughts observed may be patterns of behaviour, understandings or symbolic associations. Everything is fair game for reflection on perception.

This process is facilitated by the coordinated thinking described in Chapter 16, which has the capacity to control different thought processes, from the most mundane and immediate to the most complex overviews of internal thought relationships. Within this, we have seen how thought naturally forms ideas that are of a pattern nature, alongside resonances that have wider, looser and less exclusive associations. We also have the useful shorthand option of assumptions and inferences, with regard to physical experiences or in our thought processes. The obvious danger here is that we make errors: that we assign to pattern what should be resonance and that we make associations that are incompatible. This can lead to ingeniously creative insights that stand outside the normal range of thought or, on the other hand, to unfounded prejudice and dogma. Reflection on perception can observe these positions through the capacities of contemplation and critical analysis, facilitated by co-ordinated thinking, and then offer us the opportunity to reorganise our thoughts.

17.1: Background and Context

Reflection on perception is not quite the same as a reflective practice, which is more focused upon learning from actions and improving performance, possibly as part of a self-development programme; neither is it about statements of self-affirmation as part of a path to wellness – useful though both these things may be - but something simpler, harder and more fundamental. It is about personal truth. About being truthful with ourselves. It is entirely private and helps shape our identity, or sense of self.

Reflection on perception has to be private because it is only of value if it is personally meaningful; meaningful enough for us to adjust our perceptions. If it is not meaningful, it becomes tokenism and is largely for show, or to please an assessor. This can then confound our sense of ourselves, our identity. Indeed it can be counter-productive to require this aspect to be

[204] (1900) Regarding the wallpaper in the room where he was dying (attributed).

public. A study published in the Journal of Social Psychology, in 2011, found that in all four of their studies:

> *'evaluative self-reflection led low self-esteem participants to feel worse about themselves and high self-esteem participants to feel better about themselves. We did not find this polarization effect when more general emotions of happiness and sadness were measured (study 2) or when participants reflected on non-evaluative aspects of themselves (study 4). '* [205]

The danger when reflective practice is linked to self-worth, is that it actively reinforces those feelings of self-worth, based upon pre-existing attitudes rather than objective reality. Self-affirmation works in the same area and is also part of an externally constructed idea of self-worth. It is interesting to note, in the study above, that non-evaluative reflections did not incur this problem.

Another study, conducted by Dishon et al (2017), found that self-reflection also *'augmented social identification, but only when participants felt that their choices were personally meaningful.' [206]* Moreover, in this instance, the enhanced social identification did not contribute to prejudicial favouritism for a perceived *'in-group'* with whom they identified through the activity, and their choices remained robustly impervious to manipulation in that respect. Those who did not self-reflect or who felt that their choices were meaningless, were not observed to develop their sense of self, trait self-awareness or social identification through the activity.

Reflection on perception affects our choices, our social interactions and so our ultimate autonomy. It is through reflection on perception, that we develop our sense of self. If we provide the opportunity for clearer, and perhaps more objective, reflective activities, then those choices become clearer and free from the externally prompted feelings of self-worth that affect social interactions and cloud autonomy.

It is in the context of unadulterated reflection on perception, that we can find that firm place in our thought where integrity resides. From here we can observe both the internal and external phenomena that we encounter, and act with integrity in that light. This is the understanding which comes from true autonomy. It permits ethical behaviours founded in integrity rather than required as habit or, as Rudolf Steiner put it, *'A free human being acts morally because he has a moral idea; he does not act to bring about morality.'[207]* Steiner was clear that the inward activity could not be influenced by external expectations, writing:

> *'It is through unbiased self-observation that the human being comes to realise that it is in his nature to progress along the path of bringing to realisation ethical intuitions. However unbiased observation of the ethical aspect of human nature is, by itself, not enough to come to a firm conclusion regarding freedom. If intuitive thinking originated in a*

[205] Brown, J. D. & Brown, M. A., 2011. Self-reflection and feelings of self-worth: When Rosenberg meets Heisenberg. *Journal of Experimental Social Psychology,* 47(6) pp.1269-1275

[206] Dishon, N.; Oldmeadow, J. A.; Critchley, C. & Kaufman, J. (2017) 'The Effect of Trait Self-Awareness, Self-Reflection, and Perceptions of Choice Meaningfulness on Indicators of Social Identity Within a Decision-Making Context,' Frontiers in Psychology, 8:2034.

[207] Steiner, R., 1894. p.116

> *source other than itself, if it were not a self-existing entity, the consciousness of freedom arising from the moral life would prove illusory.'*[208]

This sophisticated reflection on perception requires a 'vivid inner experience' and is supported in that by the rest of the Creative Thinking Skills Spectrum. In common with the rest, it requires practice and is best developed (or prepared for) in line with the appropriate developmental phases of childhood and adolescence. It is a lifelong journey of discovery after that.

17.2: How is Reflection on Perception Developed?

Reflection on perception is clearly a sophisticated thought process that is not present in the very young in the way that it appears in the adult. Even adults may not always exhibit obvious evidence of it! It is a thinking skill that emerges with puberty, but also has roots stretching back into the earliest years. As Susan Greenfield observes:

> *'Everything you are currently experiencing from one moment to the next, is read off against pre-existing associations: but, at the same time, that current on-going experience will be updating the connectivity, to change it forever. As you grow, the development of your 'mind' is characterised by this increasingly vigorous and unique dialogue between your brain and the outside world.'*[209]

17.2.1: Early Years

As soon as the baby is born, it is bombarded with raw sensations that must be assimilated and coalesced into meaning through somatic, physical interaction. According to a significant study conducted by Nir and Tononi, pre-schoolers do not appear to dream: while asleep, they view only static scenes, do not experience feelings and do not take part in a narrative. They may interact with, and report on, the world and other people while awake, but do not dream of similar episodes. This may be because they do not yet remember episodes clearly in waking life. Night terrors are different and relate more to incomplete waking. From about five years old, this starts to change and longer sequential dreams appear to be experienced.[210]

Figure 75: Just Thinking (age 4) Ringwood Waldorf School (c.2016)

Yet even three to six-year-olds are beginning to form a view of themselves. A report in the journal *Child Development*, highlighted a remarkable difference in helpfulness in pre-schoolers between those who were told they were 'helping' and those that were told they were 'helpers'. The

[208] Steiner, R., 1894. pp.175-176
[209] Greenfield, S., 2016. p.69
[210] Nir, Y. & Tononi, G., 2010. Dreaming and the brain: from phenomenology to neurophysiology. *Trends in Cognitive Sciences*, 14(2) pp.88-100

'helpers' helped significantly more over four tasks, and this help extended to other adults who had not called them helpers. The children were *'motivated to pursue a positive identity'*. [211]

This has certain implications for how the early years can support a positive identity by simply considering how we phrase everyday language, while being mindful not to force the idea. This alone is good preparation for reflection on perception in later life. Another area that could provide fertile ground is the inevitable squabbles. Diverting attention, rather than admonishing, can provide an outer example of moving away from anger which, when practised, can provide a template for self-control. Helping a young angry child observe that the other child is crying, so that they fetch a hankie, is another outer example for later inner reflection upon action when the child is older.

17.2.2: The Lower School

From about the age of seven to nine, a major change in dreaming takes place that is thought to reflect a waking capacity for reflection. According to Nir and Tononi, at this age:

Figure 76: The special 'mossy green' wax block (age 7) Ringwood Waldorf School (2006).

'…dream reports become longer and more frequent, contain thoughts and feelings, the child's self becomes an actual participant in the dream, and dreams begin to acquire a narrative structure and to reflect autobiographic, episodic memories.'

At this age, novelty can offer opportunities for re-evaluating assumptions. If coloured wax blocks are given out in every shade at the beginning of the year, there is nowhere to go with it. They are what they are. But if the blocks are given out first in the primary colours, and the children taught to mix them, and then the secondary colours - orange purple and green - the joy and simple awe inspired by the new colours brings a re-evaluation of the primary colours. Another ploy is to bring a single example of an unusual colour – perhaps a 'mossy' green – which the children may use but must share equally. This requires patience and negotiation on their part, but the prize is more precious than a jewel and their reflection upon the nature of green, which began as a blend, became a glowing colour in its own right and then took on this strange earthiness, is something that will not easily be forgotten (rather like 'the best bucket'!). This again exercises externally what will later become internalised.

