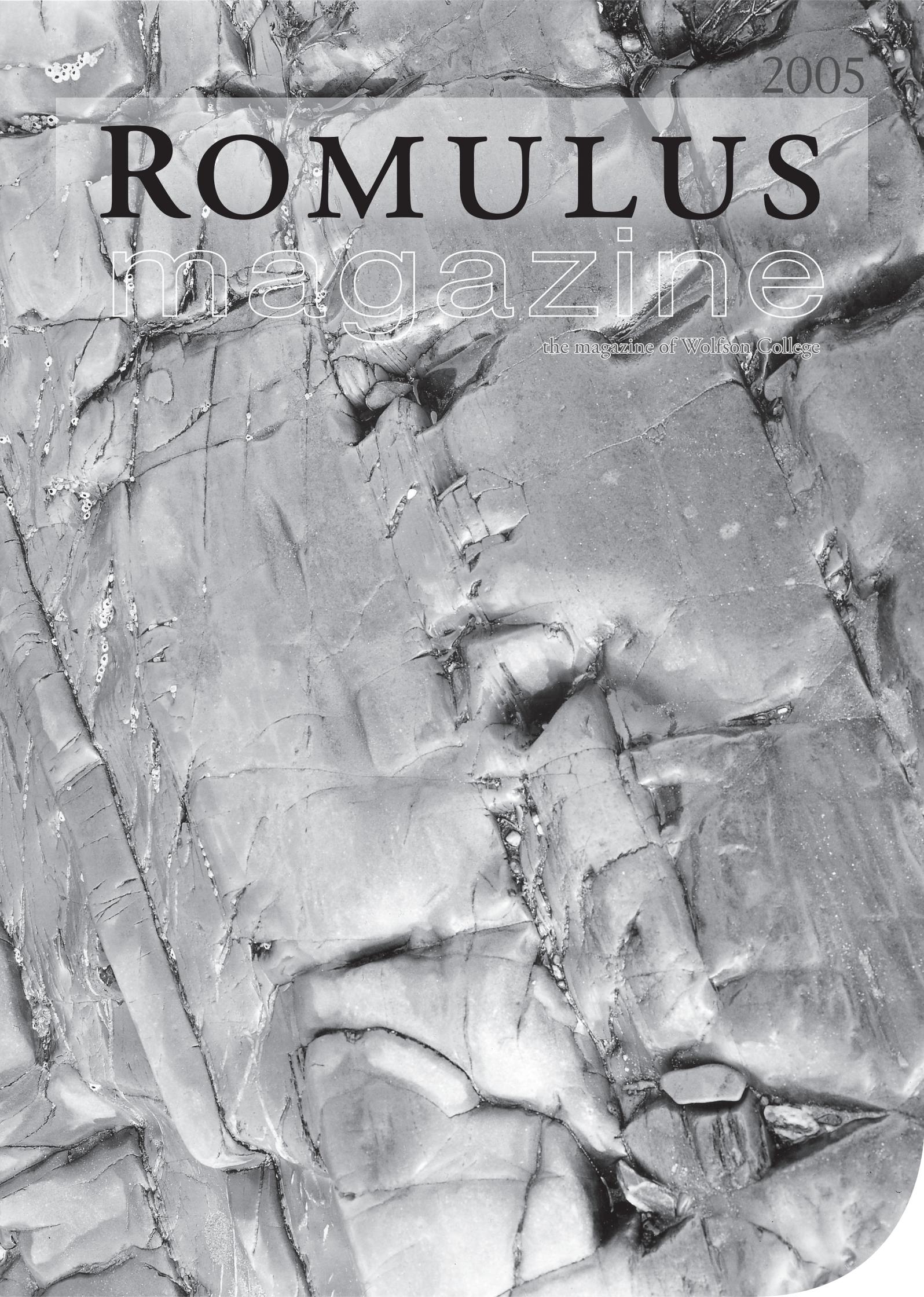


2005

ROMULUS

magazine

the magazine of Wolfson College





a note from the Editor



Douglas Ayling

Welcome to the 2005 edition of Romulus. This year's theme is **TIME & [space]**, a theme we chose in part because this year marks the centenary of Einstein's *annus mirabilis* during which he published five papers that changed our understanding of space-time.

We had some excellent contributions and a very positive response altogether. Thanks to all those involved. Our apologies to those whose work didn't make it in – as ever, time and space was limited. We hope you'll find plenty here to enjoy – and something to remember the 2004/5 academic year by.



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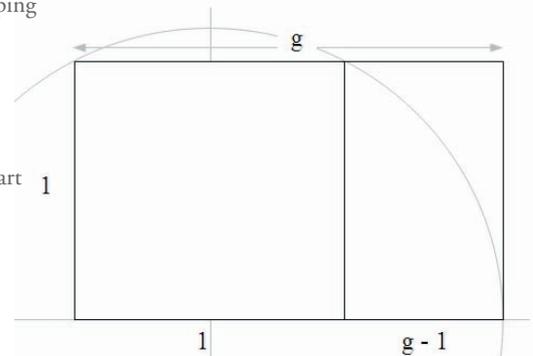
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Changing Times, Changing Places

Jill Bailey looks back on the early days of Wolfson

Trawling through back issues of *Romulus*, *Lycidas* and the *College Record*, I was surprised how many people have been penning their reminiscences. I suppose it is because it was such a privilege – and so exciting – to be in at the beginning of a new Oxford college that you want to share the experience. I was not lucky enough to have been there at the start. When I arrived in Oxford in 1970, the main common room and dining room were already established at No. 60 Banbury Road, an elegant creeper-bedecked light brick house that was immediately warm and welcoming. The offices were at No. 47, and student accommodation was in Cherwell Edge, now Linacre College, on the corner of South Parks Road.

Cherwell Edge retained vestiges of its recent past – the rather gloomy interior, wide staircases, and tall stained glass windows. The rooms varied from good-sized rooms on the lower floors to the former nuns' cells in the attic – cosy timber-lined rooms under the eaves. Cooking facilities were on the landing, which served as a gathering place for socialising and debating. There seemed to be every nationality and discipline crowded into Cherwell Edge, which buzzed with life and conversation. Friendships were formed and broken, romances sealed and shattered, the world taken apart and reconstituted – especially after midnight. There was a rather strange caretaker at one time who, on discovering me playing the grand piano in Halifax House, gave me an hour's skilful and valuable impromptu coaching on the interpretation of Haydn's Variations, yet only a day later, in his cups, bawled me out for coming in late one night.

Strange what sticks in the memory – I remember vividly a certain couple, both from “down under”, saying their fond farewells outside my door most nights. And an Australian psychologist who could blow perfect smoke rings through his keyhole. One of his experiments was to dangle a piece of string through the keyhole. When I pulled on it, a voice behind the door said “Come in, Jill.” “How did you know it was me?” “You were the only person likely to pull the string!” I have pondered ever since what that says about my personality!

On another occasion a rather shy, unworldly student called a group of us into his room to investigate the strange smell that kept wafting through his floorboards. We determined that it was cannabis fumes seeping through the wooden floorboards from the room next door! Yes – even in those days...! I shall never forget the expression of disgust and horror on his face, the creeping suspicion that his rather flushed complexion might be due to the inhalation of cannabis!

No. 60 was small, but then so was Wolfson in those days. Everyone knew everyone else – or they soon got to know them. All was gloriously informal, almost gentlemanly. Cheese did not come in little parcels or wraps, but one simply helped oneself on trust. The dining room was a great place to meet new people. I unashamedly quote from one of my early *Lycidas* editorials: “There was no choice of dining companion – you queued until a gap appeared, threaded your way carefully

between the interlocked chair legs, then gently nudged the established diners apart to wedge your plate (and yourself) between them. Nor were you free to select your companions for an after-dinner coffee. It was impossible not to talk to a stranger when he was balanced precariously on the arm of your chair, his jacket rippling your coffee, or to introduce yourself to the newcomer who sat, all unsuspecting, on the end cushion of the empty grey sofa, only to collapse, pantomime-style, on the floor in a sea of coffee.”

Dons and students mingled, often not knowing who was which! There is the well-worn anecdote of Stephen Grounds, a newly arrived astrophysicist from Birmingham, who decided he should make an effort to get to know other members of College. Approaching a stooping figure riffling rapidly through the magazine rack, he summoned the courage to say, “My name is Stephen Grounds and I come from Birmingham.” Swift came the reply, “My name is Isaiah Berlin and I come



Looking across the site of A Block to B Block, 5 January 1971; J. Harris.

from Riga.”

The upper floor of No. 60 was occupied by Dr. Strachey, and from time to time strains of live piano music wafted down to the diners below. The beginnings of Wolfson's library were housed in a small room near the kitchen. As work on the new buildings progressed, Wolfson began to increase its student intake in anticipation of the extra space. Completion was delayed, and No. 60 became so crowded that meals were limited to three per person per week, and we acquired dining rights at St. Anthony's for a time.

The move to the new buildings in Linton Road was a masterpiece of planning. Everything had to be decided and discussed, from the layout of the grounds to the design of the student accommodation, the selection criteria for allocating rooms, whether flatlets should be mixed or single-sex, whether families should live on site and what provisions should be made for them, how the Common Room should be run, how the catering should be organised and paid for and,

most importantly, how the wine cellar should be stocked. I remember one debate, which was eventually opened up to all members of College – on what to call what is now the Buttery. I recall only one of the alternative suggestions, “Uncle Izzie’s Pancake House”.

Through endless committee meetings one felt intimately engaged in the process of college-building. With as yet relatively few members, a large proportion of us were actively involved in shaping the new college. Wolfson was to expand to a community of several hundred in just a few years, and it would be difficult to maintain the close-knit community during such a rapid transition. Throughout all these processes, Isaiah Berlin took a keen interest. It was he who insisted on a high level of democracy – no gowns at dinner, no high table. Democracy extended even to the domestic staff, who were to be offered the option to become members of the Common Room. Later, Wolfson was to become the first Oxford college to elect student representatives to attend Governing Body meetings.

That the lengthy committee meetings were not too interminable was due to Stuart McKerrow, whose Scottish good sense and dry humour could usually be relied upon to bring even the most involved discussion to a prompt and logical conclusion. They were enlivened by the enthusiasm and extraordinary memory of Michael Brock, who seemed to be able to conjure a precedent and quote committee, date, clause and sub-clause out of thin air. The successful integration of the large new influx of students owed a great debt to the Domestic Bursar, Cecilia Dick. She had a remarkable skill at matching people up when allocating rooms in the college flats. Buildings Officer Paul Boddington kept a close eye on the building work, his lanky figure leaping over the puddles and ducking under the scaffolding, in my memory always reflected in mud or water.

The last winter of the building work at Linton Road was wet, muddy and foggy. The building site was a quagmire. To improve security, three students were allowed to live in the college as unofficial caretakers. One was in B Block, one in C Block and I had a room under the library. For living in these strange surroundings, we were offered free accommodation. It was a spooky experience – not for the faint-hearted. Machinery loomed unexpectedly in the torchlight on dark nights. Mist curled silently out of the Cherwell and drifted among the half-finished buildings, blanketing the sights and sounds of the world beyond. And in the mornings workmen, forgetting the odd room was occupied, would turn their master keys and burst in on a slumbering student.

Taking full possession of the new buildings opened up lots of new possibilities: concerts by the newly formed Music Society, Burns Night dinners with dancing, summer balls, and firework displays organized by the indefatigable Robin Gandy, the showpieces reflecting from the island into the harbour. So luxurious was the new accommodation that it soon became known as “the Wolfson Hilton”. With so many more students, college societies flourished. The boat crews were slowly making their way up the Oxford ladder. We had no boathouse, so the boats were left upturned in the fields. On chilly winter mornings it was the cox’s lot to sit on sheet ice, which slowly melted as it absorbed heat from the cox’s ...!

Those of us who had been so involved in the planning process, but whose time at Wolfson was almost up – the third year graduate students – were privileged to be allocated



View from roof of B Block over harbour. River Cherwell on right. Floods in distance centre, 14 January 1972; B. J. Harris, Oxford

rooms in the new buildings for their last year. It was a very special time – many of us already knew each other well, and we were all going through the same trauma of trying to finish, the tedium of writing the thesis, the stresses when it all seemed interminable. And it coincided with one of the longest, hottest summers this century. When one needed a break from the typewriter, the river beckoned. Skills in punting, tennis, snooker and bar billiards grew daily. As the drought took hold, a strange phenomenon occurred. Out on the Cherwell in a canoe one day, I discovered that if I stopped paddling, the canoe drifted upstream. To conserve water, the sluices downstream had been closed, but the parched ground upstream was drawing so much water out that the net flow was towards, not away from, the source.

In those early days of the new buildings, the hall used to be full at mealtimes. The minibus certainly earned its keep. Students and dons still mingled, but already things were changing. In the vastness of the new dining-hall, like could seek out like, the shy could sit safely amid familiar faces, and English-speaking for foreigners could easily become a thing of the past. Interaction and conversation, discussion and debate, ideally across the boundaries of both age and discipline, should be the mark of an active academic institution, but it seems to me that these are on the wane in Wolfson these days. More and more graduate students and Fellows seem to take their meals elsewhere, perhaps even at their desks or lab benches, like many in the wider world outside. Dialogue is on the decline. The little groups at tables over lunch so often contain the same people each week, and there are many empty places in the hall at mealtimes.

I’m no longer a student. Perhaps the focus has moved to the Cellar Bar, the clubs and societies, or somewhere else. Perhaps it has become more formalised, in events such as the Fellows’ lectures, for example. Maybe academic cross-fertilisation is not the main role of a graduate college. Perhaps – as in the world outside the ivory tower – friendship, community spirit and a supporting network of officers, contacts, communications, information and expertise are more important than intellectual debate. If so, then Wolfson still excels.

If internal exchanges have declined, contact with the outside world has grown in strength, with seminars, lectures, exhibitions, books and industrial and creative fellowships, Wolfson has more dialogue with the rest of the university and the wider world than ever. We have come far from the sketchy scaffolding of a college in a mudhole at the end of a no-through-road!

What time is it?

Nick Holmes on why there is absolutely no space for absolute time in the brain

Late for Work

In 1796, astronomers at the Greenwich Observatory were measuring the 'transit times' for various celestial bodies. The transit time is the time taken for the image of a celestial body to cross the wires dividing the visual field of a telescope, and was used to estimate the relative motion of astronomical objects with respect to the earth, to set the Greenwich clock, and to assist our sea-farers on their empirical travels. The problem in 1796, however, was that transit time measurements depended on the measurer. Some astronomers produced consistently longer transit times than others, and no one seriously believed that the stars and planets would actually change their speed for different observers. This timing problem was so severe that a 'personal equation' had to be developed for each observer in order to get closer to the 'true' transit time. One poor young chap, David Kinnebrook, was even sacked for his 0.8 seconds deviance from his master's estimations, a man who clearly demanded absolute time-keeping from his employees.

How could two skilled astronomers, measuring the same physical thing with sophisticated instruments, consistently arrive at different results? This puzzle led to the foundation of Experimental Psychology, and contributed to the materialistic view that all mental functions, including sense, thought, and feeling, are physical processes that take time, with some processes taking longer than others. Two hundred years later, researchers in my current laboratory and those at other longitudes have provided scientific reasons for such temporal disparities between human observers. The problems at Greenwich probably lay in the relative amount of attention each observer paid to the image of the celestial body on the one hand (visual information), versus the timing device on the other (auditory information from a clicking metronome). Concentrating first on the visual information, then switching attention to the metronome to gauge the time produced different measures compared with the opposite strategy, even though the information available was identical, and the observer always viewed the heavenly spheres through the same telescope. Concentrating and switching attention takes time, but also changes it.

As an experimenter, if you ask people to pay more attention to one part of their body, or space, or to a given source of sensory information - to expect more stimuli from that position or source, and to be more ready to respond to them - then stimuli in that position will be perceived and acted upon earlier than other stimuli in other positions. Concentration selectively speeds up the sensory signals that you are concentrating on. If you ask people to say whether a light or a sound was presented first, it depends on which you were expecting, and the positions in which they were presented. To be perceived as simultaneous with another sensory signal, visual stimuli have to be presented about 30 ms *before* auditory or tactile stimuli (i.e., vision is slower). If you're paying more attention to the visual stimuli,

this relative delay can be reduced to about 10 ms, but not much more. Furthermore, our ability to determine the order of two brief stimuli (a sound and a light, for example) is far better when they are presented from different locations than when they are in the same position, suggesting that our ability to determine the order (time) of two events, depends on their position (space).

So far, so good. Vision is slower than hearing and touch, but you can speed vision up by paying more attention to the available visual information. Furthermore, since the relative delays between the senses are quite small (about 1/50th to 1/20th of a second, say), there are no great behavioural consequences for us. In fact, there are substantial benefits to humans' inability to separate rapid sequences of events. Take the movie industry, for example. At 24 frames a second, flickering 'movie' motion is indistinguishable from 'real' visual motion. Taking advantage of the pedestrian human visual

“ Should the brain wait around for a while, until the late arrival of the toe contact signal pulls into the sensory platform? ‘We apologise for the late arrival of the touch express service from the big toe.’ ”

system like this probably saves Hollywood billions of dollars each year.

Now, think about touching your body. More specifically, touch your fingertip onto your nose. Which did you feel first – the touch on the fingertip or the touch on the nose? If you felt there was no difference, try using a toe instead (either to touch your nose, or fingertip, whichever is easiest!). If you're of average height, and if your nerves are conducting properly today, the signals travelling from your foot probably took around 50 ms (1/20th of a second) longer to reach your brain than those from your nose. That's about 1 frame of a movie. Yet the time difference of the two touches were probably perceptually indistinguishable.

So, it seems that the brain is only capable of discriminating gaps in time of around 20 – 50 ms. Anything below that just merges into a single frame of your sensory life. But, you may wonder, how then can musicians tune their instruments to within fractions of a tone, an ability that requires discriminating frequencies separated by less than a thousandth of a second? To discriminate the note 'A' at 440 Hz from its counterpart in the octave above (880 Hz), for example, the brain must distinguish timing differences between the peaks of the sound waves of only 1.3 ms. Discriminating each semitone, then, requires

even finer temporal discriminations (~ 0.1 ms), and tuning an instrument properly even finer still. When you consider that we can hear, as a child at least, frequencies up to 20 kHz (i.e., sound waves separated by only 0.05 ms), you have to question why only hearing got a whack with the timing stick when God was handing out sensory abilities.

So, because of hearing's exquisite temporal sensibility, we are forced to conclude that sensory information about time depends both on the sense, the information, and whether attention is directed towards it. The representation of time in the brain depends on the particular brain process involved. For vision, we can cope with sensory signals blurred in time perhaps because that also improves our sensitivity to very faint light sources. In hearing, however, temporal resolution is everything, and we're not particularly good at locating the position of sounds in space. This space-time trade-off across sensory systems is certainly not absolute, and may vary within a given sense with the available information, and even with the task performed, but for present purposes it will do as a useful general rule.

With the benefit of 200 years of hindsight, should poor David Kinnebrook have been sacked? Is there an absolute time, available equally to each observer, or even to the sensory subcomponents of each observer's brain? Is there an internal clock to tick away the gigabytes of mental computation? It seems not. If we are to make any sense of these apparently contradictory conclusions, it seems we must abandon the idea that there is a 'now' in the brain at all. If the perceived time of even simple sensory stimuli such as lights, sounds, and touches depends on so many non-temporal neurological and psychological factors, we can conclude that we simply cannot perceive (absolute) time at all.

Training Grounds

But I'm not satisfied with that. If you are a strong physicalist/materialist like myself, and believe that all mental functions and experiences can ultimately be traced to some corresponding physical process, then if it *feels* like there is a 'now' somewhere in the brain, then there must *be* one, right? It is of course possible that 'now' is an illusion, but then there still needs to be something producing that illusion. I'm obviously not a philosopher, but nestling among the arguments presented above is a pervasive philosophical problem. When we ask the question, 'What time does a given sensory signal arrive, or become conscious?' one needs to ask 'arrive *where?*' since sensory signals are physical processes. Asking when something arrives is fine if you know exactly where it arrives. A train is late if it stops at a platform after the scheduled time for that platform. But there are no platforms in the brain sending and receiving trains of sensory signals to and from all possible destinations. There is no controller-homunculus sitting in the brain station judging which signals are late and which on time. And even if there were such a homunculus, it would have to be no other than God Himself, since one can only judge what's late if one knows what's due to arrive. In an unpredictable world, what one needs most is a competent brain that deals effectively with the unexpected.

Consider the nose-touching example above. When the brain receives the sensory signal from the nose, informing of the recent contact between some as yet unidentified object and

the nose, what should the brain's response be? Should the brain wait around for a while, until the late arrival of the toe contact signal pulls into the sensory platform? 'We apologise for the late arrival of the touch express service from the big toe.' How long should it wait? Fifty milliseconds? One hundred? No, that's far too long. What if the touch on the nose was produced, not by your own finger, but by an alighting killer bee, ready to land a sting the instant it hops off the train? To protect you from the unexpected, the brain cannot afford to hang around while the world passes by. Every millisecond counts.

So, there appear to be several deep contradictions here. We seem to perceive a single, unified present, across the senses, but we know that sensory signals take different amounts of time to be perceived and acted upon. We know the brain can't resolve more than 24 frames a second in vision, but can resolve 20,000 waves a second in hearing. We know that it takes 1/20th of a second extra to feel touches from the toes than from the nose, but still they are felt to arrive at the same time. The problem of absolute time in the brain, then, seems philosophically and experimentally intractable.

Predicting the present

The answer to our quandary, and the temporary solution to our temporal problem is that the world is not unpredictable. Almost everything, in fact, is entirely predictable. From the moment you were conceived, gravity has pointed downwards, time has pointed forwards, and space has been, for all reasonable purposes, three-dimensional. Your legs have been fairly consistently the same length from one day to the next, and your neurons conduct impulses over about the same distance and at about the same speed today as they did last week. Your heart still pumps, your clothes still fit like last month. It is only the interesting stuff that is unpredictable. The Lottery numbers, for example, the intentions of the boy across the dance floor, the chances of a hurricane on your wedding day. Everything else is dull and predictable. The triumph of the human brain is in dealing with the dull, and deliberating on the divine. Few other animals could pole vault and write philosophy in the same afternoon.

An example will help. When I asked you to touch your nose, you were not at a loss for movements. As soon as the sentence was comprehended, a stirring in your frame was

Wells and Hubbard, Chicago; Veit U.B. Schenk



already playing out the possibilities of the act. Your arm muscles electrified at the thought of the movement alone, and, before you realised, you saw your forefinger, arching its way towards your face. Before it landed, your nose began to itch with expectancy, with the thrill of contact. You've touched your nose a thousand times before. You know exactly what's going to happen, and so does your brain. It is only when something goes wrong, like when something falls into your lap, that your head jerks down, and you're unable to avoid poking yourself in the eye. Surely then you'll jump out of your seat, and curse the falling item!

In the several hundred milliseconds between moving your finger and touching your nose, millions of your neurons were busy calculating the expected sensory outcomes – feeling one touch on the nose, and another on the finger, for example. If all went to plan, and the finger landed a nose in one, then the neurons danced a little jig and started predicting the next set of events on the timetable. If it went a little wrong, however, and the finger entered your nose, or went in your eye, then the neurons did a little learning, and the predictions were modified for the next attempt. There are interesting everyday examples of this process working: You can't tickle yourself because your brain is expecting the stimulation and takes account, cancelling the sensory consequences of the stimulation. People experiencing hallucinations have been shown to be more able to tickle themselves than others - the hallucinations themselves are thought to be a product of incomplete self-monitoring (i.e., while the hallucinations may in fact be self-generated, they are experienced as externally generated, hence the tickle).

