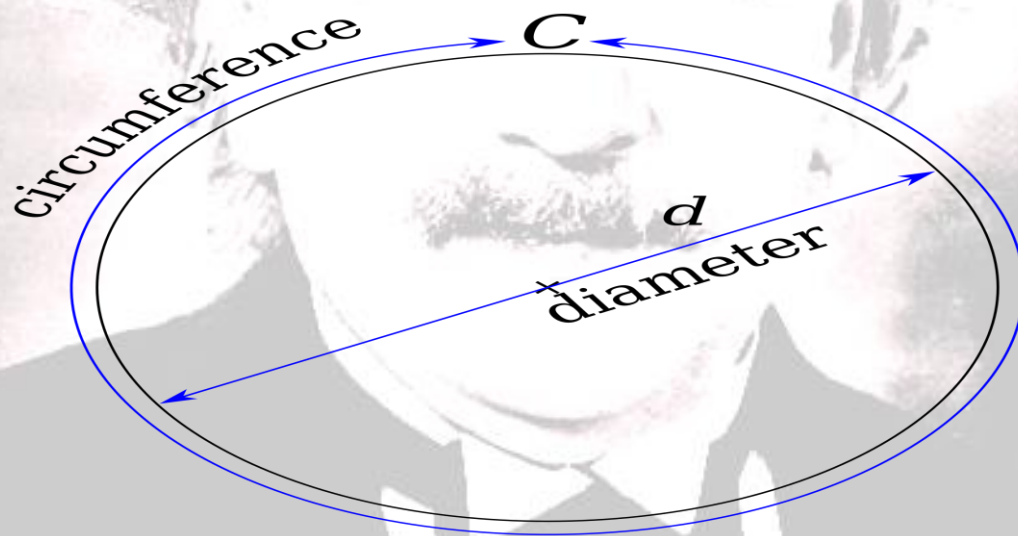




The
WORLD
INTELLIGENCE
NETWORK
ONLINE EDITION



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Introduction By The Editor, Graham Powell

Welcome to the 14th magazine to carry the name of the World Intelligence Network. During the five years of my tenure as editor of this opus, the WIN has grown from having twenty member societies, to what is now a meta-society of forty-eight groups.

The greater variety of groups has, I hope, brought a greater variety of interests that have to be catered for within the magazine. This edition has an article on the World Memory Championships, that being prompted by the date of issue, 14th March 2015. It's International Pi Day, this year's being especially significant for reasons mentioned in the article. It is also Albert Einstein's birthday, hence the picture of him as watermark for each page! I've peppered the edition with references to circles as well, which I hope will amuse and enlighten the readership.

Art also features strongly within these pages, paintings by Dr. Greg A. Grove being augmented by poetry written by our regular poets Thomas Hally, Anja Jaenicke and Therese Waneck. I have also included one of my own poems, finished only a few days ago.

Paul Edgeworth has taken centre stage once more with an extended essay on Cartesian Motion, that essay originally appearing in the 4th magazine over eight years ago. Paul Peters also delights us with a short reflective essay entitled Zen and the Art of Artistry.

This links with an interview involving the WIN's own Dr. Manahel Thabet, plus her esteemed friends Raymond Keene and Dominic O'Brien, the latter two dropping in to Dubai on their way back to England from China. All three have exciting news for WIN members!

A discussion on language has been written by our computer science expert Dr. Claus-Dieter Volko, and his essay accompanies work in a previous edition about Kurt Godel.

Finally, I hope you like the activities page. It has things to cogitate over and excite you!



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The Zen Art of Artistry, by Paul Peters.

Recent attempts to establish a contemporary art scene in China appear to be struggling to catch on. As far as commercialism goes, enough dealers have an interest in selling, but it seems that buyers are not equally eager. Although the market for luxury goods and fashion continues to grow with the obvious ups and downs, it appears that craftsmanship is what Chinese buyers are more concerned about, and not so much the contemporary characteristics that make contemporary art contemporary.

Having a better understanding and appreciation of the animistic nature of Chinese culture may provide some deeper insight beyond the surface motions of politics, the economy and social change. As the re-emergence of Traditional Chinese Medicine since the 1950s shows, many of the Chinese customs are pervaded with a sense of cultivated shamanism; and even Confucianism, once thought to have replaced old belief systems, just simply embraced the preceding, aiming to address the finer nuances of socio-political ethics. Although one can ruin one's professional career by discussing such topics too freely, to the Western mind this should not be all too uncommon as even Christianity is an animistic mystery religion, in an anthropological sense. In fact, nearly every belief system or ideology is animistic in one way or another, and modern "materialism" has only recently become de-spiritualized, with a mix of Sartre's bleak and blasé existential nihilism and the popularisation of psychoanalysis, in spite of Freud's strong distrust of unconscious inner drives and the advent of modern economical sciences with Marx's "historical materialism."

Amidst these meta-trends, contemporary art has been shaped by anti-art movements preceding the Second World War. In Germany, these anti-art movements were part of the Nazi regime's organized attempts to rewrite culture, and to enforce conformity by trying to ridicule individual expression. Architecture and sculpture were restricted to classical Greek, with heroic military themes for men and motherhood for women. Jazz and music from non-German composers were forbidden and graphic design and paintings had to fit the same propaganda. "Degenerate art" was the term used for their policy, as well as at a historical exhibition held in 1937, where the Nazi party's efforts amassed. At the exhibition, paintings were deliberately displayed in a disordered manner, jam-packed, sometimes in unframed pictures, tilted and lop-sided to add to the sense of chaos. The exposition was seen as a final blow in an attempt to reprogram public opinion, after which many works of art were carefully hidden in military bunkers and officials' private collections, or sold abroad. Lesser valuable works were burnt to keep the anti-art sentiment going.

These were dark days for social dynamics showing how people's behaviour could be moulded with enforced self-policing, where one will try to uphold the other with rules that have been imposed as 'the norm'. After leaving this period behind, attention was given to the societal function of art, and many artists developed an idea of socio-political shamanism, to provide shock treatment for the masses, to move 'the public' out of the conformity of consensus reality. Contemporary art, in a way, has been trying to establish an anti-anti-art movement due to its reactionary nature, which has a localized, timely and possibly outdated significance. However, what people say concerning art and what they actually experience is something different, and while wrongly calibrated Mayan calendars allegedly close in on the next cycle of our collective evolution with our imminent destruction, it may be time to return the muses to their respective arts and aim for a further synthesis of the figurative, visual and tangible.

After some sixty years of trying to educate, elevate and exalt 'the public', contemporary art still seems confined to a reasonably small group of artists, art historians and art critics who make up most of the gallery holders, journalists and government subsidised artists. At the top is a small self-appointed self-

glorifying art clique which actively agitates against it all, a counter-counter culture with anti-anti-anti-art movement tendencies, almost convinced their playful use of 'the big lie' somehow makes Plato's 'noble lie' look like crazy wisdom. So far, however, contrary to designer-dense 'fast arts', like fashion, jewellery, interior decorating, industrial design or creative marketing, the contemporary 'fine arts' fail to attract the 'flight to quality', which a crisis usually allows for when suppliers are trying to differentiate their offering. Obviously there is some distinction between amateur crafts and professional artistry, but as far as 'real art' goes, possibly the idea that beauty is in the eye of the beholder is only half the story.

As a reaction against the manipulation of public opinion during the anti-art era, it was thought that art does not have to be beautiful. Confusing public opinion with personal taste, beauty was understood from an anthropological perspective, more or less defined by a distinctive socio-cultural context and, while doing so, mistakes uniformity for universality. Just because the definition of beauty is malleable doesn't imply that our actual experience of it is. Studies in the areas of sensory perception, synaesthesia and neuro-aesthetics are gradually uncovering the biological foundations of our sense of beauty. At large, many facets have been uncovered in which our experience is actually the same, why we all pick out the bluest blue, or why we associate a "bouba" sound with a rounded shape, and "kiki" with a pointy one. These are not social conventions based on some form of consensus. These preferences have a biological basis originating in the workings of our sensory apparatus and the way we form such a sound. In other words, even though slight individual variations occur, the correspondences among our inter-subjective experiences are highly coherent.

If that is so, then, obviously there is a biological basis for an artist's style. And so, besides the cross-cultural influence of African art on Picasso, he also suffered ocular migraines, which caused sight to mix with underlying archetypical abstractions. Monet's case of cataracts is well-known, Degas' fading eyesight due to retinal degeneration a little less. Then we have Van Gogh's hallucinatory chromatopsia or even a mild colour-blindness, Rembrandt's aging vision, Cezanne's nearsightedness and Vermeer's astigmatism, although the latter may have been due to the use of a Camera Obscura. Maybe this demystifies the idea of the sole genius, but it also demonstrates that the artist's experience is in fact very close to our own, it is associatively affine.

Contrary to most contemporary art, these early artists are indeed popular in China and other Asian countries. And also a select few modern artists are indeed welcomed with open arms, while these have been largely neglected in the contemporary scene. The reason seems simple, as the socio-political role of Chinese art, even though clearly used for reasons of propaganda, was already established. Art and crafts have been embedded within the Chinese spiritual world since the dawn of time, while practices have been cultivated in formal systems like Feng Shui. While Western society continues to struggle with materialism and a possible behind-the-scenes puppet master who uses some illusionary tricks to make us believe we have free will, Chinese society does not deal with such issues. Although, obviously, passing through the doors of perception is a shared hurdle. Whereas contemporary art tries to glorify individuality in a disconnected world, other arts sought for the universal truth of beauty in a world of interwoven inter-subjectivity. Art is grace, dé, 德.

