Australian Journal of Parapsychology
2004, Volume 4, Number 1, pp. 2-31

Feature Article

People Who Remember Things They Never Learned

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ABSTRACT: Explaining the unique skills of so-called "idiot savants," now generally referred to simply as savants, has long puzzled psychologists. Savant Syndrome combines various brain pathologies with highly sophisticated behavioural abilities in such areas as graphic art and musical performance. As a mental realist, I contend that no view of memory or behaviour based on physical realist views can account for Savant Syndrome. I argue that it is related to other "structural" phenomena such as biological morphogenesis, the transmission of Jungian archetypes, and cognitive and sensory "formation rules" because all these classes of phenomena depend on the brain/body's access to configurations in their respective universal field levels. For mental realism, all such levels derive from the Cosmogenic Field, the "first" (ontologically speaking) emanation of Cosmic Thought in mental realist ontology. While each of us has his or her own idiosyncratic set of modulations relative to the cerebral field level of the Cosmogenic Field, every human being also has access to *a priori* structural organizing patterns introduced in our phylogenetic and cultural heritage. Behavioural as well as cognitive skills depend on such *a priori* structures. Savant Syndrome is thus explained as a sharing of or participation in field memories of advanced behavioural skills.

Keywords: Savant Syndrome, behavioural skills, memory, autism, frontotemporal dementia

INTRODUCTION

Since at least the eighteenth century it has been observed that rare people with very low intelligence or severe brain impairments can exhibit extraordinary mental and behavioural abilities completely without prior training or education. Because their low general intelligence was coupled

with mental or behavioural precocity, people of both types were formerly called by the paradoxical term, "idiot savants." In psychology at the beginning of the twentieth century "idiot" meant a person with an IQ of less than 25 (on the original Binet scale), although the IQ of idiot savants is now generally estimated to be in the range of 50 to 100. The term, "savant," originally meant a learned or knowledgeable person such as a scholar, philosopher or scientist, although it is hardly ever applied to such people now (for reasons I will not go into here). Savant Syndrome was first clinically identified in the nineteenth century. It is recognized as a distinct psychoneurological syndrome because its precocial symptoms are invariably linked to severe *mental impairments* such as autism, Williams Syndrome, or frontotemporal dementia (Treffert, 1988, 1989). Dr. Darold A. Treffert is recognised as one of the foremost authorities on Savant Syndrome. His 1989 book, *Extraordinary People: Understanding "Idiot Savants"* was an important contribution toward dispelling the stereotype of savants as "freaks." In June 2002, a paper by Treffert and Gregory L. Wallace entitled "Islands of Genius" appeared in *Scientific American* (Treffert and Wallace, 2002). According to Treffert and Wallace (2002, p. 78), "Of the known savants, at least half are autistic and the remainder have some other kind of developmental disorder." It now seems clear that such impairments are essential to the aetiology of Savant Syndrome. For purposes of this paper I will distinguish between two types of savant abilities. Prodigious verbatim recall of what is read or heard or performing ordinary arithmetical calculation at "lightning" speed I shall call "Type A." Type A abilities can be regarded as extensions of skills that any normal person can acquire. In savants they are remarkable merely in reaching levels seldom attainable by normal people with any amount of education, training or practice. On the other hand, abilities such as virtuosity in playing musical instruments, drawing, painting, sculpting and mechanical craftsmanship, are achieved by "normal" people at the level displayed by savants only through prolonged instruction and practice. I shall designate the second group as "Type B."

Of the three savants highlighted in the *Scientific American* paper, one—Kim Peek—is Type A. He is developmentally disabled but has an incredible memory, having memorised more than 7,600 books and uncounted other documents and fact sheets. The authors say, "His abilities provided the inspiration for the character Raymond Babbitt, whom Dustin Hoffman played in the 1988 movie Rain Man" (p. 78). I classify Peek as Type A because his virtuosity does not pertain to a skill that has to be learned but to a normal human endowment—memory. Everyone remembers, but Peek remembers virtually *everything,* at least everything he reads.

On the other hand, I refer to Richard Wawro and Leslie Lemke as Type B because they exemplify prodigious *behavioural skills* with no previous training. Wawro, who is autistic and legally blind, has been painting since he was seventeen and has received international recognition for his work. Leslie Lemke, on the other hand, is a musical virtuoso:

> At the age of 14 he played, flawlessly and without hesitation, Tchaikovsky's *Piano Concerto No. 1* after hearing it for the first time while listening to a television movie several hours earlier. Lemke had never had a piano lesson—and he still has not had one. Although he is blind and developmentally disabled from cerebral palsy, he now plays and sings thousands of pieces at concerts in the U.S. and abroad, and he improvises and composes as well (Treffert & Wallace, 2002, p. 78).

Experimental research on the development of piano-playing ability is rare, but one significant study, conducted by three Malaysian researchers under a grant from Universiti Putra Malaysia, concluded,

> … the research findings indicate that candidates who begin piano lessons before the age of 7 are able to achieve higher levels of biomechanical skills compared with other candidates, and candidates who start later then 15 have a significantly lower achievement level compared with others. This implies that if an individual has ambitions to achieve very high levels of skills in piano playing, piano study must begin before the age of 7 (Ang, Soh & Kho, 2003, p. 3).

A further remark about the Malaysian study will be made later. Here, however, the point is simply that Leslie Lemke's piano-playing skills exemplify a high level of biomechanical skill completely without instruction and despite the fact that his blindness is total because he *has no eyes*. It should be noted that referring to Type B savants like Lemke as "geniuses" is somewhat misleading. Lemke, for example, plays the piano at a level comparable to that of professional performers but he does not display the originality of style and nuances of technique characteristic of a Rubinstein or Cliburn. He is in a class of his own, a *savant prodigy* rather than a genius in the traditional sense of the term.

According to Treffert and Wallace, there is one characteristic that is common to all savants: "Savant skills are always linked to a remarkable memory" (Treffert & Wallace, 2002, p. 80). That, however, is not the whole story. Type A and B savants have *different kinds* of exceptional memory.