My favourite example of how the brain predicts the world, rather than just responding to it, occurs when we walk up a broken set of escalators. Children can be really apprehensive about working escalators, recoiling with fear at the site of those bright, steel jaws, gnawing at the shins of unsuspecting shoppers. Adults can mount the metal monsters while using a mobile phone, drinking a cup of coffee, or carrying heavy shopping bags, all performed with only a cursory glance into the gyrating abyss below. What bothers children so much is that escalators are not common earthly furniture: The world typically stays still when we tread on it, and different parts of the earth tend not to move independently of each other, save for the occasional earthquake or fairground ride. Once you've mastered the shopping mall escalator, however, your brain can cope with such unnatural motion. It becomes dull.

Until the escalator breaks. You may have noticed some strange sensations in your legs as you board and disembark a broken escalator. I get the heebie-jeebies mainly while stepping off at the top, a transitory feeling that the whole world is moving forwards beneath my feet. Since for most of my lifetime's experience escalators have not been broken, there is no economy in my brain learning the spatial and temporal dynamics of broken escalators. In fact, the dynamics of broken escalators are the same as those of regular stairs in the rest of the world. But the feel of the escalator beneath my feet, the thick rubber tracks in my hands, and the sight of those shiny gratings stretching out ahead, are enough to arouse a model of the expected dynamics of working escalators. The odd sensation at the top of the elevator is a hallucinated escalator experience – the difference between what my brain was expecting the world under my feet to feel like, and what it actually felt like. The difference between the predicted present, and the present present.

What Time Is It?

The next time someone asks you the time in the street, be careful. Ask them: 'What time do you want? The time you realised you were late? The time you saw me approaching? The time you glanced at my wrist? Made eye contact? Started speaking? The time I started hearing? Or the time that I first saw when glancing at my watch?' If it doesn't matter, then the nearest five minutes will do. But if your questioner *really* wants to know the time, then tell them the truth: 'I don't know. I can't know the absolute time. But my brain knows when my eyes will see my watch, and it knows when my feet will next hit the ground. It knows this because it has happened before. Thousands of times before. And each time, the brain knows more. Each step, each key-press, each note, or each turn of the lathe, the brain's time-keeping improves.'

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(above) Town houses, Park Town, Oxford; Photograph by Lucas Bluff

(below) Woodstock Road, Oxford; Photograph by Veit U.B. Schenk



Space and Time in Taïdo

Robert Norris and Rob Delicata introduce two foundational concepts of the martial art

"You're late!"

"A Wizard is never late, Frodo Baggins, nor is he early. He arrives precisely when he means to!"

Taïdo is a modern Japanese martial art with roots in Okinawan karate-do. It was founded by Seiken Shukumine (1925-2002) who studied karate and kendo during his childhood in Okinawa. Towards the end of World War II, Shukumine joined the marine division of the Kamikaze corps and trained as a *kaiten* (human torpedo) pilot. According to legend, his martial arts philosophy grew from a consideration of how to avoid enemy attacks and manoeuvre his small submarine through anti-torpedo nets. From these roots Shukumine developed a dynamic martial art, characterised by the turning, twisting and rolling of the body used to deliver each technique. Taïdo (way of the body) was unveiled in 1965 and has since gained a strong global following, with some 9000 practitioners worldwide.

Wolfson College is home to the only taïdo club in Britain, founded in 2001 by Lars Larm, a graduate student who has since been promoted to the grade of 6th Dan Kyoshi. As such, he is one of the four highest ranked *taïdoka*¹ in Europe.

Taïdo's strength lies in its ability to change according to the situation, to adapt technique to circumstance, even to the point of inventing new techniques in response to novel situations. Nonetheless, taïdo is founded on a simple principle – that every punch or kick incorporates a change in the body's axis. A technique, performed in congress with a change in body-axis, will tend to have defensive and offensive components, enabling a defender² to simultaneously evade an attack and launch a counterattack. Five such body-axis changes have so far been discovered:

<i>sen</i>	–	rotate like a spinning-top
<i>un</i>	–	ascend and descend in a wave-like motion
<i>hen</i>	–	move like a whirlpool
<i>nen</i>	–	collapse like a falling tree
<i>ten</i>	–	roll like a ball

The question of the existence of further changes in body-axis is largely open.

The study of martial arts is a slow and stuttering journey inwards – away from the physical and towards the spiritual – and in his lifetime a *taïdoka* can expect to proceed through several overlapping phases of study which affect this shift of emphasis. To a great extent the journey inwards is determined by the changing capabilities of the human body over time: the physical gives way to the mental as the ageing body becomes less amenable to the demands of rigorous training. The experienced *taïdoka* must learn to replace physical prowess with strategy and economy of movement. All martial arts are a study of body mechanics – the expression of the body in

space, through time – and an effective martial artist must learn to control his own body and, by extension, the body of an opponent.

Understanding space and time: *yoyuu* and *ma-ai*

With many lifetimes of men in which to hone his skills, not to mention the fact that, unlike Frodo, he was born onto the page with all of his skills already more or less in place, Gandalf had a considerable advantage over most of his friends and enemies. It is fair to say, therefore, that Frodo had little conception of what went into the riposte with which Gandalf opened this article. Were it possible to conceive of an apprenticeship for Gandalf at some distant time in the past, it would have involved a lot of hard training in the control of space and time. Had Tolkien been Japanese, it might just be possible that his philological passion would have led him to explore how these concepts came to be articulated in the codes of a remarkable class of people, who were still socially extant until only 140 years ago: the samurai. In particular, he might have spent some time considering the implications for the martial abilities of his heroes of concepts like *yoyuu* and *ma-ai*.

Yoyuu and *ma-ai* are related concepts in the same way that space and time are related, but they do not simply translate as 'space' and 'time'. Rather they both combine elements of 'space' and 'time' to express different aspects of a dimension we might more profitably call space-time. As such, they rely on a form of training which dynamically integrates two spheres of the same experience which in a western framework tend to fall apart irreparably. When a fencing master tells his student to 'keep his distance', the image that tends to form in the pupil's mind is of a line, measurable in feet, between him and his opponent. Again, when we say of a fencing champion that he has good timing, we refer to a vaguely formulated but extremely effective 'know-when', an instinct to act at the right moment, *diem carpere*. In both cases, the formulation is unclear and incomplete, and a large part of the problem is that they are seen as two different skills, not instances of the same skill.

As with many concepts in the martial arts, they are universally applicable, across different disciplines, but also in a full range of experiential contexts. In fact, a large part of the information contained in this section comes from an attempt to understand what these concepts mean to Japanese people who are not connected to martial arts in any special way. This should serve as a general presentation. How they apply to taïdo in particular will be the subject of the following section.

The dictionary tells us that *yoyuu* (余裕) indicates 'margin, leeway'. The kanji for *yo* (余) appears in words such as *yo-bun*, 'extra, spare, redundant', *yo-chi*, 'room, scope', *yo-dan*, 'padding

(in speech, meaning ‘extra chat’ or ‘p.s.’ at the end of a letter), *yo-jo*, ‘surplus’, *yo-kei*, ‘unnecessary, superfluous’; but also *yo-haku*, ‘blank space, margin’, and *yo-ka*, ‘leisure time, spare time’. The kanji for *yuu* (裕) appears in the word *yuu-fuku*, meaning ‘wealthy, well-off’. One possible translation of *yoyuu*, therefore, is ‘wealthy in terms of space’, where wealth can be thought of along similar lines as ‘power’. If I have *yoyuu*, what we might translate as ‘mental space’, I can afford the time to accommodate any type of contingency. I am wealthy in space and time, or space-time. Typical everyday conversations in which this word might occur are such as the following:

“Do you have time to telephone the electricity board about that phoney bill?”

“I really must prepare my lessons! I haven’t got time (*yoyuu*) now.”

Or

“I never have time (*yoyuu*) to tidy my desk!”

“Make a plan, and you will have time for everything.”

Clearly the perceived lack of time is not in terms of the number of minutes available in the day to perform these simple tasks, but in terms of some inner scale on the basis of which I decide whether or not to perform certain actions. Further, it is clear that poverty of *yoyuu* is also a matter of lack of preparation. It is indeed a form of resistance which results from not knowing how to go about things.

Ma-ai (間合) is easier to describe because it receives a lot of coverage in the literature dedicated to martial arts. Generally speaking, it is translated in reference to the theory of distance, but the kanji for *ma* (間) is used to talk about ‘interval, pause’ as well as ‘space’. The origin can be traced back to the space between the doors of a gate. In later times it took on meanings such as ‘space between things’, ‘place’, ‘room’, but also ‘period of time’, ‘free time’, as well as, interestingly, ‘reasonable’ and, intriguingly, ‘secretly’. The kanji for *ai* (合), on the other hand, has had some elevated applications in recent martial arts’ history. It represents the first sound of the word *aikido* (the way of harmony), the name given to the martial art developed during the first half of the 20th century by Morihei Ueshiba. Its original meaning was ‘to respond to someone’, and later it came to include the meanings of ‘to join’, ‘to match’, ‘to gather’, ‘to exchange’, ‘to moderate’. It would seem to combine, therefore, the notions of space and exchange between two opponents.

But how does all this fit together? One example of how *yoyuu* and *ma-ai* work together can be found on a web-board dedicated to kendo, the latter-day art of Japanese sword-fighting. In answer to a question during the written part of a grading examination, in which the student was asked to describe *ma-ai*, the student describes a situation in which he or she loses the initiative and therefore the advantage in the attack. The way it is expressed is roughly as follows: ‘If you lose out to your opponent at any particular moment (*uwate-o-torareru*), your mental *ma-ai* is taken (*torareru*) from you, and if it is a situation in which you are attacking, you will be hit, because *yoyuu* belongs to the opponent. You have given *yoyuu* to your opponent (*yoyuu-o-motareru*)’ This statement is glossed (presumably by the teacher) in the following terms: ‘When you are not strong, you feel distance to be great, but

yoyuu (left) and *ma-ai* (right); used with kind permission of Jack Halpern

when you are strong distance becomes small. The distance in reality is the same, but the difference is whether or not you have mental *ma-ai*.’ From these comments, it may be possible to say that *yoyuu*, if not actually translatable as ‘initiative’, leads to having ‘initiative’, that which belongs to the one who has the tactical edge (power) over an opponent; *ma-ai*, on the other hand, leads to ‘control’, that which determines your ability to influence the outcome of events. If you lose the initiative, then you also lose control, with the result that your action will end up in confusion and defeat.

Applications of *yoyuu* and *ma-ai*

“Best way to avoid punch, no be there.” exclaims Mr. Miyagi in a line from *The Karate Kid*, whose cult status belies the fact that it is only partly correct. It is true that violence should only be used as a last resort, but, if conflict is inevitable, a dogmatic application of this rule results in the continual retreat of a defender from the advances of an attacker. The more a defender moves away the more time he spends defending himself. A more appropriate action is for the defender to move into a position from which he is able to attack but unable to be attacked. In this context, correct *ma-ai* is achieved when a defender moves into a defensible position from which a counterattack can be launched. This suggests that, rather than retreating, it is more profitable to shift slightly from the line of the attack, simultaneously causing the attack to miss, and positioning the defender in his opponent’s blind-spot, poised to counterattack. In this situation the Goldilocks principle applies to the highest degree. To move too little is to under-react; to move so far from the line that a counterattack becomes impossible is to over-react. To achieve correct *ma-ai* requires a degree of movement which is just right. Nonetheless, this simple explanation masks the fundamental difficulty of reacting in a way which preserves good *ma-ai*, since it requires the *taidoka* to override a stubborn instinct: the tendency to move backwards when attacked. This, in turn, requires a mastery of one’s own fear of attack³.

In practical terms *yoyuu* can be interpreted as the space that a *taidoka* creates by means of movement in order to gain a strategic advantage. *Yoyuu*

can also be viewed as a metric whose measurement can be used to determine a profitable course of action. A defender who has a lot of *yoyuu* (space) can evade an attack using foot movements, one who has a moderate amount of *yoyuu* can evade attack by changing the body-axis (such as by ducking below a kick), and one who has very little *yoyuu* (if, for example, he is pressed against a wall) can evade an attack by blocking. Blocking an attack – meeting force with force – is considered only as a last resort. *Yoyuu* (space) and *ma-ai* (distance) have a clear bearing on one another since an estimation of space is used to determine how correct distance can be achieved, if at all.

In certain styles of karate, particularly the *wado-ryu* (school of the way of peace), there exists a concept called *tai-sabaki*. A literal translation means to channel the body's power efficiently; in karate this manifests itself as the natural way to use an opponent's momentum and power against him. *Tai-sabaki* can be seen as a product of correct *ma-ai* and a proper assessment of *yoyuu*. One can imagine the body as being at the centre of a circle whose circumference is described by raising a leg to horizontal and pivoting on the standing leg 360 degrees. The raised foot travels a circular path, and marks the edge of the range at which an (unarmed) attacker poses a threat. If the attacker is inside the circle then he can attack; if he is outside the circle, he cannot attack. However, the same distancing rules which constrain the attacker also constrain the defender. *Tai-sabaki* is often called the karate of the inner circle, since it actually teaches that the opponent should be kept within this range. At this distance correct *ma-ai* can be achieved by moving from the centreline of an attack but without allowing the attacker to vacate the circle.

This distance corresponds to 'moderate' *yoyuu* which requires the defender to avoid an attack by changing the body axis. If all of these components come together with correct timing, *tai-sabaki* can manifest itself in a number of ways. For instance, in the *sen* technique *sentai-no-tsuki* (spinning punch), the *taidoka* rotates along a vertical axis before delivering the punch. The decision to perform a technique (rather than flee or block) will be made by an estimation of space and an assessment of the appropriate distance from which the counterattack should be launched. The body-axis movement (initiated by the hips) also serves to accelerate the punch towards its target, whilst simultaneously moving the *taidoka's* body off the attacking line. Performed correctly, the attack will be parried to one side of the *taidoka's* body as the counter-strike reaches the attacker. The parry does not stop the attack but redirects its energy; in this way the attacker's momentum carries him forward onto the counterattack.

Final comments

As Gandalf so admirably demonstrates, the successful control of *yoyuu* and *ma-ai* is the aim of all strategy and can only be the result of years of practice. The art of strategy has a venerable pedigree in traditional *bushido*. Possibly the most authoritative treatment of the art of strategy in warfare, which is probably also the most well-known to those with an interest in martial arts, is *The Book of the Five Rings* by Miyamoto Musashi. Here the swordsman is referred to as 'the strategist' and his art is likened to that of the carpenter, whose job in old Japan required him to be architect and builder as well.

Just as the carpenter has built the house on paper even before the work has begun, so the swordsman has won the battle even before engaging the enemy. A famous example of the samurai-strategist at work is the defeat of the bandits in Akira Kurosawa's *The Seven Samurai*, where the leader of the famous Seven, Shimada Kanbe, effects victory on paper even before the bandits make their first appearance. What is most striking about Kanbe is his aplomb and good humour throughout a battle that was a desperate and bloody affair.

In this respect, Kanbe reminds one of another quotable source, Inazo Nitobe's *Bushido*, where the author translates *yoyuu* as 'capacious mind', the virtue of the courageous man who is not perturbed by catastrophe, a translation which aptly describes Kanbe's demeanour. By way of illustration, he tells of Ota Dokan, builder of Tokyo castle, who was run through with a spear. Knowing of his poetical predilections, his assassin composed a couplet to accompany the dying man's last moments:

Ah! How in moments like these
Our heart doth grudge the light of life.

Which Ota Dokan completes, thereby proving his composure:

Had not in hours of peace,
It learned to lightly look on life.

Ceaseless training was an essential part of the samurai's upbringing, training not only in the use of arms and the composition of verse (the sword and the pen were both symbolic of the samurai's way of life, if not strictly equal in the scale of values), but also in the tolerance of pain and the confrontation of death.

The control of *yoyuu* and *ma-ai* is what is achieved as a result of training, that wealth of 'mental space', or capaciousness, which is at our disposal and under our control at all times, whatever the circumstances, but also that highly developed feel for the complex dynamics of interaction. For a *taidoka*, space-time is the medium upon which he paints his technique. This canvas is seldom blank and never static but evolves over time as techniques are painted and painted over, and attackers appear and fade away. Fear disrupts technique and clouds judgment; a scared *taidoka* may flee, retreat into a corner, or perform ineffective technique. True technique manifests itself when the *taidoka's* intent – the fusion of body, breath and mind – is bent to a single purpose, and this intent is displayed on the canvas as a single brushstroke of overwhelming beauty, painted with poise and confidence.

¹ *Taidoka* is the name given to a student of taïdo.

² *Karate ni sente nashi* (there is no first attack in karate) is a central tenet of contemporary martial arts, attributed to several sources, which emphasises the wholly defensive nature of the art. As such the *taidoka* will always assume the defensive role in combative scenarios.

³ Zen Buddhism (which forms the spiritual basis of many martial arts) reduces fear to a result of attachments, whether those attachments are to possessions, prejudices, or even life itself. Zen teaches that enlightenment can be reached through the attainment of *mushin*, or no-mindedness, in which the Cartesian Duality dissolves. In such a state, time and space cease to exist.

⁴ The difference between *bushido* and *budo* lies in the difference between what is often termed 'traditional' martial arts and martial arts as we know them today. *Bushido* refers to the code of the samurai warrior and encompasses all the implications and outcomes of violent conflict (warfare, pain, death, etc.), and all the strategies and schools of thought that were developed to manage violent conflict more or less up to the start of the post-WWII period. When we speak of *budo*, on the other hand, we refer to the competitive martial arts of more recent times, where the dimension of death in particular, and endurance of pain to a lesser degree, have either been eliminated altogether, or have been absorbed into forms and formalities of sport.

Book review: *A New Short Guide to the Accentuation of Ancient Greek*, Philomen Probert

Pankaj K. Agarwalla reviews a fellow Wolfsonian's most recent publication

Originally intended to be a revision of J.P. Postgate's *A Short Guide to the Accentuation of Ancient Greek* (Liverpool, 1924), Probert's new guide is much more of a separate work in its own right, introducing Greek accents in as practical and serviceable manner as possible. As Probert explains herself (pp.ix-xiv), this book is designed for the intermediate or advanced student of Ancient Greek who received little or no training in Greek accentuation upon first learning the language (although this reviewer also found it extremely useful even with significant previous experience with accents).

The book contains a preface, bibliographical references pertinent to the book, seven chapters, an appendix on accentuation in various Greek dialects, answers to exercises, and excellent Greek and English indices. Because of the thirty-eight useful exercises interspersed throughout the guide, Probert strongly encourages the reader to treat this work as a textbook/workbook and not as a reference book.

In her first chapter, Probert provides a fascinating introduction to the meaning and development of the accent in ancient Greece (including its development into the Modern Greek accent). Most importantly, Probert emphasizes the distinction between "pitch" and "stress" accentuation systems, which is a stumbling block for most modern speakers of stress-accented languages such as English. Furthermore, her elaboration on the meaning of the acute, circumflex, and grave is excellent (pp.15-18). The sections on music, pitch and accentuation are interesting, although at times they slightly distract the reader from the main discussion (especially pp.4-6). Nevertheless, Chapter One is primarily meant as additional information and any important sections (such as the traditional definitions of oxytone, paroxytone, proparoxytone, perispomenon and properispomenon) are repeated later for ease of use.

The second chapter, therefore, begins with the basic information including lengths of vowels, weights of syllables, writing accents, position of accents, contraction, elision, prodelision and crasis. The information and exercises in this chapter are vital to the basic understanding of ancient Greek accentuation and Probert presents these rules very well (e.g. discussion of final trochee rule, pp.33-34). Her use of the terms "heavy" and "light" for syllables and "long" and "short" for vowels can seem confusing initially, but it is nevertheless an important distinction in ancient Greek.

The third chapter covers the accentuation of verbs including infinitives and participles completely and concisely, while Chapter Four introduces some general rules for the accentuation of simplex (non-compound) nouns and adjectives. Probert discusses the difference between "base" and "case" accentuation and provides an illustrative paradigm. In particular, this reviewer found the fourth chapter very useful since it succeeds in building a foundation for understanding noun and adjective accentuation. (For those unfamiliar with ancient Greek, there are a terrifying number of varieties in the declension of nouns and adjectives.) For the serious accentuation

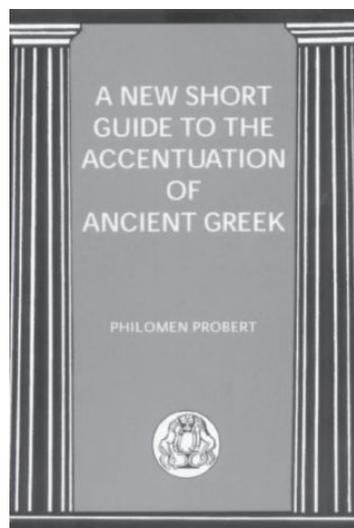
scholar, this chapter also includes interesting sections in smaller typeset that cover many historical debates over particular rules.

Chapter Five builds upon the fourth chapter's foundation by introducing the specific rules and exceptions for each declension of simplex nouns and adjectives. The arrangement of this chapter from most regular to least regular also helps the student manage the vast amount of information on this subject.

The sixth chapter covers both compound words as well as the miscellaneous words (names, pronouns, numerals and indeclinable words such as prepositions), which arise less frequently, but always end up troubling students of ancient Greek. Toward the end of the chapter, Probert gives the rules for difficult prepositions and provides a very interesting and advanced discussion on the accentuation of disyllabic prepositions (p.128). Together, Chapters Four, Five and Six represent a brilliant, concise and thorough summary of both common and difficult aspects of ancient Greek accentuation.

Finally, the last chapter on proclitics and enclitics provides even the advanced student a wealth of information on these tricky little appendages (e.g. lengthy discussion pp.138-142). The appendix on accentuation in dialects other than *koine* is also useful for the advanced student as a nice introduction to the various dialects and comes with helpful bibliographic references. To conclude the work, Probert gives the complete answers to all exercises and indices in English and Greek.

Probert's *New Short Guide to the Accentuation of Ancient Greek* presents a large quantity of information in a logical, brief and very practical manner. More interesting than the sheer volume of information is the ease and interestingly enough, the fun, with which Probert presents the material. Here is someone who truly enjoys the ancient Greek accent and students of ancient Greek would do themselves a favour by joining her in the fun.



Probert, Philomen, *A New Short Guide to the Accentuation of Ancient Greek*. London: Bristol Classical Press, 2003. Pp.xx +215.

Doing Time in a Confined Space

Meara Sullivan-Thomas on a summer in Shrewsbury prison

It is not a coincidence that the most severe punishment available in contemporary Britain, imprisonment, involves the restriction of one's time and space. This is a clear testament of our affection for these areas. Offenders are penalized by denial of what we all value most. My fascination for prisons developed out of a single desire to know the unknown. Prisons are among the most inaccessible institutions in contemporary society and as such have a mysterious allure.

I spent last summer working in Shrewsbury prison with the National Association for Care and Resettlement of Offenders (NACRO). NACRO is a private (non-government funded) organization that works in several prisons assisting offenders in resettlement upon release. I was very excited at the opportunity to combine my interest in criminology and the practical need to gain money. I was hired as a temporary Resettlement Officer, a civilian grade which involves working daily in the prison. My job was to interview men upon reception and release and assist them in maintaining existing accommodation or securing new accommodation prior to release. The NACRO team consisted of four full time staff: Avril, Mike, Rosemary and Shoyfun. Despite my initial new job nerves, they were all very welcoming and made me feel immediately part of the team. My first week was spent "shadowing" Mike. Mike, a Liverpoolian, has a great sense of humour. He called me his PA or his "slave"

because I would do little jobs to support him. When I walked onto the wings the men would whistle and make provocative comments, Mike would joke that he was very popular. After my first probationary week I was given a set of keys. This was a big deal and just a little bit scary because it meant for the first time I would be walking through halls and meeting men alone without Mike as my crutch. Shrewsbury prison is a beautiful old Victorian building built in 1877, which sits on a hill looming above the old city. It is affectionately called "the Dana", named after the area where it is located. Up to 350 men can be held inside on two separate wings. "A" wing houses the vast majority of offenders. It is a long concrete hall with cells on either side, with different coloured doors. There are names carved in the concrete above many of the cell doors, like the calling card of previous residents. There is a strong sense of history and predecessors about the space. I think that if ghosts do exist they are certainly many about there. Next to the doors are little white cards containing the names of the occupants, and their sentences. Newcomers arrive on the bottom floor and make their way up to the fourth with good behaviour and time. Similarly bad behaviour is treated with a literal demotion. The top floor offered several privileges including more time outside the cell, better jobs and I would say more respect. "C" wing is a

(below) Kilmainham Gaol, Dublin; Meara Sullivan-Thomas



lot smaller with two floors and contained vulnerable prisoners. Unlike “A” block which was always noisy and busy, “C” had a different feel. It was always quiet and still. When it rained the water leaked through the roof and was caught in containers on the ground. The sounds of water tinging echoed through the hall in an eerie way.