At the root of the Taiji, Li and Qi unite and endlessly morph in conjoined pairs of pattern and energy, order and chaos, space and time. These early artists were able to capture life's vibrancy, work with it in ways and such intensity that it makes people experience something more. Art is a physiological experience and has only little to do with how one art movement positions itself amongst others, or what some accompanying piece of paper tells you why you should think something is artful. Art is medicine. Art has been a shamanic endeavour all along, and we're nearing an era where we are rediscovering what makes this world a magical place. Art rages on at the fringes of reality. So, if you really think that much of contemporary art is ugly, that is ok, because it is. And if it makes you feel sick in some way, you may consider a career in Chinese Medicine, because you have a talent. For what it's worth, you could even become an artist.

TALK TO MOTHER

Where do I come from where have I been?
You came from inside you came from within
I caught you as a drop of blood in my bowl
You are my eyes my ears and my soul
Your values manifest the boundary of this domain
My beloved child you are my joy and my pain
Everything you do comes from my reflection
With a dust devil vortex in constant interaction
Like a fluid sperm of a time coloured face
You are the Love I have caught in my maze
A radiant beam flashing in the field of this plane
Emits energy from the stars right into your brain
Like a protective mother bear I have raised you alone
But you'll travel independently as soon as you're grown
On my breast I fed you with the sweetest milk
And I offered you grapes and I clothed you in silk
I did always cry silently when you hurt my sheet
But inwardly I rumble and I'll shake your feet
My iron heart will not quench your spoiled thirst
And when moon interacts I might as well burst
I will furiously scream in heat for my son Thor
While liquids and fire burst from my inner core
No matter if you think yourself unbound and strong
Please talk to me before you do something wrong
So dearest child act gently and wise
I am mother Gaia the sacred Goddess to stabilize.

Written by: Anja Jaenicke, Feb. 2015

SOLDIER OF WORD

I have been in a place so obscured by darkness
But I haven't been scared
I remained silent and my heart was calm
I rose up to a mountain whose summit
Unlocked the gates of heaven
And I went through the doors of artificial light
I remained silent because I was not alone
Then I saw stars falling upon the sky
Right into the pitfall of pride and ignorance
I saw men, women and children dying
They died from the drugs of wrong self perception
I still remained silent
But I cried the song of centuries without a tear
I saw creatures with eyes full of hate and greed
Longing for the carcasses of martyrdom
No I did not remain silent
I screamed outraged by so much cruel vanity
Until I heard that my scream made no noise
So I took up my arms like a soldier in battle
And reached out for pen and ink.

ANTARES

Glowing Antares brother red giant
Your sparkling colour is never silent
Be my companion for this dark night
Protected in your vicinity I fight
All the demons and all malicious fear
Five hundred light years so very near
Your spectacular light show doesn't fail
To make every shooting star look pale
Hey my friend let's stay out tonight
Let's try to set things just and right
With my intention and your gravitation
We could fight all troubles and complication
It's easy just pull me in and spit me out
With a fire sword in my hands I'll shout
Earthlings stop destruction and trouble
You live your lives in a fragile bubble
Of a sublime rotating and bent illusion
Look up at my friend and his giant fusion
Red giants and minds are somehow the same
Through their outburst they gain true fame
Their light can be seen long after they are dead
So it's true immortality man think ahead
It makes death as a concept seem like a fuss
Because there is something that will be left from us.
So earthlings look out what we leave at your porch
The fire of mind passes on the torch.

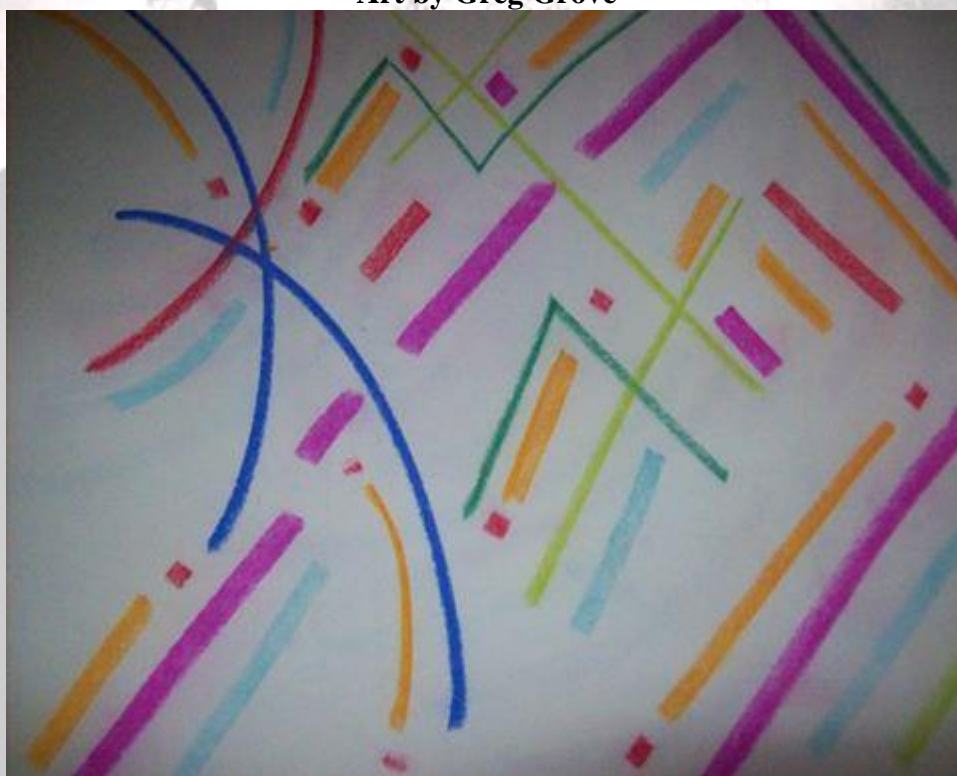
Poems by : Anja Jaenicke 2015

Poem by Therese Waneck, 2015

Umbrella Clown

A smile bright
lights up the day
and night
You look so merry!
Holding a stick
to your foot
And tilting your
head of curls
with a pot belly
at that!
Two shoes
overstuffed
Poised in a
turnout
Clumsy enough
for gaiety
Even while waiting
for rain
On the corner...

Art by Greg Grove









Formal Languages

A formal language is a set of words. This set can be either finite or infinite. If a formal language is finite, it can be specified by listing all words that belong to it. This is not possible if it is infinite. How can an infinite formal language be defined? A formalism is required. The type of formalism depends on the type of the language. Unfortunately no formalism is known that would enable one to specify any language. But for special sets of languages there are diverse, elegant formalisms.

The sets of formal languages form a hierarchy. This hierarchy is named after the American linguist Noam Chomsky. Higher languages are proper subsets of lower languages in this hierarchy. There are the following relations:

Regular languages

- ⊂ Context-free languages
- ⊂ Context-sensitive languages
- ⊂ Recursive languages
- ⊂ Recursively enumerable languages
- ⊂ General languages,

Recursive languages

- ⊂ Co-recursively enumerable languages
- ⊂ General languages.

All finite languages are regular. Moreover, languages that allow an unlimited repetition of parts of a word belong to the set of regular languages as well. Regular languages can be defined by regular expressions, that is strings which in addition to literals (characters that belong to the word) may also contain parentheses and two peculiar symbols. One of these symbols is usually expressed as the plus sign, the other as the multiplication sign. The plus sign signifies that the preceding part of the word may be omitted. Due to this, the regular expression $ab+c$ stands for the two words ac and abc . The plus sign is usually only applied to the previous literals, except in the case where several literals are embraced by a parenthesis, in which case the plus sign relates to the part of the word between the parentheses. The regular expression $a(bc)+d$ for example stands for the two words ad and $abcd$. With the multiplication sign it is quite similar; its meaning is that the marked part of the word can be repeated an unlimited number of times. The regular expression $a(bc)^*d$ creates an infinite set of words, containing the words ad , $abcd$, $abcbcd$, $abcbcbcd$, $abcbcbcbcd$ and infinitely many more.

Some readers might raise the question how is this related to computer science?

Well, actually formal languages are a central concept of theoretical computer science. Each formal language corresponds to a decision problem: Does a particular word belong to the formal language, or not? The belonging to a certain set of formal languages can be decided by a computational model, a theoretical formalism that mimicks the behaviour of a computer. In general any decision problem that can

be solved by a computer can also be solved by a Turing machine and vice versa. However, a Turing machine is not able to decide any conceivable language - it is only suitable for recursively enumerable languages. There is no known formalism for more general languages. I will talk about Turing machines later on, but now let us come back to regular languages.

Regular languages can be modelled as finite automata. An automaton is a set of states with defined transitions. There is exactly one starting state and at least one finishing (accepting) state. Any automaton begins at the starting state and reads the first literal. If there is a transition from the current state to another state with this transition accepting the literal, the transition to the new state can be made. Otherwise execution stops. A word is considered an element of the given formal language if and only if all literals have been accepted in the given order and a finishing state has been reached this way. Note that there may be more than one transition from the current state that accepts a given literal. If there are several different transitions accepting the same input, such an automaton is called non-deterministic. If such an automaton is used to check if a word is in a given language, all possible paths of execution must be considered; it is enough if a single path leads to an accepting state. The other type of automata is called deterministic; with deterministic finite automata, it is sufficient to execute them once to solve a decision problem. As the intelligent reader might suspect, deterministic automata are usually more complex than non-deterministic ones; they consist of more states. Is it possible to construct a deterministic automaton for any decision problem that can be solved by a non-deterministic automaton? Yes, it is. Since a deterministic automaton is actually a special type of a non-deterministic automaton, the opposite relation applies as well. Deterministic and non-deterministic automata have the same strength of expression. In many cases, however, it is easier to construct a non-deterministic finite automaton that accepts a given language.