The remarkable retention of information acquired through sensory channels displayed by Type A savants can be considered a prodigious extension of normal memory. On the other hand Type B savants' extraordinary memory is of *behavioural skills* such as painting in various media, minutely detailed drawing, sculpting, playing a variety of musical instruments, etc. This second kind of memory in normal people comes about through years of study and practice, so *its presence in savants cannot be merely an extension of normal behaviour for the simple reason that savants, by definition, never had the opportunity to learn and practice the skills involved.* The kind of memory that makes them possible, therefore, requires a special explanation. This paper argues that there is no credible explanation of savant memory in physical realist psychology—normal or abnormal—but that its explanation requires concepts beyond the metaphysics of physical realism (materialism, physicalism, scientism, or whatever it currently cares to call itself). The fundamental issue addressed here is: *How do savant prodigies acquire the behavioural memories that support their remarkable untutored skills?*

SHIFTING METAPHYSICAL GEARS

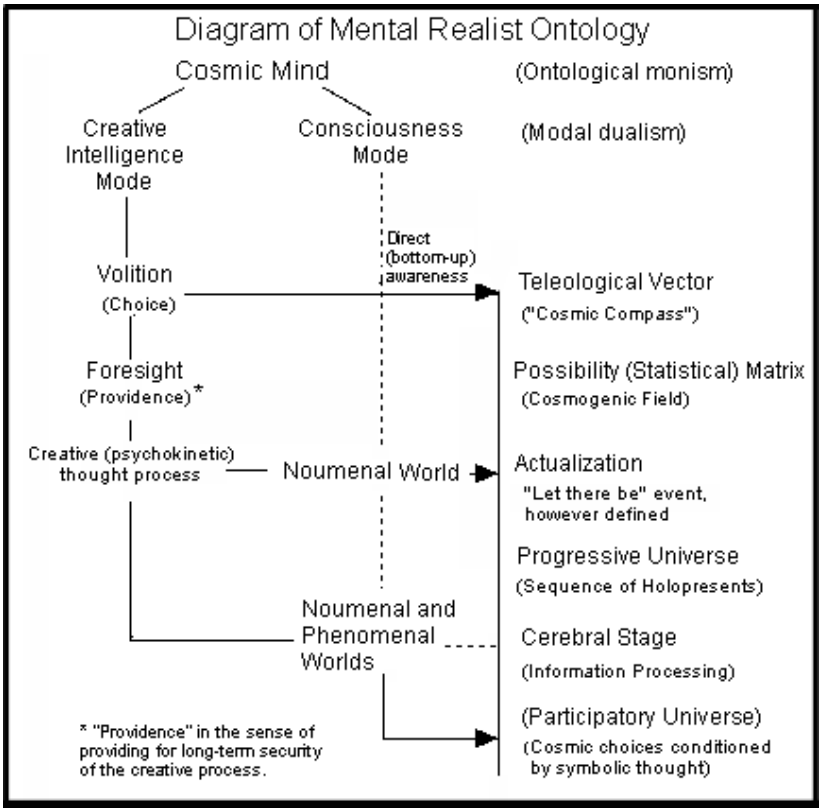
It is truly mind-boggling to understand why, nearly a hundred years after quantum physics thoroughly discredited it, most scientists in most fields still adhere to some form of *materialism.* Since the days of the Greek philosophers, inquiring minds have been wondering what lies beyond the veil of sensory reality—what Kant called the *noumenal* world as distinguished from the *phenomenal* world of conscious experience. In the Western world, beginning with Galileo, Bacon, Descartes and Newton, the speculation of Democritus that the *noumenal* world consisted of invisible, indivisible, impenetrable *atoms* perpetually moving in the void became the *default* metaphysics of science. The inescapable consequence of that view was a rigid dualism (the so-called *Cartesian* dualism) between mind and matter. There was a critical period in the 1920s and 1930s when that hoary misconception might have been changed. Nearly all the pioneer quantum physicists realized that matter, in the Democritean sense, was an obsolete and meaningless concept. Sir James Jeans pointed out that what scientists had to work with were only *observations* on the basis of which they could never deduce what actually caused those observations to be what they were but could make inferences that were more or less credible. What he found puzzling was why they clung to the anachronistic concepts of materialism instead of drawing the much more credible idea that the reality behind the veil, the *noumenal* world, is *mental,* the thought process of a universal mind:

> It is difficult for the matter-of-fact physicist to accept the view that the substratum of everything is of mental character. But no one can deny that mind is the first and most direct thing in our experience, and all else is remote inference—inference either intuitive or deliberate. Probably it would never have occurred to us (as a serious hypothesis) that the world could be based on anything else, had we not been under the impression that there was a rival stuff with a more comfortable kind of "concrete" reality—something too inert and stupid to be capable of forging an illusion (Jeans, 1932, p. 168).

For nearly a hundred years, despite this observation of Jeans, which was shared by many pioneer quantum physicists such as Eddington, Schrödinger and Heisenberg, mainstream science has stubbornly clung to its increasingly stultifying materialism. One of its most destructive consequences has been what can only be considered an all-out assault on parapsychological research, chiefly because it threatens to expose the deficiencies in the assumptions of materialism. How one interprets any phenomenon is always affected by such assumptions, although many writers do not acknowledge them up front and, in fact, may not even be conscious of them. But no set of assumptions is sacrosanct and ones that are stubbornly embraced far beyond their creative potential can be downright pernicious. In 1937, the pioneer parapsychologist, J. B. Rhine wrote:

> Some of the people who have taken an interest in these experiments have suggested the hypothesis that extra-sensory perception is due to a primordial sense, now atavistic in man; that it came before the other senses, is more general, and perhaps depends on every body cell for its reception. Others consider it a superdevelopment of the five senses, a crowning achievement of the nervous system, and the frail signs of it that we find are but the promise of great powers toward which we are evolving.
>
> But until there is forthcoming some better evidence favouring the view that what we call ESP is sensory, or is like the senses in at least some respects, I cannot see any encouragement for either of these views. *I am more inclined to expect the final explanation to come from a fundamental readjustment of our view of mind and its relation to the world of the senses* (Rhine, 1937, pp. 130-131, emphasis added).