Life inside is dominated by time. There are daily and weekly routines that one can set one’s watch by. My days always started at 8:30. As I entered the wings to go to the office I would pass by men lining up for their morning meds. This was so predictable I had to be careful not to push the wing door out too far as I knew there would be men lining up on the other side. I would work in the office until 10:00 and then go out to the wings, workshops and education areas to interview

“ My fascination for prisons developed out of a single desire to know the unknown. Prisons are among the most inaccessible institutions in contemporary society and as such have a mysterious allure. ”

men. Every day I would have a list of people who I needed to meet with. A mixture of people who had either submitted requests, were being released shortly, had just arrived, or that I was following up on. My interviewing would last until 12:00 when the men would start to get their lunches and it became too difficult to manoeuvre around. I would go the kitchen and get my lunch. I ate the same food as the men, which was surprisingly good. After my lunch break I would continue my interviews from 1:00pm until 3:00. Then I worked in the office until going home. Within this routine there were many other little routines. For example canteen took place every Wednesday morning. This is where the men would line up and receive goods they had purchased for the week, such as cigarettes and personal hygiene products. The men could

earn a nominal sum through prison work and training which they could use for canteen. The Dana has three workshops: two for “A” wing inmates and one for “C” wing inmates. They do piecework in all of them such as sewing buckles on straps and fitting screws on bolts. Another source of income is educational training, such as literacy, art, cooking, computers and employment preparedness. Work times take place in the morning and afternoon, with all men returning to their cells to be locked down for lunch.

When the Dana was built, it held half the number of its current population. Cells have more recently been doubled up, so unless numbers are very low most men share with a cellmate. Each cell door has a peep hole for officers to look in. I never used this as the cell toilet was in plain sight and I did not want to catch someone at an indisposed moment. Looking through the door there were either bunk beds on the left-hand side or single beds on either side. There is a side table usually containing a television set and personal belongings. At the top of the back wall is a square barred window. Despite prison regulations that forbid the display of sexual images, the vast majority of walls are covered with pictures of scantily clad and naked women. Images of lesbians are particularly popular. On several occasions when I was interviewing men in their cells, they apologized for the photos. But this was their space and they did not bother me.

Last summer was not the hottest one on record and so on those occasional hot, clear days I made an extra effort to go out and enjoy it. As in most prisons the inmates also got a daily opportunity for “exercise” outside in the prison yard. As my time went on, I got to know some of the men and talk to them on a daily basis. There were a few I noticed who never went outside. One day when the sun was beaming I asked one man why he didn’t go out and enjoy it. His reply to me sums up what time and space are like in prison. He said, it was too difficult to go out and smell the fresh air and feel the sun on his cheeks, knowing he had to return to confinement. He was happier waiting in his cell, until his time inside was up.

(below) Dome of the Reichstag, Berlin; Lucas Bluff



Catching stars in the Atacama Desert

Joanne Baker journeys to the Paranal Observatory, Chile

Ten billion years. Three quarters of the entire span of the universe's history. That's how long this light has been travelling across space. Emitted by atoms of carbon heated to millions of degrees and blasted with intense light from a quasar's heart at the edge of the cosmos. Dodging gas clouds, circuiting galaxies and avoiding the trap of a black hole's abyss.

Its final resting place? Smacked into a silicon block, a pixel in a camera bolted to the metal cage of a giant telescope clinging to mountainous Earth.

We have travelled far to catch these photons in our detector web. Eight thousand miles to one of the driest places on Earth, the Atacama Desert in northern Chile. Astronomers know well the discomfort of long haul flights, the aching legs and disrupted sleep patterns of jet lag and night work. But this displacement from home opens our minds to the unfamiliar, and the universe is certainly a surprising place.

The telescope site at Cerro Paranal is dramatic. Barren stony desert falling away to the cotton wool rolls of coastal fog banks. Four silver boxes perch on the Paranal mountaintop, sheltering the powerful eyes of the Very Large Telescope from the brilliant sun. At night they open to reveal the eight metre span mirrors that catch light from distant galaxies and faint stars. As the telescope slews across the sky, the heavy mirror sags under its own weight, but tiny sensors on its underside reshape it constantly to keep its eyesight true.

Cameras with coloured filters can photograph red wisps of hydrogen gas clouds and blue stars dotting the arms of spiral galaxies. Other machines are even more inquisitive, and can pull a galaxy's light apart into its constituent colours to detect the bar-code fingerprints of chemical species, including variants of hydrogen, carbon, nitrogen and oxygen.

Because, as Einstein told us, the speed of light is fixed – at three million kilometres per second – and the universe is so vast, light from distant galaxies can take millions of years to reach us. Even a ray of sunshine takes eight minutes to fall on Earth from the Sun. So looking out into space we are also looking back in time. The planets are seen in the last hour; the nearest stars several years ago; the most distant galaxies are observed as they were billions of years in the past when the universe was still youthful.

The very traits that make Paranal good for astronomy – dryness, altitude and remoteness – also make it inhospitable. Dusty air parches your lips and sinuses and the temperature swings by twenty degrees daily. All water and fuel must be brought by truck from the nearest town, the mining hub and port of Antofagasta a hundred and twenty kilometres to the north. But a hidden oasis has been built at Paranal to shelter and revitalise the astronomers. A modern and stylish low ochre building blends with the desert contours, almost invisible from the main road, apart from a walkway that disappears underground and a translucent dome that peeks through a gravel plane.

Below, inside the geodesic dome, is a miniature biosphere

filled with flowering plants and humidified by steam from a turquoise swimming pool. A welcome puff of moisture flushes your face as you walk in. Three open plan floors, housing dormitories, a canteen and office space, back the picturesque planted atrium. Through the far wall, square windows open out onto the bleak desert.

Astronomical observing is an activity tied very much to the clock; to the setting of the sun, the slow rotation of the skies and ultimate ending in sunrise. Our biological clocks and circadian rhythms are repressed as we sleep during the day, waking only to eat and resume our work.

Our time is also limited. We have just two nights to map gas blasted out from black holes in the middle of distant galaxies, called quasars. We are hoping to learn what role these supermassive black holes play in galaxies; these observations are a small step along the road to that goal. Black holes may seed the galaxy's birth, then switch bouts of star formation on and off, or blow away all the galaxy's gas in a catastrophic event,



effectively freezing it thereafter. Black holes contain as much mass as our entire Milky Way galaxy crammed into a space the size of our Solar System, and are so dense that they warp space around them so strongly that light rays that pass too close can swirl in and be trapped. Even time slows down to a crawl near a black hole, and can halt altogether within its horizon.

Recognising that the same skies have been watched from this place for thousands of years, Paranal's four telescopes are named in the indigenous Mapuche (Mapudungun) tongue – Antu, Keuyen, Melipal, Yepun – meaning the Sun, the Moon, the Southern Cross and Venus as the evening star.

Packing up and leaving Paranal, our bus bounces along the dusty road back to the airport. A successful run; we have collected good data. Photons from the edge of space, collected in a landscape coloured with layers of time.

Further photographs are available online at:

<http://astro.imperial.ac.uk/~jaffe/JCB%20VLT%20Photos/JCB%20VLT%20Photos.html>



(above) A swimming pool inside that sunny dome. Photos by Joanne Baker



The Essence of Time

Adrian Stannard explains why we need more accurate time-keeping and why that might take some time

Making Space from time – a motivation for better clocks

For at least the last six thousand years, the advance of the human race has been mirrored by the ingenious ways with which civilisations have navigated to remote, unexplored horizons. In the last 100 years, the advent of radio has been biggest development to aid navigation. This has evolved from the more crude form of radio beacons, to the accurately timed transmission signals in GPS (Global Positioning System). The GPS navigation system is a network of satellites, which in conjunction with a receiver gives a measure of 3-D spatial location on the Earth's surface, 24 hours a day, in any weather condition. There are 24 satellites (of which 3 are operational spares) in 6 orbital planes at 55-degree inclinations, orbiting the earth at 12,550 miles altitude with a period of 12 hours, and were launched over a five year period which began in 1989. Each satellite contains 4 atomic clocks, 2 caesium and 2 rubidium, with accuracies on the 1 part in 10^{14} level. This applies to the optical "clocks" and means only losing a second every million years. The figure is at least a factor of 30 better (or 30 million years) for caesium clocks (and the satellites have an operational lifetime around 10 years!) Although originally developed for military applications, it has since found use in applications as diverse as agricultural and botanical plant studies and animal migratory habits, to recreational activities including scuba diving, to locate wrecks – such as the WWII wrecks I have had the privilege to visit on exploration dives.

The principle of finding distance is through the time it takes to transmit a signal from the satellite to a receiver. Each satellite contains several high-precision atomic clocks allowing them to transmit a unique pseudo-random code to high accuracy, designed to be complex enough that the receiver does not synchronise to another satellite's signal. Receivers also generate the same random codes at the same time, and determine the time delay of a satellite's signal from the phase difference between its own signal and the detected satellite signal. The distance is then determined from the speed of light multiplied by the phase difference (delay time).

Positioning depends upon triangulation. With a single satellite, our distance measure puts us on the surface of a sphere centred on the satellite, with the distance measured being the radius. A measurement from a second satellite gives a second sphere, and intersection with the first gives a circular volume of possible points. The intersection of a third satellite measurement sphere narrows the location to two points A and B. One of these is our real location, and the other is usually obviously ridiculous (either too far from the Earth's surface, or moving at an impossible velocity) that it can be rejected in the receiver software before requiring a fourth satellite signal. Timing is crucial to the accuracy of GPS, and one would imagine the receivers must have accurate atomic based clocks, but for economic reasons they don't. Instead

they have free running quartz oscillators and achieve high accuracy by using additional satellite signals. With imperfect timing, a fourth satellite comparison will not intersect with the first three satellite ranges. The receiver's computer uses this error to introduce a correction factor to subtract from all its timing measurements until they all intersect at a single point – bringing the receiver's clock into sync with the universal time of the satellites.

“ in its introduction there were 2 types of [GPS] code signal per satellite – one for a Standard Positioning System and one for a Precision Positioning system, the former being made deliberately more noisy to reduce accuracy ”



The GPS satellite distribution of 24 Satellites

GPS was created by the US Department of Defence at a cost of about \$12bn, and in its introduction there were 2 types of code signal per satellite – one for a Standard Positioning System and one for a Precision Positioning system, the former being made deliberately more noisy to reduce accuracy. This was part of a scheme of Selective Availability (SA), so that non-trustworthy organisations and governments wouldn't benefit from the same high accuracy system as the US Defence agency itself. SA was for the most part abolished in 2000, in part as even higher accuracy was obtained through new techniques in the signal detection process (in a scheme known as Carrier-Phase GPS), and error correction methods such as Differential GPS, which use receivers in known locations to determine the error in timing signals from satellites and generate local correction factors, as well as the multi-satellite timing procedure mentioned above. These methods were born

not just to circumvent SA, but through essential research to deal with the inaccuracies introduced by the physical world:

- Ionosphere and Troposphere Delays – through dispersion, the speed of light changes as it passes through different parts of the atmosphere. Rain clouds also need to be accounted for, so some receivers also obtain local weather conditions from the met office to compute the necessary corrections.

- Signal Multi-Path Delays – These arise when GPS signals are reflected off tall buildings or mountain sides, increasing the path length to the receiver to give false readings. In electronic warfare an enemy GPS can be foiled in a similar manner, with a transmitter mimicking the satellites and introducing false signal lags, but in this instance it is much harder to correct as all the satellite signals can be “spoofed”.

- Relativistic effects – Special relativity: One of the effects of Einstein’s Special Relativity theory is time dilation. Clocks moving with high velocity run slower than clocks with smaller relative velocity. This causes clocks in the GPS satellites to run 6 millionth of a second per day slower compared to atomic clocks on the Earth, due to their comparatively high velocity in orbit. This is essentially a constant offset to correct; *however* if the receiver is also moving quite fast, or at high altitude, then dilation needs to be accounted for.

- Relativistic effects – General relativity: This arises through the effect of the Earth’s gravitational field. Clocks at higher altitude above the Earth run faster than the clocks on the surface. However, the gravitational field is not a simple spherical potential because of the ellipsoidal shape of the Earth. Fortunately these effects are too small to matter at present, however, future higher precision devices will need to make general-relativistic corrections.

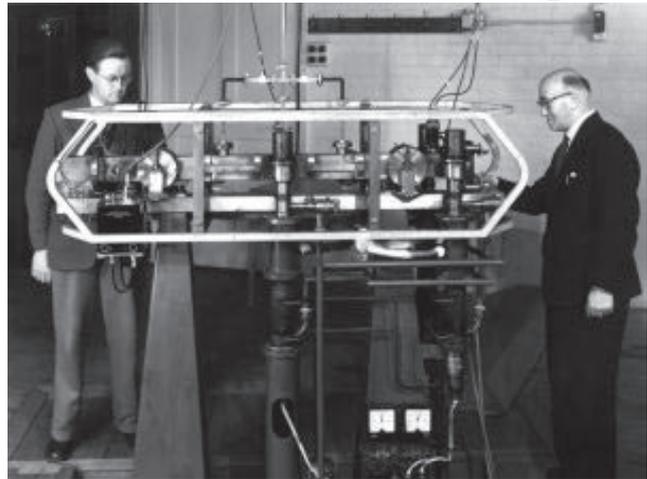
- Other errors: such as Doppler shifting of the transmitted signals. But I will shut up and move on.

The ultimate in GPS receivers can achieve accuracies to 2.4 metres (through sophisticated error reductions), typical receivers still using the precise PPS can achieve 10-20 metre accuracy. It is worth noting that in both these cases, this is with the limit of clock accuracy of 100 nano-seconds. The factor of 10 improvement arising from better error corrections and use of the Carrier-Phase GPS technique. Future optical clocks could offer at least a factor of 1000 improvement, meaning resolution to the mm scale.

Where to Begin?

“To know who you are, you have to know where you are, and when you are...” said the headmaster played by John Cleese in the hit 1985 film *Clockwise*. This was a character obsessed with other people’s lateness, being only too easily distracted from getting to his own destination in good time. The statement, which would be repeated frequently in the film, is interesting in that it implies the importance of both space and time – not that John Cleese would have wanted to discuss it any further, as he had just missed his train.

Space and time are related measures in physics. Quite famously they are related through Einstein’s Relativity theories, and it is appropriate that this annual Romulus edition is devoted to “Time and Space” since physicists are celebrating 100 years



Louis Essen (*right*) and Jack Parry with the first caesium atomic clock they developed in 1955 at the NPL, accurate to one second in 300 years, built on rather slender resources.

of Einstein, after his four seminal papers in 1905 which helped change the face of physics. Besides relativity, another relation between these two seemingly different quantities arrives from the fundamental way in which time and space are defined, i.e. through measurement. The current definition of time is based on the reference of a microwave oscillator (a maser) to a microwave *hyperfine*¹ transition in a Caesium atom, so accurate that it only loses a second every 15 million years. Space, albeit the unit of length, the metre, is actually defined in terms of time: the distance a ray of light travels (in vacuo), in 1/299 millionths of a second. In fact this is not unique to us – in everyday language, distance is frequently referred to in time – “Summertown is about 15 minutes walk from here”. As will be mentioned later, navigation (such as GPS systems) also require time measurements to determine distance, and hence at the fundamental level, time is the most important quantity in the world.

“What then,” asked St. Augustine “is time? If no one ask of me, I know; If I wish to explain it to him who asks, I know not”

To answer this question, let us first ask “Can time be measured?” The answer is actually no! What is measured is the time difference (or interval) between two events, or the time of an event with reference to a particular oscillator. So if time cannot be measured, is it physical, an abstraction, or an artefact? Let us return to the process of measurement. Some of the laws of physics are often modelled with time as the independent variable. These laws can be re-arranged to make time the dependent variable. However, under these circumstances time is dependent upon defined origins – the defined resonance in caesium atoms, the interrogating electronics, induced biases, timescale algorithms and random experimental perturbations. Hence at the fundamental level time, as man measures it by the best means available, is an artefact.

On an everyday level we all know that clocks disagree with one another, and no clock keeps “ideal” time except as we may choose to define it ourselves. However, time intervals, or frequencies of oscillation on the other hand, are fundamental – the definition of the second is therefore fundamental, ideal down to some accuracy limit. The holy grail for scientists in the field has thus been to find ways to overcome experimental limitations in order to improve accuracy, and nowhere is this more

apparent than in the Caesium atomic clock.

The Caesium Microwave Resonance

“For more than four decades, caesium atomic clocks have been the backbone in a variety of demanding applications in science and technology – satellite based navigation systems such as GPS or telecommunications networks wouldn’t function without them” - Andreas Bauch, principal scientist on the PTB (Physikalisch-Technische Bundesanstalt, Germany) caesium clock program in Germany, home to some of the most accurate caesium clocks.

Until 50 years ago, the accuracy limit of time was defined upon the Earth’s rotation – GMT, then in 1955, the world’s first Caesium clock began life here at the National Physical Laboratory, UK. Its principle developer, Louis Essen, had a background in oscillators, and despite little experience in atomic spectroscopy, and with the stuffy scientific orthodoxy still keen on keeping astronomical time, succeeded in a remarkably short time in developing the world’s first source of atomic time – in no small part through a lot of determination and self-assurance. Since then it has seen novel redevelopment (to become the “Caesium Fountain”), with the best accuracy achieved at the LPTF (Primary Laboratory for Time and Frequency) in Paris.

Almost all caesium (and hydrogen and rubidium) atomic clocks work on the same principles, but first let us say that atomic clocks are not really like everyday clocks. What is really measured is not time, but frequency, the reciprocal of time. Caesium atoms are prepared by equally dividing between two internal atomic states – the hyperfine levels of the ground state. This energy is equal to the energy of a photon of microwave radiation with a frequency of about 9.2 GHz. This means that atoms in the lowest of these states can be pushed into the higher state by microwaves, but only when the microwave frequency is extremely close to this atomic resonance. To see how this becomes a clock, consider how a mechanical clock works. At the heart is a local oscillator – a mechanism which oscillates at a natural frequency – this could be a pendulum or a wheel on a spring. On its own this may gradually lose time, so the system is regulated by hand, ultimately with reference to the hypothetical mean position of the sun on the Greenwich meridian (GMT). In the caesium clock, this process occurs almost continuously with the local oscillator. (A quartz oscillator or hydrogen maser, which means: Microwave Amplification by Stimulated Emission of Radiation; lasers being the same, just with light²). This oscillator is regulated via an atomic reference.

The problem with atoms is that, unlike ions, they are difficult to hold still in space. Caesium and Rubidium clocks need to rely on techniques to slow the atoms down as much as possible. This is necessary to increase the interaction time between the atoms and the interrogating local oscillator - long enough such that the uncertainty in frequency is reduced. Today this is achieved by laser cooling and launching the atomic cloud, and then letting it descend under freefall. Thus atomic clocks that use this technique are known as “Atomic Fountains”.

Fundamentally, the accuracy of a clock is related to the frequency of its transition and the stability of the oscillator.

A microwave frequency results in a clock with stability of the order of a few parts in 10^{15} , accurate enough that it would only lose 1s in 15 million years. This has been realised already with the Caesium fountain, and future work is concerned with atomic confinement in the interrogating region, either through optical lattices (a novel way of “trapping” atoms with laser light), as well as sending caesium fountains into space, where the Earth’s gravitational field will be too weak to pull the atoms out of the microwave region. That alone could give a factor of 10 improvement, but a growing range of applications and research are making demands for an even more accurate device.

Trapped Ion Optical Frequency Standards

“...one can logically ask, why would anyone want to build better clocks? I can give 3 reasons: 1) The advances in navigation and communications are approaching the current time barrier, 2) A better examination of fundamental physics like the constancy of fundamental constants, 3) Trapped laser cooled ions are interesting...” – D. J. Wineland principal scientist at NIST, behind some of the most important breakthroughs in laser cooling of atoms and ions, optical frequency standards, and quantum computation.

The next fundamental step in accuracy is to use a different atomic frequency. Our group at NPL is developing optical frequency standards based on ultra-narrow transitions in single strontium and ytterbium trapped ions, with similar work being conducted in time and frequency labs worldwide: mercury at National Institute for Standards and Technology in Colorado, strontium at the Institute for National Measurement Standards in Canada, and ytterbium at PTB (this is not a complete list of labs, however these are considered the most active in the field). The strontium clock at NPL has gained recent publicity on account of just being ahead of our American counterparts – although it will not be long before NIST improve their measurement statistics: they have the advantage of having the best laser in the world.

The advantage of trapped ion optical standards over caesium is two-fold: The problem of confining an atom is overcome if the atom carries an electric charge as a “handle” to hold it still – i.e. if it is an ion. (You can’t just ionise caesium as the energy level structure will be different, and the reference transition lost). The optical frequencies are a million times higher than microwave frequencies, giving 1000 times better stability (in truth, a factor of 1000 appears because caesium standards have approx 1 million atoms, the root of which gives 1000, the improvement in the signal to noise of the caesium standard).

Additional frequency shifts through sensitivity to magnetic and electric fields are correspondingly much less, although not completely free of perturbation. It should be pointed out that the optical transitions for an optical clock are different to those normally experienced with atoms (for example the glow of a sodium street light). The optical reference transitions occur in what are known as long-lived quadrupole, and in our ytterbium clock, octupole transitions. In the former these typically last around 1s, in the latter, the octupole transition is so improbable that an electron can spend 6-10 years in that state before decaying to the ground state. Such long-life atomic states mean a narrower frequency, and hence better

certainty (and stability), but are also much harder to see. In fact a trick called electron shelving is used to infer if the atom is in this clock transition, from its inability to absorb and emit cooling light. The clock aspect is as follows: the laser scans the ion's reference transition, and depending on the number of excitations, corrections are made by the servo to maintain the laser frequency in check with the atomic resonance.

A major selling point of an optical transition is that in principle it allows the equivalent stabilities of caesium clocks to be attained in a few seconds of measurement, as compared to a few hours averaging time with caesium. Instead of a microwave oscillator, a laser is used: however both are very similar in terms of operation and methods of frequency control. To illustrate, the main method of laser stabilisation employed is based on techniques developed for microwave stabilisation. In this scheme a "reference cavity" is used, which allows variations in the laser frequency to be measured. Having stated in the beginning that distance is defined in terms of time, paradoxically the stability of a laser is limited by length

“ The problem of confining an atom is overcome if the atom carries an electric charge as a “handle” to hold it still – i.e. if it is an ion. ”

fluctuations of the reference cavity (this is also the case for masers). One could say that time is limited by space, although this is really an artefact brought about by the experimental conditions: sensitivity to sound and vibration. The system is so sensitive that changes in length must be no larger than a few parts in 10^{-16} m, the nucleus of an atom.

“If the length of the cavity was the diameter of the earth, then it mustn't change length by more than the thickness of a human hair!” – J. Bergquist, NIST, pioneer in laser stabilisation, behind the world's most stable and accurate laser.