The next level in the hierarchy is occupied by context-free languages. These languages can be specified by context-free grammars. There are various notations for these, one of the better known ones being the Extended Backus-Naur-Form (EBNF). It has the following syntax:

rule \rightarrow literal* rule* literal*

Again the multiplication sign means that the preceding element can be repeated an unlimited time, including zero times. This enables one to define rules such as

$A \rightarrow abc,$

which means that any occurrence of the rule A may be replaced by the string abc, but also rules such as

$A \rightarrow a B de,$

$B \rightarrow B c,$

which mean that B may be replaced by an arbitrary number of literals c and A by literal a, followed by rule B and literals de. What distinguishes this from regular languages is that several possibilities can be defined for each rule. It holds:

$A \rightarrow B|C$

is equal to

$A \rightarrow B,$

$A \rightarrow C.$

So it is possible to choose an option, and this makes it possible to describe languages that cannot be defined by regular expressions. For instance, the context-free grammar

$A \rightarrow a A b | \epsilon,$

where ϵ signifies the empty word, enables one to form the following words: $\epsilon, ab, aabb, aaabbb$ etc. There is no regular expression for this language. For this reason this is not a regular, but a context-free language.

Context-free languages can be defined by automata as well. For this purpose push-down automata are used. These work with a stack, that is a data structure that enables one to push anything onto the top of the stack any time and to derive (“pop”) the upmost element of the stack, by which this element is removed from the stack, but not to directly access any other element of the stack. Stacks are also called LIFO memories (last in, first out). A pushdown automaton uses the topmost value of the stack as an additional criterion to decide whether a particular transition is allowed. Moreover, each transition may push a new element onto the top of the stack. With such an automaton it is possible to decide whether a given word is an element of the context-free language which is represented by that automaton.

It is easy to show that such an automaton is able to model a context-free language: If the right-hand side of a rule contains only literal, the stack is not needed. If there are references to other rules on the right-hand side, the stack can be used to save where the automaton should continue after processing the rule that is referred to. For instance, if the rule A contains a reference to the rule B, the automaton processes the word following rule A until the reference is reached. Then it saves on the stack where it must continue as soon as the processing of the rule B is finished, and goes on by processing the rule B. Once that is finished, the automaton looks up on the stack to see where it must continue. After finishing the processing of the rule A it realizes that the stack is empty and ends at an accepting state.

What is missing is the proof that such a pushdown automaton is only able to process context-free languages and not also languages that appear in the next level of the Chomsky hierarchy. Of course it is possible to show that a pushdown automaton is not able to process context-sensitive languages which are not context-free at the same time. Context-sensitive languages can be defined by grammars in which literals may also appear on the left-hand side, for example

$a A b \rightarrow b C d.$

I leave the proof to the readers as an exercise. A hint: It is related to the sequential processing of the input (one literal after the other in the very order they appear in the input word). Why may this be a problem with context-sensitive languages? Would it, in theory, be possible using pushdown automata to jump back to literals that have already been processed? Why does this not suffice to define context-sensitive languages by means of pushdown automata?

A formalism that allows to jump back to already processed literals while saving the additional pieces of information needed to process context-sensitive languages via Turing machines. Turing machines are far more powerful than automata. They can have different states, process the input from left to right as well as in the other direction, and overwrite the input. A Turing machine is represented by states and transitions just like an automaton, exactly one state being the starting state and at least one state being a finishing (accepting) state. The input word is accepted when such a finishing state is reached. Which transitions are possible depends on the current state on the one hand and on the literal located at the current position of the input/output head on the other. Each transition not only defines the following state but also the value the current input data element is overwritten with and the direction where the input/output head will move next.

Turing machines allow to describe more general languages than just context-sensitive ones. Turing machines which have to either accept or reject an input but must not enter an infinite loop are also called Turing deciders. Turing deciders represent re-cursive (also called decidable) languages. If you allow a Turing machine to enter an infinite loop if the word does not belong to the language but demand from it that it accepts the word in any other case, the set of languages that can be represented is called the set of recursively enumerable or semi-decidable languages. By contrast, if the Turing machine must always reject the word if it is not in the language but may either accept or enter an infinite loop otherwise, these languages are called co-recursively enumerable; and the set of recursive languages is the intersection of recursively enumerable and co-recursively enumerable languages.

Mind Olympiads and Academies for the Gifted.

The publication date of this WIN ONE is 14th March 2015. In many parts of the world, that date is written 3.14.15. If this magazine is read at 9.26 on that date, we have evinced the first 8 digits of the number Pi. Hence, 3.14.15 has prompted a Memory Championship to be held in Singapore, plus (in a week's time) the Italian Championship, followed by an array of other memory championships throughout the year. More specifically, let us take a look at some of the events which are closely linked to the World Memory Championships. The website <http://www.world-memory-statistics.com/home.php> gives you a taste of what to expect from these occasions.

The World Memory Championship was started in 1991 by Professor Tony Buzan and chess Grand Master Raymond Keene, OBE. The current General Secretary of the championship is Chris Day, who spoke to the editor of the WIN ONE, Graham Powell, a few weeks ago. Chris is eager for people from all over the world to enter the World Memory Championship and improve the already impressive scores obtained by competitors. Chris is especially interested in members of the World Intelligence Network taking on the challenges outlined via the website <http://www.worldmemorychampionships.com/>. Also, as the ethos of the World Intelligence Network is "A meeting of minds", it seems apt that it be applied to the memory challenges. Furthermore, it is appropriate for the neurophysiological development of the WIN ONE readership, and has a background rooted in philosophical musings, such as the following by Francis Bacon in the Advancement of Learning (1605), Book II:

"The parts of human learning have reference to the three parts of man's understanding, which is the seat of learning: history of his memory, poesie to his imagination, and philosophy to his reason,"

Buzan and Keene also founded an academy in London just after the idea of the memory championships grew to fruition, a further link with the World Intelligence Network evolving via the WIN Vice President Dr. Manahel Thabet's considerable involvement in the institution, which is still known as The Gifted Academy, and which has developed significantly since her steering of it.

More importantly, as far as the WIN is concerned, Thabet and Powell are developing The Gifted Academy in Dubai. Both are qualified psychometric assessors and have the staff at The Gifted Academy in London to call upon, especially during what will be a huge cultural

change, and, above all, a push for creative and innovative development within the MENA region. This will be ably and enthusiastically backed by a team of psychologists, which includes expert assistance from the WIN President, Dr. Evangelos Katsioulis.

The Gifted Academy in Dubai will also have the goal of raising the standard of gifted student provision in schools, generating more interest in the education and development of the intellectual capital present in the area, and for fostering a greater acuteness for identifying the appropriate skills and enhancing those skills within the institutions already settled in the Emirates. It's an exciting time to be doing this, made even more so via the plethora of talent available to The Gifted Academy.

For starters, there is mnemonist Dominic O'Brien, the first winner of the World Memory Championships, and an eight-time winner of that event. He has devised courses which will improve the memory skills of the students he instructs. He is the Director of Memory Training at the Gifted Academy. Then there is Phil Chambers, the Chief Arbiter at the World Memory Championships, and the reigning World Mind Mapping champion. Chambers can also instruct students in speed reading and accelerated learning.

Ms Sabila Din instructs current and future leaders, especially women, and has immense experience of liaising with influential figures around the world on the subject of leadership development, and how to steer companies towards being the best in their sphere of operation. The major promoter of mind mapping, Tony Buzan, is also available to take sessions which will bring the latest developments and techniques within the discipline to students, and all with Buzan's immense enthusiasm for the subject.

The courses and curricula are overseen by Dr. Manahel Thabet and Graham Powell, with expert adjuncts from The Gifted Academy board member David Taylor, an expert on advising governments on large-scale evaluations. Taylor also has experience of working with the Education Ministry in Abu Dhabi.

Aside from Raymond Keene, another chess player of distinction on the board of directors is the Patron of the academy, Lord Julian Hardinge, a Godson of Queen Elizabeth II. Professor Michael Crawford is a board member (as Chancellor) his expertise being in brain nutrition, the Institute of Brain Chemistry and Human Nutrition having been set up for him at Imperial College, London, where he is the Director.

An associate of The Gifted Academy is Michael Gelb, a distinguished writer, instructor and presenter on creativity, innovation and leadership, one of his books being How to think like Leonardo da Vinci. He has been praised for his work by such notables as Murray Gell-Mann, the Nobel Laureate for Physics, and has been of global influence since 1979.

Along with The Gifted Academy, the World Intelligence Network is going through a transitional phase, the "Hand to Head" campaign starting that surge towards a more active engagement of resources both financial and cognitive to issues which require attention. This is the wish of a team at the WIN, the founder Dr. Evangelos Katsioulis leading the change of focus.

A significant factor in the current media interest in Dr. Katsioulis has been his recent inclusion in the top 50 geniuses in the world today. During 2015 the WIN should further develop activities and financing opportunities to help the transition just mentioned. Please contact the WIN if you wish to be involved, the WIN ONE and the <http://www.iqsociety.org> website, plus the social media groups, all helping to spread the updates. For those who understand Greek, the agency started by Dr.Katsioulis can be viewed on <http://www.aaaa.gr/>. We hope you have found this introduction useful, inspirational and motivational. We look forward to your positive contributions.