The choice of a quotation from Rhine is apt because my assumptions are those of *mental realism,* which is an attempt to effect that "fundamental readjustment of our view of mind and its relation to the world of the senses." It is a philosophical explication of the postmodern paradigm shift that began emerging in science in the twentieth century and continues in the twenty-first. In brief, it *emphasises* consciousness as primordial rather than derivative from "matter," time as process rather than geometry, holism rather than reductionism, teleology rather than mechanical causality, and inventive design in evolution rather than chance and natural selection alone. The most comprehensive statement of mental realism is in *The Mind Paradigm: A Central Model of Mental and Physical Reality* (Chandler, 2001). Mental realism is an *ontological* monism with a *modal* dualism. I have given it diagrammatic representation in the box below.



Note that the concept of a "modal dualism" within an "ontological monism" obviates the insidious effect of the mind-matter dualism that has plagued Western thought for more than three centuries. There is nothing arcane or esoteric about a modal dualism. *You* are one (monism) but you both *think* and *are conscious.* Thinking and experiences are *two modes* of your one mind. In my view it conforms to another significant observation made by Rhine ten years later:

> The evidence for psychophysical interaction contributed by parapsychology logically opposes any basic duality in the nature of man. The very act in which the two systems of mind and body operate upon each other necessarily unifies them to some degree into a single process, much as the reaction of two substances in a chemical beaker makes a single functional whole out of the two. No one can conceive of the interaction of two systems, except by supposing that there are properties common to both. There has to be a continuity of process from one interagent to the other in every event in nature—in mind and matter reactions the same as in any other. At least we know of no other way to understand causal change of any kind.
>
> What we conclude in all safety is that the facts of parapsychology not only do not require one to be a dualist—they do not *allow* one to be (Rhine, 1947, pp. 178-9).

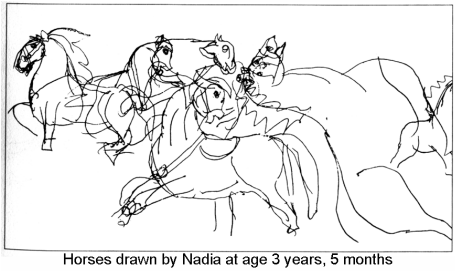
In my judgment, if scientists had taken to heart Rhine's observations, not only parapsychologists but scientists in every field of study from quantum mechanics to evolutionary biology and cognitive science would find themselves in fewer *culs-de-sac* than they are today. A caveat is in order. To get past the dualist dilemma requires a bold leap of the imagination, one that the fainthearted may characterize as a *saltus ad absurdum.* Fortunately, not everyone is as fainthearted as Colin McGinn (1999) who claims the human mind is simply not equipped to solve the dualist dilemma. Let us then make that bold leap to see how far *mental realist* assumptions will take us in understanding Savant Syndrome.

DEFINING CHARACTERISTICS OF SAVANT ARTISTS

Let us first eliminate one source of possible confusion. While autism is common in savants, it is also associated with the remarkable eidetic

drawings produced by some autistic children. Eidetic images are sometimes referred to as "photographic" memories but in my view they are less like photographs than preservations of *salient features* of remembered subjects. Eidetikers (eidetic imagers) appear to *project* them steadily onto blank surfaces and then simply draw them where they are seen. Experimental psychologist Nicholas Humphrey (2002a, 2002b) has made an excellent argument that while modern eidetic imaging in autistics is linked to the *impairment* of conceptual and linguistic development, its appearance in Cro-Magnon cave paintings marks it as a significant step in the evolution of human conceptualisation. Figure 1 compares a painting of horses from the earliest known cave gallery, Chauvet, to horses drawn by a young autistic girl named Nadia who was studied in the 1970s by Lorna Selfe (see Figure 1). It is difficult to avoid the conclusion that the same psychic process was operative in producing both these aggregates of images. It is also tempting to lump eidetikers (eidetic imagers) together with savant artists since both tend to get their unusual skills at the expense of some form of brain dysfunction. However, there are important differences between the two groups.

Horses painted on Chauvet Cave walls, ca. 32,000 BCE
from N. Humphrey, The Mind Made Flesh, with permission



Horses drawn by Nadia at age 3 years, 5 months
from N. Humphrey, The Mind Made Flesh, with permission

Figure 1. Comparison of autistic eidetiker and ancient cave paintings.

First, eidetikers tend to lose their special gifts when they acquire language and communication skills whereas savants do not. On the contrary, savant skills seem frequently to open the way toward socialisation and the overcoming of disabilities. As Treffert and Wallace say,

> Whatever their talents, savants usually maintain them over the course of their life. With continued use, the abilities are sustained

> and sometimes even improve and in almost all cases, there is no dreaded trade-off of these wonderful abilities with the acquisition of language, socialization or daily living skills. Instead the talents often help savants to establish some kind of normal routine or way of life. (Treffert & Wallace, 2002, p. 82)

They note, for example, that "memory wizard Kim Peek has emerged from the social isolation that characterized him before the movie Rain Man was made; he now travels the country talking to hundreds of school groups" (p. 85).

Second, one of the common symptoms of autistic eidetikers is shortness of attention span. They start and stop their drawing without any apparent plan or purpose and usually spend only short amounts of time at it. Savant artists, on the other hand, work regularly for long periods of time and engage in projects that have a definite beginning, middle and end.

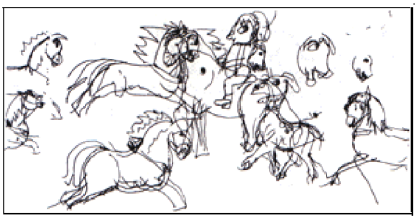
Finally, it should be noted that almost any child *can* draw in some way. Most children love to do it. Humphrey relates the following about Nadia:

> Nadia, born in Nottingham in 1967, was severely retarded in several respects. By the age of six years she had still failed to develop any spoken language, was socially unresponsive and physically clumsy. But already in her third year she had begun to show an extraordinary drawing ability: suddenly starting to produce line-drawings of animals and people, mostly from memory, with quite uncanny photographic accuracy and graphic fluency (Humphrey, 2002, p. 133).