Conclusion

Whilst achieving a transportable trapped ion optical clock is still a long way off (all the equipment weighing at least 1 ton, let alone the power requirements of lasers!), it is perhaps worth noting that the first caesium references were also pretty massive. New developments in laser devices and fabrication, and engineering advances such as the development of micro-traps can make this a reality.

As remarked by Wineland, the use for high accuracy atomic clocks is not just limited to navigation, but to a broad range of areas. Even where not time-keeping specifically, the same techniques recur – identical laser stabilization methods at the extreme level are used in the gravitational wave project LIGO (Laser Interferometer Gravitational-Wave Observatory) at Hanford, Washington, and Livingston, Louisiana, US; and the laser cooling and trapping techniques are already being applied to trapped ion quantum computers.

As for applications in navigation, accurate navigation is not just of interest to the military. Improved precision will be more sensitive to general relativistic errors, in other words, better

experimental clarification of General Relativity. The field of space exploration will put even more demands on navigation and signal times as further frontiers are explored. The Cassini-Huygens mission to Titan (one of Saturn's moons) was very lucky not to have ended in disaster due to neglect of Doppler shifting of the radio signals in the design stage. In the end, the Huygens probe had to orbit Titan 40,000 miles higher than planned in order to slow down for descent, making the task far more difficult than planned. The guesses were only known to be right when the first bytes of data came streaming in – like some cinematic dénouement in which a longer radio silence than expected left ground crews momentarily anticipating the same fate as Beagle 2. There is no doubt that better positioning (and hence better timing) would have huge benefits in such circumstances, as well as for better probe and rover tracking. This is all technology that was not even available to the Cassini-Huygens project since as these probes were launched in 1997, the electronics had to be designed near the beginning of the project in 1988. That was a time when the best desktop computer was the Commodore Amiga A500, ix86 PCs were fine if you liked green monochrome screens and 10 MHz processors, and when Kylie Minogue regrettably embarked on her music career.

References/interesting reading:

St Augustine (Confessions XI: 11) – although first gleaned from 'Time and Frequency (Time-Domain) Characterization, Estimation, and Prediction of Precision Clocks and Oscillators', D.W. Allan

Understanding GPS: Principles and Applications (Artech House Telecommunications Library), E. D. Kaplan

Global Positioning System: Theory & Applications, B. W. Parkinson and J. J. Spilker.

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¹ For the non-physicist, an atom consists of a nucleus and electrons, where the electrons occupy a discontinuous, quantised energy spacing. It is quantised according to various "quantum numbers", some of which describe the momentum and spin properties of an electron, and at a smaller level on properties of the nucleus. The hyperfine separation of an energy level results from the spin of the nucleus, giving rise to a small magnetic moment, which interacts with the electron's own magnetic moment, perturbing (splitting) the electron's energy levels a very small amount – hence hyper-fine. MRI scans work by interrogating the hyperfine splitting of hydrogen contained in the water in our bodies. When exciting this transition you are actually rotating the spin of the nucleus from downwards to upwards with respect to the electron's spin.

² Just to confuse matters, all electromagnetic radiation is light, with the only light visible to us being a very small subset of the spectrum. The term "Laser" applies to the range of visible wavelengths, with the everyday usage of light being visible only. They also work just a bit beyond, into IR and UV. Lasers are really oscillators as opposed to amplifiers, and so the acronym should be "Loser"!

Time Devouring a Torso

Gertrud Seidmann on Edward Burch's engraved gem sealstones

In 1775, James Tassie, a Scottish artist and manufacturer, active in London, brought out his first sale catalogue of impressions from engraved gems. No. 82, out of more than 3000, is described as:

*SATURN, holding the trunk of a figure upon a pedestal - By Burch (Duke of Marlborough's)
[meaning that the original stone was in the duke's collection]*

The collecting of casts from gems was a new fashion, introduced by Grand Tourists returning from Rome, not only with a few ancient Roman gems set in rings, but with whole boxes of impressions cast from intaglio-cut sealstones or the rarer cameos, sharply moulded in sulphur dyed red or in a type of plaster. Their purpose was instruction. The multiplicity of designs found on ancient gems, from images of the gods and scenes from the legends to depictions of rural life, monsters and animals, offered an enormous repertoire for studying the ancient world, during the 18th century once again of primary interest to the cultivated. Not all the stones or their impressions were ancient in origin: for this interest had brought forth a revival of the millennia-old craft, and workshops could be found in Rome and Naples from the 1730s, offering modern imitations of ancient motifs on stones, mostly quartzes such as cornelian and chalcedony. London was a long way from Rome, but gem-engraving, in imitation of what was happening in Italy, had been promoted by the recently founded Society for the Encouragement of Arts, Manufactures and Commerce (more briefly known as The Society of Arts and still, as the Royal Society of Arts, residing in its John Adam home off the Strand). It advertised prize competitions for artists, including gem-engravers. Three of these competitions, in 1762, 1763 and 1765, were won by one Edward Burch, two for cameos (an Apollo Medici and a Head of Alexander) and one for an intaglio (sealstone) of the Apollo Belvedere.

Burch was a phenomenon. A humble cockney, a Thames waterman, he was strongly drawn to the arts, taught himself drawing and the craft of engraving seals (crests and initials for the 'quality'), attended a London drawing-school, made friends with budding artists and, having turned gem-engraver – cutting heads and figures in the classical mode – joined them in a society which put on the first ever artists' exhibition in London, enrolled as a student at the newly founded Royal Academy of Arts, and within two years found himself in the first group of *elected* Royal Academicians (the original group was nominated). His skill with the engraving tools was outstanding: several of his gems, including a brilliant *Apollo Belvedere*, are in the British Museum; the seal Joshua Reynolds wore on his watch-chain is in the Ashmolean.

But how was he able to achieve such a meteoric career? Many years later, when he issued his own catalogue of one hundred selected gems, he singled out his studies in anatomy under Dr William Hunter: Zoffany's painting of the Academicians, in the Royal Collection, shows him literally crouching attentively

at his feet. But one figure from his past is conspicuous by his absence: George, Duke of Marlborough.

This nobleman had been seized by a passion for engraved gems during a brief Grand Tour stop in Venice, aged 22, when he acquired four gems from the collector and dealer Anton Maria Zanetti, including two ancient stones: a famous head of Antinous and a Sabina. When Professor Nevil Story-Maskelyne catalogued the collection inherited from his ancestor for the 7th duke in 1870, it comprised 739 numbers; most collected, a number commissioned: for the duke was also a patron of contemporary gem-engravers. Two famous artists of an older generation worked for him, as did the up-and-coming Edward Burch in his early thirties, and Burch's pupil Nathaniel Marchant, nine years younger. What he required from them were mostly copies, on different gemstones, of gems from his own collection. This prestigious patronage was of enormous importance to the aspiring artists. Marchant was suitably grateful to the duke and continued to execute commissions for him in Rome. Burch, as we see, ignored him later. Why?

“ A humble cockney, a Thames waterman, he was strongly drawn to the arts, taught himself drawing and the craft of engraving seals ”

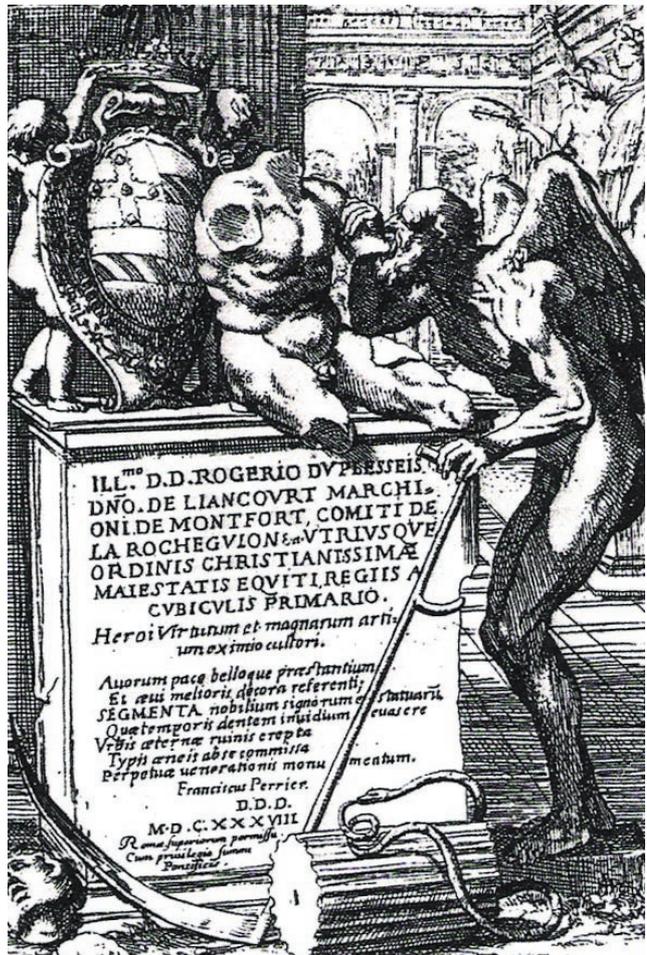
Jealousy of Marchant may have been the cause. Burch had copied the duke's *Antinous*, *Sabina* and a *Bacchus* figure, and cut at least another three stones for him, one of them the *Saturn* of Tassie's catalogue. By the time he issued his own, twenty years later, the group was renamed *Time*.

It occupied an odd place among the stones he cut for the duke - not one of the customary classical subjects, divinities or heroes of legend and history. It depicts a seated, winged figure of Chronos or Saturn clutching a muscular torso. In mythology, Chronos/Saturn, the father of Zeus/Jupiter devoured his children – this was taken to symbolise Time, which devours everything eventually. And here he is shown clutching and gnawing at a mutilated athletic body: but this figure was extremely famous among connoisseurs of ancient art, as the statue in the Vatican Museum, known as the *Torso Belvedere*. This enormously powerful figure, known since the 15th century, was greatly admired by Michelangelo, and acquired additional lustre when placed in a special vestibule in the newly created Vatican Museo Pio-Clementino in the 1770s. Much reproduced (there is a fine terracotta version in the Ashmolean), it became accessible to Burch, who never visited Rome, through a cast in the Royal Academy, but miniature

copies were obtainable in all the plaster-shops. Burch was in fact something of a rebel against the overwhelming dominance of the classical. Nature – the knowledge of anatomy – was his goddess, although he had to bow to the fashion of the time. But here he must have seen a subject to which he could apply his studies of the human body, while pandering to neo-classical taste. And the *Torso* had been shown before in an emblem of Time literally devouring this image of strength and power, helpless against its ravages: it had been used by Francois Perrier as the title-page of his *Segmenta* (1638) listing works of art which the ‘tooth of time’ had destroyed. He shows a standing figure of Chronos gnawing away at the seated fragmentary torso.

It is quite likely that Burch knew this print, for he had a predilection for allegories, perhaps nurtured by emblem books and by an early patron, the brewer Samuel Dickenson, for whom he engraved three extremely odd allegorical gems. One of them shows a lion above a recumbent tiger, with the gloss ‘The Lion having subdued the Tyger, grants him his life on submission’, supposedly an ‘instance of the disposition of Julius Caesar...as ready to spare, as conquer’.

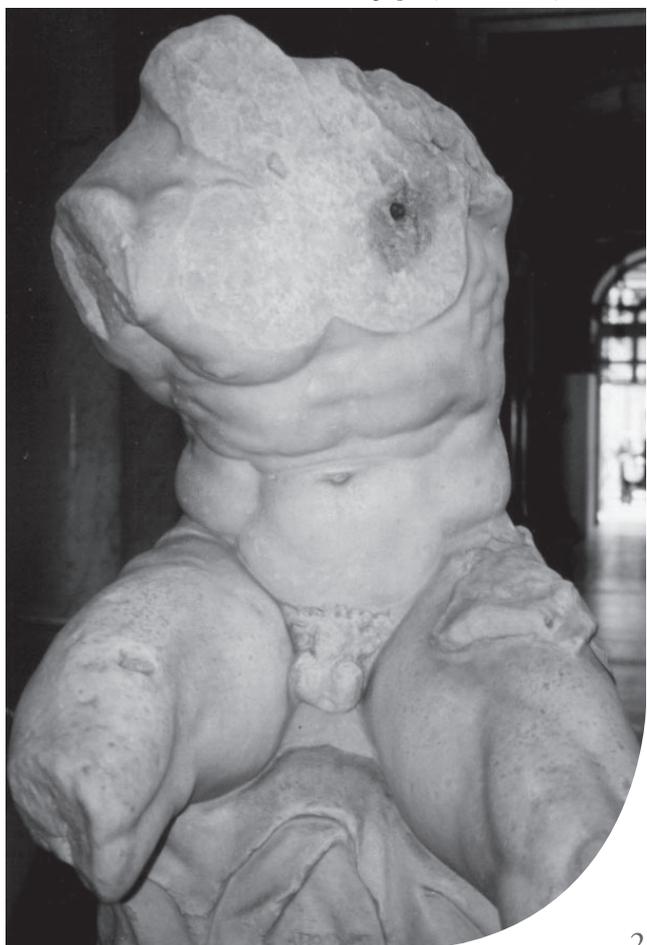
Chronos gnawing away at this powerful figure is a far more intelligible allegory of a truism. The cast, from Burch’s 1795 catalogue, allows us to appreciate the engraver’s skill in creating this intricate group: I was touched and astonished when I happened on the original gem, a tiny, unmounted cornelian, in the Krakow National Museum.



(above) Time Gnaws on a Torso, title page of Francois Perrier's *Segmenta*, 1638

(below) The Torso Belvedere, Vatican. Photograph by Leslie Looney

(below) Edward Burch, *Time*, 1791, red sulphur cast from gem, by James Tassie. Victoria and Albert Museum, London; photograph by Robert Wilkins, Institute of Archaeology, Oxford.



Brian Aldiss Unbound

Paul Bateman interviews the science-fiction writer Brian Aldiss

Despite preparing to celebrate his eightieth birthday in August 2005, Brian Aldiss won't be retiring from the literary scene soon. It's a career spanning fifty years and including such science fiction classics as *Hothouse* and *Non-Stop*, as well as a number of highly praised contemporary novels and poetry. "As I get older, I get wiser," Aldiss says, "Well, more experienced and so I want to keep writing."

Indeed his body of work has won him many fans and awards. The Science Fiction World Association have named him a Grandmaster, although this doesn't appear to have made much difference to him. "I'm not sure if it's for merit or longevity. Nice to be given this award, but you read magazines, like *Locus*, filled with pictures of little grinning people with awards."

The University of Reading have also made him an honorary Doctor of Letters. He notes that Oxford hasn't done the same and possibly feels snubbed. (All the best people have doctorates from Reading, I tell him, as I have one too.) He finds Reading more up to date than most of the Oxford colleges. He also finds Wolfson to be more friendly than most of them and is a member of the Common Room. It's a position that came about through Martin Francis as both he and Aldiss knew Philip Mors Berger, a US artist and Head of the Ruskin School of Art. Wolfson has certainly had an influence on Aldiss as certain parts of *Affairs at Hampden Ferrers* take place within the College, but Aldiss is wary of supplying a copy to the College library, as he is unsure of the response. *Affairs at Hampden Ferrers* was published in 2004, but this is far from his last novel having published *Jocasta*, a take on the Oedipus legend from the mother's point of view. And there's no sign of him slowing down.

Indeed, Liz and I have interrupted work on his latest novel, *Walcot*, which has taken two and a half years in the making so far. "Usually a novel will take a year to write," he says, "but this is larger and more ambitious than my usual work. It's a retrospective look at the twentieth century through the eyes of a family. It's an all-embracing book like *Life in the West*, the *Squire Quartet* and, to an extent, *Helliconia*, embodying everything I know and things I didn't know. Well, not quite like *Helliconia*, as it's set on the only planet I've lived on."

The writing seems to be going well although he says that during the third draft he'd realized he'd missed something: "I didn't mention the National Health Service!"

Few authors today could be in a position to attempt such a work. He has age and experience on his side. He's lived through most of what he's covering and has been writing for quite some time.

"I always knew I was going to be a writer," Aldiss says. "I was writing when I was four, with illustrations, which my mother encouraged. She used to bind the stories in wallpaper and put them on the shelf with the other books, but unfortunately didn't keep them. At school I used to write stories and charged a penny a read. But I was too anxious to

have them read so did not make much money. A friend and I put them in a biscuit tin and buried them in a rabbit hole. The *Western Daily Mail* wrote an article claiming that they were found. A film crew recorded it being dug up by some sixth formers. The stories are now in the Bodleian with the rest of my collection. A chap in Hong Kong wrote to me saying he found the episode very heart-warming." He grins, "But it's a hoax! The tin they're in isn't the original. It's one my wife and I found from the period."

Some authors harp on about how difficult writing is. Aldiss disagrees. "I wouldn't say writing's a struggle at all. Iris Murdoch once told me, 'Never let on how much you enjoy it.'"

We turn to the theme of this year's issue of *Romulus*, time and space, and how this affects his writing. "Since my wife died I live in the house alone. The writing spreads from room to room and I can write at any time. When I bought the house I

“ [Kubrick] asked me if we could dream up a modern myth, something as popular as Star Wars, but still retaining kudos. ”

had a wing built which includes the staircase and a study with a book room above."

Aldiss finds it difficult to name other authors who have a direct influence on his own work. He suggests Thomas Hardy, and then says, "That may be too grand. I'm omnivorous in my reading."

When he was a boy he used to subscribe to a magazine called *Modern Boy*, in which ran a yearlong series by Murray Roberts, concerning the adventures of Captain Justice. Aldiss was a keen devotee. "Those stories probably had as much influence on me as a writer as Hardy."

Although Aldiss hasn't paid obvious homage to either Thomas Hardy or Murray Roberts, he has paid homage to Mary Shelley, whom he considers to be the founder of science fiction. His novel *Frankenstein Unbound* follows the adventures of a scientist who travels back in time to meet Mary Shelley and discovers that Frankenstein and the monster actually existed. The book was adapted to film by Roger Corman and starred John Hurt and Bridget Fonda. He found it to be "okay", but the script was "not so good". Aldiss says that relations with Corman were cordial. This is more than can be said for his relations with Stanley Kubrick.

"He had made three science fiction films. [*Dr Strangelove*, *A Clockwork Orange* and *2001: A Space Odyssey*.] He read one of my books – in paperback, too cheap to buy it in hardback – and invited me to lunch. He asked me if we could dream up a modern myth, something as popular as *Star Wars*, but still

retaining kudos. So we thought of a story where a young man has a series of adventures, picks up friends along the way and gets the princess in the end. Then we realized, "Shit! It was *Star Wars!*" Anyway, he looked at some of my work and picked *Supertoys Last All Summer Long*. He used to send a limo to take me to his pad in Buckingham. In those days we were smoking and drinking lots of black coffee, but we made no progress. He wanted it to have the Blue Fairy like in *Pinocchio*, but I disagreed and was kicked out. I tried to get the story back but the contract read 'in perpetuity'."

Kubrick was friendly with Steven Spielberg who inherited the film from Kubrick after his death. "Kubrick would take ages with a film while Spielberg is hasty." Aldiss had a look at the story and saw how it could continue and wrote to Spielberg who offered to buy a sentence from him. "This was as much as I get for an advance for one of my books! So I wrote two stories and sold them."

The resulting film was *A.I.* about an android boy, who replaces a woman's comatose son. Aldiss found it "too sentimental" and the plot flawed, lacking some SF logic. In the film, the robot eats spinach, which is caught in his gullet causing a malfunction, as he isn't allowed to swallow anything. Later on he falls into water but there's no effect, but later on he jumps in the Hudson with the intention of drowning. Then there was the ending a thousand years later where the mother is revived for a day from some DNA. Aldiss found this corny, but points out that the ending was very Oedipal as the boy gets to sleep with his mother. Aldiss sighs, "It strived to be intelligent but just missed out. And he meets the Blue Fairy and becomes a real boy as Kubrick wanted."

Aldiss hasn't finished with films yet. He has had a cameo in *Brothers of the Head*, another production based one of his books. And this isn't the first time he acted. He used to be part of a little group called SF Blues in the '80s and '90s, whose chief actor, Ken Campbell, wanted to take science fiction to the masses; sometimes as many as twenty-one people. Aldiss has even played Hitler at the 2002 Edinburgh Book Festival in a play based on his short story *Swastika*.

If *Swastika*, among other works, comments on society, has he found that life has been imitating his more speculative work?

"I don't rate prediction very highly," he says.

What about *Super-State*, which is about Europe in fifty years time? Part of it concerns an ice shelf breaking off Greenland causing a tidal wave across Ireland and Britain. I happened to read this a week before the Boxing Day Tsunami. It's not clear if he sees much in such parallels as he says the book was about Europe being a superpower and invading a small country in the East, which is more like the recent situation in Iraq. "I'm just sorry I hadn't predicted Turkey as an EU member though I got it right with Romania, which is fairly prescient."

Unlike some writers of science fiction, perhaps the reason he isn't concerned about prediction is that his concept of time and space has changed over the years. "When I was a kid I used to have a book called *The Treasury of Knowledge*, which was published in 1935. I still have it. But it doesn't venture to state how old the Earth is - quite surprising how things change in one's lifetime. Now Sir Martin Rees, the Astronomer Royal, talks about the multiverse quite casually, a term Michael Moorcock [a SF contemporary of Aldiss] claims to have invented."

When would he go with a time machine?



Brian Aldiss by Paul Bateman

"Forward or back?" he asks and ponders an answer. "I'd like to go to the nineteenth century, meet Byron and see the Industrial Revolution as it was unfolding.

"Would also like to go ahead, but it might be sad to see the errors and blunders of the West, many unnecessary; the West fading out and China becoming the dominant superpower. I'm fond of the Chinese, but find the idea of a Chinese future a bit sinister. Also what would humans be like with cyborgism and the like?"

What would he have done in a parallel universe had he not been a writer?

"I'd have been a scientist, an archaeologist," he says. "But I'd spent a long time in the army in the East and couldn't tell the difference between a florin and a crown - luckily they've got rid of them now. My uncles could have taken me on as an architect, but I couldn't commit to that length of training. I'd felt I'd done my penile servitude, ten years in school and six in the army."

Nevertheless, unlike a number of people his age, he says he's quite content with the present day. He finds it more pleasant to be old than an adolescent. He now has peace and quiet to write. The atmosphere in Old Headington may have changed over the years from zimmer frames to fast food. He's adapted to his house and has no reason to leave.

When he's not writing, he's fairly gregarious, drinking and chatting with friends and he still enjoys travelling. He'd like to go back to Turkey and Paris, and since 1981 has visited Florida annually for the Conference of the Fantastic. Later this year he'll be returning to Burma for the first time since he was in the army during the Second World War. He'll be filming a documentary of his journey from Mandalay to Rangoon.

I ask if he has any advice for aspiring authors.

"Yes," he says. "Don't." But he continues, "No, what should you say? You have to be a fairly solitary person, sitting on your own, thinking all the time. You also have to be prepared to be ignored."

It's comments like these that make me suspect that he feels under-appreciated. Perhaps Aldiss isn't as famous as when he wrote *Life in the West* or *Helliconia*, but I suspect *Walcot* won't be ignored given the calibre of its author.

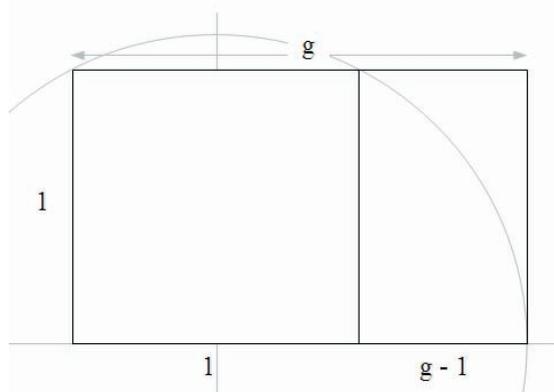
Paul Bateman would like to acknowledge Elizabeth Bateman for her help in conducting the interview and preparation of the article.