ΑΝΑΔΕΙΞΗ
ΑΝΑΔΗΝΑ ΑΝΩΤΕΡΗΣ ΑΕΙΟΘΗΤΗΣ

Cartesian Motion, by Paul Edgeworth

Author's Note: The following is an expanded version of an article which first appeared in Win Online Magazine, 4th Edition, October 2006.

1. Motion as Local Motion

Aristotle's natural philosophy played a significant role in scholastic philosophy and was at the center of the curriculum studied by Descartes at La Fleche. In this tradition, bodies were composed of prime matter and substantial form. It is form which differentiated one body from another. All change involves an underlying matter which is transformed and results in a new structure or form. Change is from matter which is potential to form which is fulfilled or actual. It is within such a broad definition of change that Aristotle defines motion in his *Physics* as the actuality of a thing in so far as it is in potentiality. For Descartes such an understanding of motion is both obscure and very strange.¹ In a methodology embracing the concept of clear and distinct ideas there is no room for a vague term such as potency. Descartes was determined therefore to jettison the old patterns and methods of tradition in favor of a new method better suited to understanding the world.² For Descartes, there is no reason to accept substantial forms, rather the true form or essence of a material body is its extension.³ If all there is in such a body is extension, then all change must be grounded in change from one place to another. Motion then for Descartes is local motion, the change of place. This is a radical advance, indeed, for Descartes is substituting for the complicated explanations of the scholastics with their forms and quiddities, a single account of nature in terms of position and changes in position.⁴ Descartes has thus substituted the unclear and complex definition of motion as found in Aristotle for the clear and distinct idea of local motion.⁵

Again, when people say that motion . . . is 'the actuality of a potential being, in so far as it is potential,' do they not give the impression of uttering magic words which have a hidden meaning beyond the grasp of the human mind? For who can understand these expressions? Who does not know what motion is? Who would deny that these people are finding a difficulty where none exists? It must be said, then, that we should never explain things of this sort by definitions, in case we take hold of composite things instead of simple ones. Rather, each of us, . . . must attentively intuit those things which are distinguished from all others.⁶

¹Rene Descartes, *The Philosophical Writings of Descartes*, vol. I. trans. John Cottingham, Robert Stoothoff, and Dugald Murdoch (Cambridge: Cambridge Univ. Press, 1985), 94. Hereinafter referred to as CSM I.

²John Deely, "What Happened to Philosophy Between Aquinas and Descartes?," *The Thomist* 58 (1994): 558.

³*The World, Chapter 6*, CSM I 92; AT XI 36.

⁴Marjorie Grene, *Descartes* (Minneapolis: Univ. of Minnesota Press, 1985), 55-56.

⁵It is a fundamental requirement for Descartes that all the terms used in philosophy and physics reflect the clear and distinct perceptions of the mind when it is freed from the lumber of preconceived opinions and guided only by careful rational reflection. See John Cottingham, *Descartes* (New York: Basil Blackwell, 1986), 7.

⁶*Rule 12*, CSM I 4; AT X 426.

While Descartes does not attempt a definition of motion in the *Rules* as just stated above, he does, however, provide one in *The World*. It is by now the familiar one of local motion. Descartes says, “For my part I am not acquainted with any motion except that which is easier to conceive than the lines of the geometers— the motion which makes bodies pass from one place to another and successively occupy all the spaces which exist in between.”⁷ Gone then for Descartes are the motions posited by the philosophers such as “*motus ad formam*,” “*motus ad calorem*,” “*motus ad quantitatem*,” and numerous others.⁸

2. Motion as Transference and Mode

The definition of motion as local motion is further refined by Descartes in his *Principles of Philosophy, Part Two*. Here he distinguishes between the ordinary sense of motion and the strict sense of the term. Motion in the ordinary or common sense of the term is simply “*the action by which a body travels from one place to another*.”⁹ Again, this is the familiar concept of local motion taken as self-evident and undefined, i.e., a simple nature. On the other hand, if we consider motion “in accordance with the truth of the matter,” we must say that “*motion is the transfer of one piece of matter, or one body, from the vicinity of the other bodies which are in immediate contact with it, and which are regarded as being at rest, to the vicinity of other bodies*.”¹⁰ In the common definition, motion is an action, whereas in the strict definition motion is conceived as a transference. Indeed, Descartes tells us that we commonly think that all motion involves action whereas rest consists in the cessation of action. But Descartes is rejecting the conception of motion involving the activity by which any body passes or travels from one place to another.¹¹ Gone then is a view of motion which entails an inner energy or force in the body causing its local motion.¹² By use of the term transfer, Descartes wants to make clear to us that motion is always in the moving body; thus, it is a mere mode of that thing.¹³ He goes on to tell us that he wants to divest us of the belief that more action is needed for motion than for rest. For “we will easily get rid of this preconceived opinion if we consider that it takes an effort on our part not only to move external bodies, but also, quite often, to stop them, when gravity and other causes are insufficient to arrest their movement.”¹⁴ Thus no more action is needed for motion than for rest.

⁷Chapter 7, CSM I 94; AT XI 40.

⁸*Ibid.*, 94; AT XI 39.

⁹*Principles, II*, 24, CSM I 233; AT VIIIA 53.

¹⁰*Ibid.*, 25, CSM I 233.

¹¹Thomas L. Prendergast, “Descartes and the Relativity of Motion,” *The Modern Schoolman* 49 (1972): 66.

¹²*Ibid.*, 67.

¹³“The transfer which I call ‘motion’ is no less something existent than shape is: It is a mode in a body.” See *Letter to More, August 1649*, in Rene Descartes, *The Philosophical Writings of Descartes*, vol. III, *The Correspondence*. trans. John Cottingham, Robert Stoothoff, Dugald Murdoch, and Anthony Kenny (Cambridge: Cambridge Univ. Press, 1991), 381; AT V 403. Vol. III is hereinafter referred to as CSMK III.

¹⁴*Principles, II*, 26 CSM I 234; AT VIIIA 54.

Furthermore, in order to assign a definite nature to motion, Descartes finds it necessary to furnish a definition such that motion is understood as relative to a set of contiguous bodies considered at rest.¹⁵ Accordingly, while there is no absolute motion in Descartes' view, because a change in place can only be determined by regarding a certain point as fixed, nevertheless, he is able to assign motion to certain bodies by establishing a frame of reference, i.e., contiguous bodies considered at rest.¹⁶ That such an account leads to relationalism is confirmed when Descartes tells us, "we cannot understand that a body AB is transferred from the vicinity of a body CD without simultaneously understanding that CD is transferred from the vicinity of AB."¹⁷ He furthermore tells us, "we will remember that whatever is real and positive in moving bodies— that in virtue of which they are said to move— is also to be found in the other bodies which are contiguous with them, even though these are regarded merely as being at rest."¹⁸ Predicated upon this, the choice of which bodies are at rest or in motion is arbitrary or relative to different frames of reference.¹⁹ However, Descartes is presuming that rest and motion are not only distinct but opposing states of bodies, such a qualitative difference would not only appear to run afoul of relationalist doctrine, but moreover simply could not be countenanced on any strict relational theory.²⁰

Based on the foregoing, we can see that Descartes is distinguishing between action and rest, that motion is a mode of a body, and that transference of a body takes place from one vicinity of bodies that touch it to another vicinity of bodies that will border it. Therefore we can see that action and rest are to be understood as opposites; and to say that motion is a mode of body is to identify it as an attribute of body and to distinguish it from the cause of motion in the body; and that to enter upon a discussion of vicinities of bordering bodies is to make clear the distinction between what is in motion and what is at rest; and that furthermore such a distinction is indeed real for Descartes, and not just arbitrary. Descartes, accordingly, found it necessary to expound upon a strict definition of motion in order to insure that motion would serve to account for all variety in matter.

The matter existing in the entire universe is thus one and the same, and it is always recognized as matter simply in virtue of its being extended. All the properties which we clearly perceive in it are reducible to its divisibility and consequent mobility in respect of its parts, and its resulting capacity to be

¹⁵Prendergast, 67.

¹⁶Ibid.

¹⁷Edward Slowik, "Descartes' Quantity of Motion: 'New Age' Holism meets the Cartesian Conservation Principle," *Pacific Philosophical Quarterly* 80 (1999): 192; *Principles, II*, 29, CSM I 235; AT VIII A 56.

¹⁸*Principles, II*, 30, CSM I 236; AT VIII A 57.

¹⁹Edward Slowik, *Cartesian Spacetime: Descartes' Physics and the Relational Theory of Space and Motion* (Dordrecht: Kluwer Academic, 2002), 141.

²⁰Ibid., 142; In *The World, Chapter 7*, Descartes states, "For my part, I conceive of rest as a quality too, which should be attributed to matter while it remains in one place, just as motion is a quality attributed to matter while it is changing place." See CSM I 94; AT XI 40.

affected in all the ways which we perceive as being derivable from the movement of the parts. If the division into parts occurs simply in our thought, there is no resulting change; any variation in matter or diversity in its many forms depends on motion.²¹

3. The Cause of Motion

We have just said above that motion is a mode of body and is to be distinguished from the cause of motion. What then is the cause of motion? For Descartes, it is God who first moved matter in different ways and who now conserves the world with the same amount of motion.²² In *The World*, he tells us that God created matter in motion and now continues to preserve it in the same way that he created it.²³

²¹*Principles, II, 23*, CSM I 232; AT VIIIA 53.

