

LIFE IN TWO DIMENSIONS

By the early years of the millennium, approximately half of all one year olds will be unable to listen satisfactorily to the sound of their mothers' voices against the TV.' So warns Sally Ward, who studies attention skills in babies. In 1984, apparently, 20 percent of nine-month-olds were unable to listen selectively; but just fifteen years later, in 1999, that proportion had doubled. And, equally depressing, the psychologist Dimitri Christakis has estimated that for each additional hour of TV per day that a child watches before the age of four, the risk of attention problems by the age of seven increases by 9 percent.

A plausible explanation for this worrying state of affairs could be that the longer a child experiences the fast pace of the TV world, the more they might expect a higher level of stimulation than was available in real life. In line with this idea, the neuroscientist Daphne Bavelier has observed that video gamers possess increased visual attention, and can handle more complex visual attention-switching tasks. But the news isn't entirely good: this talent in the cyber-world could actually lead to increased distractibility in visually weak environments of the type that arguably constitute the 'real' world. Might it just be the case that constant, fast-paced and noisy thrills and spills, with one screen image tumbling in after the other, could well militate against the long spans of attention that we of the twentieth century have taken so much for granted, from the time we first listened to stories and then escaped into a magic world by reading on our own?

The capacity to sustain only shorter attention spans might itself drive the need for more stimulation within short periods of time. And, along with shorter attention spans, the ability to 'lose' yourself in a good book might also be in jeopardy. Just as reasoning and thinking skills may be stymied by a fast, screen-based and therefore visual experience, so also might that mysterious and very special cognitive achievement be threatened that, until now, has always made the book so much better than the film: imagination.

From birth and for the first year or so of its life a baby is locked into the here-and-now, at the mercy of the external environment. But as the memories of past adventures accumulate, so the infant increasingly evaluates what is happening, or about to happen, in terms of previous experience. And as the toddler learns symbols, words in particular, and how they can stand for things, so they can escape the press of the moment altogether as their mother tells them what excitement might be about to happen tomorrow.

Or perhaps it won't be what will happen tomorrow at all, but the fantasy of a story read aloud, which enables the young mind gradually to conjure up a special inner world. The passport into this world is language; but if you want to travel on your own, the additional entry requirement is literacy. Ad practice enables you to become more adept at creating this powerful and secret inner place, as yet inexplicable in neuroscientific terms, so the flat pictures in your story books start to atrophy: compared to the reality of your own first-hand imagination they are now unneeded, second-rate and second-hand.

But hang on: surely a screen-based life, rather than a literary-based one, has been with us for quite a while. For the last fifty years or so, the flickering external images of the TV screen would surely always have competed with books, and would already have placed the development of sustained attention spans and imagination at risk? Not quite: just think of the enormous differences between daily life then and now, and you'll realize that these differences are probably crucial. One of the most basic points is that the hours when TV was broadcasting were much shorter, so there would have been less opportunity for the waking hours of the pre-school child to be as saturated by the screen as they are today.

Secondly, since back in the mid-twentieth century there was only one TV to a household, watching would have been a communal, family activity. Programmes would be discussed on sofas and across coffee tables as they were broadcast on a schedule that you either caught or missed; to varying degrees the screen input would be diluted and offset by real conversations and human interactions. How different things are now! By 2005, 80 per cent of five-sixteen-year-olds had a TV set in their bedrooms – and broadcasting 24/7 at that. TV watching has now become a solitary activity, a substitute or competitor for family-based activities rather than a backdrop for them.

Sue Palmer has pointed out that, in addition, wall-to-wall TV might pose a serious issue for very young children if used as an electronic babysitter that replaces real conversations. In the same spirit, Peter Hobson in his *Cradle of Thought* maintains that for language learning there must be a 'triangle' consisting of parent in one corner, child in the second and outside world in the third. Only then can a child develop a notion of himself or herself as a separate being, one that can then communicate with others. In order to speak, and then to read, an infant needs an awareness of phonemes (the smallest unit in language that distinguishes meaning, roughly equivalent to sounds, such as 'a' as in 'cat' or 'ae' as in 'gate', for which early exposure to language and talking is essential. Hence a hearing infant of deaf parents who was exposed to TV in an attempt to encourage him to talk persisted in using sign language until he was exposed to real, interactive conversations at school. It was the act of speaking and evoking a reply that mattered. The electronic babysitter might therefore be a serious impediment to eventual ability for learning to read.