No one had to teach Nadia *how to draw.* What distinguished her from normal children was her exceptional ability to project and copy eidetic images from memory. I do, however, take exception to Humphrey's use of the words "photographic accuracy" vis-à-vis Nadia because, as I said earlier, her drawings seem to me to convey *salient features* of her subjects rather than complete likeness. The latter is far more evident in the work of savants, who exhibit various complex motor skills *of professional quality* in areas such as painting and sculpture that, unlike drawing, are not common to most children, but rather the result of extended training. The contrast between the two types of ability is dramatically illustrated by comparing the renditions of horses in Figure 2 (below). As impressive as Nadia's drawings are, there is a world of difference between them and the savant painting of running horses on the right. Nadia's work betrays no awareness of spatial

dimensions and no separation of the horses, one figure being drawn haphazardly over another.

Figure 2. Comparison of autistic eidetiker and savant drawings of horses.



Horses by Nadia at 3 years, 5 months
From The Mind Made Flesh (Figs. 9 and 11)

Horses painted by 84-year old woman with no previous artistic training after being afflicted by frontotemporal dementia (From Treffert and Wallace Scientific American article courtesy of Bruce L. Miller, U.C.S.F.)

By contrast with Nadia, the savant painter displays a sophisticated level of composition and execution that would take most artists years of training to achieve. This is evident as well in the work of Richard Wawro, sculptor Alonzo Clemons, and draftsman Stephen Wiltshire as demonstrated in the works shown over the page (see Figures 3, 4 & 5).

On the left in Figure 5 is Wiltshire's mind-boggling rendition of Manhattan. On the right is his drawing of the Natural History Museum in London. It is reported that he can be flown over any city, town or area once and can later draw a highly accurate map of it from memory.

Another corpus of savant drawings comes from a young autistic named Boone who began using a computer at eighteen months and producing delightful renditions of clocks at age three. He was still painting at the ripe old age of five but his repertoire of subjects had substantially expanded. Boone's abilities are significant evidence for the thesis I will develop in this paper but they are best discussed after evidence from the work of other savants is considered. It should first be noted that Type B savant talents are *formal* behavioural skills in the sense that they are *not content specific.* They do not specify *what* is to be painted, sculpted or, in Leslie Lemke's case, played on a piano, but only *how* to do it.

Figure. 3. Paintings of Richard Wawro

Figure 4. Dramatic sculptures of savant artist Alonzo Clemons.

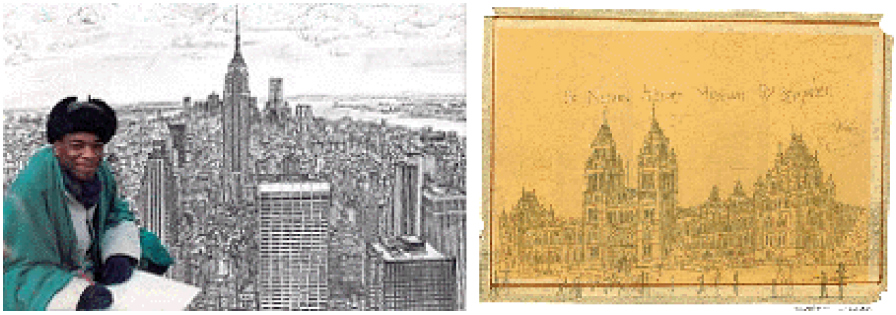


Figure 5. Stephen Wiltshire and two of his “architectural” drawings.

Although each savant tends to execute a limited range of themes and in a characteristic style, there appears to be nothing mysterious about that. Wawro, for the most part, paints outdoor scenes in a very realistic and parsimonious style. His work includes very few human figures, especially ones in motion. Since he is legally blind, one is tempted to suspect that he relies considerably on blindsight, perceiving far greater detail than he is conscious of. But whatever he perceives, even momentarily, he remembers and can make it the theme of a painting.

While the feats of savant visual artists such as Wawro, Clemons and Wiltshire are sufficient to require a radically new explanatory approach, the case of pianist Leslie Lemke *absolutely demands it.* Lemke was born prematurely in 1952 and was given up for adoption by his mother. As a result of the premature birth, the baby suffered brain damage leading to cerebral palsy as well as retinal problems and *glaucoma so severe that both his eyes had to be surgically removed in infancy.* As a child he delighted in music and rhythm, often playing and singing simple popular tunes since classical music was not usually played in the home of May and Joe Lemke, his adoptive parents.

Leslie's prodigious talent appeared without foretokening when he was about 14. One evening, he listened while May and Joe watched a movie for which Tchaikovsky's Piano Concerto No. 1 was the theme music. When May awoke to music in the house in the early morning hours, she thought Joe had left the television on, but when she went to turn it off she found Leslie at the piano, playing the concerto flawlessly. Encouraged by May, who thought the boy's newfound talent was a miracle from God, Leslie began to give concerts around the area. Soon a local television station brought tapes of Lemke's performances to Dr. Treffert who recognized the boy's talent as an example of Savant Syndrome. Since that time, Lemke has performed thousands of concerts in the U.S. and abroad and has been interviewed on many television and radio shows.

How does Lemke do it? Like all savants, he has a remarkable memory but since he is blind his memory is perforce auditory. He can repeat verbatim, intonations and all, a whole day's conversation he has listened to while visiting with others. That, however, is a Type A savant skill. His virtuosity at playing the piano, on the other hand, is a Type B ability. It is something he clearly *remembers* how to do but *it is a remembered skill that he was never taught and, being blind, one that he could never have seen anyone else perform.* No matter how great the range of his ability to remember the notes, chords and rhythms of complex classical compositions, the irreducible mystery is *how he got the memory of where to position and move his fingers in playing those compositions, especially since he could not even see the keyboard?* The same question

must be asked about all other savants who perform in one artistic medium after another. *How do they remember how to perform complex skills that they never learned?* Of all the Savant Syndrome cases I have studied, one stands out as extraordinary because of the range of the expertise involved and the early age at which it became evident. The subject is a savant computer artist named Boone who began drawing clocks like those in Figure 6 with a computer at age three.

Figure 6. Clocks created in Paint Shop Pro by Boone.