By the age of nine or ten, the children are able to write coherently about episodes in their lives, but not yet their life stories.[212] This indicates a degree of reflection but one that is not yet placed into a timeline or life narrative. Socially, it is helpful for them to continue noticing the effects of their behaviours, as an external precursor to reflection on perception, and hearing stories that

[211] Bryan, C. J.; Master, A. & Walton, G. M., 2014. "Helping" Versus "Being a Helper": Invoking the Self to Increase Helping in Young Children. *Child Development,* 85(5) pp.1836-1842

[212] Bohn, A. & Berntsen, D., 2008. Life Story Development in Childhood: The development of life story abilities and the acquisition of cultural life scripts from late middle childhood to adolescence. *Developmental Psychology,* 44(4) pp.1135-1147

explore the results of good and less good behaviour are helpful to this. Aesop's Fables are short and pithy in this respect. It is also possible, from this age, to begin to unpick squabbles by asking the children to calmly say to each other what upset them, asking the question, 'Why did you…,' and then allowing them to trace the sequence of events back to the initial slight, by which time they are usually ready to make up and play again, but the external pathway to understanding and self-understanding has been practised. This ability to reflect upon our actions and assumptions is important throughout life. For example: when my colleague takes the last biscuit, I am perhaps indignant, but then I remember that it was only the last biscuit because I had eaten all the others in the packet. This reflection (hopefully) moderates my initial thought!

A useful activity - this time for parents to practise - which is particularly helpful for children who are distressed or have attention difficulties, is the process of reflecting by thinking backwards through the day. It can be done at bedtime and helps build security into reflection on their personal narrative of the day. You start in the present and work backwards towards breakfast, calmly noting each event as a simple, objective celebration of the day as a whole.

17.2.3: The Middle School

As the child progresses through middle school, narratives within the lesson content can be very helpful. Personal histories of remarkable people who have overcome difficulties, or helped others, are useful story arcs for the students to have available as templates for their own life narrative arc. This is particularly useful at the age of thirteen – just before the capacity for cultivating their own life-story blossoms. In Steiner Schools, a Main Lesson block of three weeks or more is devoted to literature that inspires and surprises, prompting reflective thought expressed in creative writing. This is an excellent time to develop poetry, which can express the innermost thoughts, fears and hopes within the relative safety of metaphor. What we express creatively, we can reflect upon more objectively. This is the great strength of creative writing at this age.

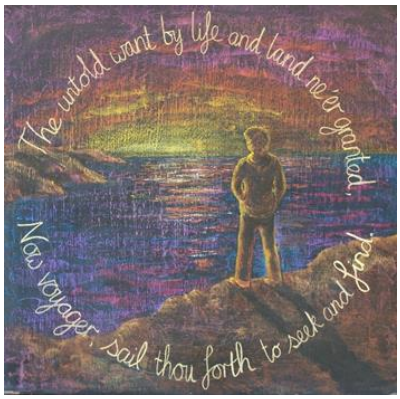


Figure 77: Blackboard Drawing for 'Wish, wonder and Surprise' Main Lesson (for age 13) by Elaine Holt(2011).

This was brought home to me in the immediate aftermath of the civil war in Sierra Leone, where local social workers and educationalists were trying to pick up the pieces of a child army that had been 'liberated' and ended up on the streets of the war-torn capital, Freetown. These children had been used and abused from as young as six years old, for example to carry ammunition. Most had been separated from their families, many had been forced as 'soldiers' to kill or mutilate tribal or family members. They could not go home.

Figure 78: 'The Blind Beggar' (age 12) Photo by Elaine Holt (2005).

Foster homes were found for these street children. In a simple stick and tarpaulin hut called the Goderich Waldorf School, the children were also introduced to a therapeutic version of Steiner education which the local people had adapted for their particular needs. It included two key elements that allowed the possibility of reflection upon the truly monstrous perceptions that these children carried in their memories and would allow them to process the horrors and move on with their lives. The first was allegorical story-crafting.

Figure 79: 'The Rich Man's Children' (age 12) Photo by Elaine Holt (2005).

In one instance, the students wrote and performed a story about a blind man who went begging to a rich man's house every day. This annoyed the rich man and his wife, so they decided to poison the old man. They gave him some food which was poisoned, but their children, who were like their parents, used to taunt the old man, and when they saw that he had food, they stole it and ate it. They died. The fictional parents saw the results of all their actions and attitudes. There was no happy ending in this story, but the children could reflect upon it and move on. It seemed very satisfying to them.

17.2.4: The High School

The second element was used with high school age students. It involved the use of culturally specific ritual connections. In this case, it was pouring libations to the ancestors and teaching the older girls the shamanic dances of their culture. The skill of the dancer was to express the percussive accompaniment, taking on the attributes of various animals – perhaps a huge crane. The dance allowed a connection to the narrative of the entire tribal history and the spirit of the tribe. It was beautiful and awesome in the protected experience it seemed to offer through the shuffling, stamping and expansive movements. I asked one of the teachers why there were mirrors on the dancer's hat. He said they were placed there to confound evil with its own image.

Figure 80: 'The Crane Dancer' (age 15) Photo by Elaine Holt (2005)

The power of reclaiming the narrative of one's own life story is not to be underestimated in the rehabilitation of young people. And, while these examples are extremes, all teenagers experience times of difficulty and confusion to some degree.

It is also possible, in high schools generally, to look at global ethics from a variety of viewpoints. This will inevitably challenge assumptions and previous understanding. If we take the current problem with plastics and follow through the various needs and impacts on the

fabric of the world, on the animals, on the peoples, and on the individuals, a more complex set of relationships emerge, which then can be food for reflection. Philosophy inevitably becomes involved – 'How will I live my life in the light of this knowledge?'

****

'The unexamined life is not worth living.'

Plato

(from The Apology of Socrates)

Chapter 18: Synthesis

'Time is that wherein there is opportunity,
and opportunity is that wherein there is no great time.'

Hippocrates of Cos

The creative thinking skills outlined in this book will, in combination, help pave the way to the 'A-ha' moment; to insight, or to a personal conviction based upon objective understanding, alongside self-understanding. They will also enable and enhance meaningful creative action.

18.1: Form and Freedom

To be fully realised, these creative thinking skills need to be honed in accordance with the stages of human development. Then they have the opportunity to fully integrate and achieve a healthy balance between form and freedom; instruction and experience; knowledge acquisition and capacities; pattern and symbolic resonance; logic and intuition; service and autonomy; external imperatives and identity. Both forces are integral to creative action, as two sides of a coin, and both can be observed in the differing interpretations of creativity. One is expressed in the convergent thinking, involved in problem-solving, and the other, the divergent thinking involved in finding a variety of alternatives.[213] Both are needed, because options without a solution are fairly pointless, and solutions based upon a limited overview of options are likely to be reactionary and flawed. Fully integrated and exercised, creative thinking skills become a powerful and effective tool.

18.2: The Creativity Gap and Autonomy

Currently, school education leans towards the first of these two forces in terms of formal learning, the predictable pattern of targets and servicing the aims of the state, and external imperatives, as discussed at the beginning of this book. It is this imbalance which is having the detrimental effect that all see, but to which fewer can offer effective solutions. It was particularly interesting to read the recent study by Runco, Acar and Cayirdag.[214] This study identified a 'creativity gap', where students were reported to be significantly more creative outside school, than inside. Those who were more creative outside school did not bring that creative potential into their school work. Moreover, it was noted that *'these potentials are not displayed when they are in school, perhaps because usually there is more structure and more restrictions in school, and creativity entails autonomy and independence.'*

The Creative Thinking Skills Spectrum, as we have seen, imbues all of life because it is an expression of natural life and development. For this reason, it is hardly surprising that it is not

[213] Runco, M., 2014, p. 9.

[214] Runco, M., Acar, A. & Cayirdag, N., 2017. A closer look at the creativity gap and why students are less creative at school than outside of school. *Thinking Skills and Creativity,* Volume 24, pp. 242-249.

always fully realised within the formality of institutions. Creative thinking skills need to be realised through integrated learning across all areas of life.

The learning activity that takes place outside school is usually referred to as non-formal or informal learning while within schools it is called formal learning. These three types of learning were defined by the OECD in 2010, and the following definitions are largely informed by that.[215]

18.3. Formal, Non-formal and Informal Learning

According to the OECD, there is relative consensus about the nature of formal learning: '…it is always organised and structured and has learning objectives. From the student's perspective it is always intentional.' This is the usual understanding of what school education involves.[216]

Non-formal learning is much less consistently defined. It is less organised than formal learning and is not required to have explicit learning objectives, but could potentially provide assessable skills. If, for example, it occurs in a Parkour club, then there will be learning objectives relating to the skills and safety requirements of free-running, but the progress made will be voluntary on the part of the student and no certification may be applicable. But non-formal learning could equally occur in school. An example would be if an injured bat appeared outside a Chemistry lesson, and the students wanted to help it. They might call the Bat Conservation Trust and ask the rescue worker, who came out to retrieve it, many questions about bats, conservation of wildlife and the specific illnesses that bats suffer. The Biology learning here is intentional on the part of the students, but not the intended 'formal' learning so carefully prepared by their Chemistry teacher!