²²“I agree that ‘if matter is left to itself and receives no impulse from anywhere’ it will remain entirely still.” *Letter to More, August 1649*, CSMK III 381; AT V 404. To which we can add that if there were no motion, the world would be the uniform plenum of Parmenides and Melissus. See Stephen Menn, *Descartes and Augustine* (Cambridge: Cambridge Univ. Press, 1998), 365.

²³*Chapter 7*, CSM I 92; AT XI 37. We should always bear in mind that God’s actions are eternal or non-temporal. It therefore makes no sense to think of God first creating the universe and then conserving it; rather, it is one and the same atemporal act on his part to create/conservate the universe. See Desmond M. Clarke, *Descartes’ Philosophy of Science* (University Park: Pennsylvania Univ. Press, 1982), 91. But can such a view be reconciled with Descartes’ frequent references to “In the Beginning” (*Principles, II, 36*, CSM I 240; AT VIIIA 61, for example), which infers a creation that is temporal? Indeed, in a *Letter to Mersenne, 27 May 1630*, he appears to hold both views simultaneously:

You ask me by what kind of causality God created the eternal truths. I reply: by the same kind of causality as he created all things, that is to say, as their efficient and total cause. . . . You ask also what necessitated God to create these truths; and I reply that he was free to make it not true that all the radii of the circle are equal — just as free as he was not to create the world. And it is certain that these truths are no more necessarily attached to his essence than are other created things. You ask what God did in order to produce them. I reply that from all eternity he willed and understood them to be, and by that very fact he created them. Or, if you reserve the word created for the existence of things, then he established them and made them. In God, willing, understanding and creating are all the same thing without one being prior to the other even conceptually (CSMK III 25-26; AT I 151-53).

In the above passage, we are immediately struck by the presence of a temporal/atemporal gestalt switch. What seems to predominate, however, is the sense of a radical, ontological dependence on God. Colin Brown tells us that although Descartes can oftentimes be seen to be drawing upon the legacy of the Middle Ages, there is a sense in which he represents a new departure. For Descartes was interested in God not for his own sake, but rather for the sake of the world. Descartes invokes God as a kind of *deus ex machina* to guarantee the validity of our thought about the world. Apart from this use, God remains eternally standing in the wings. It is not surprising then that later philosophers who shared in Descartes’ assumptions, would then proceed to dispose of this unwanted prop entirely. See *Philosophy & the Christian Faith: A Historical Sketch from the Middle Ages to the Present Day* (Downers Grove, Ill: InterVarsity Press, 1968), 52.

In order to understand this better, recall that among the qualities of matter, we have supposed that its parts have had various different motions from the moment they were created, and furthermore that they are in contact with each other on all sides without there being any void between any two of them. From this it follows necessarily that from the time they began to move, they also began to change and diversify their motions by colliding with one another. So if God subsequently preserves them in the same way that he created them, he does not, preserve them in the same state. That is to say, with God always acting in the same way and consequently always producing substantially the same effect, there are, as if by accident, many differences in this effect. And it is easy to accept that God, who is . . . immutable, always acts in the same way. But without involving myself any further in these metaphysical considerations, I shall set out two or three of the principle rules according to which it must be thought that God causes the nature of this new world to operate. These, I believe, will suffice to acquaint you with all the others.²⁴

Because God is immutable, he will always operate in a manner that is immutable. If such is the case, there will be a definite design or pattern and it could not be otherwise. “[W]ithout basing my arguments on any principle other than the infinite perfections of God, I tried to demonstrate all those laws about which we could have any doubt, and to show that, even if God created many worlds, there could not be any in which they failed to be observed.”²⁵ Thus from God’s immutability and the fact that he also acts in the same way, Descartes derives three rules or laws of nature.

4. The First Rule of Nature and Its Consequences

The first of these as stated in *The World* is “that each individual part of matter continues always to be in the same state so long as collision with others does not force it to change that state.”²⁶ Once again in this paper, we see that Descartes is referring to motion as a state, and if the distinction did not yet have meaning for us, it would manifest itself to us when he goes on to tell us that the motion of which the philosophers, i.e., Aristotle and the scholastics, speak has a strange nature, “for whereas all other things have their perfection as an end and strive only to preserve themselves, it has no other end and no other goal than rest and, contrary to all the laws of nature, it strives of its own accord to destroy itself.”²⁷ If we unpack this sentence carefully, we see that Descartes is repudiating a teleological approach to nature. Hence there is no final cause for

²⁴*The World, Chapter 7*, CSM I 93; AT XI 37-38.

²⁵*Discourse on the Method, Part Five*, CSM I 132; AT VI 43.

²⁶*Chapter 7*, CSM I 93; AT XI 38.

²⁷*Ibid.*, 94; AT XI 40.

Descartes. There is no “striving” for earth or fire to reach their natural places in the cosmos. Motion is a state and not a process of passing from one state to another, such as the emergence from potency to act, as it is for Aristotle. As a process, it is something that will come to an end or in Descartes’ words “destroy itself.” Motion then in this sense is the process of acquiring or of losing.²⁸ In becoming an oak, the acorn no longer exists. That is to say, for Aristotle, it is natural that a body tends to come to rest. For Descartes, if a body comes to rest, it does not do so on its own. The common notion that a moving body slows down and stops of itself is a prejudice formed in infancy and is the result of an uncritical judgment based on sense experience.²⁹ Motion in the larger sense as envisioned by Aristotle is biological. In contradistinction, Descartes’ model of motion is mechanical in nature.³⁰ Since motion is regarded as only the displacement of body and not as a change in it, motion is now considered as a mechanical phenomenon and not as a biological process.³¹ Descartes is more interested in the size or speed, i.e, quantitative properties, of a body in motion than in any changes that may be occurring in the material body itself, i.e, qualitative properties.³² Such a notion on Descartes’ part, in turn, represents a significant advance over the traditional views of natural philosophy.

5. The Second Rule of Nature and Its Consequences

The second law put forth by Descartes in *The World* is “that when one body pushes another it cannot give the other any motion unless it loses as much of its own motion at the same time; nor can it take away any of the other’s motion unless its own is increased as much.”³³ If we do not immediately grasp the implication of this rule, Descartes quickly points out to us its significance. “For, having supposed the preceding rule, we are free from the difficulty in which the Schoolmen find themselves when they wish to explain why a stone continues to move for some time after leaving the hand of one who threw it.”³⁴ What Descartes is doing here is repudiating the necessity for any theory of impetus. He is pointing to the superiority of his account over the traditional

²⁸James A. McWilliams, “Aristotelian and Cartesian Motion,” *The New Scholasticism* 17 (1943): 315.

²⁹S.V. Keeling, *Descartes* (London: Oxford Univ. Press, 1968), 150.

³⁰In fact, in the *Discourse on the Method, Part Five*, he tells us that the laws of mechanics are identical with the laws of nature. See CSM I 139; AT VI 54.

³¹S.M. Bhawe, “Descartes: Epitome of Scientific Revolution,” *Indian Philosophical Quarterly* 26 (1999): 535.

³²But bear in mind what has been said on previous pages herein.

³³Chapter 7, CSM I 94; AT XI 41.

³⁴*Ibid.*, 95.

accounts of continued projectile motion.³⁵ Aristotelians were in disagreement about how to account for the continued motion of projectiles, and their accounts were based upon a distinction between terrestrial and celestial motions, but here Descartes changes the question so that now it becomes one of explaining why the motion of the projectile decays rather than why it continues to move, and the answer, is found to be the air's resistance.³⁶

6. The Conservation of Motion Law

Before proceeding to the third law, Descartes tells us that the first two laws follow from the fact that God is immutable. He then makes the following interesting statement. "For supposing that God placed a certain quantity of motion in all matter in general at the first instant he created it, we must either admit that he always preserves the same amount of motion in it, or not believe that he always acts in the same way."³⁷ What Descartes is providing us with here, even though he does not explicitly label it as such, is a conservation law, one in which the quantity of all motion in the cosmos is conserved. It should be noted that the conservation of total quantity of motion in the universe seems to be logically prior to the laws of nature, that is to say, the conservation principle forms the foundation for the three laws of nature which describe the basic motions of material bodies in the plenum.³⁸ Since God is immutable and acts immutably, Descartes determines that the quantity of motion in nature does not change. It is a positive quantity that neither increases nor decreases, but remains constant. While God was free to choose how much motion he originally put in the world, his immutability assures that he will continually sustain exactly the same quantity of motion for all eternity.³⁹ If we are perplexed as to what the term "quantity" entails, Descartes clarifies it for us in his *Principles of Philosophy, Part two, Article 36*, where he states the following:

But nevertheless it [motion] has a certain determinate quantity; and this, we easily understand, may be constant in the universe as a whole while varying in any given part. Thus if one part of matter moves twice as fast as another which is twice as large, we must consider that there is the same quantity of motion in each part; and if one part slows down, we must suppose that some other

³⁵Stephen Gaukroger, *Descartes: An Intellectual Biography* (Oxford: Clarendon Press, 1995), 243.

³⁶*Ibid.*

³⁷*The World, Chapter 7*, CSM I 96; AT XI 43.

³⁸Slowik, "Descartes' Quantity of Motion: 'New Age' Holism meets the Cartesian Conservation Principle," 181.