Lyon Roussel follows lines of perspective through the history of art

Art, like Homo Sapiens, just seems to have arrived. A few scratches on rocks, and then suddenly the blasting glories of the cave paintings of Lascaux or Altamira. Just as art and religion are closely linked, so the question is raised whether art is innate or acquired. Were these early masters part of a self-perpetuating priestly cult, or apprenticed as in later times? So much of what we admire in art today is there to be found: in the sense of time, the immediacy of a spear thrust, or an outlined hand print, imparted to rock faces millions of years old. Or in space the sheer size (“caverns measureless to man”), and incomparable beauty, of some of the caves themselves which must have awed and inspired those early artists. There is also a sense of freedom, before the constraints and frustrations of agriculture, which awakens nostalgia, a by-product, indeed subject, of so much of more recent art. This freedom also exists in artistic terms in the extent of the space available, dwarfing the Sistine Chapel (though drawings were spread over many millennia and one often superimposed on another): rather as if delighted children were let loose with coloured chalks in a deserted mansion.

The time since has been spent in taming art – art husbandry: adapting art to the spiritual and temporal needs of domesticated mankind. It resurfaces in terms we can recognise in Mesopotamia and Egypt. Often grand indeed in terms of scale and space, but tailored to serve as architectural decoration, a pyramid, an illustration of imperial power. Art becomes allied to mathematics – the very manifestation of space and time in current thinking -and rules are applied, new techniques examined.

The ultimate definition of an ideal spatial relationship was described by Euclid in 300 BCE¹. A straight line is said to have been cut in extreme and mean ratio when, as the whole line is to the greater segment, so is the greater to the less.



The larger rectangle is similar to the smaller rectangle:

$$\frac{g}{1} = \frac{1}{g-1}$$

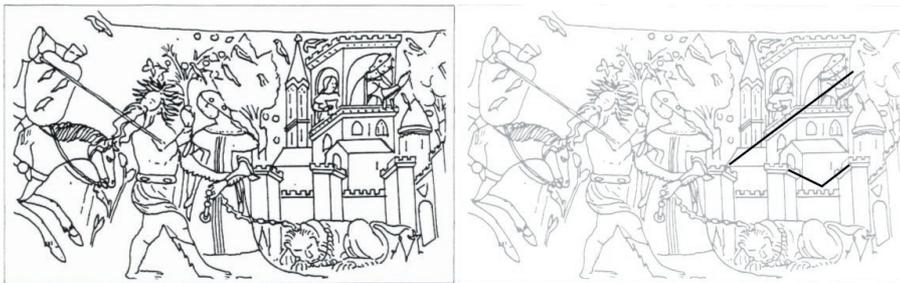
$$\therefore g^2 - g - 1 = 0$$

$$\therefore g = \frac{1 + \sqrt{5}}{2} = 1.618034\dots$$

Illustration of the application of “g” (called “The Golden Mean” by Kepler, 1571-1630) can be seen in Greek temples and in Western “art forms” since – for example, the traditional sash window. The desire to “arrange” is instinctive: “geometrical intuition” – even laymen know when a picture is “wrong”, or when the furniture in room looks awry, though they may not be able to analyse this awareness. As though restricted by this, artists have deliberately sought aberrations. In Japanese pottery, for instance, an imbalance or slight imperfection is considered an aesthetic essential. In China a mended vase (sometimes repaired with gold) would be the more highly prized. A Persian carpet weaver would insert some imperfection since perfection was the prerogative of Allah. More recently we have had more iconoclastic forms of art: Dada, Duchamp and his urinal, and entries for, and sometimes winners of, the Turner Prize. Cubism is sometimes mistakenly placed in this category. Far from being “a heap of broken images”, it is a highly sophisticated way of looking at the same object from different viewpoints: in terms of space, a kind of artistic implosion. Indeed Picasso and his influence can not be overemphasised; but he always returned to the object for inspiration no matter how he might interpret it (“at fourteen I could draw like Raphael; it has taken me a lifetime to learn to draw like a child”). It was thought by some that Cubism would forever change the stylistic approach to art (just as it was often thought that James Joyce would put a lasting imprint on literature). But it was not to be: the exceptions proved the rule. In Western art, at least, Cezanne remains the anchor man. It is significant in this context that David Hockney recently forsook painting for a time to research the lost techniques of the Old Masters and produce his superb book, *Secret Knowledge*².

The most commonly accepted arrangement of space in two dimensional art is through perspective: the vanishing point. This is widely held to be a Renaissance discovery (Brunelleschi 1377-1446), and the most quoted example is Ucello’s *Battle of St Romano* (c. 1450). In point of fact the Romans understood the vanishing point as early as the first century BCE, and there is a fine example of this in the recently excavated Villa Atrintis (near Naples) – where Nero allegedly kicked his pregnant wife, Popea, to death – where the entrance hall appears vastly enlarged by murals of imaginary buildings of imperial splendour receding into space. The best current treatise on perspective is Professor Sir Christopher Zeeman’s *Geometry and Perspective*³ written to accompany a video for schools (produced by popular demand following the great success of his televised series of lectures “Mathematics into Pictures”). The “Zeeman” diagrams opposite indicate two lines of approach to composition, pre- and post- 1420.

Does perspective, by imparting realism, enhance or detract from the composition, movement or the essential message of the picture? In *Hall of Kings* (c.1350), the artist wanted to impose several views at once. For example the view obtained by looking up at the ramparts as you approach is superimposed



Hall of Kings (14th Century), Alhambra, Spain



Domenico Veneziano (active 1438-1461), *The Annunciation*, Fitzwilliam Museum, Cambridge



(above) Image of a stag from the entrance to the Painted Gallery, Lascaux caves. *La France - des origines aux gaulois*, archaeological edition.

on that obtained by looking across at the turrets from on top of the walls. The two women have an important role and are made much more prominent than their space in perspective would justify: as a child might draw a room, giving size and prominence to a favourite doll propped up on a bed in a far corner, or a shelf of books on a side wall presented square on. Perhaps the enchantment of early art and, later, naïf art is that it draws us back to childhood and a more innocent way of looking at the world.

Any discussion about almost any form of art must draw attention to the significance of Leonardo da Vinci and in particular his *Last Supper*. No work of art has taken on the universal character that this fresco has: and we in Oxford (Magdalen College chapel)⁴ are most fortunate in having one of the best copies (and possibly contemporary) of this masterpiece, particularly given that the original in Milan is in such a state of disrepair having suffered at the hands of too many restorers. In Leonardo's time painting was still struggling to emerge from its poor relation status vis-à-vis literature and music: it had to "surprise by a fine excess." It had to reflect nature, human emotion ("man and the intention of his mind"), and a sense of time – past, present and to come. All this comes together in *The Last Supper*. In religious terms it represents

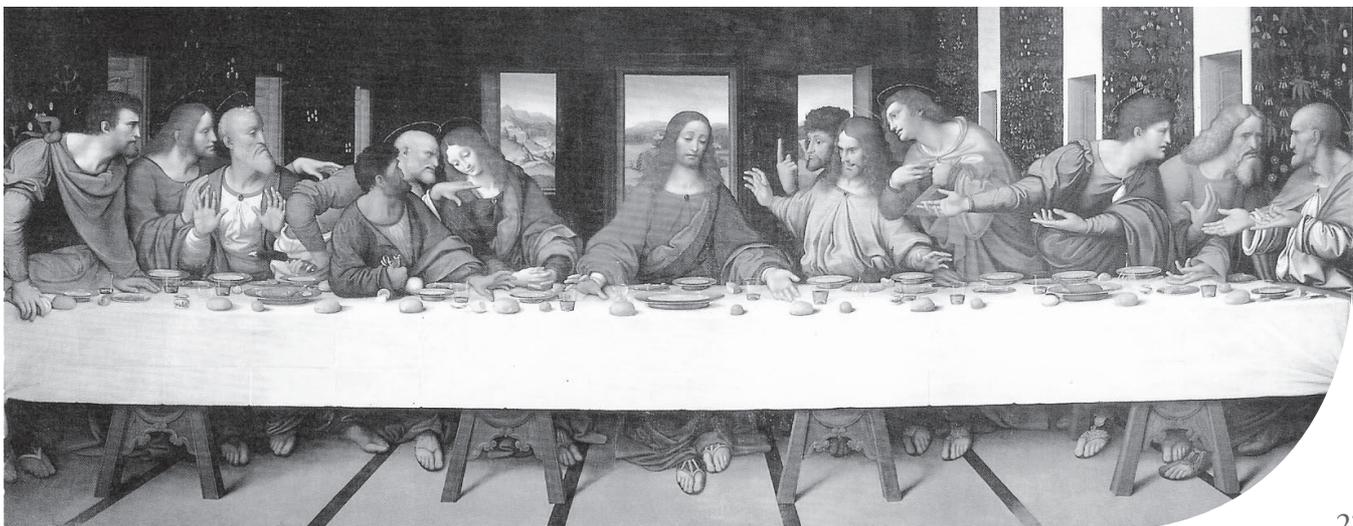
(all are agreed) the central point of the Christian doctrine of salvation, the institution of the Eucharist during the Passover supper celebrated by Christ and his disciples. The timing is as exact as the clash of symbols in a crescendo: "One of you shall betray me". The disciples round the table reflect many emotions – consternation, surprise – and with an exactitude that reflects Leonardo's own agonising over this masterpiece. The sensitive depiction of Christ's features (on which all the lines of perspective dramatically converge) hark back to Isaiah "A man of sorrows and acquainted with grief" and forward to redemption and eternal life: hope born out of sorrow. Leonardo adds a puzzling element: St John is portrayed as a woman, pale of face and with flowing locks. Something to perplex theologians and occupy scholars till eternity.

¹ Euclid: *Elements*, trans. T.L. Heath, (1908), Dover, 1956, Book VI, Definition 3, 1, Vol. 11, p.188

² D. Hockney, *Secret Knowledge*, Thames & Hudson, 2001

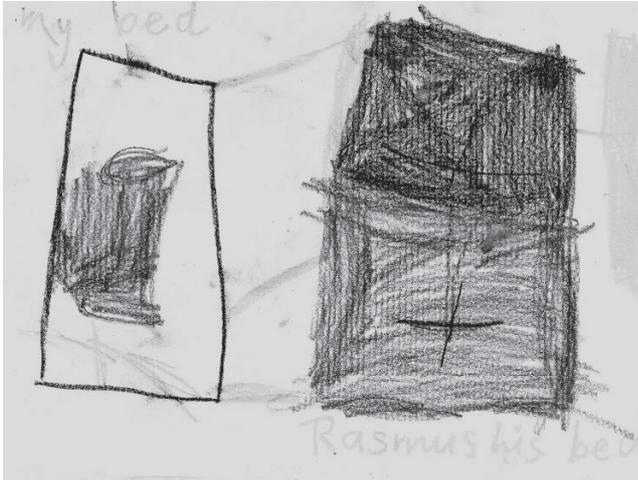
³ E.C. Zeeman, *Geometry and Perspective*, video and book, Royal Institution

⁴ E.H. Gombrich & P. Rogers, Papers given at the Dedication of The Last Supper (after Leonardo) Magdalen College, 1993

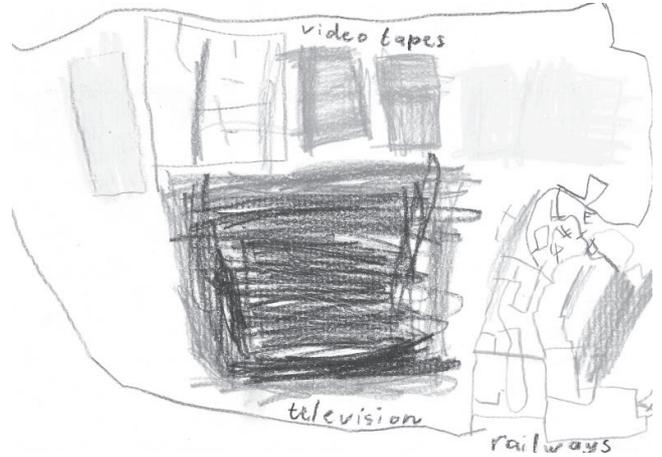


The Wolfson Family Society

Contributions from some of Wolfson's youngest members, who were asked to draw pictures of their rooms



(above) Elva Bisschop, aged 3

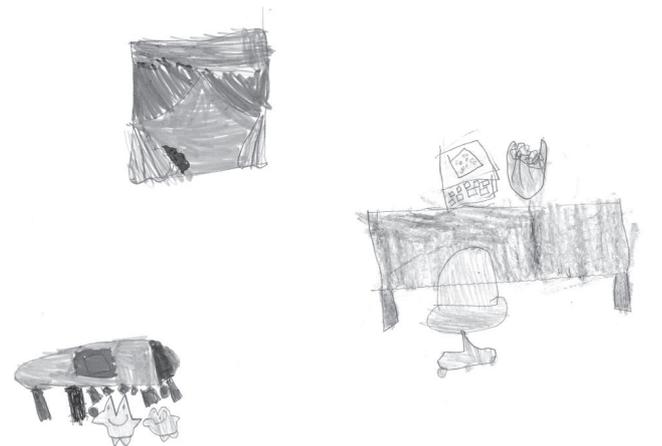


(above) Rasmus Bisschop, aged 4



Caroline Boda - age 4

(above) Caroline Boda, aged 4



(above) Ashwaty Ashley, aged 5



(above) Libby, Caroline and Emily Boda, left to right, aged 7, 4 and 9



(above) Lucas Menezes Oliveira, aged 5

The Time of My Life

Emily Boda, aged 9

My favorite bedroom was my bedroom in Wolfson Collage. I liked it a lot because of the big windowsill. I liked it because I could stand, sit, and play on it. I could even hide behind the curtains. My sister and I could lower things on strings out of the window, or throw paper air planes, or talk to our friend in the courtyard. We could even spy on the kids in the nursery! Here, in Virginia, I have boring old normal windows. So you people in Wolfson are lucky to have big windowsills like those!



(above) Lucas Menezes Oliveira, aged 5



(above) Gabriel Grüter, aged 6



(above and below) Ashwaty Ashley, aged 5



Libby Boda age 7



(above) Libby Boda, aged 7

Jon Ouin considers the work of American composer John Cage

With its six soundproofed walls and sonic-absorptive surfaces, the anechoic chamber at Harvard University is designed especially to block out external sounds for the purposes of acoustic measurements and experiments. This silent chamber provided the setting for a discovery by American composer John Cage (1912-92) that was to transform his ideas concerning silence and the role of the composer in music. He had entered the chamber fully expecting to hear...*absolutely nothing...*

...but his expectations were confounded. Rather than experiencing total silence as he had anticipated, Cage could detect two distinct sounds—a high-pitched whine accompanied by a low-pitched hum. According to his own recollection, when he described these two sounds to the engineer in charge of the chamber, he was informed that the first noise was his own nervous system in action and that the second was his blood circulating. Whether or not the engineer's explanation was even half accurate, the experience in the chamber provided him with sufficient proof to suggest that, for man, absolute silence as an acoustic non-event or sonic absence simply did not exist: instead, "silence" was merely the absence of *intended* sounds among ongoing indeterminate, ambient sounds. "Until I die there will be sounds. And they will continue after my death. One need not fear about the future of music," Cage concluded.

Although there seem to be a number of variations on Cage's Harvard chamber anecdote (this is in part due to the man himself), the conclusion is always the same: from this point on he was to be wholly convinced by the idea of an incessant, non-intentional music within "silence". This idea is evident in his notorious composition *Four Minutes and Thirty Three Seconds (4'33")* for piano (1952), the aural equivalent of a blank canvas. Just as Robert Rauschenberg's *White Paintings* (geometric, white canvases) had apparently eliminated all external references but were, on closer inspection, flecked with non-intentional tiny specks of dust and minute shadows, Cage's piece had no sound deliberately added to that of the environment in which it was performed, and was flecked with the external 'music' of the audience (coughing, whispering or unwrapping sweet-papers) and any noises emerging from outside the concert-hall.

The temptation with *4'33"* is to regard it as a conceited (albeit vacuous) gag at the audience's expense. And certainly, there was an inevitable element of theatre involved in its enactment which didn't help its cause. First performed on 29th August 1952 in New York for an audience supporting the (pro-contemporary music) Benefit Artists Welfare Fund, the pianist David Tudor simply had to sit at the piano, lower the keyboard lid, and then after thirty seconds raise the lid once more without having played any notes at all, repeat the process twice - for 2 minutes 23 seconds, and then for 1 minute 53 seconds - and then stand to bow. In theory it was written for any instrument or combination of instruments at all, but

4'33" is usually performed as a piano piece (perhaps as a result of Tudor's historic recital), with the work's only specifications being that it should consist of three movements, in each of which the lone instruction is "TACET", indicating that no deliberate sound on the part of the performer. Despite the fact that there was obviously no great need for written music, a manuscript was printed in a conventional format, with several pages of blank measures – no rests – and a tempo of 60. Tudor had to time the lengths on a stopwatch while turning the pages of the score; the timings (and consequently the title) of the piece were not always the same, because, as designated by the composer, they were arrived at by aleatoric methods.

Naturally, the "Silent Piece" (as it came to be known) created a furore in the music world in its day - even among an audience that was apparently predisposed to the New York avant-garde. As Cage himself recalled decades later: "People began whispering to one another, and some people began to walk out. They didn't laugh - they were just irritated when they realized nothing was going to happen, and they haven't forgotten it 30 years later: they're still angry." Just how far the piece has come in terms of its acceptability as part of the classical canon on this side of the Atlantic can perhaps be seen in the BBC Symphony Orchestra's decision to perform the work at the Barbican in January last year to an eager audience.

“ “They didn't laugh - they were just irritated when they realized nothing was going to happen, and they haven't forgotten it 30 years later: they're still angry.” ”

(As it was being broadcast live, apparently Radio 3 bosses had to switch off their emergency back-up system which is designed to cut in when there is an unexpected silence on air!) And yet despite this apparent recognition of the importance of the piece by today's music establishment, *4'33"* still divides opinion amongst musicians and concert-goers fifty years on: for the enthusiasts it stands as a window to experiencing the sublime in raw nature, while for the sceptics it's the epitome of self-indulgent posturing in modern art.

If there is any doubt as to the authenticity of Cage's artistic statement (and whether he really *meant* it), what needs to be appreciated is that Cage's *4'33"*, rather than being a spontaneous leap into a musical abyss, was in fact just part of his exploration of different ways of producing non-fixity in music. This tends to be overlooked by his detractors. With previous works, such as *Music of Changes* (1951) and *Imaginary Landscape No. 4* (also 1951), Cage's fascination with the *I Ching* (the Chinese *Book of Changes*) had begun to make itself felt in the sense that these pieces were written so that they could vary every time they were played. Just as in the *I Ching* a random

number generator system is used to select one of 64 hexagrams that points to a daily oracle, Cage used a similar system in *Music of Changes* with 26 different charts to resolve the pitches, tempi, durations and dynamics of the notes to be played on the piano. In another exploration of chance, *Imaginary Landscape No. 4*, he wrote for twelve radio receivers to be controlled by 24 performers, explaining how the performers were to set their radios and alter them over the designated period of time, without any possibility of him being able to direct the resulting sound that emerged (since that was whatever was playing on the radio at that particular time and place...).

In this sense, when you compare *4'33"* with the mathematical, structured works of musical serialism by Cage's contemporaries (especially early Boulez or Stockhausen), it becomes clear that its creator had a strikingly unusual musical outlook for his day. Whereas in serialism there is a succession of musical events whose relationships have been pre-ordained by the composer, Cage was more concerned with creating a haphazard music that he believed bore a closer resemblance to the music of the greatest music-maker of all: Nature. According to Cage, we need to have *a priori* knowledge of certain human musical procedures and traditions in order to hear twelve-tone music or tonal harmony and make any sense of it. So the "point" behind his almost complete abdication of compositional control in *4'33"* is to allow the listener to hear sounds as independent events, rather than trying to link them together in the expectation that the music will somehow

translate into some sort of compositional narrative. In this way, *4'33"* is designed to be an ego-free environment liberated from the composer's stylistic predilections. As an apparently democratic, non-aesthetical musical space, any mistakes or accidental sounds are allowed into the performance, supposedly rendering traditional value judgements extraneous.

But the flaws in all this appear to be relatively basic. Though theoretically an open process, *4'33"* surely involves prescribed directives and a structural framework in order to be enacted: the concert-hall, the audience, the score, the piano, the stop-watch and the pianist. Did not Cage, as composer, actively instigate the standard concert setting in order to frame the "silence" within it? Even if indeterminate music, as Cage understood it, was present and accessible at all times and in all spaces in Nature, the contrived space-time framing that he had fixed for this piece – even with its margin of chance – was, ultimately, just as synthetic and intentional as any of the other system within classical music. Furthermore, while the piece allows for the non-intentional music of its environment, it actively disallows any noise that is intentional.

Despite all of that, what Cage had discovered by using chance operation as a compositional tool was that, given a structure built on lengths of time, any arrangement of the natural, ambient sounds was valid and interesting. Chance had allowed him to avoid conventional approaches to musical thought, and was the means through which he could create a space for the ongoing music of silence.

(below) Matriculation day 2004; original photograph by Sharath Srinivasan, image altered by Douglas Ayling



Greek Philosophy in the Borgesian *Aleph*

Juan Carlos Dominguez catches echoes of the ancients in Jorge Luis Borges' short story

'Philosophy is an unusually ingenious attempt to think fallaciously'

Bertrand Russell

I still recall the first time I read *The Aleph* by Jorge Luis Borges. It was in the year of 1999. I remember sitting in a desolated room, in a dusty flat of Buenos Aires where I had just moved a couple of days ago. It is late at night. The electricity is not yet working and a candle is my only companion. Surrounded by furniture, trembling shadows, and half-opened boxes, I feel as if I am in the basement where Borges finds the Aleph; or in the words of the fictional Carlos Daneri, "...one of the points in space that contain all points...the place where, without admixture or confusion, all the places of the world, seen from every angle, coexist..."

But, what is the hidden meaning behind the story? I think about innumerable ways to read and interpret *The Aleph*: from psychological and philosophical standpoints, as well as in comparison to other authors such as Kafka or Cortázar. I am overwhelmed by the endless possibilities and for a moment, I feel incapable of such an endeavour. After all, Chomsky is right when he says that the interpretation and use of words involves processes of free creation and I have never been very creative. Frustrated and disillusioned, I leave the book aside.

I try to get over it, to think of something else, to read another book... but I can't help it. *The Aleph* is flickering in my mind, like the shadows projected on the wall by the shaky flame of the candle. And it is only now that I remember Plato! And it is now that one idea leads to the next and, after a short concatenation of thoughts, that I remember other Greek philosophers.

Maybe I am abusing the potential for interpretations, but an idea comes to my mind: what if the Argentinean writer created literary universes that work with the laws and causal relations inspired by the works of classical Greek philosophers?

I go back to *The Aleph* and read it again. I realise that the soundness of plots, characters and narrative voices is a product of constructing and narrating simple facts that together constitute a phenomenology through which imaginary universes become self-explanatory. In this Borgesian world, time runs along the limited space that the pages of a book are able to cover. It mimics the circle and turns into an expression of the infinite.

But I should slow down and go step by step. I read the description of the Aleph: one of the points in space that contains all points...and I can only conclude that Borges grants the Aleph an ontological existence through a sort of Pythagorean reasoning. After all, these philosophers conferred an ontological existence on numbers through the following reasoning: a *number* of points constitute a line, a *number* of lines constitutes a surface, a *number* of surfaces constitutes a body; ergo, the Universe must be made of *numbers*.