Another example might be a student who loved everything to do with animals and studied everything he could find, spending many hours observing all manner of creatures. He wanted a Harris hawk and so learned everything he needed to know, volunteering at a local wildlife centre as well, until he had the knowledge he needed to get his own hawk and care for it properly. This is entirely self-directed hard work with a clear objective, not haphazard or accidental. It involved a great deal of time, including twelve hours a week, for six weeks, to train his hawk. If the activity were less focused, it might be considered informal learning.

Informal learning is less contentious. The OECD has referred to general agreement that it is never organised and has no formal learning objectives. 'It is never intentional on the student's part.' [217] It may arise from life experience and the everyday activities relating to family life, work or leisure: a Saturday job on a fruit farm, perhaps, or a family visit to a castle may provide unexpected learning. There are also many children who look after disabled parents. They may have to cook, clean, do the laundry, the shopping, and take responsibility for medication or crisis management of health, or mental health, conditions. This often requires effort, inventiveness and coordinated thinking skills for which they receive sympathy but, currently, no credit for those skills. Life situations, both positive and negative, generate learning and this could be assessable in certain cases, manifesting what the OECD termed *'a*

[215] OECD, 2010. Executive Summary. *Recognising non-formal and informal learning: outcomes policies and practices.* Paris: OECD
[216] OECD, 2010.
[217] OECD, 2010.

rich source of human capital'. More important still, it offers the opportunity for every individual to acknowledge their full potential and validate those abilities. Non-formal and informal learning will involve a variety of creative thinking skills that are essential to innovation. In 1918, Einstein famously said:

> *'The supreme task of the physicist is to arrive at those universal elementary laws from which the cosmos can be built up by pure deduction . There is no logical path to these laws. Only intuition, resting on sympathetic understanding of experience, can reach them.'* [218]

It is heartening to read, in the OECD Executive Summary,[219] that they recommend the recognition of non-formal and informal learning as a means to encourage and enhance more self-directed and life-long learning in the population, as well as providing a psychological boost to disaffected individuals, older people and displaced migrants, who might also benefit from other ways of showing what they can do. Moreover, the OECD reports that non-formal and informal opportunities represent efficient learning, both economically and in terms of time, allowing for the very real possibility of a broader, healthier educational experience - if we grasp this opportunity.

From all that has gone before in this book, it should be clear that a refocusing of values is needed, not only in education but also across society, if meaningful change is to be achieved. That refocusing needs to manifest on the level of the individual if it is to be a true reflection of human potential. This will be relevant not only to students, but to teachers and governing bodies also, as part of healthy learning communities, and can inform policy-makers.

From the point of view of the Creative Thinking Skills Spectrum, the value of encouraging an integrated framework for practice, application and validation of the full range of potential capacities, is obvious.

Writing in 1894, Rudolf Steiner put it this way:

> *'No one can remain satisfied by merely developing some of his inner faculties; the ultimate goal must be the development and ennoblement of all the potentials that slumber in mankind. Knowledge has value only in so far as it contributes to the all-round development of all aspects of human nature'.*[220]

[218] OECD, 2010.
[219] OECD, 2010.
[220] From an address delivered to the Physical Society of Berlin, in 1918, marking the 80th birthday of Max Planck

18.4: Integrating Teaching and Learning for Creative Thinking Skills

As Mark Runco states, *'Creativity is, then, something we can find in every child.'* [221] It is widely distributed. I have also discovered, in my work over the years as a teacher trainer, that this also applies generally to adults - even if not all recognise this in themselves at first. It is as though the creativity has been educated out of some at present, and just waits to be reawakened.

18.4.1: The Early Years

In the early years, many of the creative thinking skills are in their most formative stage. Providing flexible teaching spaces and resources for their development is ideal at this age. The aim is to support playfulness alongside self-directed and self-articulated experiences connected to everyday life. Simple props, as mentioned previously, are ideal at this age: clothes horses and veils, a few 'precious stones' simple, non-specific dolls, boxes, logs, planks and so forth.

A homely setting will allow healthy informal learning of the kind found in the home. This is supported and strengthened by the measured, interested and considered example of thoughtful action, set by the early years teaching staff. These can give the external template, for the children, for the inner thought processes that will one day emerge in them. This includes the conscious decision, for example, of whether to say the children are 'helping' with daily tasks, or are, instead, 'helpers', as was discussed in the previous chapter.

18.4.2: The Lower School

Playfulness continues to be important in lower school but may gradually take on more complex games. The use of open questions is invaluable to the development of creative thinking skills, as is a flexibility of approach in teaching, to follow non-formal opportunities as they arise and weave those into the overall aims. Also, giving time to hear the sometimes marginal associations and thoughts of the children when they are recalling the previous day's work, can helpfully stimulate the integration of thought at home and thought at school.

Figure 81: 'Come As Your Favourite Animal Made From Household Items Day' (age 10) by Elaine Holt (2008).

The power of inspiration is harnessed by leading the students in such a way that they discover things for themselves, by interacting with the physical world in a less formally controlled way. This may be as simple as a selection of games: for example, guessing a letter drawn on one's back or, when blind-folded, guessing a letter cut from sandpaper by touch alone; or trying to take a bell from in front of a blind-folded 'giant' without being heard or, again, cutting a Plasticine cake into halves repeatedly and counting the number progression. This enquiry and exploration becomes a habit of thinking and investigation that can extend into the home. Games played both inside and outdoors can inspire play at home which may otherwise turn increasingly to digital distractions. Towards the end of the lower school, small but meaningful personal projects with a degree of freedom can be introduced. This may involve something as simple as making an animal costume out of

[221] Runco, M. A., 2009, Education for Creative Potential, *Scandinavian Journal for Educational Research,* 47(3), pp. 317-324.

Figure 82: 'Hippo and Snail' (age 10) by Elaine Holt (2008).

household items for a Zoology Main Lesson block. These lesson blocks, consisting of the first two hours of each day for three or more weeks, and linked to the subject lessons through the theme, are a specific feature of Steiner education. This builds the learning around a central emotional engagement, which dramatizes an imaginative interpretation of the theme through narrative or descriptive images, rather than a dry sequence of ideas. This creates for each child an individual set of personally meaningful symbolic relationships at unconscious, dreaming and conscious levels. Not all will be immediately obvious to them, but will emerge as part of later creative options or interpretations – perhaps many years later. This idea is not entirely exclusive to Steiner education, and other educationalists including Kieran Egan, have also become strong proponents of using emotional tension to link, but not fetter, learning.[222]

18.4.3: The Middle School

In the middle school, clubs and interests outside school increase. Finding ways to bring these in, and acknowledge them as valuable and valid learnings, is important. Teachers will need, at this age, to take an interest in the world of the growing child, and the influences that impact upon them.

Links can be made to home life through projects that include degrees of freedom. Perhaps a project on Egypt will involve making something. One child will come in with a scarab beetle carefully modelled out of papier mâché, another will bring a home-made papyrus scroll, made out of cow-parsley, while another will have built an enormous, and somewhat flimsy, pyramid that he struggles to get through the classroom door, but can wear as a costume – and does - all day! It is important at this age that a mood of good-humoured appreciation is cultivated within a safe, non-valuative and non-judgemental atmosphere.[223] This is, of course, easier in a system where competitive test-taking is minimised and diversity celebrated. It is best practised in earlier years through the way the students learn to receive the presentation of each small project in class, and the questions they ask of their classmates. In this context, it is important to preserve and make accessible, to the growing students, all the potential playfulness and inventiveness of the younger child, but in the context of growing maturity, where greater exercise of choice is possible.

18.4.4: The High School

As mentioned in Chapter 16, a practical and useful start to integrating teaching and learning for creative thinking skills in high school is a simple exercise for teachers that can be completed by groups of ten, or so, in about 30-40 minutes during year planning sessions, with a following round-up of results. Focusing on connections, it is equally useful in both well-resourced and quite challenging teaching circumstances. The activity is a simple mind map exercise around a

[222] Fettes, M., 2013.
[223] Runco, M., 2014, p.45.

theme – simple nouns and abstract nouns are particularly good for this because they are not already loaded with meaning and can inspire or surprise – an example might be *Salt*.

Figure 83: Teachers' Mind Map Exercise (2015) ACTS Conference, Copenhagen by Crossfields Institute.