³⁹Andrew Pavelich, "Descartes's Eternal Truths and Laws of Motion," *The Southern Journal of Philosophy* 35 (1997): 528.

part of equal size speeds up by the same amount. For we understand that God's perfection involves not only his being immutable in himself, but also his operating in a manner that is always utterly constant and immutable.⁴⁰

So if we were unsure as to the meaning of the term "quantity," and therefore what was conserved in totality, Descartes has now told us that it is "size times speed." Letting size = S and speed = V , and keeping in mind what Descartes has told us above, namely, that when one part of matter moves twice as fast as another which is twice as large there is the same amount of motion in the smaller as in the larger, we can then refine our formula to read as follows: $Q = \sum_i S_i V_i = \text{Constant}$, where the subscript "i" is used to express a range over all parts of matter in the universe.⁴¹ The larger a body is, the greater is its persistence to remain in motion or at rest, and the greater is its resistance to another body; likewise, the faster a body moves, the greater is its persistence to remain in motion, and the greater is its resistance to another body.⁴² It is this formula that maintains the total quantity of motion in the world. Such a formula is not surprising in a philosophy which designates extension as the essence of matter. In such a system, the Newtonian concept of mass would be incomprehensible, or perhaps we should say that "mass" when viewed as designating an inertial resistance to change would have been identified by Descartes with spatial volume or extension and nothing more.⁴³ Though we now know that Descartes was not altogether correct, his conclusions constituted the first published statement of a conservation principle and the first clear version of what Newton would term the principle of inertia.⁴⁴

7. The Third Rule of Nature and Its Consequences

Descartes adds, as a third rule, "when a body is moving, even though its motion for the most part takes place along a curved path . . . each of its parts individually tends always to continue moving along a straight line."⁴⁵ This follows from God's preserving each thing precisely as it is at the instant he preserves it. Only motion in a straight line, Descartes tells us, "is entirely simple and

⁴⁰CSM I 240; AT VIIIA 61.

⁴¹Despite his stress on the mathematical notion of quantity as the key to physics, Descartes never commits himself to the thesis that in order to do good science one must actually supply detailed formulae for calculation in respect of the phenomenon to be explained. See Cottingham, 89.

⁴²Richard J. Blackwell, "Descartes' Laws of Motion," *Isis* 57 (1966): 225.

⁴³*Ibid.*, 233.

⁴⁴Daniel Garber, *Descartes Embodied: Reading Cartesian Philosophy Through Cartesian Science* (Cambridge: Cambridge Univ. Press, 2001), 26.

⁴⁵*The World, Chapter 7*, CSM I 96; AT XI 43-44.

has a nature which may be wholly grasped in an instant.”⁴⁶ For to conceive circular motion it is necessary to conceive at least two of its parts and hence at least two instants. While God is the author of all motions in the world and in so far as they are rectilinear, “it is the various dispositions of matter which render them irregular and curved.”⁴⁷ Here Descartes clearly states that the tendency to move in a straight line is owing to God alone, but he does not assign to him responsibility for the irregular states that bodies take.⁴⁸ Rather, Gary Hatfield calls to our attention that there are two factors that determine these paths, i.e., the laws of nature and the various arrangements of matter throughout the plenum. Since the laws of nature are direct manifestations of God’s activity, they must be attributed to him. Therefore, it appears that God must not be responsible for the patterns of particles. But if each pattern proceeds from a previous pattern according to the laws of nature, then it must be that God is not responsible for the sizes and speeds of the particles — “the various dispositions of matter” — at the creation. Thus God is seen to have created a chaotic universe which sorts itself out in the ordinary course of nature.⁴⁹ While God then is the cause behind each motion, he is not then responsible for the fact that some one pattern of motions has occurred rather than another.⁵⁰ While the laws of nature will always be the same, there is still a place for chance, that is to say, *per accidens*.

8. Theological Implications of Curvilinear Motion

Immediately following his statement in *The World* concerning the disposition of matter and irregular motion, Descartes presents us with an interesting analogy that affords us insight into his distinctive theology. For he tells us, “Likewise, the theologians teach us that God is also the author of all our actions, in so far as they exist and in so far as they have some goodness, but it is the

⁴⁶Ibid.; AT XI 45.

⁴⁷Ibid., 97; AT XI 46.

⁴⁸Gary C. Hatfield, “Force (God) in Descartes Physics,” *Studies in History and Philosophy of Science* 10 (1979): 128.

⁴⁹It was Descartes view that the present state of the world can be explained if we imagine an initial state of disorder which sorts itself out into swirls of fluid by way of the laws of motion. These swirls or vortices are what Descartes identifies with planetary systems, with a sun at the center of each and planets circling about. Essential to such an account is the assumption that all motion produces circular motion which derives from the doctrine of the plenum. See Garber, *Descartes Embodied*, fn 24, 27. See *Principles, II*, 33, CSM I 237-39; AT VIIIA, 58-59, and also *Principles, III*, 46ff., CSM I 256ff.; AT VIIIA, 100ff.

⁵⁰Hatfield, 128-29.

various dispositions of our wills that can render them evil.”⁵¹ What appears to be happening here is a comparison between the curvilinear on one hand and evil actions on the other. God as we have seen is responsible for the tendency of matter to move in a rectilinear motion. But God is not the only cause of motion. Human minds (and the minds of angels) possess this capacity as well. And just as two human beings can exert contrary impulses on the same piece of matter, so too can our minds impose an impulse contrary to what God imposes.⁵² God is the author of all that is good. In so far as man is the author of actions that may be contrary to those of God, he may indeed be the cause of evil. Thus God can leave plenty of elbow room for other causes to produce their effects.⁵³ Stephen Gaukroger provides additional insight into the theological implications of what Descartes is saying when he points out that while God provides the power or force for a body to move, it is the diverse dispositions of the surrounding bodies that are responsible for the resulting paths of those bodies. And, of course, God knows what the dispositions of surrounding bodies are, just as he knows what the dispositions of our wills are. Therefore, Gaukroger asserts that Descartes wants us to draw the rather orthodox conclusion that just as God knows the dispositions of our wills does not mean that he is responsible for what we do, so too then, just because he knows the dispositions of bodies does not mean that he is responsible for particular motions, as he would be if the world followed some divine plan down to the last detail.⁵⁴ Things can really become complicated if God does not will curvilinear motion. For Descartes holds that the will and intellect are identical in God.⁵⁵ If this is the case then God does not will or know the circular universe, and this is the universe that we as human beings inhabit. In so far then as the human good is concerned with bodily health, we are then on our own.⁵⁶

9. Distinction between *Secundum Esse* and *Secundum Fieri*

Mark O. Gilbertson points out an interesting distinction between God’s causation of being

⁵¹Chapter 7, CSM I 97; AT XI 46.

⁵²Daniel Garber, “How God Causes Motion: Descartes, Divine Sustenance, and Occasionalism,” *The Journal of Philosophy* 84 (1987): 579.

⁵³*Ibid.*, 569.

⁵⁴*Descartes: An Intellectual Biography*, 248-49.

⁵⁵And even his [God’s] understanding and willing does not happen, as in our case, by means of operations that are in a certain sense distinct one from another; we must rather suppose that there is always a single identical and perfectly simple act by means of which he simultaneously understands, wills, and accomplishes everything.” See *Principles, I*, CSM I 201; AT VIIIA 14.

⁵⁶In the *Discourse, Part Six*, Descartes tells us that we are to make ourselves “the lords and masters of nature. This is desirable . . . most importantly, for the maintenance of health, which is undoubtedly the chief good and the foundation of all the other goods in this life.” CSM I 143; AT VI 62.

and God's causation of motion, for in the former case God can be viewed as the substantial cause of all that is, whereas in the latter case, we see God acting by way of impulse⁵⁷ to produce motion in matter. Motion as we have seen is a mode of matter, and for Descartes, God as a modal cause of motion substitutes for the abandoned substantial forms of scholasticism. God's acting as a substantial cause of being and as a modal cause of motion involves his being the only such cause in the former case, but not so in the latter. Thus, for Descartes, there are genuine finite causes, especially us.⁵⁸ Gilbertson's distinction was, of course, earlier pointed out in Garber's work who, in turn, tells us that Descartes in defending himself against Gassendi's criticisms drew upon Thomas Aquinas's *Summa Theologiae* I, q 104, a 1, wherein Aquinas distinguishes between causes *secundum fieri*, a cause of becoming, and *secundum esse*, a cause of being.⁵⁹ Garber goes on to state that roughly speaking Descartes understood *causa secundum esse* as a cause which must continue to act for its effect to continue, unlike *causa secundum fieri* which produces an effect that endures. The significance of this distinction being that whereas finite things might be able to stand as efficient causes *secundum fieri* of things in the world, only God can stand as their cause *secundum esse*.⁶⁰

To reiterate, Descartes is telling us that God is the cause of all motion in the world, and that any change that occurs is the result of bodies colliding with each other and their resultant patterns. Gone then is final cause and in its place we find instead a series of efficient causes (which can themselves be understood at best as modal causes) going back to God who can be viewed as acting in one case as a modal cause, and in the other as the substantial cause and first efficient cause. It is not therefore the final cause, but rather the efficient causes of created things that Descartes says we must inquire into.

When dealing with natural things we will, then, never derive any explanations from the purposes which God or nature may have had in view when creating them < and we shall entirely banish from our philosophy the search for final causes >. For we should not be so arrogant as to suppose that we can share in God's plans. We should, instead, consider him as the efficient cause of all things; and starting from the divine attributes which by God's will we have some

⁵⁷God's impulse can be viewed analogously as an act of will, just as in ourselves we seem to will ourselves to move.

⁵⁸"Descartes on God's Creative Activity," *Southwest Philosophy Review* 5 (1989): 17-18.

⁵⁹Garber, "How God Causes Motion: Descartes, Divine Sustenance, and Occasionalism," 573.