Of course, the Pythagorean argument is heavily dependant on the assumption that numbers are things in themselves – i.e. that they have ontological existence – and on using a linguistic trick to superimpose this assumption onto the fact that the Universe can actually be described through arithmetical relations. However, Borges defines the Aleph as an infinite set of bodies that constitute a point and by doing so, plays with the linguistic trick to construct a literary world where the Universe is containable into a body – and perhaps where a body is containable into a line. He implicitly *inverts* the Pythagorean argument and suggests a folding, rather than an unfolding reality.

I try to picture Borges or even better, I try to picture myself as if I was Borges standing before the Aleph. The vision is fascinating and overwhelming at the same time. Multitudes, cities, images from my childhood; "...clusters of grapes, snow, tobacco, veins of metal, water vapour..." All at once, I contemplate the infinite content of the Aleph and while contemplating it I see myself contemplating the mysterious point.

“ in another interview – this time with Osvaldo Ferrari – [Borges] declared that his tale was not about the infinite but about eternity. ”

The vision is gone and I come back to reality. Borges is Borges and I am myself again, in the same flat, lit by the same dying candle. I take a deep breath and doubt my conclusions. Now that I think carefully, the Pythagoreans are not alone in *The Aleph*.

The Eleatic school, headed by Parmenides and continued by Zeno of Elea and Melissus, comes to mind and I speculate. What if Borges conceived the Aleph as a sort of Eleatic paradox itself; and what if certain occurrences – almost unnoticeable – hint to the construction of a fictional Universe that *works* according to a mix of ideas from different Eleatic thinkers? The result could only be consistency and correspondence between two separate, but intermingled realms: the Aleph and the Universe, one contained in the other.

If I am not mistaken, Zeno's paradoxes can be described as "thought-experiments" that are intended to show that paradoxically, a finite distance that can be divided into an infinite number of sub-distances is still finite, even when its sub-components are not. Of course, as Aristotle later explained, Zeno's paradoxes can be solved by adding a further mathematical specification: that there is a difference between

things that are quantitatively infinite and things that are infinite by division.

However, the need to take into account this condition illustrates the essential problem behind the Eleatic paradoxes. That is, any system that is described by a number of specifications and/or rules always becomes self-redundant unless more rules are included. The problem is precisely that this process can go *infinitely*.

I remember that Douglas Hofstadter analysed the presence of these paradoxes in musical compositions of Bach, in the engravings of Escher, and in the mathematical theorem of Gödel. In the course of his analyses in the fields of music, painting, and mathematics, Hofstadter coined the concept of the “strange loop”. That is, when going down the different hierarchical levels of a system, unexpectedly, one finds oneself at the beginning of that system again.

Considering the implicit presence of Eleatic paradoxes – as “strange loops” – in the works of great artists such as Bach and Escher, to speculate on the presence of Zeno of Elea within the lines of *The Aleph* becomes too enticing. Borges himself, in an interview with Georges Charbonnier declared his sympathy for and knowledge of the Eleatic paradoxes.

Although, now that I remember, in another interview – this time with Osvaldo Ferrari – he declared that his tale was not about the infinite but about eternity. Is it that my interpretation has reached a limit? I reflect upon the words of Borges and I think they are as deceptive as the shadows on the wall. In fact, I think that his explanation is misleading because he defines eternity as “past and present contained in a single instant” whereas the Aleph is an expression of both: infinite space and infinite time.

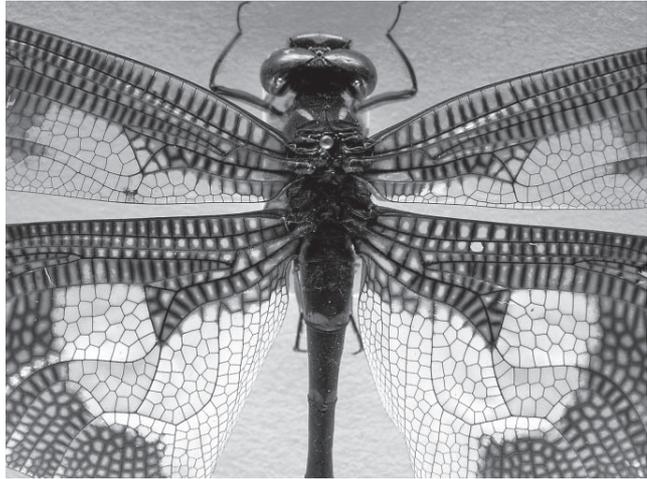
On the other hand, the Aleph contains and is contained by a fictional Universe created by Borges. Therefore, it does not surprise me that certain facts and events that announce the climax of the story – the contemplation of the Aleph – might constitute a phenomenology that hints at the circularity inherent to a Borgesian universe, a structure which works like a “strange loop”.

It is late and I am tired, but I cannot resist the temptation to go over the story again and again. I find that the meetings that the narrator has with Carlos Daneri are examples of this kind of phenomenon. In one of them, Daneri shows one of his poems to Borges and the latter expresses: “...he [Daneri] proposed to versify the entire *roundness* of the planet...”

With such a simple phrase, the Argentinean writer provides the reader with a hint about the workings of the Universe that has been constructed behind the scenes and that is characterised by circularity and intelligibility of such circularity. He uses an isolated event – Daneri’s poem – to show that he is moving in a Universe where the impossible has become possible; where “the entire *roundness* of the planet” can be versified in a single poem and the entire Universe can be contained in a single spot: the Aleph.

I have been everywhere without hardly moving. After using my interpretations to travel across time and space, I look around and everything is the same: dust and boxes. I hold the book in my hands, choose a page randomly, and read aloud, as if I was Borges uttering my thoughts: ‘...all language is an alphabet of symbols whose use presupposes a past that speakers share...’

It reminds me of Aristotle. In his ethical and political



(above) Dragonfly asserted by a simple pin; photograph by Lucas Bluff

analyses, he gives paramount importance to language. From an Aristotelian perspective, language is made conscious collectively and alludes not only to what men do but to what men have done in the past. It plays a central role in the modulation of tensions between the individual and the collective.

For Aristotle, all things are equipped with matter and form – hylomorphism. Matter is what constitutes things, including ideas and materials; and shape is the limit of corporeal reality, viewed from all points of view. Transferred to the Borgesian Universe the Aleph could embody the point – or sphere – that gives shape to the matter that constitutes the physical existence of the infinite.

But for now, I close the book. The journey across different interpretations of *The Aleph* has been long and intricate, and at the end of the day it is just my opinion; the opinion of a common man who is sitting in an unfurnished flat in Buenos Aires, reading half in darkness.

(below) Palm leaf, spice plantation, Goa; photograph by Lucas Bluff



Cityscapes: Joyce's Dublin and Rushdie's Bombay

Stuti Khanna traces the intersections of two literary cities

An odd twosome, one would think. James Joyce, the Dubliner who went on to become the high-priest of Western modernism and wrote one of the – some would say *the* – most important novels of the twentieth century, and Salman Rushdie, the Bombay boy, winner of the Booker of Bookers, and the most prominent South Asian writer writing in English today. What do the two have in common? Apart from the fact that their novels display a linguistic verve and narrative energy that leaves readers gasping for breath? Or that they were born in British colonies, and were keenly conscious of their colonized status? Or that they spent most of their lives away from the cities and countries of their birth – Joyce lived in Pola, Trieste, Zurich, Paris, and only returned to visit Dublin twice in his lifetime after he moved out of there in his late teens, while Rushdie came to England as a teenager and spent much of his life here, before moving to New York recently, where he still lives. Or, what is most interesting for my purposes here, that they both obsessively went on writing about the cities that they assiduously chose to stay away from all their lives. Take Dublin away from Joyce's writings, and they cease to exist. Take Bombay out of Rushdie's oeuvre, and only a pale shadow remains. In fact, the narrative zest of their novels primarily originates in and derives from their experience(s) of the city, in particular, Dublin and Bombay.

The immense creative potential that these cities have for the narratives of both writers is predicated upon the fact of their *distance* from them. Joyce was a self-styled exile who left Dublin at the age of twenty and never returned to live there. The short stories he had been writing since 1904, subsequently published ten years later as *Dubliners*, had, unsurprisingly, the city of Dublin as their *raison d'être*. But what a big difference there is between this city and the Dublin of *Ulysses*! The city in the earlier work is one that imprisons its people in an invariable, listless routine marked by apathy and inertia; “the odour of ashpits and old weeds and offal hangs round” them (Joyce's letter to Grant Richards, 23 June 1906). A grim example of what V.S. Naipaul calls “half-made societies”, the characters who inhabit this world are equally “half-made” – frustrated, truncated, semi-paralyzed human beings who lack any sense of purpose or direction. As Joyce says in a letter to a friend – “I am writing a series of epicleti – ten – for a paper. [...] I call the series *Dubliners* to betray the soul of that hemiplegia or paralysis which many consider a city.” His purpose seems didactic and almost moral: *Dubliners* is to act as a “nicely polished looking-glass” in which the Irish people will be able to see their spiritual vacancy, and, hopefully, bestir themselves to some purposeful action.

The shift in tone in the later, 1922 novel, *Ulysses*, is remarkable. The physical distance from the city allows Joyce a new perspective. Primarily through the character of Leopold Bloom, but equally through the many inventive narrative styles that the novel employs, *Ulysses* invests the city of Dublin with a sense of energy, fecundity, and most importantly, *possibility*.

Far from being a place of paralysis, the Dublin of *Ulysses* is the site and setting for epic adventures of the Homeric variety. On a single day, June 16, 1904, Bloom's Ulyssean wanderings through Dublin incorporate a battle with the one-eyed giant Cyclops, sexual encounters with the shy Nausicaa and the tyrannical Circe who turns men into pigs, and a reunion with his (surrogate) son Telemachus, while the unfaithful Penelope cheats on him at home. What is remarkable is that this imaginative elasticity coexists with the most rigorous adherence to fact, so that the city of Dublin is spatially evoked with a self-confessedly maniacal accuracy and detail. Joyce asked his Aunt Josephine “to try to lay hands on any old editions of Kickham, Griffin, Carleton, H.J. Smyth & c, Banim [Irish novelists and poets] and to send [him] a Xmas present made up of tram-tickets, advts, handbills, posters, papers, programmes &c. I would like to have a map of Dublin on my wall. I suppose I am becoming something of a maniac.” (To Stanislaus, 6 Nov 1906) This meticulous, bit-by-bit reconstruction of a city that Joyce both (physically) needed to, and yet never really (imaginatively) managed to, get away from, is what accounts for the narrative energy of *Ulysses*. The stroke of genius here lies in the vivid evocation of *tangible, material* spatial locations and details to bring about a rather “*fantastic*” mapping of the epic-world of the ancient Greeks on to the contemporary world of the Irish. It is almost as if physical distance from Dublin becomes the precondition for being able to look at it with new eyes, so that it becomes an enabling space for adventure and heroism.

In this regard, it is possible to trace a contrasting trajectory in the fiction of Salman Rushdie. *Midnight's Children*, the novel that catapulted him to fame in 1981, is as much about the city of Bombay as it is about the postcolonial Indian nation. In fact, one of the most significant aspects of this novel is that, to a large extent, it tells the story of the Indian nation through the lens of Bombay-city. Calling it a “novel of profligacy”, Rushdie says that the “teeming” narrative of *Midnight's Children* was an attempt to find a literary equivalent of the sheer multitude of people in the city. In his words: “One strategy that was deliberately adopted in that book was deliberately to tell, as it were, too many stories, so that there was a jostle of stories in the novel and that your main narration... had to kind of force its way through the crowd, as if you were outside Churchgate station trying to catch a train ...”. It becomes immediately evident that the aesthetic “excess” that this novel famously embodies is a direct effect of trying to delineate the experience of the postcolonial, overcrowded city.

Having left Bombay at the age of fourteen to go to first school and then university in England, Rushdie's nostalgia for the city of his childhood comes across in many interviews as well as in *Midnight's Children*. In a mode similar to that of Joyce's evocation of Dublin, Rushdie, more nostalgically perhaps, writes of Saleem's school bus passing through Bombay streets, under

Thomas Kemp and Co, (Chemists), beneath the Air-India raja's poster ('See you later, alligator! I'm off to London on Air-India!') and the other hoarding, on which, throughout my childhood, the Kolynos Kid, a gleamtoothed pixie in a green, elfin, chlorophyll hat proclaimed the virtues of Kolynos toothpaste: 'Keep Teeth Kleen and Keep Teeth Brite! Keep Teeth Kolynos Super White!'

This sense of fondness and nostalgia for a city that Rushdie not only grew up in, but which also stood for values that he places great faith in – cosmopolitanism and inclusiveness – comes, gradually, to be replaced by a sense of disillusionment and betrayal. In *Midnight's Children* Rushdie represents the city of Bombay as the cumulative of its several pasts – the Koli fishermen, the Portuguese invaders, the East India Company – each of which is an integral, undeniable part of the entity called Bombay. The regressive attempt to convert this Bombay back to the imagined authenticity of Mumbai – an increasingly violent and destructive attempt that led to mass-scale riots and coincided with the rise in power of the Hindu fundamentalist group, the Shiv Sena, in the 1990s – is what comes under attack in *The Moor's Last Sigh* (1995). Through the self-reflexive figure of the artist in this novel, Aurora Zogoiby, Rushdie elaborates many of his concerns with art, the city and the nation. Her son and for a while her subject, the Moor, embodies the newly-independent nation, whose past(s) and present(s) are not only plural and multilayered in themselves but form a palimpsest, a "Mooristan ... Place where worlds collide, flow in and out of one another, and washofy away. ... One universe, one dimension, one country, one dream, bumpo'ing into another, or being under, or on top of. Call it Palimpsestine".

In a reversal of Joyce's emotional and artistic trajectory vis-à-vis Dublin, Rushdie's reflects a growing sense of disenchantment and disillusionment with the city of Bombay and the failure of its cosmopolitan promise. While a significant trope in his earlier novels, particularly *Midnight's Children* and *The Satanic Verses*, is that of *return*, of the main characters returning to Bombay after having moved away from it for different reasons,

the later novels depict characters *moving away* from Bombay, never to return. As *The Ground Beneath Her Feet* (1999) shows, the splitting of Bombay into the linguistically-based states of Gujarat and Maharashtra sets into motion a series of splits – "Everything starts shifting, changing, getting partitioned, separated by frontiers, splitting, re-splitting, coming apart. Centrifugal forces begin to pull harder than their centripetal opposites. Gravity dies. People fly off into space." Needless to say, a strong elegiac sense accompanies this escape, and an overpowering disappointment with what the city has come to represent. Most importantly, there is the knowledge that return is now impossible. The city has failed its promise. The Moor ruminates on the plane to Spain:

As my aeroplane banked over the city I could see columns of smoke rising. There was nothing holding me to Bombay any more. It was no longer my Bombay, no longer special, no longer the city of mixed-up, mongrel joy. Something had ended (the world?) and what remained, I didn't know.

This is in complete contrast to Joyce, whose "maniac" obsession with Dublin remained unchanged, and indeed grew stronger, all through his career. In the case of Rushdie, New York lately seems to have replaced Bombay as the city of promise, and his latest novels, *The Ground Beneath Her Feet* and *Fury* are set in New York. I end with a reference to the concept of the "open" city that the late Jacques Derrida discussed, as a place of "refuge" for "the immigrant, the exiled, the deported, the stateless or displaced person". It seems that Rushdie sees New York as an example of such a city. He says in an interview: "Every time I've come here [New York] I've felt ridiculously comfortable, [...] It has to do with it being an immigrant city, a city whose culture is created by successive waves of migration." And yet, the gaping hole in the middle of New York since September 11, 2001, cannot but be a constant reminder that like Bombay, New York is not a charmed city either.

(below) Victoria Terminus, Mumbai; photograph by Lucas Bluff



What has Einstein ever done for us?

Ben Keitch rates Richard Feynman. Take physics, pomp.

This year is Einstein year. A celebration of 1905, the “annus mirabilis” when Einstein published his “big three” papers, one of which would later win him the Nobel Prize. Much has been said about Einstein’s contribution to Physics and world politics. He is one of the few household names in Physics, and possibly the most known in all science. He has become the archetypal scientist. The Hollywood figure of a white-haired old man, bumbling around in a white coat and plucking remarkable theories out of thin air. This is exactly the image I despise. This article seeks to redress the balance. To put Einstein back into the social and scientific context in which he belongs, and to redeem the image of physicists the world over. To do this I will need a foil to Einstein’s bumbling foolery: in the form of Richard Feynman. Perhaps not a household name, but definitely a heavy-weight in the history of physics. Thirty years Einstein’s junior, nevertheless Feynman changed the way physicists perceive universal space and time.

I personally hate Einstein for the stereotype he left behind. It would be believed that science is somehow done in isolation from the rest of the world, that theories are more marvellous the more weird and wonderful they are. It perpetuates the idea that genius is the edge of madness, and that a bad sense of fashion is required to be successful in science. There is no doubt that Einstein was a remarkable thinker. He had a perception and a clarity of thought that stamped a legacy on scientific history. However, it is arguable whether he was a genius. As any research scientist knows, no work is truly one in isolation. Each scientist builds on the work that has gone before. Although the history of science is not a smooth and linear progression, the jumps are smaller than the general public are lead to believe. It is interesting to note that whilst the general public talk about “Einstein’s Theory Of Relativity”, physicists talk of “Minkowski Space” and “Lorentz Transformations”; the tensor calculus of Ritz, the equations of Maxwell and the geometry of Gödel. All these people and many more laid the foundations of relativity, and a great amount of work has been done since. Einstein, contrary to popular belief, did not jump into a brimming bath and have a Eureka moment. It is not surprising to then learn that he was not awarded a Nobel Prize for his small, but significant, contribution to relativity. Indeed, it was his first paper, on the photoelectric effect, which won him his Nobel Prize. This paper essentially interpreted the results of the formidable experimentalist Hertz. The real reason for this was not some great leap of understanding, nor some intimidating grinding through complex mathematics, but rather the confident surmise he made – that photons must carry momentum. He was in the right place at the right time to see this. Einstein did not have a research post and was not having to find or justify his own theories. He could calmly read and summarise other people’s work and come to a clear and concise conclusion. A feat he would repeat when it came to relativity. Einstein’s work has a zen-like quality – the beginner’s mind. In 1905 a huge debate was raging over whether light was

a particle – carrying momentum and bouncing off objects like miniature billiard balls – or waves. These waves eerily penetrate the whole universe, rippling through space and spreading out through what scientists at the time called the aether.

By 1887 the aether had been shown to not exist by a seminal experiment done by Michelson and Morely. Also that year a careful set of experiments by Hertz, the first experimentalist to generate radio waves, showed that light striking a surface generated an electric current. This left the problem of how these waves could travel through empty space. Papers were flying back-and-forth trying to explain these phenomena, and at the same time to settle the so called “ultra-violet catastrophe”, an issue with the amount of energy these photons, or waves, should carry. Painstaking experiments by Thomson and Lenard showed the exact nature of this current, and how it came in discrete amounts, just like miniature billiard balls. Thomson had also recently discovered the electron, and Lenard had showed how it was electrons being knocked along by the light that created the electric current. Einstein boldly

“ It would be believed ... that theories are more marvellous the more weird and wonderful they are. It perpetuates the idea that genius is the edge of madness, and that a bad sense of fashion is required to be successful in science ”

put two and two together and surmised that light must also come in discrete lumps – so called photons. A few years later he would endorse the work of de Broglie, a PhD student who went further and said that all waves were particles and therefore all particles were waves (prompting the question “what is the wavelength of a double-decker bus?”). An unacceptable idea at the time, which would have been dismissed if it had not been for Einstein’s intervention at the thesis viva (or so the story goes). It is interesting to note that Einstein’s experimental work did not win him any recognition. In fact, by the 1930s his output as a physicist had dropped to almost non-existent, only really taking a consultation role. Instead he turned to political commentary.

Just as his prize-winning paper on the photoelectric effect, Einstein’s work on relativity was also built on the work of others. In fact, he himself admitted to not being able to understand the mathematical tools that were used to solve real problems in curved space-time. This was provided by the ingenious 19th century mathematician, Lorentz, who a year earlier than Einstein had shown both time-dilation and length-contraction. The finer and stranger details of this new universal paradigm were provided by heavy-weight logician and mathematician,

Gödel. It was Minkowski, a Siberian physicist, who two years later invented the concept of 4-dimensional space-time. To this day the diagrams that physicists use to explain relativity carry Minkowski's name. In fact what is interesting is that only one equation in physics actually makes reference to Einstein. It relates to a simple (but powerful) accounting technique in atomic physics which keeps count of the number of excited and unexcited particles in a medium. What Einstein did do for us was give a very clear and concise summary of work that at the time was being argued over and was spread around a pre-war Europe. He gave a child-like insight into some difficult concepts, perhaps because he himself didn't like the complicated mathematics that was adorning the literature.

So if my opinion of Einstein is no more or less than any other good theoretical scientist, and perhaps special mention should be made of his contribution to world politics, then who should have the throne as the hero of physics? There are many admirable physicists, who have either made fantastic steps forward in the theory, or performed painstaking and precise experiments. However, to have the title I think this individual must have that rare stroke of genius that sets him apart from the pack. An ability to solve problems in a truly novel way and, more than anything, to be a little bit cool! Not to shuffle around in carpet slippers, but instead to dare to do things that others in the institution don't do. Yet also to have made a significant contribution not in one or two fields of science, but to be remembered for everything he turned his hand to. That one person is Richard Feynman. Someone who truly earned the title "genius" and whose contribution benefited many areas of science. Someone who had panache and style, and stood apart from the white-haired ranks of elderly physicists. Why this name has not become synonymous with style and ability, I can only speculate. Maybe he was too much in one package. Maybe with his death recently occurring in 1988, the world hasn't caught up yet. Maybe he bucked the institution too much and didn't provide the homely moralistic model that middle-America wanted to promote. (He was once quoted for saying how much he liked pretty girls, he would chat them up by telling them he was a rocket scientist!)

Feynman was at graduate school just as Einstein was beginning to fade into a retirement of political-activism. Even in his undergraduate years he gave molecular physicists a powerful tool-box to solve real-world problems. His doctoral thesis revolutionised the way that scientists understood space, time and matter in a way that made relativity pale in comparison. He was a real working scientist. Not having the leisurely clerical job that Einstein had landed, Feynman was sent off to do his patriotic duty developing the atomic bomb. Here he ripped through complex mathematical and physical problems that had left all the greatest minds that America could scrape together stumped. It didn't take other people's work or lucky timing for Feynman to prove his mathematical genius. His career was peppered with dashing contributions to other scientists' work. In his sabbatical year he joined a biochemistry lab, and solved problems that the biochemists had been stuck on for over a decade. He solved one of the hardest problems that relativity and quantum mechanics had left behind – unifying the two into his revolutionary Quantum Electrodynamics. It proved to be a powerful and all-encompassing theory. He also put as much energy into the theory of nuclear physics, following up QED with QCD (Quantum Chromo-Dynamics), though by this time others

were working on similar theories.

Yet he managed to achieve so much more as well. His personality was legendary. If he wasn't picking his colleagues' safes, he was giving public performances on the bongos. He could dance, perform, tell jokes and would argue against religion and other "woolly thinking" (as he called it) long into the night. He became a sought-after educator and lecturer, using his dry New York wit to entertain his students. He had a burning passion to reach the public with what he felt was the truth about the universe, and displace the myths and nonsense that he saw sway and corrupt people. He sat on the education board of America, doing much to promote science and physics in schools. He wrote popular science books as well as his more technical set of lecture notes, *Feynman's Lectures in Physics*, which took a fresh approach to the subject, starting from the top and sweeping away the historical baggage that physics still carried.