But perhaps the most generalized drawback of TV, however, one just as valid of the sitting room of the fifties, is quite simply that watching TV is not living life to its fullest. The experiences are second-hand. Hence the conceptual framework, which is so important for thinking, might not be as extensive nor composed of such diverse elements when TV-derived as one generated by a combination of reading books and setting out into the happenstance of the outside world in order to have real-life 'everyday adventures'.

While the value of escapism, relaxation, information access and entertainment should never be undervalued, the stark reality is that TV does little for the inner imagination, nor is it an outer real life. However, real life, even of somewhat distanced, is moving in. Steven Johnson in *Everything That Is Bad Is Good for You* attributes the rise and rise of reality TV to the fact that it offers the nearest thing yet to your own 'real' emotions.

Because the contestants in these shows are not paid actors but ordinary people, experiencing the all-too-familiar vicissitudes of domestic arguments/makeovers/new business ventures/wife swaps/house purchasing, it is easier to identify and empathise or indulge in *schadenfraude*, all from the safety of the armchair. And then we come to the third and biggest difference between twentieth-and twenty-first-century TV: instant interaction.

This safe involvement with a sanitized reality can be simulated further thanks to interactive TV, and the opportunity to have a hand in deciding an individual's fate with a vote. A plethora of channels and round-the-clock broadcasting are mushrooming, yet even now the relatively cumbersome and slow mass participation which the TV screen offers means that it will never be as pervasive as the computer the defining feature of which, after all, is interaction.

Both the social scientists Dimitri Williams and Sherry Turkle independently suggest that the internet will amplify whatever tendencies an individual might have – the highly social will become generally more so, which those who are shy will retreat even more from real human contact. While the TV in the bedroom might encourage solitary tendencies in the young, the interactive game-playing and web-based socializing *offered* by the computer can, it seems take the scenario of the poorly socialized nerd to worrying extremes. In Japan, one estimate is that currently more than one million individuals, predominately young adult males, are locking themselves away in their rooms to live a screen life. There is even a new term for this withdrawal from all real human contact; *hikikomori*.

But for the sociable and anti-social alike, a still bigger issue is what is happening in their brain, how they are thinking. The whole point of a screen is that it rarely contains mere text. Were it to do so, then the printed page would still have an advantage in terms of portability, power needs and general ease of access. But the great appeal of the screen is that you actually see something on it, an ever-changing visual image. And usually it's an image that's arresting and fast-paced and that invites you to interact. And if you are spending on average some six hours a day literally taking the world at face value, might you not start *only* to see the world literally?

For us People of the Book, an icon on the screen can be a symbol for many other things. But without a pre-existing conceptual framework, there can be no metaphor: the icon is there for and of itself, in its own right. For example, how many of those born in the 1990's, for whom screen living is embedded as a way of life, would actually recognize and understand the significance of that most-used icon, the egg timer?

An intellectual skill that comes as we develop and read books is the process of generalization of an abstract concept from a multitude of different examples and scenarios. Might succeeding generations be less automatically inclined to savour ideas without icons? Perhaps we should no longer take for granted the ability of young people to 'understand' concepts such as democracy or honour or the soul. How would such concepts be described and displayed using icons or visual images in multi-media? Of course, once you have framed your question about an abstract concept, once you know

you want to find out about democracy, or different notions of love, or what poetry might be, then you can turn to Google or Wikipedia. But my real, deep concern is that such open-ended questions just won't occur to those brought up in a here-and-now world of screen experiences, nor will the concepts be introduced amidst the pace and sensation of a screen life.

Another basic and novel feature of screen-based interaction is the directory tree. If you are always working with directory trees – where menus are offered with fixed number of options, where in order to get to another action you have to plod up and down through various branch lines of thinking – might that pattern not impose itself on the way you think in general? Perhaps such fixed and systematic thinking could, on the one hand, give a certain rigour and logic to your thought processed; but on the other hand, surely it would be highly restrictive? Fixed options might exclude, especially in the developing mind, the possibility of thinking laterally, of defying the up-and-down iterations. Might it be harder to innovate, if you are so used to all options being limited and laid before you? As the Nobel prizewinning physicist Neils Bohr once admonished a student: 'You are not thinking, you are just being logical!'