⁶⁰*Ibid.*, 569-70.

knowledge of, we shall see, with the aid of our God-given natural light, what conclusions should be drawn concerning those effects which are apparent to our senses.⁶¹

10. The Three Rules as Laws of Nature

In *The Principles*, the laws as given above are presented in a different order. More significant, however, is a distinction which Descartes offers to us in *Part Two, Article 36*. Here Descartes states that the universal and primary cause of motion is God, but then he goes on to tell us that there is a particular cause “which produces in an individual piece of matter some motion which it previously lacked.”⁶² These particular causes then are nothing other than the universal principles of nature which we have seen discussed above as the three laws of motion. It is through these universal principles of nature that the total quantity of motion is distributed amongst individual material bodies. The changes that occur in the many parts of matter cannot, Descartes tells us, be attributed to the action of God since such action never changes. Therefore, Descartes attributes these changes to nature, and the rules by which these changes take place he calls the “laws of nature.”⁶³

11. Mathesis Universali

Based on the foregoing, we can say that Descartes supposed that material bodies are characterized entirely by extension, and that they moved in accordance with the laws of motion. He is interested in the simple nature of things, and for him Aristotle’s definition of motion could not constitute a simple nature. Descartes, above all, “delighted in mathematics, because of the certainty and self-evidence of its reasonings,”⁶⁴ and in his *Discourse*, we see him developing a method whereby he could apply mathematics to non-mathematical phenomenon.⁶⁵ This is in marked contrast to Aristotle. In his *Physics, Bk II, Ch.2*, Aristotle distinguishes between the physical and the mathematical. They, of course, belong to different genera; accordingly, mathematics cannot be used to explain phenomena that occur in nature such as the motion of bodies. But, for Descartes, this is not the case. In *Rules for the Direction of the Mind*, he tells us, under *Rule 4*, that the

⁶¹*Principles, I*, 28, CSM I 202; AT VIII A 15-16.

⁶²CSM I 240; AT VIII A 61.

⁶³*The World, Chapter 7*, CSM I 93; AT XI 37.

⁶⁴*Discourse on the Method, Part One*, CSM I 114; AT VI 7.

⁶⁵*Part Three*, CSM I 126; AT VI 30.

exclusive concern of mathematics is with order or measure and that it is irrelevant whether the measure involves numbers, shapes, stars, or sounds, for “there must be a general science which explains all the other points that can be raised concerning order and measure irrespective of the subject-matter, and . . . this science should be termed *mathesis universalis*.”⁶⁶ Thus, Descartes is saying that all sciences are to be taken together and that mathematics is the method that will pertain to them universally. Specifically, as related to physics and mathematics, he says in *Principles of Philosophy, Part Two*, in *Article 64*, that the only principles required in physics are those of geometry and pure mathematics, and that such principles explain all natural phenomena.⁶⁷ It is pronouncements such as this which leads Diogenes Allen to state that Descartes was deeply impressed with the clarity and certainty which is achieved in mathematics, especially in geometry, with its self-evident axioms and clearly formulated demonstrations unmatched in any other subject.⁶⁸ Accordingly, this led Descartes to seek the same clarity and certainty of mathematics in other subjects. This was to be done by adapting the procedures of mathematics into a method suitable for the search for first principles and then, on the basis of these principles to study nature itself.⁶⁹ Descartes’ picture of the world therefore did a great deal to establish the idea of a physical world which is fundamentally of a mathematical character and which, in turn, permits mathematical physics to be done.⁷⁰

12. The Key to Cartesian Physics

In such a mixed science certainly much has been gained, but we must always bear in mind that something has been lost as well. Because there is no final causality in mathematics, a mathematical physics denies final causality in nature as well. Gone are Aristotle’s prime mover, final and formal causality, and the sense of a material substrate in which a formal cause operates. But Descartes could not eliminate an important role for God which, as we have seen, consists in being the first efficient cause for everything which happens in the world. Indeed, we can even go much further and say that for Descartes God was at the foundation of his system, and that he did not leave us with a Godless world; rather, his world was made by God and our knowledge of it is

⁶⁶CSM I 19; AT X 378.

⁶⁷CSM I 247; AT VIIIA (78).

⁶⁸But readers who turn to Descartes’ scientific writings expecting detailed geometrical measurement, arithmetical calculation, or algebraic formulae will be disappointed; indeed, it is the paucity of such mathematical workings that distinguish Descartes’ physics when compared with the work of Galileo, for example. See Cottingham, 88.

⁶⁹*Philosophy for Understanding Theology* (Atlanta: John Knox Press, 1985), 172.

⁷⁰Bryan Magee, *The Great philosophers: An Introduction to Western Philosophy* (Oxford: Oxford Univ. Press, 1987), 88.

guaranteed by God Himself.⁷¹ In studying the laws which govern the world, we are, in turn, developing our appreciation of God's immutability; accordingly, Descartes laws of nature can be said to make more explicit what can be known *a priori* concerning God and what he has created.⁷² The key then to Cartesian physics is to recognize that the laws of nature are the consequence of God's immutability rather than merely being the result of his ordination, for they are the consequence of the kind of activity God must exercise in virtue of what he is.⁷³ Matter depends on divine mind, or supermind, for its existence, and motion is conceived as imparted to matter by a divine fiat.⁷⁴ For Descartes then there are no contingencies in his laws of nature. These are the only conceivable laws of nature. These laws would be present even if God made many worlds. This does not appear to be very scientific or mathematical. Rather, it appears to be an approach designed not to permit gaps or contingencies in which a Biblical God can re-enter upon the scene. What Descartes appears intent upon accomplishing in the final analysis is to develop a new science in which the world (and human life itself) can be understood without reference to the aforementioned Biblical God. Descartes thus relies upon the immutability of God to set things apace and then appears conveniently to set him aside. However, once Descartes has established the existence of God, he is in possession of the possibility of progressing beyond such isolated flashes of cognition and then can proceed with building up a systematic body of knowledge, or as Descartes puts it, he can move from *cognitio* (mere cognition) to *scientia* (stable cognition).⁷⁵ A superhuman mind at work has therefore been used to set things up and to will all motions to occur. "For what more firm and solid foundation could one find for establishing a truth, even if one wished to choose it at will,

⁷¹Ibid., 91.

⁷²Alan Nelson, "Micro-Chaos and Idealization in Cartesian Physics," *Philosophical Studies* 77 (1995): 386.

⁷³Blake D. Dutton, "Indifference, Necessity, and Descartes's Derivation of the Laws of Motion," *Journal of the History of Philosophy* 34 (1996): 208.

⁷⁴Charles Hartshorne, *Insights & Oversights of Great Thinkers: An Evaluation of Western Philosophy* (Albany: State Univ. of New York Press, 1983), 112-13.

⁷⁵Cottingham, 70. See also *The Philosophical Writings of Descartes*, vol. II. trans. John Cottingham, Robert Stoothoff, and Dugald Murdoch (Cambridge: Cambridge Univ. Press, 1984), *Second Set of Replies*, 101, where Descartes states the following:

The fact that an atheist can be 'clearly aware that the three angles of a triangle are equal to two right angles' is something I do not dispute. But I maintain that this awareness of his is not true knowledge since no act of awareness that can be rendered doubtful seems fit to be called knowledge (AT VII 141).

It is arguments such as this that would help to answer influential people who claimed that Descartes new teaching was atheistic. See Tom Sorrell, *Descartes: A Very Short Introduction* (New York: Oxford Univ. Press, 1987), 65.

than the very firmness and immutability which is in God?”⁷⁶ But then perhaps an atheist would assert at this point that there may be many universes which come into being and that constants which make conditions possible for life to emerge might get reset, and that laws that might be deemed necessary will look well designed and set in motion in what may very well turn out to be chance in a huge sequence of Empedoclean dice rolls. To which we might then reply that little or no light can be thrown on the puzzle of how the many different values in many persons and many animals, perhaps on many different planets [and many different universes as well], can add up to a significant whole, unless there is a form of life [i.e., divine] that includes all lives and survives all deaths [whether of individuals or species, worlds or universes].⁷⁷ As we strive then to make manifest the background of distinctions of worth we define ourselves by [and the world and the things in it], is what we are articulating ultimately to be understood as our human response to our condition, or is our articulation striving rather to be faithful to something beyond us?⁷⁸

⁷⁶*The World, Chapter 7*, CSM I 96; AT XI 43. This statement also causes us to pause and ask did Descartes just make it up to get where he wanted to go? Based on the following passage from a *Letter to Mersenne, 15 April 1630*, Descartes appears to be sincere in his endeavour:

Your question of theology is beyond my mental capacity, but it does not seem to me outside my province, since it has no concern with anything dependent on revelation, which is what I call theology in the strict sense; it is a metaphysical question which is to be examined by human reason. I think that all those to whom God has given the use of this reason have an obligation to employ it principally in the endeavour to know him and to know themselves. That is the task with which I began my studies; and I can say that I would not have been able to discover the foundations of physics if I had not looked for them along that road. It is the topic which I have studied more than any other and in which, thank God, I have not altogether wasted my time. At least I think that I have found how to prove metaphysical truths in a manner which is more evident than the proofs of geometry— in my own opinion, that is: I do not know if I shall be able to convince others of it (CSMK III 22; AT I 144).

⁷⁷Hartshorne, 115.

⁷⁸Charles Taylor, *Philosophy and the Human Sciences: Philosophical Papers 2* (Cambridge: Cambridge Univ. Press, 1985), 11.