A few years before he died he appeared on national television and explained the cause of the shuttle disaster. Dismissing politics and management issues, he made a graphical demonstration of how freezing water would make the critical O-rings in the fuel system brittle and weak. This proved to be the correct cause of that fateful event. This was the essence of Feynman. A showman – yes – but a good scientist too: using an experiment to demonstrate the truth, rather than hiding behind words. From high-school to his death, his amazing intellect and skill for mathematics had shone through: no-one could doubt his reputation as a genius. Yet he wasn't without humour or presentation skills, often appearing on camera or to audiences of thousands. His own autobiography *Surely You're Joking Mr Feynman* is full of his lampooning wit and joyous delight with the world. He reached a younger generation (he held a series of lectures on the science of smoke rings, and he experimented with LSD). He managed to inspire a new group of physicists who could see that physics captured the popular imagination, it could be cool and you didn't need a pipe or slippers. Perhaps he managed to undo the harm Einstein and his sycophants had done in the '50s and prevent an intellectual migration away from physics. Perhaps it is Feynman, not Einstein who deserves a year in his honour.

This is to all the scientists who don't have years named after them. Young or old, each has made a contribution to our understanding of the world.

Putting the ‘Meta’ back into Physics

Or, What is Wrong with the World Today

(including commentary on popular music)

Professor Urban Chronotis, the Regius Professor of Chronology,
Fellow of St Cedd’s (Cambridge) and Wolfson (Oxford)

A dear friend – it may have been Albert – once told me that while an hour with a pretty girl seems like a minute, a minute with your hand on a hot stove seems like an hour. This, he said, was relativity.

Consider Harrison’s various chronometers. Although the best timepieces in existence in the eighteenth century, they could not meet the accuracy of a contemporary atomic clock. Or could they? What if in the meantime, as it were, time itself has shifted? We know that time is inherently subjective, a mere pawn of gravity. Why should it remain self-consistent? Notably, over the course of my long career, I have found that evenings have become progressively shorter. In addition, it is well known that a clock placed on a train in Japan will lose no time. Contrainterdictorily, a clock placed on a British train will arrive half an hour late. This is exactly what I mean.

Postmodern critique has had profound influence on the conceptualisation of post-Einsteinian reality. Heisenberg was wholly correct: we cannot attempt an objective quantification of that which exists. Authors such as Sokal have emphasised the role of hermeneutics in physics. As a forceful exposition of this, I observe that quarks are named after *Muster* Mark, the Higgs Boson is clearly a subtextual gender referent and the “strange” quark is a homophobic pejorative. We can no longer trust physicists to determine the character of our reality.

I posit that the nature of space and time is inherently individualistic and firmly enculturated. Take the Aymara, an Amerindian society from the Titicaca altiplano. In this culture, the past is expressed as being oriented in front of the individual, whereas the future is behind – the reversal of our own Western dorsoventral spatiotemporality. Such a reversal, although arbitrary, has profound consequences when cultures are compared. The Aymara think nothing of waiting half a day for a bus. After all, if you cannot see the future, why bother planning? Differences in the subjective experience of space-time also occur intramurally. The spacial perception of men and women in our own culture is so systematically divergent that there is little consensus on the definition of, say, six inches.

It is no surprise that the average person feels a post-relativity ennui, a burden of enforced insignificance in the face of incomprehensible distortion of reality itself. Could your butler deduce from

$$\psi(a,t) = \psi(a)e^{-iEt/\hbar}$$

that El Naschie’s $\mathfrak{E}^{(\infty)}$ Cantorian space-time can be invoked to explain why the Universe can be seen as a complex oscillating system comprised of some 10^{80} nucleon oscillators? If your butler *can* perform this feat and also serve a hearty tiffin, then good for you, sir! I suspect that he cannot, and this is the salient point: **the problem with the world today is that reality has become too difficult to understand!** This is easy to demonstrate with reference to some of my favourite ‘pop’ musicians.

Time and space and hurt
and tears are not enough
love and light and faith and
words, are not enough.

K. Minogue, *Drunk*

I want to let go of all disappointment that’s waiting for me.
What I want is to live forever,
Not defined by time and space.
It’s a lonely place,
That’s what I want.

Madonna, *Easy Ride*

Where have I been?
What lifetime was I in?
Suspended between time and space...

M. Jackson, *Happy*

It appears that the concepts of space and time are colloquially synonymous with loss and suffering, with loneliness and dislocation. That rational, intelligent people like Jackson *et hoc genus omne* can feel alienated from the fundamental constituents of being speaks of a failure of physicists to fulfill their epistemological function.

Metaphysics is too important to be subsumed by physicists. I challenge YOU to define your own space and time. Do not be dictated to by a quartz crystal hooked up to an LCD display! Why succumb to the constraint of normative, linear, directional time? Dam the river of time, pluck the arrow of time from the quiver of outrageous fortune, cut the continuum and rend apart the very weft of space-time itself!

Now, if you will excuse me, I am just going outside and may be some time.

[The editor wishes to thank Lucas Bluff for transcribing this article.]

A Tale of Three Borders

Zuzanna Olszewska

It all began with Chopin, who was, in retrospect, the simplest. Randomly flipping through channels one winter in Warsaw, I settle on *Summer in Nohant*, a humid TV play about that delicate, egotistical darling of the salons, and his stormy relationship with cross-dressing, cigar-smoking authoress and *bête noir* of Parisian high society, George Sand. It is 1849. Chopin, Polish émigré *par excellence* and model held up for the rest of us to emulate, wants his heart sent back to his homeland after his impending consumptive death. Cut to his sister Ludwika's encounter with a customs official on the border with Tsarist Russia, then occupying the eastern part of Poland. "What is in your bag?" he asks, in the sinister manner of customs officials, indicating her leather attaché case. "It is my brother's heart," she responds curtly. He waves her past, too taken aback to impose a customs duty.

Two days later, I am watching *All About My Mother* after a spaghetti dinner with friends. Single mother Manuela, a nurse and organ donation counsellor, suffers the tragic fate of seeing her only son Esteban struck by a car and killed on his seventeenth birthday. With poignant irony, this time it is she who must sign the agreement for a heart transplant. The camera lingers on a portable plastic cooler that is used to transport the still-living heart by plane to another city where its recipient awaits. Manuela breaks the rules of her profession, traces the recipient, and watches from her car as he leaves the hospital with her son's heart beating inside him.

The rest of the story unfolds as Manuela journeys to Barcelona to find Esteban's estranged father (amidst a parade of transgendered sex-workers, a pregnant nun, drug-addicted lesbian actresses and, finally, the father, now a woman, dying of AIDS, that only Almodóvar could so lovingly make plausible) – but I am transfixed by those two images of hearts transported in cases, one to be entombed in a column of Warsaw's Church of the Holy Cross, and the other, enshrined in living flesh. What are they trying to tell me? It's as if there is a dotted line that I'm supposed to connect, an invisible silver thread on which these two polished stones both hang. Their congruence – down to the bureaucratic release of both hearts – suggests that something other than chance is at play. Crumbs from a riddle-bird.

It is over a year before I receive the next clue, this time a parcel waiting for me in literary form – unmistakably so, since two friends unknowingly give me the same book for my birthday, as if agents of an unseen will that wants to make doubly sure that I read it – *Kafka on the Shore* by Haruki Murakami, an opulent, surreal mix of Greek mythology, Japanese spiritworld, prophecy and Prince. Fifteen-year-old Kafka Tamura runs away from home to escape his abusive father. In a faraway town, he is drawn to the middle-aged, enigmatic and beautiful custodian of a valuable old library, Miss Saeki. With the help of her androgynous assistant, Oshima (a biological female who

identifies as a gay male), Kafka finds work and lodging in the library and uncovers one of its secrets. At night, Miss Saeki's luminous fifteen-year-old self, a "living ghost," comes into his room to gaze at a portrait on the wall, that of her former lover who was killed at a young age. For long ago she found the entrance to a world where time had no meaning and where she could remain at her happiest, forever fifteen with her fifteen-year-old lover, on a sunlit summer seashore. The "real" Miss Saeki is a mere husk of a person, her shadow only half as dark as it should be.

But, when he falls in love with her, Kafka sets something in motion. He is her lover, back from the dead; she is his mother, who abandoned him as a child. In this borderland, dream, metaphor and reality merge into one. Murakami evokes the rush of returning time with haunting images:

That night you make love again. You listen as the blank within her is filled. It's a faint sound, like fine sand on a shore crumbling in the moonlight. You hold your breath, listening. (...) The moon rises, the tide comes in. Sea water flows into a river.

Kafka, too, fleeing his own demons, later finds his way into that timeless otherworld, in the heart of an ancient forest, guarded by unaged World War II deserters. But he is compelled to return, and live the life Miss Saeki had abandoned out of despair.

A week later, another love story. I am watching Michel Khleifi's *Tale of the Three Jewels*, a magical parable set amidst the backdrop of violence in the Gaza Strip. Twelve-year-old Yusef falls in love with Aida, a beautiful gypsy who affectionately toys with him like any adolescent girl first tasting the sweetness of power over men. To marry her, she says, Yusef will have to find the three jewels lost from her grandmother's necklace – in South America. Afflicted with love and the impossibility of the challenge, Yusef cannot concentrate in school. He finds himself drawing a nude androgynous figure and writing three times the word *hodud*. Borders. His uncomprehending teacher wants to punish him, but Yusef runs away.

Yusef, himself a trapper of songbirds, knows about cages. *Hodud, hodud, hodud*. Determined to find passage out of the one that surrounds him, penniless and passport-less, he hatches a plot to escape in a crate of oranges bound for Europe. Asleep that night, buried in his orange cocoon, Yusef dreams of his blind old neighbour transformed into a wise sheikh in a luminous palm grove. "These are the three jewels, Yusef," he says. "The borders that enclose human existence. Time. Space. The flesh. Those who have sought to defy one have found the others closing in on them. They have had to pay with their lives." In the morning a remorse-stricken Aida and his family run to find him, but too late. Yusef, tranquil and heedless with the joy of his enlightenment, has had an encounter with uncomprehending Israeli security forces. Shot in the heart, he dies in his mother's arms. But, moments later, in a transformed, dreamlike state, they all rise and walk away.

The three borders. The lessons we learn

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from them; the things we do, driven by our passions, to defy them and the three-headed Cerberus that guards them. Some find redemption, for some it is elusive, for all there is a heavy price. Rosa, the pregnant nun, and Esteban, the now-female father both of her child and of Manuela's, die of AIDS; a symbolic retribution for their transgressions of the boundaries of the flesh? But the process is transformative for all, and potentially liberating. Is it a coincidence that each of these stories also involves, as a powerful metaphor, the transgression of gender boundaries? Agrado, Almodóvar's feisty transsexual ex-streetwalker (and before that a hirsute truck driver) trying to clean up her life, says it best in an impromptu stand-up act in which she names and puts a price ("You add it up, because I stopped counting") on the multiple operations that have transformed her body: "We must not be cheap with regard to the way we look. Because a woman is more authentic the more she looks like what she has dreamed for herself."

I've worked for five years with people who have sought to transcend the strictures of space in an unequal world – Nepalese migrant workers, and refugees from war, violence and economic collapse in Chechnya and Afghanistan. A Nepalese migrant once told me a story about a relative of his who had worked abroad for many years. When he finally saved up enough money to return home, his plane was caught in thick fog and crashed into a mountain. Before his family received news of this, one night his sister began to shake and fell into a trance. As the family gathered anxiously around, she spoke to them in her brother's voice, explaining what had happened and exactly where to find his body. In his animist society, proper funerary rites and the correct ritual guidance of the soul back to the land of the ancestors were of crucial importance. More serious than the painful irony of his incomplete *physical* return home, if his soul had been unable to communicate with his

family, he would have risked total spiritual oblivion.

Whether or not this sounds plausible is of no importance. Like the other stories, it is a myth, a moral narrative. I ponder this, and the stark vision of the two hearts returns insistently. Suddenly, the elusive silver thread comes into clear view as I realise what links all these narratives. For they make *literal* what is usually expressed metaphorically; actual journeys are made where usually we mean them symbolically. The heart of the patriot returns to his homeland, the dead son lives on, the lover steps outside the snares of time that stole her beloved, the boy living under military occupation seeks to creatively elude its spatial strictures, androgynous or transgendered figures subvert the rigid categories of flesh, the migrant's soul returns to his family and ancestral land. This is the power of stories: they dramatise in vivid images the transgression or transcendence of the three borders, the three-jewelled chain that confines us, and the transformations and miracles that are worked by the force of love.

Chopin himself cannot, but his heart parts from his weakened tubercular flesh and returns to Poland. It miraculously escapes wartime bombing and is still visited by busloads of tourists almost two centuries after his birth. Without it, his music would be inconsequential, lacking emotional depth: the heart, reincorporated into the now-independent motherland, binds music to time and place and, as he wished, helps propagate a romantic nationalist myth. Like her own son's heart, Manuela lives on and moves beyond grief to find meaning – and a miraculous healing – in her motherly devotion to damaged others. Yusef's spatially circumscribed homeland remains unfree, but his heart, metaphorically, is liberated. ("Your love will save us all," he says to his mother). And Kafka Tamura returns from the otherworld at the heart of the forest to rejoin time. But unlike Orpheus, he is given a second chance when he stops to look back.

(below) *Her Earliest Memories*; photograph by Hardave S. Kharbanda



Father

When death's wings flew you to another place
 She took my joyful memories of you with her.
 An infinite number of small moments – laughs, looks, tastes, smells
 Now void of scale
 Are etched in my mind
 Completely lacking the texture, emotion, sensation they once possessed.
 They are crowded out by images I wish I could forget.

I see a photograph of us cutting birthday cake together
 But instead of strawberries, cream
 I taste the helplessness I felt in my stomach when I found out you were ill.

I recall you lifting me above the waves in the ocean as we swam together
 But instead of the crashing surf
 I hear your frustrated voice the first time you needed help to get out of your chair.

I can imagine you dancing in the kitchen with Mum before dinner
 But instead of the floating carelessness of that moment
 I relive our family's warped sense of accomplishment at your being able to walk to the end of the driveway. A good day.

I know that you had a loud laugh
 But I don't remember what it sounded like.
 Instead I hear the sound of vomit hitting the hardwood floor as, too exhausted, you could no longer get to the bathroom
 on time to be sick.

I almost hear the music that you played each night at the piano
 But it is drowned out by the silence and emptiness
 Of the house as Mum drove you to the hospital. Again.

I envision this car you made out of sand for me on the beach one day
 But instead of the colours of the ocean, the mangoes we ate there, the beach towels,
 I see the colour of the trail of puddles you tried to clear away when you were ill. Red.
 Blood.

I know that you hugged me the first time my heart was broken
 But instead of the warmth and protection I felt in that instant
 I feel clammy, translucent skin on your forehead as your illness progressed.
 Sweat.

I have photos of you smiling
 But in my mind all I see
 Is the look in your face when you stopped knowing me.

There was a time when I eagerly awaited the return of my joyful memories
 But I have accepted the possibility that death will not relinquish them.
 And so I continue to wonder
 How to remember you and smile? To keep you in my life when the memory of who you once were is void?
 And at last, I choose to stop fighting. I surrender the memories of moments in time if I must
 And understand that what happened once, who you were once – regardless of my ability to recollect –
 Will always be. And death, no matter how cruel, can't take that away from me.

Guilaine Mala

As far as I can remember, I have never been interested in marriage, even in making a good marriage. All I have ever wanted, all I have been searching for, has been the Great Adventure beyond the limits of space and time, sacred knowledge and sacred love. But the interwoven path of the Profane and the Sacred is a confusing path.

When I was a little girl nicknamed Feu Follet, I had made a solemn promise to myself that I would explore the most diverse traditions existing on earth. But when a copy of *Tintin in Tibet* fell into my hands, I remained completely lost in thought for a long time in front of the transfigured face of the young Tibetan monk in levitation. It seemed to me that it was the most precious learning of the world.

That is why, many years later, back from a long journey to the Far East, I am sitting at a desk of the National Library in Paris, totally immersed in an ancient Tibetan scroll. Nothing else matters, everything around is engulfed in the overwhelming silence...

Suddenly, I look up instinctively, and stop breathing, horrified by the dark blazing eyes of an Inquisitor ready to send me to the stake. Discovered, he does not lose his grip, and continues to pierce through the core of my soul. I remain paralysed with fear, but gradually my spirits come back and, intrigued, I penetrate in my turn these two scorching embers. I instantly recognize what I have been always longing for, the concentrated and purified energy of one who devotes each minute of his life to the Sacred. I admire the strength of his dedication. From this moment, the threat retreats in his eyes, swept away by an expression of free surrender. Then a flow of mutual communion springs up between us for a detached moment, an eternity. In the end, it is he who looks down. The eyes are now enclosed in a long and slim face adorned with thick velvet black hair, the face of a Spanish medieval crusader. When he gets up, he is immense in his long black robe; when he walks, he moves as an ascetic with sober gestures. On the left side of his chest, I see a blood-red heart glowing, and the emblem of the Integralists' Order, the most conservative faction of the French Catholics! But it is already too late. From then on, everyday I wait for his arrival. I learn that he is an expert in Persian manuscripts.

One afternoon, as I bring back a Tibetan scroll to the Library store-keeper, the latter slips a folded paper into my hand, muttering: "A gift. We noticed a change in the atmosphere". I unfold the paper and read the word Monk, followed by a name and an address in Paris and that of a monastery in the south of France. It is signed with a cross ending in a red-blood leaking heart pierced through by an arrow. I have the greatest difficulty in concealing uncontrollable laughter when he chooses this moment to make his entrance. His name is Bruno, it suits his dark eyes, dark hair and dark cassock.

Week after week, the link silently forged between us strengthens from afar. To work with him in the same room makes me happy. We have not yet exchanged a word. We avoid

looking at each other. However, on a Friday at five o'clock, the time of closure, I cannot help it. I am standing near the exit door, ready to hand back an ancient Tibetan painting, which was discovered at the beginning of the twentieth century in a cave in Touen-houang, when he moves towards the door, about to leave. I smile at him. He hesitates, gazes at the old painting of the Buddha that I am holding, then, very sweetly, smiles back to me.

He was never to come back. Day after day, the throbbing need to see him again persisted. His disappearance hurt me because it was not in my intention to damage the integrity of a consecrated man. Moreover, I could not and still cannot reconcile the religious teachings on finding the divinity within all sentient beings with the fact that 'the holy ones' or genuine men of God feel compelled to reject those who come to them in the purest state of mind and with the highest aspirations. Are they aware of the pain they inflict by making them feel forever unworthy?

A few months later, I read that the Integralists would

“ the latter slips a folded paper into my hand, muttering: “A gift. We noticed a change in the atmosphere” ”

soon hold their annual public congress in Paris. I decided to attend the meeting in the hope of catching a glimpse of him. And there he is, he is even the right-hand man of the head of the Movement. It is he who is entrusted with making the most important speech of the evening. He ascends the stage, reverently bows down in front of the altar, and starts presenting the goals and achievements of the Movement. He is articulate, imposing; he holds his head high and his voice sounds clear and carries far into the vast Hall, which is full to bursting. But suddenly, the tone of his voice changes, and little by little, he spells out with acrimony the reasons why the Movement refuses to endorse any reform to modernize the Church. These reforms, he claims, are weakening because they aim to adapt the Church to the dull needs of a degenerate society. At that point, he launches a vitriolic diatribe against the real culprits, the common believers with their loss of virtue, steadfastness of mind, and laxity of morals. Condemning indignantly their inertia, he exhorts them not to be ashamed of bearing witness to their faith. The tension rises among the public who become agitated. He not only calls upon all the Saints of the past who were mentally prepared to shed their blood for the service of Christ, he also solemnly entreats them to revive the ancient Soldiers of Christ who were not afraid to fight the non-believers, the infidels who were opposed to the divine order. By then, his eyes throw flashes of lightning; under the vault of the ceiling, his voice resonates as the thunder; his whole body seems to lengthen inordinately, and becomes gigantic.

The crowd of the Integralist partisans, galvanized by his power, pray with him louder and louder. They soon grow excited, and all of a sudden, a collective mystical hysteria takes possession of them all. Some kneel down and weep, some are ecstatically prostrate, others throw themselves flat on the floor and repent. I can hardly believe that it really is happening. The scene is quite frightening. He has managed to communicate his holy trance to several thousand listeners. It is not the kind of spiritual raising I was ultimately looking for. Where he sees a glorifying homage to an implacable God, I only see distortion and chaos.

At last, the meeting draws to a close; the people somehow restore composure to their faces, and go out. The Hall is now immersed in silence and shrouded in the semi-darkness. One chandelier remains switched on over the altar. He is there, putting everything in order, folding up the embroidered altar-cloth. Hidden behind a pillar, I observe him, wrapping up in precious brocade a beautiful statue of the Virgin Mary. Each of his gestures embodies worship, his hands caress tenderly, with great veneration and an extreme gentleness. I am still tormented, there is no place for me in his world. He stands so close to me, yet he is so far away.

As he is going to sit in his car, I advance in his direction. I dissimulate my face and my long hair into my shawl, in the moonlight he cannot recognize me. I have to speak to him. Without thinking, I heckle him: "Allow me to say that you are a fanatic!"

Sarcastic and superb, he replies: "Thank you for the compliment".

In other times and other circumstances, would he have burnt me alive to sever the root of his own temptation? I walk back home, strolling thoughtfully in the streets of Paris. During that night, my passion for him withered away.

The following day, I was finishing my work at the National Library. Having been assigned to a research post in Tokyo, I was waiting for this new experience with curiosity, because at the age of twelve, I had had a dream in Japanese. Although I could not possibly have at that time distinguished between Chinese, Japanese or any other oriental language, when I woke up, I knew with certainty that in my dream I was in Japan, encircled by Japanese friends among an immense gathering of Japanese people. All the conversations I could hear were in Japanese. But this is another story.

(below) *Border Patrol*, encountered in the Jura, 12th December 2004;
Photograph by Anokhi Parikh



Edward's Replacement Part

Felicity Decker

The first word I said clearly was *Baywatch*. Kate had just got up from the visitors seat to find the TV guide, was asking me what I wanted to watch next, and there it was, resounding through the hospital room:

"*Baywatch*."

When she heard the word, she turned back toward me, gave me an excited smile.

"That sounded really good, Ed." She patted my feet through the sheets. "Almost perfect."

I smiled too. I was happy for myself, happy for her also.

She had been patient in the past weeks, had worked hard to comprehend my misshapen words. She had needed to become an interpreter of sorts, connecting the syllables that became disconnected in the uttering, puffing up and re-imagining some of my flatter sounds. She had made light of it all, but there had been a line of worry dancing on her forehead the first week after the surgery. And she had smoked furiously – always a sign with her that she was anxious – leaving the room every fifteen minutes during visiting hours to stand by the ashtray towers at the rear of the hospital. Boy, had she smoked.

Even though it was smoking that had brought me there.

"Say something else," she prodded, returning to my bedside and placing the guide on my chest.

"Like what?"

"Ha! Great! Now show me."

I dropped my lower jaw and she peered intently into my mouth.

"Yep, still a good colour."

I smiled at her zeal. Dr Mann had confirmed this just half an hour ago, had shown me in a hand mirror. The tongue was red, apparently getting good blood circulation. It was looking like my own. All was, apparently, going swimmingly.

But there was still a sense of foreign-ness. The size of the organ had, according to the doctor, been a perfect match, but it *felt* large. Large and unwieldy. And sensation was patchy; creating the impression it was unbalanced in my mouth. I worried at it continually, raising it and tipping it to the side as if to correct the list. Kate told me the action made me look like I was suffering from a palsy.

"You'll get used to it," Dr Mann said when he saw me perform the action. "But it *will* be incremental." His face was flushed as he spoke. He was visibly pleased with himself, with the success of the procedure. Fair enough, too. I was only the fifth. The fifth ever. Anywhere. And Kate had stroked his ego for days, waxing lyrical about the miracle he had performed, his brilliance as a surgeon.

"It wasn't me alone," he responded modestly to her praise. "There were nine of us, plus the nurses, the anaesthetist, other theatre staff -"

"I know. I know. You're all brilliant."