Many more of Boone's prolific drawings of clocks can be viewed on his own Website (http://home.isoa.net/~nitetrax/justclocks.htm). At the age of three, Boone began using computer programs, mostly *Paint Shop Pro,* to design his clocks, which accounts for their precision, layout and sophisticated coloring. No one who has used one of the new generations of draw-paint applications like *Corel* or *Paint Shop Pro* (or even one of the "ancient" ones like *SuperPaint)* and is familiar with how intricate their operations can be, can doubt that they engage higher cortical functions. In Boone's case, however, the more we explore his talents, the more mysterious and prodigious they turn out to be. The young savant's interest in clocks seems to have arisen from his encounter with clock sites on the Internet, yet his own clocks are quite original and exhibit what at first seem to be several puzzling aspects. For example, he started his drawings with fewer numbers in Arabic style but later switched to Roman numerals. Where he got the idea for the 24-hour clock with Roman numerals shown above was at first a mystery since they are extremely rare and his mother confirmed he had not seen a real one anywhere. The possibility exists that he may have extrapolated the numbers after XII by understanding that they

are constructed by adding the lower numbers to X. If that were the case, however, his XIV would have been XIIII since 'IIII' for '4' instead of 'IV' is a longstanding convention on clock faces. The puzzle, however, was solved when I discovered a drawing of the following well-known (to the British) 24-hour clock on the Internet (see Figure 7).

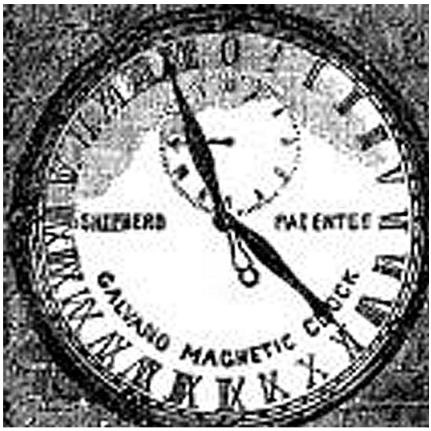


Figure 7. Clock at the Entrance of the Royal Astronomical Observatory at Greenwich.

After seeing that drawing and finding it differed from Boone's only in having a "0" at the top rather than a "XXIV," I was convinced that there is little mystery about how Boone constructs his clocks. His mother confirmed that, "Boone often surfs the Internet and one of his favourite websites is the one about 24-hour clocks" (Sissy Garvey, personal E-mail, August 19, 2003). So one could simply say that Boone's precocity is based on his acquaintance with images on the Internet combined with extraordinary curiosity and creativity. That is a sound reductionist way to eliminate the mystery of Boone. Nevertheless, I had a hunch that there was more to Boone's talent than I was taking into account, so I decided to press a little further and wrote Mrs. Garvey again, asking three questions about Boone. Here are my questions and her answers (both verbatim):

Q. Who taught Boone to use the computer and Paint Shop Pro?

A. Boone is self-taught on all computer programs. He's always been interested in the computer and actually started using the computer

unaided at 18 months of age. I guess that's when I gave up trying to keep him off of it. We started saving his drawings when he began drawing clocks at age 3.

Q. Do you have any idea what triggered his interest in clocks?

A. No idea whatsoever. I assume it came from his interest in numbers. Boone's first words were numbers and the only words he spoke for a very long time were numbers. We knew he could read at a very young age because he would spontaneously say written words he'd seen and he could follow written instructions on the computer.

Q. How did he learn to surf the Internet, which requires some reading and writing (or typing) skill? It took me a while, as I recall, finding that 24-hour clock page.

A. Boone taught himself about the Internet. He also taught himself to read, write, type, tell time, add, multiply, subtract, divide and how to figure ratios and percentages. He taught himself the capitals of the United States at age 3 and the capitals and currencies for every country in the world at age 4. (Personal E-mail, August 26, 2003)

Talk about not seeing the forest for the trees! Obviously, Boone's real savant skill is not simply confined to his clever clocks but includes learning to use a computer and surf the Internet *on his own,* beginning at 18 months. That in turn was based on his *near miraculous* abilities "to read, write, type, tell time, add, multiply, subtract, divide and how to figure ratios and percentages" without taking the time to be educated like the rest of us. We must add, of course, the ability to understand and use a personal computer. That seems to be difficult for many adults, else we would not see so many advertisements offering people instructions on how to do it. Those are Boone's real savant abilities and they cry out for explanation.

Treffert says, "The significance of Savant Syndrome lies in our inability to explain it. The savants stand as a clear reminder of our ignorance about ourselves, especially how our brains function. For no model of brain function, particularly memory, will be complete until it can include and account for this remarkable condition" (Treffert, 1989, p. xiii). My contention in this paper is that no *physicalist model* of brain function is adequate to explain even the most ordinary modes of memory beyond simple conditioned reflexes and that any model that can explain the skills found in Type B savants will be one that goes a long way toward explaining

all memory skills. Where, then, do we look for the hidden trove from which savants draw their skills?

THE DJINNI IN THE BRAIN

Why should our inability to explain Savant Syndrome be significant *per se?* There are many psychological phenomena we cannot *yet* explain but that is not particularly daunting as long as explanation appears to be *possible* using currently accepted assumptions and principles. What Treffert is saying is that explaining Savant Syndrome does *not* appear to be possible in such a way. It is not a matter of "not yet" but "no way." That does not mean that the syndrome cannot be explained but that doing so will require substantially different assumptions and principles.

Foremost among the assumptions that hinder explanation of Savant Syndrome is the one that assigns all mental functions, *including memory,* to the brain. In the "orthodox" *physicalist view* of psychology and cognitive neuroscience there is only one place memories can go into and come from—the brain. In addition, there is only one way memories, such as the behavioural memory of how to play the piano or make exquisitely accurate architectural drawings, can be acquired, namely, through sensorimotor training. In accordance with this physicalist view, if we have memories that do not appear to have been acquired in that way, then they either *cannot* be genuine memories *or* must be explicable by some neurophysiological *djinni* in the brain—an obscure magical mechanism in the cranial bottle. Therefore we should not be surprised when two scientists, A. W. Snyder and D. J. Mitchell advance the opinion that dysfunction or damage in the left frontotemporal lobe of the brain is one, although not the only way, to "open the door" to *a hidden reservoir of cerebral abilities* (Snyder and Mitchell, 1999). According to Dr. Robyn Young, a lecturer in psychology at Flinders University in Adelaide, Australia, Snyder and Mitchell propose that savants

> . . . have access to an unidentified mechanism *(e.g., lower level processes and/or information or talent)* that underpins their skill. While this in itself is not unique what makes their hypothesis so exciting is that they claim that this mechanism is not restricted to savants, instead it resides in all of us. The majority of us, however, are unable to access this mechanism because of interference from higher order cognitive processing. The nature or form of this mechanism is unclear and Snyder and Mitchell (1999) make no attempt to identify it. It remains unclear whether this mechanism is unique to the skill or universal across all skills with environmental

> differences such as opportunity, practice and exposure determining the type of skill that emerges (Young, 2002, p. 3, emphasis added).