Beyond our reasoning ability, and even more basic, is our ability to appreciate, 'understand', what is happening around us. The computer, even more so than the TV, may be initiating a fundamental change in the development of a robust conceptual framework based on a wealth of different narratives. Imagine you are sitting in front of a multi-media presentation where, because you haven't had the experience of many different journeys led by an author or authority, you're unable to evaluate what's flashing up on the screen. The most immediate reaction would be to place a premium on the most obvious feature, the immediate sensory content: the 'yuk' and 'wow' factor. Ad the sounds and sights of a fast-paced, fast-moving, multi-media presentation grabbed any time you might have had for reflection, and hence for the forging of any sequential steps in your brain, you would be having an experience rather than thinking.

In *Toxic Childhood*, Sue Palmer expresses concern that such a lifestyle for the young will compromise the normal pattern of learning which has stood most of us in good stead so far: first, focusing on other people's choices rather than what grabs your attention; secondly being able to defer gratification; and thirdly, becoming able to balance your own needs against those of others. Perhaps future generations will live instead, in the fast-paced, immediate world of screen experience: a world arguable trapped in early childhood, where the infant doesn't yet think metaphorically. It's a world, remember, that lacks the checks and balances of the adult mind: reality can blur easily with fantasy, since there is no read-off against past conversations, thoughts or events. It is consequently a frightening, exciting, unpredictable and above all emotionally charged world – a world of immediate response rather than one of reflective initiative.

A further issue of relevance to future education is plagiarism from the net. We don't need here to discuss the ethics, technology or regulations of downloading answers and essays, but rather the basic question of 'understanding'. In fact, the concern here is not plagiarism *per se*: after all, cutting and pasting from search engines and learning valuable

facts from Wikipedia, as many of us do nowadays, are arguably at different ends of the same continuum. The key issue is, rather, how much use of search engines aids and abets ‘understanding’ – the placing of facts in a context that enables them to be evaluated in terms of other facts or events.

In the twentieth-century classroom, when it was just not possible to import information in macro chunks, the ability to précis textbooks was a key talent and one we were made to practice: it enabled us to see the wood for the trees. The copying of paragraphs wholesale from much-used and familiar textbooks was pointless because they were rarely succinct enough, in such short extracts, for wholesale plagiarism. In any event such slavish, unmodified reproduction would have been immediately spotted!

But now précised, predigested paragraphs are readily on offer; the BBC in their promotional trailers even at one stage referred to the availability of ‘bite-sized’ chunks of revision. No, the danger is not the trend for downloading *per se*: but rather, again, the lack of an ensuing guarantee of any real understanding, of placing one thing in the context of something else, of seeing one thing in terms of another. Surely we should not be reducing information, but doing quite the opposite – expanding it into a much wider context. If the context is shriveled to bite-size, if facts are stripped bare and left on their own, what will the student ‘understand’? Already, a simple augury of what might be to come is the inability of many of today’s younger generation to ‘understand’, say, grammar or long division: after all, you just have to press the appropriate keys. Given that the current education system, in the UK at least, still requires good old twentieth-century homework, the application of twenty-first century delivery to meet an arguable old-fashioned need means that students in school could well be passive go-betweens, passing on messages as though in a code that they themselves didn’t know but that would be comprehensible at the point of delivery – the teacher.

Another arguable impediment to ‘understanding’ would be the discouraging of precisely those activities that we listed earlier as favouring the formation of neuronal connections: physical exercise to ensure the greatest amount of oxygen reaches the brain and repetition to strengthen the respective synapses that make the associations required for seeing something in terms of something else. In a traditional game, be it football, or Cowboys and Indians, or just climbing inside a box that becomes a castle or a car, the use of symbols, of something ‘standing for’ something else, is inescapable. But with the advent of toys that are computer games, or that link TV shows to console games, the emphasis has shifted towards taking the world at face value with little need to question or understand it, let alone create it for yourself.

A final factor that would distinguish computer games from movies or conventional card-playing is whether or not the latest generation of punters really does regard the screen world as ‘reality’. Sherry Turkle gives a good example of this phenomenon in *The Second Shelf*, where she looks at the computer not as a ‘tool’, but as part of our social and psychological lives: on a holiday in the Mediterranean, with her eight-year-old daughter saw a jellyfish and said, with amazement, ‘Isn’t it realistic!’ This world can readily intermingle science fiction with everyday objects, can have plants and animals and

weapons that are almost like their counterparts in the real world, but intriguingly not quite. This eerie similarity to, but lack of total congruence with, reality is all the more captivating as it is more readily believable: a version of our banal everyday lives that is more exotic but at the same time not so wildly different as to disorientate and confuse.