The idea for a shared theme came to the ACTS project meetings from colleagues in Finland, where the schools use this practice. The theme is placed at the centre and the subjects taught in the school are placed around the edge. Teachers draw lines to any subject with a note added, stating how this theme links back to the subject. It starts slowly but quickly becomes animated. Early on, teachers began to see links between subjects that referenced salt, so a web of associations began to form. The teachers were learning from each other, and were interested in the connections, which were not constrained by external learning priorities but, rather, intrinsic interest and attributes. This procedure was adopted in participating schools in Finland, with the theme *Time* for fourteen to sixteen-year-olds, and *Truth* for sixteen to eighteen-year-olds, for the year 2018-2019. It has become part of their year planning procedures.

It is then possible, with this seed map, for each age group to be taught normal curriculum lessons, but with the teachers including subject-appropriate references to the shared theme. From this, the students are able to create a personal project based on the theme, and centred upon a subject they feel strong in - be it Science, Maths, Art, the Humanities or movement lessons - but referencing and coherently including information from three others. This allows students to discover interest in other subjects that they may have considered closed to them, and the courage to explore that further. Important connections are made in this way and a habit of thinking explored. There is also the opportunity for non-formal and informal learning about bat health, Parkour, handling hawks or an assessment of care in the community, to be brought into the context of an integrated learning.

Figure 84: Final project (age 18) by Gottfried Straube Fjeldså (n/d)

Final summative projects, with total freedom of content, could also provide opportunity for expressing creative thinking skills at age sixteen and at graduation at age eighteen. In Steiner Schools in Denmark, these projects are marked and graded by specialists chosen from the field of work covered in the project. Many of these come from higher education.

This process provides a natural and self-directed form of transdisciplinary thinking and habit of overview, for staff and students, but it requires courage on the part of school governors to provide the truly broad and balanced curriculum upon which creative thinking skills are founded.

18.5: Assessing Creative Thinking Skills

It will be clear from the above that the bulk of assessment for creative thinking skills can be gleaned from personal project and portfolio work. This becomes highly relevant after the age of fourteen, when exams syllabi are taken in most schools. The OECD has said that portfolio evidence of non-formal and informal learning is fairly widespread, but the value of the portfolio, for assessment purposes, was reportedly unclear. This is because the apparently disparate elements of a personal project can be hard to identify in a reliably comparable way. The Creative Thinking Skills Spectrum offers a means to provide that identification breakdown in a way that is authentic, reliable, current, appropriate, inclusive, sufficient and integrated.

Within that, the form of assessed material may include, but is not limited to:

- Presentation of a project to the school community
- Journals documenting the project, their decisions, challenges, strategies and so forth
- Interviews with staff members to discuss the project
- Peer-review, which can formalise the good habits built up in lower and middle school and extend the 'Tops and Tips' approach mentioned in Chapter 13.
- Products could be assessed – be it a painting, an essay or a ten-foot tall home-made medieval trebuchet!
- Question and answer session
- Discussion
- Personal Statement
- Witness account
- Film or sound recording
- Performance
- Test [224]

Teacher observations and student records will also provide useful corroborative evidence of the less visible inner qualities such as reflection on perception. This might be observed, for example, during a debate or discussion where a particular view was modified and articulated in such a way that the change of mind was thought through and clearly not flippant.

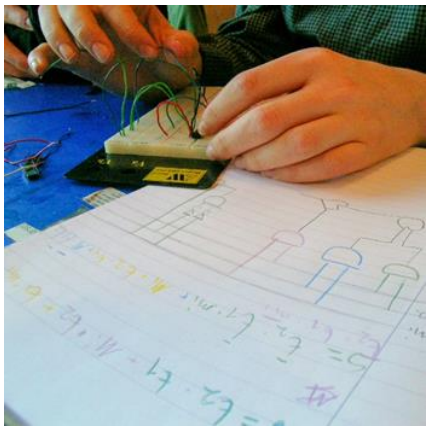


Figure 85: Physics (age 15) Image Source: Gottfried Straube Fjeldså (n/d)

It was particularly interesting to note, when preparing qualification documentation for registering the new qualifications with Ofqual, that the level of personal projects being currently produced in Steiner Waldorf schools in the UK were deemed, by the relevant consultants, to be two years ahead of the expectation for the age, so the sixteen-year-olds were producing work at the level of eighteen-year-olds and the eighteen-year-olds were producing work at the level of undergraduates. This reflected the judgement of the New Zealand Ministry of Education regarding the independent project work of Steiner high school students in New Zealand. Without wishing to jump to any premature

[224] Crossfields Institute (2015) ACTS Conference, Denmark.

conclusions, as this was not a formal study, it is really not surprising to me, in the light of the integrated educational system used in Steiner Schools.

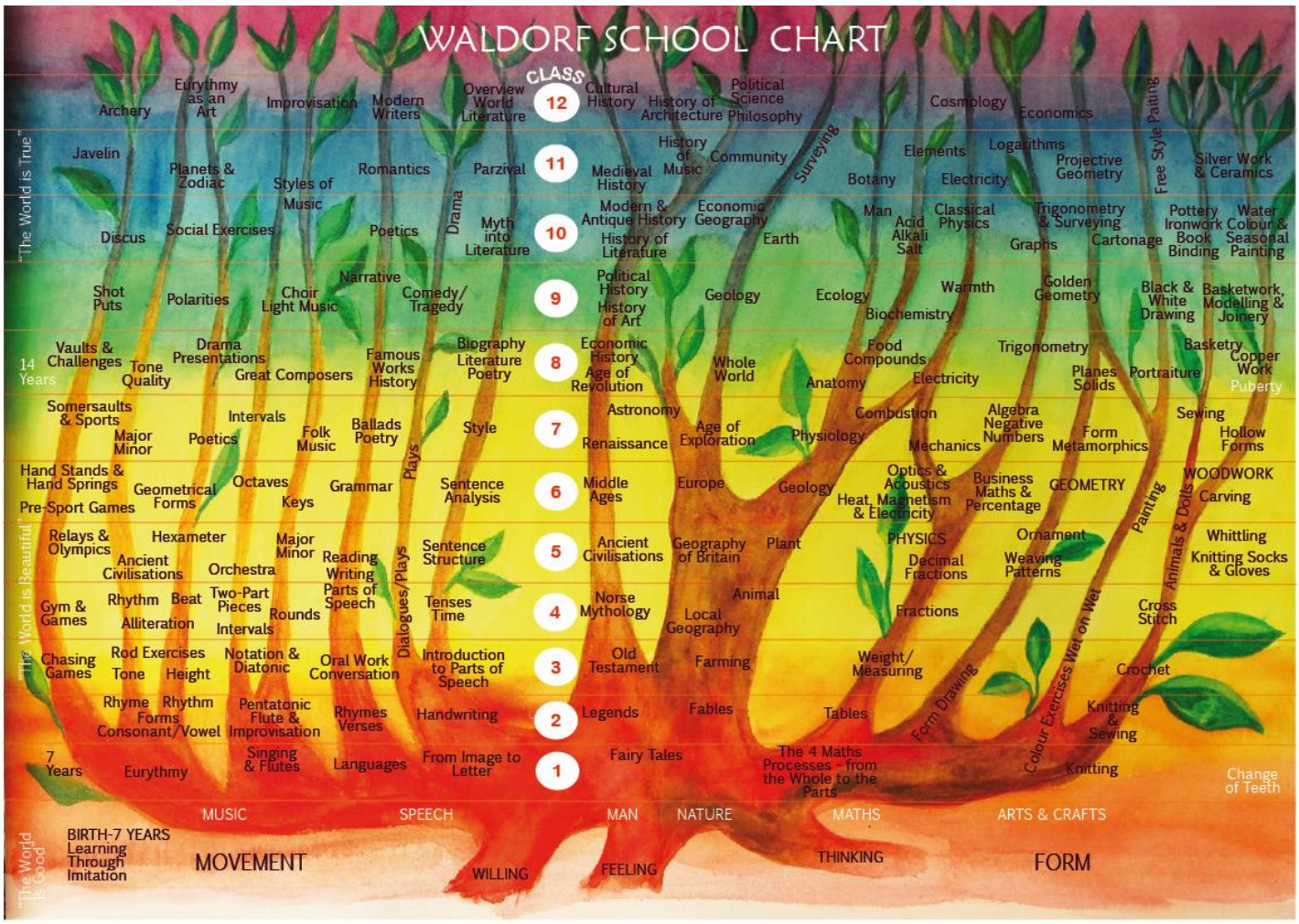
18.6: Synthesis

The provision of a broad and balanced curriculum, which meets developmental needs throughout school life, is central to the integrated development of creative thinking skills, and cannot be underestimated. Also, the integration of formal, non-formal and informal learning opportunities is necessary to encompass the whole. We may then, as teachers, garden with integrity and sensitivity in the eco-systems of our students' minds. We may then provide the opportunity and scope for those children and young people to develop well-rounded creative thinking skills that will, in turn, support effective creativity and innovation, exercised through a true autonomy of action.