According to this "exciting" view, savants are exceptional because they can tap into or access this "unidentified mechanism" (the djinni in the brain), which could be "lower level processes and/or information or talent," while ordinary people cannot. Snyder and Mitchell speculate that the unidentified mechanism resides in certain "primitive" parts of the brain that process sound, vision and numbers and further suggest that if we ordinary folks had access to those "primitive" parts, then "each of us could draw like a professional, do lightning-fast arithmetic." To test this suggestion, Dr. Young performed a well-conceived and executed experiment to test whether temporary non-intrusive disabling of the left frontal cortex would allow normal volunteers to tap the alleged "hidden reservoir of cerebral abilities." The experiment tested seventeen healthy right-handed volunteers, aged 20-45, from the Adelaide suburbs. The tests were designed to measure changes in memory, artistic merit and accuracy, mathematics, pitch, calendar counting and linguistic representation. As Dr. Young explains the method she employed:

> Tests were administered under three different conditions. No stimulation was used during Condition 1. Condition 2 comprised rTMS to the left motor cortex (MC) head area (approximately 4 cm anterior to, and 7 cm lateral to the vertex) and for Condition 3 rTMS was applied to the left fronto-temporal cortex (midway between electrode positions F7 and T3 in the International 10/20 electrode placement system). Conditions 1 and 2 served as control conditions with Condition 3 being the experimental condition (Young, 2002, p. 7).

In short, the experiment temporarily and partially disrupted the left frontotemporal lobes of the subjects by repetitive electromagnetic stimulation applied to the adjacent regions of their scalps. Dr. Young reports that one subject out of the seventeen is said to have shown "marked improvement" in his ability to draw a horse during FTL stimulation. Five of the group scored better on calendar counting during stimulation, one scored better on all tasks and another on all but one. "Performance by other participant's [sic] across conditions was idiosyncratic." (p. 6). She concludes:

> In summary *these striking findings* lend support to the hypothesis that disruption of functioning in left hemisphere cortical regions

> facilitates access to mechanisms that are central to the development of exceptional skills exhibited by savants. Also, these mechanisms might reside in all of us but access normally is restricted by higher cognitive function (emphasis added).

Although describing the findings as "striking" seems a bit hyperbolic, they do suggest a very limited corroboration of Snyder and Mitchell's hypothesis about "a hidden reservoir of cerebral abilities" which may be available to all humans. However, the experimental results offer *no corroboration at all* to the further speculation that that "reservoir" is located in some *primitive* part of the brain. In fact, that part of Snyder and Mitchell's proposal completely misses the point of Type B Savant Syndrome. The alleged mechanisms that might be restricted by higher cognitive functions are *not primitive but are themselves higher cortical functions,* albeit mostly associated with the right rather than the left cortex. The defining characteristics of Savant Syndrome themselves clearly rule out the idea that Type B savantism can be derived from any "primitive" part of the brain. The skills that Mrs. Garvey, for example, attributes to Boone's inventiveness are products of *cultural history.* Reading and writing date back 5,500 years to the dawn of Western civilisation. There is sound evidence that counting (Thompson, 2003), visual conceptualisation (Chandler, 2002c) and an innate sense of symmetric patterning (Jablan, 1995) came even earlier. If savants do access a "hidden reservoir" of behavioural skills, it must relate to a much higher level of cerebral function than Snyder, Mitchell and Young suggest.

"Where" then do we look for the kind of memory savant performers access? It should first be recalled that Type B savant talents are *formal* behavioural skills in the sense that they are *not content specific.* They involve *competence,* not repertoire. The memory accessed by savant prodigies is essentially *structural.* The model for structuralist explanations is Noam Chomsky's "generative grammar," (Chomsky, 1969) although the concept can be traced back as far as Plato's *Meno* (Plato, 1937, Vol. I, pp. 360-367). Chomsky proposed, in contrast to behaviorist views, that language capacity is based on a universal *a priori* set of formal grammatical structures that organise linguistic content. His principles were adapted as a model of sensory information processing by Marr (1982), Fodor (1983) and Jackendoff (1990) *inter alia.* What such a model looks like can be seen in Jackendoff's diagram of visual processing in Figure 8. In this diagram, the lower sequence with its directional arrows represents the *content* of visual information beginning with photons striking the retina. The upper boxes represent its structural components. The arrows that point in both directions indicate which levels can provide feedback that alters lower levels. In

Jackendoff's construction, feedback is possible only to the level of the 2 1/2D ("D" = "Dimension") sketch, not to the "primal" sketch or the "retinal array." I have argued elsewhere (Chandler, 2002c) that the latter component of Jackendoff's theory is unsustainable but here I simply want to point out that in discussing savant memory we are referring not to *content memory* but to *structural memory* of behavioural skills. While content memory is notably prodigious in nearly all artistic savants, it derives its contents from ordinary sensory sources. Leslie Lemke's remembering the musical content of Tchaikovsky's *Piano Concerto No. 1* is only remarkable in that he was able to absorb it so thoroughly at one hearing. What is truly baffling is that he was able to sit down at a piano and *play* what he had heard only once. The question is how he acquired the *structural memory* for such performances and, *mutatis mutandis,* how Wawro, Clemons and Wiltshire acquired their graphic art proficiency.