And if future generations end up being far more dominated by sensory, particularly visual, inputs in a way that requires more ongoing external stimulation, what knock-on effects might there be? One particular tendency that could well be modified, and in a way that is potentially both good and bad, is risk-taking. The degree to which we do or don't take risks, how we perceive risk under different conditions, and how the degree of risk shapes not just our overt decisions but our general attitudes to goods, services and other people, are all of obvious relevance to present and future society. If the cyber-world is one where it's all a game, where no one feels pain when shot, or actually dies forever, might the long-term consequences of actions in the real world be harder to grasp?

A neuroscientist's approach to understanding more about risk could consist of examining different brain conditions in which attitude to risk is abnormal – most usually where it is excessive enough to be regarded as recklessness – and see what each of these conditions might have in common. Earlier we met Phineas Gage, an individual for whom much was changed by the iron rod driven through his prefrontal cortex; one big transformation was that he suddenly became reckless. His physician at the time, a Dr. Harlow, reported:

“His (Gage's) contractors, who regarded him as the most efficient and capable foreman in their employ previous to his injury, considered the change in his mind so marked that they could not give him his place again. He is fitful, irreverent, indulging at times in the grossest profanity (which was not previously his custom), manifesting but little deference for his fellows, impatient of restraint of advice when it conflicts with his desires, at times pertinaciously obstinate, yet capricious and vacillating, devising many plans of future operation, which are no sooner arranged than they are abandoned in turn for others appearing more feasible. In this regard, his mind was radically changed, so decidedly that his friends and acquaintances said he was ‘no longer Gage’.”

Recklessness does indeed seem to be generally symptomatic of damage to the prefrontal cortex. Sadly, there have been some twentieth-century Gages with the same problem. Michael was a soldier in the US army in Vietnam, where one day an explosion drove a piece of shrapnel through his prefrontal cortex. As a result of the severe change that the injury made to his overall outlook, Michael was discharged prematurely from the army to lead the more limited life of a hospital janitor. Of the many tests that neurologists and neuropsychologists have asked Michael to undergo, one is a gambling task. Michael has to gamble chips on whether a card is high, in which case he wins, or low, when he loses. The cards are deliberately stacked to give him a winning streak followed by a steady run of losses. Most people would quit while they were ahead; Michael, characteristic of those with prefrontal damage, will play on until he is completely out of chips.

And yet radical mechanical damage to the brain tissue of the prefrontal cortex is not by any means necessary to make someone reckless. An imbalance of neurochemicals, such as dopamine in excess, can have the same effects: an underworking of the brain's cells in that area, leading to less neuronal networking. Such a situation underlies schizophrenia, where one of the symptoms is recklessness. The parallels we drew in Chapter 5 between schizophrenics and children would hold here as well: children too take more risks, not least because they are simply, through lack of experience, unaware of the consequences. The connections are just not there.

Perhaps not surprisingly, risk-taking could be linked to a scenario where the checks and balances of the normal adult mind simply don't exist, or, for whatever reason, cannot be accessed, or are offset disproportionately by the sensory thrill of the moment. We have already talked about how children and schizophrenics are not so adept at seeing or expressing one thing in terms of something else – interpreting proverbs, for example. So it may not be surprising that metaphorical thinking, 'understanding a situation', seems to develop with age, whereas the first and most basic tendency of humans is not to rely on the personalized associations of neuronal connectivity but to take the world at face value, as do schizophrenics.

Another entirely different group of people characterized by the taking of excessive risks are the sleep-deprived: this is not unreasonable when you consider that sleep deprivation leads to a chemical imbalance in the brain that in turn gives rise to abnormal perceptions, such as hallucinations, that are hard to distinguish from real psychoses. However, a less predictable set of individuals characterized by recklessness are the obese. In a recent study in Italy, for example, clinicians compared the performance on a gambling task of twenty obese versus twenty normal-weight subjects. The number of 'good' choices made by the two groups differed significantly: the obese group didn't learn to maximize advantageous choices compared to their normal-weight counterparts – behaviour that could be consistent with a prefrontal cortex defect.

Why should the obese have this flaw? What might these individuals have in common with schizophrenics? The issue in either case is not that the prefrontal cortex is malfunctioning in isolation, but rather that the functional balance with other brain areas is thrown out of kilter. Perhaps normally there are two opposing forces at work: on the one hand the strong sensationist present, where you are the passive recipient of strong stimulation, and on the other the checks and balances of the personalized mind. One intriguing possibility in the case of obesity is that again the emphasis is skewed disproportionately in favour of the here-and-now: the strong sensation of the moment, this time of the experience of taste and smell.