The road to adulthood can be a courageous, joyful and informed adventure if children and young people are allowed to be children and young people, and this awesome world of ours given the time to reveal itself to them, in all its glory and its essence. Then the road to creativity and understanding is opened before us and we will have given the greatest gift of all to future generations.

Figure 86: Walking into the wild for an overnight class trip to the New Forest (age 10). By Elaine Holt (2008)

Appendix 1: The Steiner Waldorf Curriculum



The Steiner Waldorf Curriculum Indications: from kindergarten through to graduation in Class 12.

Image Source: Courtesy of Michael Hall School, Forest Row, England

Appendix 2: Socratic Questions

Socratic Questions

1.	<u>Questions that seek clarification:</u>	
	Can you explain that...?	Explaining
	What do you mean by...?	Defining
	Can you give me an example of...?	Giving examples
	How does that help...?	Supporting
	Does anyone have a question to ask...?	Inquiring
2.	<u>Questions that probe reasons and evidence</u>	
	Why do you think that...?	Forming an argument
	How do we know that...?	Assumptions
	What are your reasons...?	Reasons
	Do you have evidence...?	Evidence
	Can you give me an example/counter-example...?	Counter examples
3.	<u>Questions that explore alternative views</u>	
	Can you put it another way...?	Re-stating a view
	Is there another point of view...?	Speculation
	What if someone were to suggest that...?	Alternative views
	What would someone who disagreed with you say...?	Counter argument
	What is the difference between those views/ideas?	Distinctions
4.	<u>Questions that test implications and consequences</u>	
	What follows (or can we work out from) what you say...?	Implications
	Does it agree with what was said earlier...?	Consistency
	What would be the consequences of that...?	Consequences
	Is there a general rule for that...?	Generalizing rules
	How could you test to see if it was true...?	Testing for truth
5.	<u>Questions about the question/discussion</u>	
	Do you have a question about that...?	Questioning
	What kind of question is it...?	Analyzing
	How does what was siad/the question help us...?	Connecting
	Where have we got to/who can summarize so far...?	Summarizing
	Are we any closer to answering the question/problem...?	Coming to conclusions

Robert Fisher, 1995. Socratic Education. *Thinking: The Journal of Philosophy for Children,* 12, (3) p.28. DOI: 10.5840/thinking19951236

Creative Thinking Skills (CTS)	**Distinction 4**	**Merit 3**	**Pass 2**	**Working towards 1**
1. Linguistic Articulation (written and verbal are combined in this example)	Independently proof reads and edits own work, demonstrating a high level of sensitivity to context and audience. Uses an extensive vocabulary and a variety of forms of written and spoken communication	Reliably produces effective written and spoken communication that meets the requirement of set tasks and different contexts. Demonstrates a wide vocabulary and good use of chosen forms.	Able to produce written and spoken communication that shows an awareness of literary and oral conventions and context in the appropriate choice of form and vocabulary	Vocabulary and structure is limited and shows limited understanding of context
2. Imaginative, non-linguistic thought pictures	Independently initiates creative, imaginative non-linguistic communication in a way that effectively contributes to a purposeful intention	Consistently able to use creative, imaginative, non-linguistic communication with purposeful intention	Able to use creative, imaginative, non-linguistic communication with purposeful intention	Needs support to use non-linguistic forms of communication, and such communication is likely to be derivative with little or no evidence of connection between communication and intention

3. Imagined inner forms, structures and systems (3D)	Initiates and develops imagined physical or conceptual *inner* forms, structures and systems in 3D without prompting. Able to confidently and effectively communicate them	Uses imagined physical or conceptual *inner* forms, structures and systems in 3D without prompting and is able to effectively communicate them.	Able to imagine physical or conceptual *inner* forms, structures and systems in 3D and effectively communicate them	Little or no evidence of the ability to imagine and communicate physical or conceptual *inner* forms, structures and systems in 3D
4. Resonance and pattern in thinking	Is able to spontaneously and confidently make and explain links and relationships between a range of activities, knowledge and influences without prompting, drawing on a variety of sources.	Is able to make and explain links and relationships between a range of activities, knowledge and influences without prompting, drawing on a variety of sources.	Able to make and explain links and relationships between a range of activities, knowledge and influences, drawing on a variety of sources	Is not yet able to make and explain links and relationships between a range of activities, knowledge and influences without support
5. Improvisation (heuristic thinking)	Actively initiates testing a range of approaches when dealing with unknowns,	Consistently chooses to try and out and evaluate a range of approaches to achieve	Able to try out and evaluate a range of approaches to achieve an outcome when	Needs support to identify and try different approaches when

	consciously drawing on previous knowledge and experience. Able to confidently explain and evaluate the process.	an outcome when dealing with unknowns, without prompting. Able to give reasons for doing this.	dealing with unknowns, and confidently communicate what has been learnt from the process	dealing with unknowns. Needs support to articulate what has been learnt from the process.
6. Co-ordinated thinking	Is consistently able to realistically set priorities, adapt and initiate change whilst demonstrating flexibility, method, strategies and organisational skills when working on complex tasks or projects, giving consideration to your own and other's needs	Consistently demonstrates flexibility, method, strategies and organisational skills when working on complex tasks or projects, giving consideration to your own and other's needs	Able to demonstrate flexibility, method, strategies and organisational skills when working on complex tasks or projects, giving consideration to your own and other's needs.	Is not yet able to demonstrate flexibility, method, strategies and organisational skills when working on complex tasks or projects, giving consideration to your own and other's needs without support
7. Observational thinking	Actively seeks out different perspectives and approaches to phenomena and	Consistently chooses, without prompting, to consider different perspectives when	Able to independently choose to take different perspectives when considering	Not yet able to move from a "fixed" perspective and evaluate reasons for

	situations and is able to question and justify own and other's views	considering phenomena or situations and is able to describe and evaluate different views	phenomena or situations, and evaluate the reasons for the accepted or common view.	a common or accepted view without support
8. Contemplation	Consistently refrains from judgement without prompting when considering information and experience. Able to articulate reasons for own bias and accept challenges to own views.	Consistently able to refrain from judgement and recognise own bias when considering information and experience. Can recognise the validity of other points of view.	Able to refrain from judgement, recognise own bias and be open to different perspectives when considering information and experience	Regularly jumps to conclusions and struggles to recognise own bias or preconceptions when considering information and experience
9. Critical analysis	Consistently and independently makes substantiated judgements and able to clearly and confidently articulate reasons for these verbally and/or in writing.	Consistently makes substantiated judgements without prompting and able to give an articulate account of the process used to reach judgements.	Able to make substantiated judgements without prompting and able to give a coherent account of the process used to make judgements	Regularly makes superficial judgements and struggles to fully substantiate them. Finds it hard to give a coherent account of own process in making judgements

10. Reflection on perception	Without prompting, will initiate an objective comparison between new perceptions and previously held views, experience or understanding. Will independently adapt to new perceptions and be able to argue in support of new or previously held views, experience or understanding. Able to recognise and fluently articulate paradox where this arises.	Consistently and objectively compares and contrasts new perceptions with previously held views, experience or understanding and able to articulate why you have, or have not, adapted your perceptions. Able to recognise and articulate paradox where this arises.	Able to objectively compare and contrast new perceptions with previously held views, experience or understanding and adapt or support one or the other. Able to recognise and articulate paradox where this arises.	Not yet able to independently hold contrasting views or perceptions and adapt and develop own understanding from the experience. Needs considerable support to engage with this process.

Appendix 4: Further Reading

Day in the Life of the Brain, by Susan Greenfield, Allan Lane (2016)

Creativity Theories and Themes: Research Development and Practice by Mark A. Runco, Academic Press (second edition, 2007)

Drama At The Heart, by Nell Smythe, Floris Books, (2016)

Educating Through Art, available in Sweden as **The Philosopher's Button. On art and knowledge and the unknown background of Waldorf education**, by Agnes Nobel, Floris Books (1996)

Philosophy of Freedom by Rudolf Steiner, Rudolf Steiner Press (1894, revised 1918, reprinted 2011)

Story-telling & the Art of Imagination, by Nancy Mellon, Element Books, (1992)

Towards Creative Teaching: notes to an evolving curriculum for Steiner Waldorf teachers, Rawson, M & Avison, K (Ed), Floris Books, (2013).