The knowledge of all those people in the operating theatre created an odd image in my mind. Nine doctors corralled around me, one making the incision from ear to ear, the

others hand-passing the donor's tongue around the circle like a ball, then eighteen hands tangled together inside my jaw, connecting the muscle tissue, nerve endings, arteries and veins. Needles and threads criss-crossing.

"*Baywatch* isn't on yet," Kate said scanning the page open in front of her. "Not until 7.00. So, it's News or *Big Brother*?"

"*Big Brother*."

"Fabulous sound," she exclaimed. "Full of texture. Better even than before the op. Here you go." She handed me the remote control. "I'm going down for a smoke."

It was the second week after returning home from the hospital that Kate first noticed it.

"You've really got some spin on your 'r's." She laughed. "You sound like my high school Spanish teacher."

"Really? What did I say?"

"Garden." She repeated it, accentuating the 'r's. "Garrrrden. Perhaps the way they've hinged the tongue gives it a good roll."

"Yeah?" I was only half listening, reviewing a set of financial statements, trying to catch up on some work in preparation for a return to the office the following week. I didn't pay much attention to her comment on that morning. "Hmm, yeah, probably."

But the following week, she brought it up again. Her tone was more serious this time, her observations more closely researched and pointed. I was, she said, dropping the sound of "l's when they occurred mid-word and replacing them with a soft "y" sound. I was replacing "j's with breathy "h's.

"I can't hear it!" I told her.

"Not at all?"

"Nope."

And I recall being vaguely disappointed.

It's hard to know exactly when it started to obsess her, but she began drawing my attention to each and every incident.

"There!" she would exclaim. "Did you hear that? Just then."

Eventually I too was listening for it. Occasionally, I could distinguish in my speech the sounds that continually surprised her. But I wasn't worried by it at all. I would laugh each time Kate frowned, repeat the offensive word, like a young child playing with a newfound ability.

"Don't!" she growled one day. I remember her tone distinctly because it was the first cross word she had said to me since the diagnosis. The first time she had raised her voice since I had become "the sickie": a cancer victim.

"Stop doing that," she insisted angrily. "It's not funny. Don't play around with it. It makes me feel squeamish. Like they're someone else's words."

And her anxieties slowly began to migrate and become mine.

At my next appointment with Dr Mann, I worked around

to the question casually. *The donor. What am I able to find out about the donor?*

His response was matter-of-fact. "Nothing, I'm afraid. I mentioned to you at the time...I know it was a difficult time to take things in – you weren't well – but the law prevents me from disclosing details. Not just a name. Anything at all." He paused. "I know very little myself. Procedurally, that is thought to work best. I learn little more than the blood type... measurements."

I acted like it didn't matter. I told him I was simply curious and he accepted the lie, proceeded to the usual questions about degrees of function, sensation, comfort. My responses were well-modulated, ostensibly sane, but I watched his mouth as he spoke, the words being shaped and propelled from the hole. *His* words. And he caught the intensity of my gaze and paused before changing tack.

"I can refer you to someone if you would like. It's not uncommon after these types of procedures to find it useful to speak with a...specialist...and the immunosuppressant drugs. They can knock you around a bit, too."

"Daniel," I said with a laugh, wanting to end the doctor-patient formality. "You know I'm an accountant. My mind couldn't be more prosaic. I don't have crazy...even very interesting...thoughts. There's a change in my speech now. An accent. I just want to know whether it's possible that the donor spoke another language."

"Well." He turned his palms up and out in a gesture of frankness. "It's possible. There are many people whose first language is not English in this country. Anyone can be a donor. But, medically, what you are saying is a nonsense." He paused, looked over his half-glasses at a distant point in the room, thoughtful. "Sean Whitbread is good with these things." He tore a sheet of paper from a yellow pad, lifted a pen. "I'll get you to see him."

I took the referral letter. But, as I drove home, the need to be re-assured was dissipating. I was comforted by Dr Mann's words. *A medical impossibility.*

"It's a complete nonsense," I told Kate without waiting for her to ask.

She seemed happier that evening than she had in a while: laughed throatily while we cooked dinner, limited her cigarette-intake to two for the evening. We curled up together on the bed after eating, revelling finally in the fact of a rescue from cancer. In the fact of a life saved. And more than a life, a lifestyle. For there had been an alternative, a quite unattractive alternative, to the transplant: a procedure that might have saved my life but not its quality. The doctor had explained this alternative in some detail: he would need to cut out a large part of my tongue with the tumour then use a chunk taken from my small intestine to cover the hole. And after that: a life unable to speak or feed properly, a tube running forever into my stomach. This was what I would have faced had the procedure, the donor, the know-how not been available, if circumstances had been different. Both Kate and I must have realised how very, very lucky I was. How lucky to live now. Here. Now. Here. Now.

Only kissing seemed intimate enough to celebrate it, and our mouths joined passionately for the first time since my return from the hospital. But the connection lasted less than a minute.

"What are you doing?" She drew back on the bed.

"What?"

"You're making me gag."

I straightened up confused. "What!"

"I think you're making that movement while we're kissing. The *palsy* thing."

"Am I?" I felt violently hot. Embarrassed. Angry. "I haven't done that in ages."

"I thought the balance felt OK now."

"It does." My body was stiffening defensively beside hers, every muscle contracting, every cell flattening to increase the distance between us, to remove the points of physical contact. "I didn't think I –"

"Oh!" She looked contrite then. "I'm sorry. I just panicked because I felt choked. It's OK." She drew me back down and brought her mouth close to mine. I watched the expression on her face, her features were frozen into a mask of resistance, and she delayed oral contact for a moment rubbing the tip of her nose against the tip of mine.

I concentrated closely as we kissed. Tried to make my tongue lie still on the floor of my mouth. But each time her tongue touched it, it rose spontaneously, it pounced – pounced on the organ that moved beside it, coiled around it and hung on in a tight, writhing embrace.

"My god!" Kate's voice when she found it was a welter of confusion. "Who is kissing me?"

I think we were both embarrassed the next day. Kate at her lack of sensitivity. At her obvious repulsion. Me, at my apparent lack of control. My physical schizophrenia. It seemed easier not to speak about it. The fantastic thoughts underlying the unspoken explanation were too strange. Too *not-us*. We were believers in medicine and science. We trusted. So she smoked in the garden and I worked on a file I had bought home from the office. There were some items on the balance sheet that were baffling me, that required some concentration. And I had imagined that I would find the required concentration best at home, away from the phones and the ill-timed demands of colleagues. I needed to understand the accounting standards and how they would apply in the case, and I needed to assure Brancon that their treatment of the item was fair and reasonable. The company was my biggest client; its success was important for my own.

Late in the afternoon, Kate came into the study and tried to help me. Her actuarial mind was even better with numbers than mine. We worked at the issue for over an hour. Perhaps it was the sleepless night, but we were both unable to resolve it. The facts of the transaction simply fell outside the parameters of the standards.

Dr Sean Whitbread – string of qualifications in neat lettering after his name on a plate inlaid in his desk – took his cue from me and tried to make light of it at first.

"So you're suddenly craving paella and empanadas?"

I had just explained to him with a grin that that I had developed a ridiculous belief that a Spanish tongue had been put in my mouth and that it was giving my words a Latin lilt. I was conceding in my tone that I was thinking irrationally. Nevertheless, his response about food surprised me.

"Food cravings?" I replied. "No. That's not part of it. I can't taste anything since the procedure. Well, I can't really distinguish tastes..."

"Ah, my apologies." He explained that he had many different types of transplant patients

and that he didn't have a perfect understanding of everyone's circumstances.

I understood, I said. It wasn't a sore point, anyway. I had known from the outset that that particular sense would be a casualty of the procedure.

"So, you're thinking a lot about the characteristics of your donor?" he asked more seriously.

"I wasn't really aware that I was, but then..."

I went on to explain the pronunciation that was worrying me, and then, with a flush of embarrassment, the strange behaviour of my tongue when kissing my wife.

Sean Whitbread – B.Psych, D. Phil., P.C.A.S – worked hard that afternoon to convince me of the physiological impossibility of what I was saying. Of the unquestionable psychological underpinnings of the manifestations.

He said that Kate might like to come and speak with him too, that it was often as hard in these matters for the partner as the patient. And there was a drug he could prescribe if I felt it necessary. Or if she did.

But, on the elevator ride down to the street, with his learned words in my ears – all those letters after his name! – I felt less and less like I would need it.

"There is *always* a sensible explanation for things," I told Kate over dinner.

She nodded hopefully.

"I mean, Christ, I'm probably just trying to get a smidge of nicotine when I'm kissing you! A tiny shot – I was addicted to it for years. It's not like I can't smell the stuff on you. It's almost as strong as tasting it."

She laughed, but there were also tears bubbling up from her tear-ducts. "Do you think that's it?" Her question full of forced credulity.

"It's as good an explanation as any of the craziness we can come up with. And god knows why my words sound different, but why wouldn't they? I've got a strange object in my mouth. It's hardly surprising that I don't sound quite the same. That I might..."

The rational explanations were coming thick and fast. We were grabbing them with elation. Nodding furiously at their undeniable veracity. We were turning our backs on fantasy and fear.

I had to go back to Dr Whitbread's anyhow. He wanted to see me a fortnight after the first appointment to ensure the fears were resolving themselves or to determine the need for further treatment. In the waiting room, I chatted to the patient seated beside me. We came to our respective transplant stories quickly.

"A tongue transplant," I told him matter-of-factly. "Freaky, I know. But it saved me from some pretty nasty cut-and-patch-work. And you?"

He paused, touched the side of his head. "Some...a little brain tissue –"

I laughed. "Right! Fair enough. You don't have to say if you don't want to." I laughed again. "Sure, a brain transplant!" That old joke.

But his eyes didn't acknowledge any comedy. Carefully he explained the facts. The early onset of Parkinson's. The experimental transplant of tissue containing neurones that can produce the dopamine that is lost with the disease.

"And the transplantation tissue came from a pig," he

concluded. "If you can believe it."

"No! Really?"

"Yes. Apparently compatible with humans."

"*Really?*" My voice was high-pitched with disbelief but his expression remained earnest, "Well but that is fascinating."

I didn't say anything more for a few moments then I couldn't suppress it, I had to ask. I leaned across conspiratorially.

"This may sound strange... but...have you got any odd memories since the procedure? Memories that aren't...*yours?*"

He laughed. "What? Like life in the litter?" A disdainful snort. "No. Of course not. Anyhow, it's not that part of the brain. It's the basal ganglia...it's the part that deals with movement."

"Oh," I sat back in my chair quickly, felt a heat in my ears and a nervous flap of my tongue against the inside of my mouth. He picked up a surgery magazine and began to read it with a tilt to his head that betrayed his assessment of my sanity. *Ridiculous!* I couldn't help but concede it. *He's right. I am ridiculous.*

Long minutes passed. I focused on a ragged fingernail on my left hand, a dark spot on the beige carpet. I could hear scorn rising audibly in the man's breathing and was relieved when the nurse appeared in the doorway to the waiting room, called him in for his appointment.

But it was then that I saw it. I raised my gaze toward him as he rose, and I'm sure I didn't imagine it: he lurched forward from his seat and moved across the room with quick, high-footed steps, his buttocks swinging with an unmistakably porcine wobble.

The Watcher

Peet Morris

For the last billion years, the remaining species had grouped together, and then jointly *held station* – whilst the remnants of their observable universe’s matter continued to condense into a single point – a point that now contained nearly *everything*; everything apart from themselves, and the multitude of minor planets they kept alongside.

Although they had been correct on other things, they had all been wrong here – through gradually turning their captured planets into energy, they would have been able to hold their current position for many million years more. However, they had reasoned that their *mass excess* had made some things much simpler – for one, they would now be spared the task of having to capture some of the *next cycle’s* speeding primeval matter. They could now wait with ease – and until the heavens were once more alive with a billion young or forming stars.

Their greatest success was in predicting the exact point of the approaching *big crunch* – their surprise in that had been the proof that it had also revealed the site of the current cycle’s originating *big bang* ... it seemed obvious to them now – that the two locations should be one and the same. Of course, the universe’s final resting place could really be *anywhere* – for it was only now they that moved *relative* to it. Everything – everything else had, in some sense, ceased to be, and, distant as it was, they could only wonder at the enormity of the black hole that had replaced it all.

Of course, once they had truly contemplated *the end of everything* they had come up with alternative plans of *escape*. Their previous joint attempt started with a premise: they had been simply arrogant to assume that the universe – as a whole – was the same as the one they had once *observed*. If space truly were infinite, couldn’t there be – wouldn’t there be – other observable universes: when *the infinite* could contain any number of *big bangs*, why should nature permit just one? They had spent millions of years looking in vain; exploring regions

of the infinite that were now, apart from the black hole, so very much like their *local space* – full of nothing, but a total, complete, blackness.

As the last remaining free atoms of matter were captured by the gravity well, and were absorbed, the news came through that only four things now existed – time, space, the black hole, and themselves. Any moment now, any moment now they had thought.

The “moment” never came, and their wait eventually turned into an *age*. Where was the next cycle, why hadn’t it begun – what was the singularity waiting for? Actually, they had really known *the why of it all* very early on – but they waited all the same.

Now their wait was finally at an end, and, having realised what was needed, they did it willingly, and in a true sense of self-sacrifice.

Soon, they reasoned, the universe would contain just two things, the singularity and space – they believed that time did not exist without a witness to its passing.

As they moved ever closer to the event horizon, they wondered how they hadn’t previously seen what was now so clear – that Nature is *exact*, and that the long awaited rebirth *would* come – but only when an exact amount of matter was on hand to set it in motion – the dreadful irony being that the mass required was exactly the same as had been there *in the beginning*.

In their final seconds, forsaken as they had previously felt, they were full of wonder, and at peace – for at their end, something was revealed to them, and they saw that, apart from time and space, there was a long forgotten *other* in the universe; a presence that had always been there, and that would always be there – and my grace and spirit were upon them.

Darkness was once again upon the face of the deep.

(below) Wolfson punt harbour and Cherwell; photo by Sharath Srinivasan



The Older Bride

Zuzanna Olszewska

She's selected this auspicious date
in late winter
when the ponderous grey stone
and tangled gardens of North Oxford
become fragile again with flowering plums
like shy brides.

Old shoes that have seen her through
(though the dress, like the white, is new).
A garland of her mother's borrowed dreams
Bouquet spiked with thorns and victories
Veins of experience marbling her hair
Finely chiselled glance and smile
A hungry womb—

Down, down the aisle
All poise and style
(Unflinching, as to her other battlefields)

Her former lovers, a bundle of cards
Tucked into her bra for good luck.
And closest to her heart, perhaps
the joker of the pack—
the one who lied and cheated;
the one who left no trace on Google.
Just one of them has come, today,
he's in the third row, all smiles;
a fashionable tie, a Thai wife.
He made it in investment banking
and long ceased to pose a threat.

Down, down the aisle
All pose and guile
(and humming a blues that goes like this—

*Please excuse
My worn-out shoes
Please excuse
These worn-out shoes
'Cause I've been on the road so long
Where you been hiding, you've been taking your time*

*Please excuse
My occasional blues
Please excuse
These unladylike blues
'Cause I've been on the road so long
With or without you I'll get through them just fine*

—and takes her down the aisle.) And in
this eternal march towards her ideal self,
the two-tone echoes of those saxophones
hold out a certain wisdom
A certain comfort.

Oxfordian Complacency

Hedwig Emmerig

I hate your well-trained washboard stomachs
your dynamic steps confident of victory
your artificial smiles.

I hate your ubiquitous mobile phones
your meaningless conversations
your long, dark-grey coats.

I hate your dissociation
from everything that life means
warmth, suffering, love and failure.

He Revisits Earth

Merryn Williams

I landed feet first, in a rush of wind.
Grey-silver light; I saw the rarest owl
sail past; time was when I'd have noted that.
There's dust on my binoculars. And all

seems much the same. She's sitting in my chair,
red-eyed, and some years older. But the gate
hangs loosely, not the way I liked. I can't
unlock this window. Bring me up to date.

Where are the children? No response; the house
is firmly barred; they've left me far behind.
I stand here shivering; February stars
chill to the bare bone. Who has seen the wind?

The End

Sharath Srinivasan

slam.

i just can't stop looking back at the door. i know i have to. it tells me something, unlocks something i know inside but can't utter, can't find words for. not sure. maybe, it's telling me what to think about, so then i can understand. need to understand. so confused. so damn... the door. now. breath, warm, regular. in the armchair, sitting, looking over. thinking, looking at the door. listening. not listening enough. nothing comes clear. just the door. closed, silent, unmoving. though not then. yes, then, that moment. of course, the door, *then*. only from there, that i can start to understand everything before. then, there. the end. no. but perhaps. think this, but quickly thoughts wander, heart racing, everything before, no, just bits, different turns flash, trigger others, then, she flicked her hair, her ear was red. how red was her ear! with rage, such burning red. thoughts trail off. now, again, the door. looking at it. this stupid door in this bloody room.

the room, ah, now darker. evening comes. quieter now. still. but something, some smell hangs around me. nausea. a twitch. quickly, zoom, i am at its edge where it opens, looking a while, the splintered edge of the door, chipped white paint, the darkness at the skirting. the darkness, the gap, that connects this room, my room, our.. but then the lock. every time, the gunmetal lock. and then, again, it slams. slow motion. but so quick; turn towards, through the room, door, edge, lock. slam. heart pounds again. *slam*. ringing in my ear. that narrowing blackness hurls this ringing at me. blood to my head, thoughts, racing thoughts, ringing, cannot understand a thing, this damn ringing. consequence. i know, i *know*. what? i cannot stand to know this. god, where *is* she? i get up.

blood pouring through my face, through my itchy sweating skin. move, must move some. pace a little, *damn*. weak, so weak my legs, tingling in my thighs, the front, the back of my thighs. armchair. grasping one arm just to make it. stumble, swivel, fall in. yes, better. cigarette. reaching slowly, painfully to find it. then suddenly lit, in my mouth. click. thoughts in between swallow moments in time. the lighter's click invades the room's silence and the noise in my head. staccato crackles as the cigarette sucks up the flame. inhaling, some relief. but the sickness in my stomach rising up again. sinking like this. must sit up. a dribble from my nose, Jesus! force my head up, free my hand to wipe it. ash falls away, on my leg. snuffle, snort, full clog hits the back of my throat. for a moment gagging, stickiness, choking. cough. throat so dry. the smell. cigarette smoke. no, not just. smell of tears and mucus. warm, baby-like smell. the sickly smell of my emotions churn in my stomach. empty stomach. swallow. rein in. settle. enough. enough of this. breathe. clears the view a little. cigarette butt fizzled out in dirty coffee cup. sitting. leaning back now, whooze. can see, see. can see the room. beyond me. amongst something, in a space. the room.

darker still, the room. head drops a little, toward nowhere. blood receding through my cheeks like sun through a cloud.

colder, a shiver. another breath. now looking at myself. oh jeez man. laughing at myself, maybe. sniggering. such a sight. like this, sitting here. such a pathetic sight! tears, mucus, wrench in the guts. look at me. i wonder, *what sort of act am i putting on here?* might i be just playing something out like i have to, like they're watching. whoever. sit up some. or is it just happening? no, nothing just happens, i know that. all is doing. otherwise, nothing is, right? and now, this ritual devastation that i choose. it has to be. that's what this is. how cheap. such a moment and still able to sit outside, observing myself, watching the spectacle. leg kicks out and – *damn* – away at nothing. just want the real thing. the punch in the solar plexus, the wind knocked out, but not to call it so, not recognising, only the pain. swallowed whole. wait on, here. just before, she left. *she bloody-well left*. there's the punch for you. out the door. the end, maybe. do you realise? left, gone. ta-ta. adios..... fool. armchair. slouched. here. confused. did she really leave?

pain. the pain of my self resonates. the sickness inside, that's real. the only thing here. the room surrounds me, otherwise empty. the room is silent. silent for hours, for days. night now. breathe. deep breath. eyes close, not asked to, closed. blackness. absence. deep breath. colours darken, fall over each other into maroon, storm grey, black. deathly silence. try to listen to it. calming. just for a moment, in cool silence... no, damn, not silent now; that ringing. wanted to be closer, listened too hard, disturbed it. now this bloody ringing again. now louder.

her face contorted, wild. she appears, now, all of her. the shouting, the screaming. the shoving of heavy furniture out of the way of hell's fury. such a blur. the screaming. no reason. i screamed back, i remember, but it did nothing to stifle her hysteria. i pleaded, then rage and again. the screaming. the violence. then, all whirled together, more violent, tremendous, culminating, sucking into one point, one moment, faster, looking away, turning, looking at her, just a moment, everything in just a moment. the door. it comes as an electric blast. blood to my face prickling madly. immediately i turn, again, to face it. to see it whole, to see it for the first. then, closer, the dark edge at the opening. vaporous pillows of air hurrying in and out back and forth through the zip of black space at the door's edge. this space, still frenzied, ringing madly from before. before. then. the lock. the cock of the gun when she unfastened the latch to leave. looking away. the sound. ringing again. slam. no ordinary slam. again, this thought. i just know it. a different slam altogether. not hard, like other times. just firm. quick, sharp, definitive. not with the emphasis and acceleration she would have used if she was trying to tell me something, sought to scare me, prompt a response. there was no dialogue with that slam. no! bloody hell. this is it. just, *slam*. sharp, brutal, the door, then slam. the end, now clear. the slam, the effort to slam, was for her, not for me.

Time heals all wounds, but sometimes the

* * *

When I was in love with her, love left me anxious. And I found her wanting. Her impulsiveness, her giddy rapture in frivolous things. Her matter-of-factness, abruptness, that would catch me off guard; stopping me to comment on the profuse neck hair of the man walking towards us as I was telling her a story about some beautiful piece of music or a place I loved in my childhood. Her weakness and vulnerability. I found fault-lines between her and the idea of her that this feeling, love, demanded. It harmed our relationship, said or unsaid. Later, I was out of love and her faults just reminded me of how so different we were, how she was so wrong for me. How we weren't 'meant' to be, as though only perfect things are intended to happen, or at least to endure. We were still together, often we both wanted this, though rarely at the same time. And yet the ability to see a life without her was made more easy with every passing day. I was slowly exiting, preparing myself for an exit. Untangling a destiny together that at the beginning had been a current I feared and resisted, and which for a time was an effortless riverflow of dreams. That time, the beautiful time, now lost amidst all else, inscribed unreliably on an ancient tablet in memory's store.

I don't know what was worse, struggling with who she was yet loving her and wanting to be with her forever, or quitting the struggle and just building a stockpile of excuse or disappointment for the day I would need it. Of course, no stockpile would ever be enough. I guess leaving a lover is having both the courage and foolishness to choose one unknown over another. And when the day came, I immediately wondered if she was the one after all, if I just didn't see it right. All that. I suppose I could never know that she was the one I missed the chance on. I was blind to whether perfection was staring me in the face, and deaf to any whisper that this just may be as good as it gets in an imperfect world. And then, what if I had been different? Was different because I'd become a better person better able to just be with her? To live it out with her? What if she, we, had changed to make all this possible, or other possibilities I don't even know? What if? In an arbitrary life bound by the unforgiving march of time what ifs don't matter when you finally find yourself asking the question. By then, you're only left with whatever. The next time I saw her proper was that autumn in the west park in the city, twenty-three years later. But we weren't talking about that, so best I leave it alone.

Afterward

Douglas Ayling

It's not as if we spent the next years in mourning. Genocide or no genocide we'd accumulated happier hours and hoarded them jealously. I've got a happy memory of us gardening in Uncle Henri's compound in Norbury. We began overturning buried bulbs from last year as we tried to plant new ones. I smudged off the mud with my thumb.

"Mum, look! I've found another one."

It felt like a ripe secret.

"Put it back in, make sure it's facing the right way."

There were so many sitting underground, waiting for our spade fall, that we stopped and looked elsewhere to plant anew. And afterwards we could treasure the guilty knowledge of where they were buried, the presents we were due.

Editorial Team

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