In the normal situation, this here-and-now thrill would be balanced by the 'mind' that takes you beyond the present into a past and a future: the ability to see one thing in terms of something else, the ability to be conscious of yourself as a distinct entity in an unfolding narrative. This ability to place the present in a wider context will be reflected in the degree of activity in the prefrontal cortex, and its relative dominance.

But if, for whatever reason, the ‘mind’ is suppressed, or if the sensations are stronger, a here-and-now mentality will dominate. The obese individual ‘knows’ the consequences of overeating, but lets the sensation trump them. And similarly with Michael. Compulsive gamblers, for example, might well ‘know’ the consequences of what they are doing; but such thoughts are as nothing compared to the thrill of the moment, the adrenaline rush of excitement as the cards are revealed, the wheel is spun, the starter’s gun cracks, the flag comes down at the finishing line.

So the underfunction of the prefrontal cortex can be linked to excessive risk-taking. In turn, underfunction of the prefrontal cortex characterizes a variety of conditions and life situations beyond Phineas Gage-type damage, namely schizophrenia, obesity, sleep deprivation and childhood. All are very different scenarios in themselves, but they share an unusual weighting of the here-and-now sensations over the checklist of the standard adult mind. If the screen world constantly encourages here-and-now sensations, perhaps in the future the malleable human brain will respond accordingly and we could shift the balance more generally. It’s not difficult to see how perhaps future generations will be more predisposed to a mindset characterized by less prefrontal function, and so with a tendency to take more risks.

Would a less risk-averse society actually be desirable? Clearly, much would depend on just how reckless twenty-first-century citizens became, and what they were doing at the time. From my own perspective, a risk-averse attitude to scientific research, where people were less afraid to be wrong, would be very welcome. On the other hand, such a tendency wouldn’t be encouraged in an airline pilot. Attitudes to risk, and how they might change, can only be evaluated in the broader context of the agenda and abilities of future society and the various sectors that will constitute that society. So many scenarios are possible that all we can say is this: less risk aversion may well be a feature of twenty-first-century society, and, as with technology itself, may have the potential to be both very good and very bad in its knock-on effects.

But we need to address an even more immediate issue. Screen culture is set to dominate for quite a while yet: but in the not too distant future we might also have to take on board another key transformation in how we think. As we have discussed already, the screen by definition emphasizes visual inputs and so could impose a literal, face-value outlook on the world. But soon computing will become increasingly ‘embedded’: technology will be so sophisticated that a screen and keyboard will be obsolete. Instead, devices within your clothing, jewellery and spectacles will respond by voice interface-command: they eyes will give way to the ears. From an icon-dominated world, we shall move on to a world of sounds.

Who knows – such a transition might herald a return of the imagination, just like that developed by our ancestors when they listened round the campfire to the recitation of sagas. But then again, the big difference is that embedded computing will offer not the chance to dream, to retreat into your imagination following the narrative ‘structured string’ of a story, but instead a fast-paced interchange of action-reaction. With embedded computing and the demise of the need to balance a keyboard on your knees you will be

able to wander about in a wrap-around Google. Already the 2007 Ofcom report has pointed to a predilection for those technologies, such as iPods and multifunctional mobiles, which maximize mobility. As you speak and move, the outside world will respond to you: inert objects will no longer be that different from people. Just as screen culture could eventually favour and foster a blurring of reality with fantasy, so a world dominated by the spoken word – and one of mainly warnings and statements, of question and answer rather than protracted conversation – could radically change the way upcoming generations see the world, and themselves in it.

The critical issue facing us will be how we make a transition from the old question-rich, answer-poor environment of the twentieth-century classroom to making sense of – indeed-, surviving in – the current question-poor, answer-rich environment delivered by fast-paced technology. We, or our children, will need to remember not facts *per se*. If search engines can and do deliver up-to-the-minute information, why does it now need to be internalized, imperfectly, into our highly unstable brain memory banks?

But it will still be essential to ensure the presence of over-arching conceptual frameworks, a context into which those facts can be placed and related to each other, can be given ‘meaning’. Just as the invention of the printing press freed humanity from a huge burden on their working memory, and gave people a wider and more flexible means of finding things out, so search engines have the potential to free up more of us for asking questions and ‘thinking’ than we could ever have imagined possible. But how will we think? What will we think about? What questions might we ask? The answers might lie in the current obsession of both adults and children for computer-based games and alternative cyber-lives.