The Tasks & Content Of The Steiner Waldorf Curriculum, Avison, K. & Rawson, M.(eds), Floris Books, (2014).

Understanding The Steiner Waldorf Approach: Early Years Education in Practice by Janni Nicol and Jill Tina Taplin, Published by Routledge, (Second Edition, 2018)

Understanding Waldorf Education: teaching from the inside out, by Jack Petrash, Gryphon House Press, (2003)

Bibliography

Avison, K. & Rawson, M. eds., 2014. *The Tasks & Content Of The Steiner Waldorf Curriculum.* 2nd ed. Edinburgh: Floris Books.

Aydin, K. et al., 2007. Increased grey matter density in the parietal cortex of mathematicians: a voxel-based morphometry study. *American Journal of Neuroradiology,* November, 28(10), pp. 1859-1864.

Badley, G., 2003. The Crisis in Educational research: A Pragmatic approach. *European Educational Research Journal,* 2(2), pp. 296-308.

Barnett, R., 2014. Learning for an Unknown Future. In: *Thinking and Rethinking the University: The Selected Works of Ronald Barnett.* Abingdon: Routledge, pp. 219-234.

Barron, F., 1993. Controllable Oddness as a Resource in Creativity. *Psychological Inquiry,* Volume 4, pp. 182-184.

BBC, 2016. Jersey sea rescue: Passer-by "saves man's life". *BBC*, 22 July.

BBC, 2017. 'Selfless heroes' pull two people 'on fire' from car. *BBC News*, 22 June.

BBC, 2018. Passer-by saves family after Leeds canal burst its banks. *BBC News*, 4 April.

Beaty, R. E. e. a., 2018. Robust Prediction of Individual Creative Ability from brain Functional Connectivity. *Proceedings of the National Academy of Sciences,* 115(5), pp. 1087-1092.

Berninger, V., 2012. *Evidence-Based, Developmentally Appropriate Writing Skills K–5: Teaching the Orthographic Loop of Working Memory to Write Letters So Developing Writers Can Spell Words and Express Ideas.* Washington, Handwriting in the 21st Century?: An Educational Summit.

Blanke, O., 2015. Multisensory brain mechanisms of bodily self-consciousness. *Nature,* Volume 13, pp. 556-571.

Bohn, A. &. B. D., 2008. Life Story Development in Childhood: The development of life story abilities and the acquisition of cultural life scripts from late middle childhood to adolescence. *Developmental Psychology,* 44(4), pp. 1135-1147.

Booker, C., 2004. *The Seven Basic Plots: why we tell stories.* 1st ed. London: Continuum.

Brandão-Berglund, A., 2018. *Language/ Art Project presentation, ACTS Transnational.* Helsinki: s.n.

Breakspeare, S., 2012. *OECD Education Working Paper 71 (2012).* [Online]
Available at: www.oecd-ilibrary.org/docserver/5k9fdfqffr28-en.pdf?expires=1524688017&id=id&accname=guest&checksum=DBD48EF65E2E1FDDC6ECB67236C883B9
[Accessed 25 April 2018].

Brooks, M., 2013. Invest in Minds not Maths. *New Scientist,* Volume 220, pp. 38-39.

Brown, J. &. B. M. A., 2011. Self-reflection and feelings of self-worth:When Rosenberg meets Hesenberg. *Journal of Experimental Social Psychology,* 47(6), pp. 1269-1275.

Bryan, C. J. & Master, A. &. W. G. M., 2014. “Helping” Versus “Being a Helper”: Invoking the Self to Increase Helping in Young Children. *Child Development,* 85(5), pp. 1836-1842.

Bucklow, S., 2010. *The Alchemy of Paint.* 1st ed. London: Marion Boyars.

Cameron, T., Moore, K., Montgomerry, R. & Stewart, E. J., 2018. Creative ventures and the personalities that activate them in a post-disaster setting. *Creativity and Innovation Management,* 27(3), pp. 335-347.

Campbell, J., 2013. *The Symbol Without Meaning.* San Anselmo: Joseph Campbell Foundation.

Campbell, J., 2013. *The Symbol Without Meaning.* San Anselmo: Joseph Campbell Foundation.

Carlsson, I., 2002. Anxiety and Flexibility related to high or low creativity. *Creativity Research,* Volume 14, pp. 341-349.

Cennini, C., 15th Century. *The Craftsman's Handbook: Il Libro dell'Arte.* New York: Dover.

CFP, 2013. *China Daily - Monitoring Around Test Sites - cheat vest at Banpo Museum.* [Online]
Available at: http://www.chinadaily.com.cn/photo/2013-10/23/content_17053205.htm
[Accessed 16 July 2018].

Chambers, 2005. *Chambers Etymological Dictionary.* Edinburgh: Chambers.

China Daily - chinaculture.org, 2009. *The Imperial Examination System and its Vagaries.* [Online]
Available at: http://www.chinadaily.com.cn/life/2009-02/27/content_11569607_2.htm
[Accessed 17 July 2018].

Chomsky, A. N., 1957. *Syntactic Structures.* 2nd ed. Eastford: Martino Fine Books.

Coss, R., 2017. Drawings of Representational Images by Upper Palaeolithic Humans and their Absence in Neanderthals Reflect Historical Differences in Hunting Wary Game. *Evolutionary Studies in Imaginative Culture,* 1(2), pp. 15-38.

Crossfields Institute, 2015. *ACTS conference presentation.* Copenhagen: Unpublished.

Cyranoski, D., 2014. Worlds oldest art found in Indonesian cave. *Nature*, 8 October.

Daily Telegraph, 2013. *The Telegraph: University students 'made to wear anti-cheating helmets'.* [Online]
Available at: https://www.telegraph.co.uk/news/newsvideo/weirdnewsvideo/10246867/University-students-made-to-wear-anti-cheating-helmets.html
[Accessed 27 July 2018].

Dash, M., 2012. *The Demonization of Empress Wu.* [Online]
Available at: https://www.smithsonianmag.com/history/the-demonization-of-empress-wu-20743091/
[Accessed 16 July 2018].

Davies, D. et al., 2013. Creative Learning Environments in Education. *Thinking Skills and Creativity,* Volume 8, pp. 80-91.

De Beauvoire, S., 2002. *Memoires of a Dutiful Daughter.* London: Penguin.

Ding, N. et al., 2016. Cortical tracking of hierarchical linguistic structures in connected speech. *Nature Neuroscience,* 7 December, 19(1), pp. 158-164.

Dishon, N., Oldmeadow, J. A. & Critchley, C. &. K. J., 2017. The Effect of Trait Self-Awareness, Self-Reflection, and Perceptions of Choice Meaningfulness on Indicators of Social Identity Within a Decision-Making Context. *Frontiers in Psychology,* Volume 8, p. 2034.

Doll, A. e. a. (., 2015. *Mindfulness is associated with intrinsic functional connectivity between default mode and salience networks.* [Online]
Available at: https://doi.org/10.3389/fnhum.2015.00461
[Accessed 1 August 2018].

Dolowitz, D. &. M. S., 2000. Learning From Abroad: The role of policy transfer in contemporary policy making. *Governance,* 13(1), pp. 5-24.

Doniger O'Flaherty, W., ed., 1981. *The Rig Veda: an anthology.* London: Penguin.

Dunbar, K., 1997. How Scientists Think: On-line Creativity and Conceptual Change in Science. In: T. T. B. Ward, M. Smith & S. Vaid, eds. *Conceptual structures and processes: Emergence, Discovery and Change.* Washington D.C: American Psychological Association Press, pp. 461-493.

Editorial, 2003. 'Neurogeometry and Entopic Visions of the Functional Geometry of the Brain'. *Journal of Physiology,* Volume 97, pp. 87-92.

Einstein, A., 1954. Reprinted 1997. *Ideas and Opinions.* London: Random House.

Elam, B. A., 1989. Imperial Politics and Confucian Societies in Late Imperial China: The Hanlin and Donglin Academies. *Modern China,* 15(4), pp. 379 - 418.

English, E., 2017. 'I didn't think, I just jumped in to help,' says man who saved woman and two children from drowning in River Lee. *Irish Examiner*, 28 June.

European Centre for the Development of Vocational Training, 2007. *Recognition and validation of non-formal and informal learning for VET teachers and trainers in the EU Member States.* Luxembourg: Cedefop.

Fettes, M., 2013. Imagination and Experience: An integrative Framework. *Democracy and Education,* 21(1), p. 4.

Finlayson, N., Zhang, X. & Golomb, J., 2009. Abstract for Differential patterns of 2D location versus depth decoding along the visual hierarchy. *NeuroImage,* Volume 147, pp. 507-516.