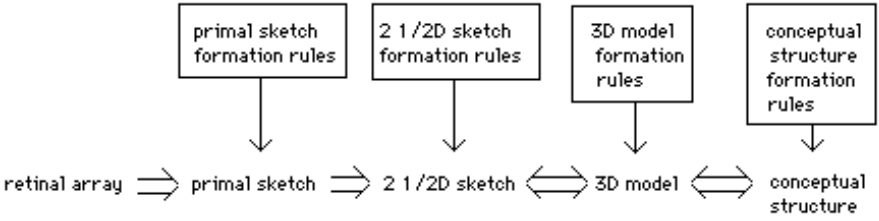


Figure 8. Overall organization of levels of visual representation (Jackendoff, 1990, p. 186).

I anticipate that someone will suggest that savants' abilities are in some way a genetic fluke that somehow got "hardwired" in the brain. Apart from the implication that introducing professional-level artistic and other skills into the gene pool sounds shockingly Lamarckian, I take it that the recent epidemic of "genomania" culminating in Richard Dawkins' book, *The Selfish Gene,* has been or soon will be an anachronism. For Darwin's theory to be successful, there had to be some unit of heredity that was subject to variations on which natural selection could work. In the first decades of the twentieth century that unit was identified as a chemical "gene" and it was also accepted that the gene was the fundamental unit required by Mendel's laws of heredity. The gene soon became the "atom" of evolution, the fundamental "particle" in terms of which everything biological could be explained. In it biologists seemed to have found the

long sought philosopher's stone, a universal key to the transmutation of base chemicals into every aspect of biological and psychological existence. Everything was due to genes and genes were invented even when there was no evidence for them. At the height of genomania, the philosopher of science, Sir Karl Raimund Popper, was engaging in the wildest fantasy when he wrote,

> I assume that there are different classes of genes: those which mainly control the anatomy, which I will call a-genes; those which control behavior, which I will call b-genes. The b-genes in their turn may be similarly subdivided into p-genes (controlling preferences or "aims") and s-genes (controlling skills)….My suggestion for this internal selection mechanism can be put schematically as follows: p—> s—> a. That is, the preference structure and its variations control the selection of the skill structure and its variations: and this in turn controls the selection of the purely anatomical structure and its variations. This sequence, however, may be cyclical: the new anatomy may in its turn favour changes of preference, and so on (Barlow 1994, p. 139).

The point to be taken here is that if we clearly understand what genes actually are, then we cannot ascribe to them any memory of *biological form,* let alone psychological processes. Although genes can provide the information for eye colour, there are no genes for eyes—or noses or brains. Mental realism holds that morphogenetic memory is transmitted through configurations in the biological level of the cosmogenic field. Those configurations serve as generative equations or, in the terminology of self-organization theory, as attractors that guide the metabolic processes of life formation and regulation. Genomania has quite recently been seriously called into question by biologists themselves, first in the emergence of "proteomics" as Carol Ezzell wrote in the April, 2002 issue of *Scientific American,*

> Move over, human genome, your day in the spotlight is coming to an end. Researchers are now concentrating on the human proteome, the collective body of proteins made by a person's cells and tissues. The genome—the full set of genetic information in the body—contains only the recipes for making proteins; it's the proteins that constitute the bricks and mortar of cells and *that do most of the work.* And it's the proteins that distinguish the various types of cells: although all cells have essentially the same genome, they can

> differ in which genes are active and thus in which proteins are made . . . (Ezzell, 2002, emphasis added)

Still more recently it has been shown that only about 2% of the genome consists of gene templates, while the other 98% consists, at least in part, of,

> . . . myriad "RNA only" genes sequestered within vast stretches of noncoding DNA. Science had dismissed such DNA as the useless detritus of evolution, because no proteins are made from it. But it turns out that these unconventional genes do give rise to active RNAs, through which they profoundly alter the behavior of normal genes (Gibbs, 2003a, p. 108).

Furthermore, *Scientific American,* apparently judging these new discoveries to be very significant, devoted its next front page article to the same issue, in which Gibbs said,

> Above and beyond the DNA sequence there is another, much more malleable, layer of information in the chromosomes. "Epigenetic" marks, embedding in the mélange of proteins and chemicals that surround, support and stick to DNA, operate through cryptic codes and mysterious machinery (Gibbs, 2003b, p. 48).

Attempts by biologists to explain morphogenesis, the origin of biological form (phenotypes), on the basis of such concepts as genetic algorithms have, as opponents of Neo-Darwinism have long predicted, led inevitably to a dead end as reflected in the following conundrum posed by microbiologist Friedrich Cramer:

> Morphogenesis or the generation of form in "morphogenetic fields" is thus explained by concentration gradients of activating or inhibiting substances whose exact nature is still unknown, but whose production appears to be governed by genes. Otherwise, these forms would not be mutable or inheritable. What is involved then is not self-organization in the true sense, but rather organization according to a prespecified program. This program is laid down in the DNA, possibly in a somewhat more complicated form than is the case for simple structural genes. Here, a higher control gene switches entire groups of structural genes on and off. In principle, however, this is no different from turning single genes on and off. The structure of the organism, then, is organized

> according to a program. *But what organizes this program?* (Cramer, 1993, p. 170, emphasis added)

"What organizes this program?" is indeed the crucial question. Adding proactive RNA and epigenetic marks simply compounds the perplexity for physical realist biology. Cramer's conundrum remains: "What organizes the program?" The mental realist view is that phenotypic configurations in biotic field memory guide the form creation functions of the ribosomes and their ancillary organelles as well as the template genes they require. Comparably, structural forms without content such as universal grammar, sensory information processing "rules," archetypes, and civilised mindsets are configurations created, stored and remembered in the universal field level dedicated to human brain function. In short, they are *formal memories* (Jung referred to archetypes as "forms without content" and the same is true of mindsets) from a source common to all humans. None of those formal or structural memories can be found in the genes, blastocysts, ribosomes or brains. It is merely an unfortunate misconception by physical realists that we have become accustomed to thinking of human memory as something "stored" in the 1450cc container perched atop our spinal chords. In the intellectually anorexic view of physical realism, where else can memory be except in the electrochemical processes of our cranial wetware? The argument in all my books has been that there is no credible physical realist doctrine with respect to memory. Hilary Putnam is famous for his remark, "Cut the pie any way you like, 'meanings' just ain't in the head!" (Putnam, 1975, p. 227). For mental realism, the same is true of memories. They "just ain't in the head!"