Oxygen

By Graham Powell

With "Os," they met,
and tried not to part,
giving life, essentially,
as a core to their being;
the heaviness in three
often bearing too much,
though zones of places
called for such loose practices:
hidden,
with a force, unseen, that
in wrongful hands
destroyed like Vishnu, or
so it was said,
the test, at Trinity,
exploding in a world
which would feel and regret, as
the hydrogenous,
the androgynous, made the
warping of genetic trees
and happiness light up -
all removed in clouds
and shockwaves which shuddered
towards oblivion.

And so it is with all things;
oxygen, hydrogen,
that fan flames,
or give us life,
some humans choosing their way,
choosing our fate,
till all comes from harmony
to an end.

**Meeting Dominic O'Brien, Raymond Keene, OBE, and Dr. Manahel Thabet -
an interview by WIN ONE editor, Graham Powell.**

At the Royal Mirage Hotel, Dubai, within the Palace grounds restaurant, I met Dominic O'Brien, Raymond Keene and Dr. Manahel Thabet to find out more about their projects and backgrounds.

Firstly, I asked Dominic about how he got interested in developing his memory. His answer was that it was partly due to the fact that he was not especially talented at school, in fact, he didn't start speaking until he was four years old, this late development in speaking, as pointed out by Dominic, being a similar experience to one shared by Dr. Thabet. The specific moment that sparked his interest in memorizing was when his mother made him watch a scene on television where Creighton Carvello was recalling a deck of cards. It intrigued Dominic, his school career having ended inauspiciously, yet definitely leaving a seed within him for development, the sight of Carvello remembering playing cards galvanising Dominic into action. Dominic soon developed his own method of remembering large numbers, long series of cards and other seemingly difficult tasks involving recall.

At the first World Memory Championship, Dominic got to the final round, his main challenger being the same Creighton Carvello, the deciding task being playing card memorization. Dominic managed to recall an entire deck in 1 minute 29 seconds, beating his muse into second place. I asked about the way Carvello had accepted defeat, Dominic saying that he was gracious about it, Dominic's own calm, friendly demeanour coming across well as I asked the question.

I also asked about the development of memory, especially with regard to savants like Rüdiger Gamm and Daniel Tammet. Dominic was involved in the research for the programme 'The Boy with the Incredible Brain', citing at that time how he didn't believe that Tammet was as autistic, or his memory functions as synaesthetic, as Tammet proclaimed. That criticism was cut from the programme, the analysis of Tammet's autism, plus his form of synaesthesia, still being under speculation and investigation.

Linked to that topic was the next question about Transcranial Direct Current Stimulation (tDCS), a technique used under controlled conditions, and which has been noted as giving benefits, perhaps most notably with regard to concentration. Dominic said that the

frequencies applied were likely to eliminate, or mask, the various brainwave frequencies during cognitive functioning, hence a clearer, more adept sense of concentration was experienced. During some courses, Dominic analyses people's brainwaves and advises on methods to maintain the optimal brainwave frequency for doing particular tasks.

The final question for Dominic was inspired by something Dr. Thabet had told me, namely, that Dominic had hurt himself when young, a lesion still being noticeable on scans. Dominic confirmed that fact, though he wasn't sure if it had inhibited his development in the early years. Perhaps it is a factor in his life that will never be resolved. Overall, however, it was clear that Dominic was, and is, a thoughtful man who knows his job very well.

Dr. Manahel Thabet was asked about how she met Dominic and Ray, her answer being that she initially met Tony Buzan in Dubai, then met Ray later on as a direct result of that encounter. She met Dominic due to his connection with the World Memory Championships, plus The Brain Trust, which Manahel represents in the MENA region.

I also asked Manahel about her vision for The Gifted Academy over the next 20 years, her answer being a practical one whereby the planning for a corporate entity only spans five years before being reviewed; however, the idea was to make The Gifted Academy the main font for developing gifted education and for raising the innovative and creative skills base of companies in the Gulf Region.

That begged the question: what makes The Gifted Academy so special? Her answer was that the people involved in it are supremely talented. The Academy has uniquely skilled staff who will definitely strive to meet the goals set them during the next five years, they are that motivated and resourceful. The Gifted Academy is special because it supports the highly gifted and can train executives, CEOs and managers in large corporate entities to use complex skills efficiently and well.

Raymond Keene is a man who exemplifies supreme skills, his Order of the British Empire coming in recognition of his services to British chess. He is a Grand Master, and has written numerous books on the game. I asked him about his connection with Gary Kasparov, which I'd read about and understood went back many years. He said that he met Kasparov in 1982,

when Gary was only 19. Ray recognised the prodigious talent in the player, and subsequently organised Kasparov's world championships in '86, '93 and 2000. Ray also wrote a book with Kasparov, and even learnt about Kasparov's infamous battles with Anatoly Karpov, correcting Kasparov on the number of games played between the two Russian Grand Masters - Kasparov had forgotten the game the Russians had played in the junior championships!

Ray recounted how he had got into Cambridge University, though, much to his embarrassment in front of Manahel Thabet, he admitted that he wasn't very good at maths, and was terrible at physics. Fortunately, he got into Cambridge because he passed the maths entrance exam with the minimum acceptable score!

That said, one of Ray's great achievements was his performance while simultaneously playing 107 games of chess, whereby he beat 101, drew 5 and lost only 1 - the one defeat being mainly caused by a not very good chess set, the pieces being remarkably similar. Ray didn't recognise his opponent's queen, and made a wrong move as a result. The curious end to the story is that the young man (named Benjamin) died not very long afterwards. Being beaten at chess is bad enough when playing Ray; but, perhaps, beating him is even worse!

Finally, I asked Ray about the World Memory Championships, which he'd just secured for a second year in China. The prize money is a tremendous £100,000 for each aspect of the championship. He hoped that the excellent funding would incentivise members of the WIN to enter, the event taking place in December 2015. The good news is that Dubai is also being considered for the 2016 championship, the bidding for that event coming quite soon.

Then, cordially, a pleasant evening ended, and the mood was positive as we said our goodbyes. Above all, the gauntlet has been thrown down, ladies and gentlemen. I hope interest in the championships and the development in gifted education and training will inspire all the readers of this magazine to show their mettle. Do your best for humanity, and eventually someone will recognise it!

I-5 Alive

by Thomas Hally

6 p.m. Motorized Phalanxes armed with new and late-model automobiles

doggedly trundle forward “going Home”

Lazy sheets of foggy haze sweep down and brush

the highway, blinding drivers for a time tonight on I-5

Windows push-button-cracked-open an inch or two let cold,

winter winds whistle and snap like a lariat gone wild throughout

the dark, passenger-laden interior of my old SUV

To the left race members of the Camaro and Mustang Gangs,

whizzing past us and showing the animal side that side we all share.

Perhaps squadrons of F-16s *en route* to some

Middle Eastern combat zone

A few short breaths ago a terrible accident happened

Drivers gawked and stared morbidly as the CHP and

Para-Medics cleaned up the bloody mess of a fatal mistake, a nightmare of a memory left behind,

Tonight “Live” on the California Interstate 5.

Lady
by
Thomas Hally

I confess Lady

here in these lines

I studied you carefully

from front to behind

When I was there

And yes Lady,

you are really quite fine

I knew right from the start

you would never be mine

Your face your figure

your long wavy black hair

hypotized me,

and all I could do was stare

Lady you said not a word most of the time

but your pretty doe eyes

spoke in verses that rhymed

And I would rehearse

And I would chime

each verse in your stanzas

line-by-line

Lady I had no choice

What else could I do?

I offered my love

to the likes of you

Lady, you did not respond

to my tender glances

my adventurous flirts

my subtle advances

Lady did you not understand

and you did not read or appreciate

the honey-sweet poems I wrote

for you with my trembling hand

Lady you appeared grateful
for my costly presents
but tried not to laugh at my corny jokes
You felt uneasy at my very presence
I lusted for your body and your sexy grace
And all of your girlfriends envied
your beautiful figure and alluring face
What had you hidden behind
your big black liquid eyes
always melancholic—
or was that just a disguise?
And I reiterate
You did not even say "hello"
when our shadows passed
strolling opposites side-by-side
When I was there
Lady did you ever consider becoming my friend?
Now it is doubtful that we will meet again
Is that a relief or surprise?
Until then...

Activities and Entertainments Page.

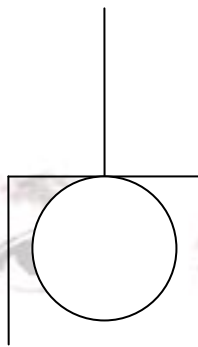
Overheard in a bar...

"Let's talk about the Heisenberg Uncertainty Principle."

"Umm, are you sure?"

If you have a few matches and a coin, try this neat little puzzle:

Place **four** matches as shown to make the shape of a spade. Put the **coin** down as if on the spade, like this:



Moving **only two matches**, and not touching the coin, how do you get the coin off the spade?

(Answer in the next edition!)

Did you know that brainstorming in groups has been shown to be **less effective** than brainstorming individually? (Leigh Thompson, 'Making the Team', 2011)

Why? Because members of a group tend to work with to accommodate the least effective person. Try brain-writing instead, where each member has a card and writes down an idea, then passes the card to the next person. The second person tries to improve the idea even further. Of course you can do it for other matters too, jokes, for example!

Did you know that 'quote' is the verb and 'quotation' is the noun?

So, finally, to end this edition, here are a couple of...**circle quotations**.

"The whole universe is based on rhythms. Everything happens in circles, in spirals."
John Hartford.

"Circles create soothing space, where even reticent people can realize that their voice is welcome." Margaret J. Wheatley.

I hope you enjoyed this magazine. Graham Powell Editor, WIN ONE 14.