Finlay, V., 2003. *Colour: Travels Through the Paintbox..* 1st ed. London: Hodder and Soughton.

Fisher, R., 1995. Socratic Education. *The Journal of Philosophy for Children,* 12(3), pp. 23-29.

Flecken, M., Athanasopoulos, P., Kuipers, J. R. & Thierry, G., 2015. On the road to somewhere: Brain potentials reflect language effects on motion event perception. *Cognition,* Volume 141, pp. 41-51.

French, A. P., 1979. *Einstein: A Centenary Volume.* 1st ed. Portsmouth: Heinemann Educational Publishers.

Freunde der Erziehungskunst , 2018. *Waldorf Worldwide.* [Online]
Available at: /www.freunde-waldorf.de/en/waldorf-worldwide/
[Accessed 25 April 2018].

Fuchs, J. L., Kumar, V. K. & Porter, J., 2007. Emotional Creativity, Alexithymia and Styles of Creativity. *Creativity Research Journal,* Volume 19, pp. 141-162.

Gibson, T. & Conway, B. R., 2017. Languages don't all have the same number of terms for colours – scientists have a new theory why. *The Conversation*, 18 September.

Giles, S., ed., 1993. *Theorizing Modernism: Essays in Critical Theory.* London: Routledge.

Gogh, V. V., 2009. *The Night Cafe, 1888 by Vincent Van Gogh.* [Online]
Available at: https://www.vincentvangogh.org/the-night-cafe.jsp
[Accessed 16 6 2018].

Grant, A., 2014. *The Dark Side of Emotional Intelligence.* [Online]
Available at: /www.theatlantic.com/health/archive/2014/01/the-dark-side-of-emotional-intelligence/282720/
[Accessed 5 July 2018].

Greenfield, S., 2015. *Mind Change.* 1st ed. London: Rider.

Greenfield, S., 2016. *A day in the Life of the Brain.* London: Allan Lane, Penguin.

Hahn, T., 1975 (reprinted 2008). *The Miracle of Mindfulness.* london: s.n.

Hamzelou, J., 2017. How our sleeping brain stores away memories. *New Scientist*, 7 October, p. 11.

Hawking, S., 2002. *A Brief History of Time.* Cambridge: Cambridge University Press.

Heinonen, J. et al., 2016. Default Mode and Executive Networks Areas: Association with the Serial Order in Divergent Thinking. *PLoS ONE,* 11(9).

Holt, E., 2015. *ACTS Project Handbook.* Stourbridge: Steiner Waldorf Schools Fellowship.

Holt, E., 2015. *What are Creative Thinking Skills? ACTS conference C1.* Copenhagen: Steiner Waldorf Schools Fellowship [internal document].

Holt, E., 2016. *Creative Thinking Skills.* Brighton: Unpublished.

Holt, E., 2017. *What are Creative Thinking Skills?.* [Online]
Available at: https://acts.cloud/what-are-creative-thinking-skills/

Holt, E., 2018. *Educating for a Creative Future?.* [Online]
Available at: https://peda.net/steinerkasvatus/verkkolehti/tlk4l/lt
[Accessed 23 July 2018].

Horváth, G. et al., 2017. Celestial polarization patterns sufficient for Viking navigation with the naked eye: detectability of Haidinger's brushes on the sky versus meteorological conditions. *The Royal Society Open Science,* 8 February.

Iyengar, S., 2010. *The Art of Choosing.* Oxford, England: TED talk.

James, K. H. a. E. L., 2012. 1(1), pp. 32-42.

James, K. H. a. E. L., 2012. The effects of handwriting experience on functional brain development in pre-literate children. *Trends in Neuroscience and Education,* 1(1), pp. 32-42.

James, K. H. & Engelhardt, L., 2012. The effects of handwriting experience on functional brain development in pre-literate children. *Trends in Neuroscience and Education,* 1(1), pp. 32-33.

Johnson, H., 2016. *Foreign Policy.* [Online]
Available at: https://foreignpolicy.com/2016/03/01/to-prevent-cheating-indian-army-recruits-took-

entrance-exam-in-only-underwear/
[Accessed 27 July 2018].

Johnson, H., 2016. To Prevent Cheating, Indian Army Recruits Took Entrance Exam in Only Underwear. *Foreign Policy*, 1 March.

Johnson, M., 2015. Embodied Understanding. *Frontiers in Society,* Volume 6, p. 875.

Kaufman, J. C. & Beghetto, R. A., 2009. Beyond Big and Little: The Four C model of Creativity. *Review of General Psychology,,* 13(1), pp. 1-12.

Keate, G., 2017. Oxford student Rafael Ochoa killed himself amid worries over degree and golf. *The Times*, 23 August , p. 17.

Keller, G., 2016. *The World Needs Originals Not Copies. ACTS Conference, C3.* Oslo: unpublished.

Keller, H., 1929. *Midstream: My Later Life.* New York: Doubleday, Doran & Co.

Klemm, W. R., 2013. *Why Handwriting by Hand Could Make You Smarter.* [Online]
Available at: https://www.psychologytoday.com/us/blog/memory-medic/201303/why-writing-hand-could-make-you-smarter
[Accessed 15 June 2018].

Knowles, E., ed., 1995. *Oxford Dictionary of Quotations.* Oxford: Oxford University Press.

Knowles, E., ed., 1995. *Oxford Dictionary of Quotations.* Oxford: Oxford University Press.

Lewis-Williams, J. D., 1988. The signs of all times: entoptic phenomena in Upper Palaeolithic art. *Current Anthropology,* 29(2), pp. 201- 45.

Li, T., 2018. *Thinking Outside of the Box Like a Magician: A Magic-based Teaching Strategy to Facilitate Thinking Flexibility.* Ashland OR, USA: Southern Oregon Creativity Conference.

Locke, J., 1690. Reprinted 1998. *An Essay Concerning Human Understanding.* London: Penguin Classics.

Maguire, E. A. et al., 2000. Navigation-related structural change in the hippocampi of taxi drivers. *Proceedings of the National Academy of Sciences,* 97(8), pp. 4398-4403.

Mangen, A. & Velay, J., 2010. Digitizing literacy: reflections on the haptics of writing. In: M. H. Zadeh, ed. *Advances in Haptics.* Vukovah: In-Teh, pp. 385-402.

Mauren, N. M., 1998. *The Pursuit of Spiritual Wisdom: The Thoughts and Art of Vincent Van Gough and Paul Gauguin.* Vancouver: Fairleigh Dickinson University Press.

McCoy, M. B., 2009. Alcidamas, Isocrates, and Plato on Speech, Writing, and Philosophical Rhetoric. *Ancient Philosophy,* 29(1), pp. 45-66.

Meadows, T. T., 1847. *Desultory Notes on the Government and People of China.* first ed. London: Wm H Allen & Co.

Meyer, H. & Zahedi, K. e. a., 2014. Open Letter to Andreas Schleicher. *Policy Futures in Education,* 12(7), pp. 827-877.

Mission, G. P., 1993. Form and behaviour of Haidinger's brushes. *Ophthalmic and Physiological Optics,* 13(4), pp. 392-396.

Niy, Y. &. T. G., 2010. Dreaming and the brain: from phenomenology to neurophysiology. *Trends in Cognitive Sciences,* 14(2), pp. 88-100.

Norman, E., 2017. Metacognition and Mindfulness: the Role of Fringe Consciousness. *Mindfulness,* 8(1), pp. 95-100.

OECD, 2010. *Recognising non-formal and informal learning: outcomes policies and practices..* Paris: OECD.

O'Flaherty, D., 1981. *The Rig Veda: an anthology.* first ed. London: Penguin.

Onarheim, B., 2018. *Frontiers in Human Neuroscience, ACTS Conference.* Oslo: Unpublished.

Paine, T., 1792. Reprinted 1984. *Rights of Man.* London: Penguin Classics.

Paul, R. W., 1997. *California Teacher Preparation for Instruction in Critical Thinking.* Tomales: Foundation for Critical Thinking.

Petitot, J., 2017. *Elements of Neurogeometry: Functional Architectures of Vision.* 1st ed. Cham: Springer International Publishers.

Piffer, D., 2012. Can Creativity be Measured? An attempt to clarify the notion of creativity and general directions for future research. *Thinking Skills and Creativity,* 7(3), pp. 258-264.

Poutanen, P. & Parviainen, O., 2013. Analyzing group creativity and learning in online environments. *Interdisciplinary Studies Journal,* 2(3), pp. 149-157.

Puglise, N., 2016. *The Guardian - Wonder Woman announced as UN ambassador amid staff protest.* [Online]
Available at: https://www.theguardian.com/books/2016/oct/21/wonder-woman-un-ambassador-staff-protest
[Accessed 16 July 2018].

Raunela, E., 2017. *Dialogic teaching presentation, Acts conference.* Forest Row: unpublished.

Reich, L., Szwed, M., Cohen, L. & Amedi, A., 2011. A Ventral Visual Stream Reading Centre Independent of Visual Experience. *Current Biology,* 2(1), pp. 363-368.

Reporter, D. T., n.d.

Researchers, V., 2014. *The Bionic Eye in The Scientist.* [Online]
Available at: https://www.the-scientist.com/features/the-bionic-eye-36747
[Accessed 20 August 2018].

Rhoda Kellog Archive, 1967. *Rhoda Kellog Child Art Collection Handbook.* [Online]
Available at: http://www.early-pictures.ch/kellogg/archive/en/categories?allStats=1&expandAll=1#e20
[Accessed 27 4 2018].

Roberson, D., Davidoff, J., Davies, I. & Shapiro, L. R., 2005. Color categories: Evidence for the cultural relativity hypothesis. *Cognitive Psychology,* 50(4), pp. 378-411.

Root-Bernstein, M. & Root-Bernstein, R., 2006. Imaginary World-play in Childhood and Maturity and its Impact on Adult Creativity. *Creativity Research Journal,* Volume 18, pp. 405-425.

Ross, A., 2016. *The Guardian - One less woman in politics: Wonder Woman loses job as UN ambassador.* [Online]
Available at: https://www.theguardian.com/world/2016/dec/12/wonder-woman-un-ambassador-gender-equality
[Accessed 16 July 2018].

Runco, M., 2003. Education for Creative Potential. *Scandinavian Journal of Educational Research,* 47(3), pp. 317 - 324.

Runco, M. A., 2014. *Creativity Theories and Themes: Research, Development and Practice.* 2nd ed. London: Academic Press.

Runco, M., Acar, A. & Cayirdag, N., 2017. A closer look at the creativity gap and why students are less creative at school than outside of school.. *Thinking Skills and Creativity,* Volume 24, pp. 242-249.

Sacks, O., 1985. *The Man Who Mistook His Wife For a Hat.* London: Picador.

Sacks, O., 2012. *An Anthropologist on Mars.* London: Picador.

Salovey, P. & Meyer, J. D., 1990. Emotional Intelligence. *Imagination, Cognitionn and Personality,* Volume 9, pp. 185-211.

Schlegel, A. et al., 2015. The artist emerges: Visual art learning alters neural structure and function. *NeuroImage,* Volume 105, pp. 440-451.

Section of Partnerships, Cooperation and Research, 2017. *Unpacking Sustainable Development Goal 4 Education 2030.* [Online]
Available at: http://unesdoc.unesco.org/images/0024/002463/246300E.pdf
[Accessed 30 7 2018].

Shaw, B., 1930 (reprinted 1960). *The Apple Cart: A Political Extravaganza.* London: Penguin.

Starck, E., 2016. *Running on autopilot: scientists find important new role for 'daydreaming' network'.* Cambridge: Cambridge University.

Steiner, R., 1894. *The Philosophy of Freedom [Revised 1916. Trans. Rita Stebbling, 1988].* London: Rudolf Steiner Press.

Steiner, R., 1919 reprinted in 1985. The Threefold Social Order and Educational Freedom. *The Threefold Social Order: The Renewal of the Social Organism.*

Steiner, R., 1919. Lecture XIV. In: *The Study of Man.* London: Rudolf Steiner Press.

Steiner, R., 1920 reprinted in 1985. The Pedagogical Basis of the Waldorf School. In: *The Renewal of the Social Organism.* New York: Anthroposophical Press.

Sternberg, R., 2018. *Save the World!: We Don't Just Need Smarter or Even More Creative Kids—We Need Wiser Ones Too.* Ashland, Southern Oregon University Creativity Conference.

Stone, D., 2004. Transfer agents and global networks in the 'transnationalization' of policy. *Journal of European Public Policy,* 11(3), pp. 545-566.

Tech, T., 2012. *Visit from ITESM Campus Ciudad de México students to a foster home for girls (Casa Hogar de las Niñas) in Tlahuac, Mexico City.* [Art] (Monterrey Institute of Technology and Higher Education, Mexico City).

The European Centre for the Development of Vocational Training, 2007. *Recognition and validation of non-formal and informal learning for VET teachers and trainers in the EU Member States,* Luxemborg: Office for Official Publications of the European Communities.

Torrance, E. P., 1972. Can we Teach Children to Think Creatively?. *Journal of Creative Behaviour,* Volume 6, pp. 114 - 143.

Torrence, E. P., 1972. Can We Teach Children to Think Creatively?. *Journal of Creative Behaviour,* Volume 6, pp. 114-143.

Turkle, S., 2016. *Reclaiming Conversation: The Power of Talk In a Digital Age.* 2nd ed. New York: Penguin .

Tweedie, P., 2001. *Aboriginal Australians: Spirit of Arnhemland.* 1 ed. London: New Holland Publishers.

Twiss, H., 1844 . Lord Chancellor Eldon. *The Anglo-American*, 10 August, Volume 3-4, pp. Volume 3, 376-377.

United Nations General Assembly, 2015. *Transforming our world: the 2030 Agenda for Sustainable Development,* New York: United Nations.

Usher, A., 2016. *Higher Education Strategy Associates - A Brief History of Exams.* [Online]
Available at: http://higheredstrategy.com/a-brief-history-of-exams/
[Accessed 17 July 2918].

Vallotton, C. D. & Ayoub, C. C., 2010. Symbols Build Communication and Thought: The Role of Gestures and Words in the Development of Engagement Skills and Social-Emotional Concepts during Toddlerhood. *Social Development,* 19(3), pp. 601-626.

van Alphen, P., 2011. Imagination as a transformative tool in primary school education. *Research on Steiner Education, Vol 2, no.2,* pp. 16-34.

Van Gogh, V., 2009. *The Night Cafe, 1888, by Vincent Van Gogh.* [Online]
Available at: https://www.vincentvangogh.org/the-night-cafe.jsp
[Accessed 8 August 2017].

Van Raemdonck, M., 2018. *Portfolio Presentation, ACTS Conference,.* Helsinki: unpublished.

Vasagar, J., 2013. Germany drops its longest word: Rindfleischeti.... *The Daily Telegraph*, 3 June, p. 2013.

Von Petzinger, G., 2015. *Why are these 32 Symbols Found in Caves All Over Europe?.* Pacific Grove, California: TED Fellows Retreet.

Vygotsky, L. S., 2004. Imagination and Creativity in Childhood. *Journal of Russian and East European Psychology,* 42(1), pp. 7-97.

Wallas, G., 2015. *The Art of Thought.* Tunbridge Wells: Solis Press.

Warder, G., 2015. *VCU Libraries - Social Welfare History Project: Horace Mann and the Creation of the Common School.* [Online]
Available at: https://socialwelfare.library.vcu.edu/programs/education/horace-mann-creation-common-school/
[Accessed 17 July 2018].

Ward-Jones, J., 2015. *Decreased Perception of Color in Depression.* [Online]
Available at: https://psychcentral.com/news/2010/07/21/decreased-perception-of-color-in-depression/15826.html
[Accessed 5 July 2018].

Waterloo Global Science Initiative, 2013. *Learning 2030.* [Online]
Available at: http://wgsi.org/learning-2030
[Accessed 25 April 2018].

Weissberg, J. W. et al., 2000. Social and Emotional Learning: A Framework for Promoting Health and Reducing Risk Behaviour in Children and Youth. *Journal of School Health,* 70(5), pp. 179-185.

Werquin, P., 2010. *Recognition of Non-Formal and Informal Learning: Country Practices,* Brussels: United Nations.

Wong, W. & Stamp, M., 2006. Hunting for Metamorphic Engines. *Journal in Computer Virology,* 2(3), pp. 211-229.

Woon-Kwong, L., 2016. *Empress Wu Zetian: an example of female power which remains relevant today.* [Online]
Available at: https://www.scmp.com/news/hong-kong/article/2054886/empress-wu-zetian-example-female-power-which-remains-relevant-today
[Accessed 16 July 2018].

Yamane, Y. et al., 2009. A neural code for three-dimensional object shape in macaque inferotemporal cortex. *Nature Neuroscience,* 11(11), pp. 1352-60.

Yukako, Y. et al., 2008. A neural code for three-dimensional object shape in macaque inferotemporal cortex. *Nature Neuroscience,* 5 October.p. 1352–1360.

Zimmer, H., 1969. *Philosophies of India.* Princeton: Princeton University Press.

Table of Figures