Holarchy: a nested system of holons (organic entities), a term used in holistic and organismic biology, systems theory, etc., to emphasise autonomy of levels rather than levels of ascending control implied by the term "hierarchy".

Mental realism offers an alternative to "where" memory is. In the mental realist model, every human participates in a holarchy of information field levels, which are "downward derivations" from the *Cosmogenic Field* of Cosmic Mind's universal thought process, the "lowest" level currently conceived by physics as being that of subatomic "particles"—or superstrings or whatever the latest family of mathematical entities happens to be. While all levels in the universal holarchy are interrelated, any physical process can only be fully described and explained in terms of its own functional level. Biological processes, for example, cannot be fully defined by their atomic or molecular field levels but only by generative

equations at their own, much more complex, field level. Cerebral information processes can only be comprehended in terms of what I call the cognitive or cerebral field level appropriate to all creatures with at least the rudiments of brains. Human cerebral processing, in addition, requires a still higher cognitive/cerebral field level because it supports human-type cognition in which information is organized around the self-referential properties of identity structure. Memory, then, is not stored in neurons, patterns of neurons or networks of neurons but in the cerebral field level of the brain. In the act of remembering the brain acts as a *scanner* of field configurations that are not resident in the brain but transcend and "in-form" it.

The mental realist view of memory, moreover, not only finds it unnecessary to hypothesise a "location" for memory in the brain but does not even find a need for "memory" as a special cognitive function. That is because in reality long-term memory is simply *the global configuration of our cognitive structure,* which includes the idiosyncratic configurations derived from our personal information processing history as well as the unconscious formal structures acquired in our phylogenetic and cultural heritages. These types of structure and content together constitute the way we think about the world. It is crucial to note that the brain's cognitive field is a single, universal field. There is not a different field for every brain but every brain is represented by unique *configurations* in a universal field common to all brains. There is no need to posit a separate field for each individual any more than there is to posit a separate quantum field (as distinct from a wave function) for every electron.

I do not dispute neurological findings that some areas of the brain, such as the right frontal lobe and a portion of the medial temporal lobe called the parahippocampal cortex contribute to making something *memorable.* What I do dispute is how such findings are *interpreted.* They do not support the conclusion, nor, to my knowledge has any neuroscientist claimed that memories are *located* in such areas of the brain but simply that those areas are instrumental in *forming and retrieving* memory representations. The same thing applies to *all* mental functions that may be associated with various areas of the brain, such as the schema recently proposed by Peter J. Snow (2003) in *Journal of Consciousness Studies.* The mental realist view is that all such areas are involved in the *scanning* of field configurations that are not resident in but transcend and "in-form" the brain. No memory, for example, can be formed unless the brain's scanning resonates with a *compatible* set of configurations in the cerebral field that, unlike neurons and synapses, do not degrade with time. When such compatibility is not found, no retrievable memory can be formed although it may be held in a "buffered" field configuration for various reasons,

repression being notable among them. The same scanning process takes place in retrieving memories or, more precisely "reconstructing" them. Usually such scanning immediately accesses the relevant configuration. Even when the reconstruction is not immediate, the scanning process often proceeds while our minds are otherwise engaged only to have the reconstruction emerge hours or even days later. That is a common occurrence. I daresay that nearly every reader has experienced it. The recovery of repressed configurations can be a long psychiatric process due to the fact that the memories sought are elusive precisely because they represent threats to the stability of the psychological system. The implication is that no memories are ever *lost* but for various reasons the scanning system of the brain may not be able, temporarily or permanently, to access them. Infantile memories are not retrievable in my opinion because they were never formed. Forming a memory requires at least a minimal level of conceptual (biographical) structure to which it is indexed and roughly until the age of three that structure has not formed.

My model of memory is obviously at odds with the consensus of many cognitive scientists that such structural elements that they recognize are "hardwired" in the human brain whereas the "raw material" which they organise is derived through the senses. Neuroscience and cognitive science have identified to some extent a correspondence between the former's neural pathways and the latter's hypothesised visual information feed-forward and feedback sequences. But they have yet to explain where and in what neural form the structural "formation rules" are to be found.

In general, I take issue with the "the-mind-is-the-brain" school of thought's notion that memory of any kind, structural or content, is "stored" in the brain. The concepts of durable storage and neural processes are virtually incompatible notions. Although I disagree with Deepak Chopra on several counts, he has stated the physicalists' problem with explaining memory quite convincingly. Recounting his remembering of a patient, Raoul (including his telephone number), whom he had not seen for twenty years, Chopra says,

> Amid these chaotic swirls of chemicals and electrons, no one has ever found a memory. Memories are fixed. For me to recall Raoul's face, I have to retrieve it intact, not in bits and pieces. Where do I go to do that? Certainly not into the firestorm of the brain. No single neuron in my brain has survived intact for twenty years. Like migrating birds, molecules of fat, protein, and sugar have drifted through my neurons, adding to them and leaving again after a time.

> Even though we can identify the memory centers of the brain, no one has ever proved that memory is stored there. We assume it is, but how? To store a memory in a neuron is like storing a memory in water. (In fact, the brain is so fluid that if homogenized it would have the same water content as a bowl of oatmeal. Your blood is actually more filled with solid content than your cerebrum.) The notion that we store memory the way a computer stores it by imprinting microchips with bits of information, is not supported by the evidence; when neurologists try to prove it, they soon hit a wall (Chopra, 2000, p. 213).

I do not dispute that the brain is some sort of information processor but (1) unlike computing machines, it has no memory storage of its own and (2) it does not *think.* Its computations *serve* the mind, just as my Mac or a PC does but it no more thinks than they do. As psychoneuroimmunology pioneer Candace Pert once said, "The mind is in a different realm from the molecules of the brain" and as John Searle has indefatigably maintained for so long, "symbolism is not to be found in the physics of the brain."

How Do People Remember Things They Never Learned?

In my view, Type B (at least) savantism is based on formal memories exactly like cognitive formation rules, Jungian archetypes, and mindsets. Savants' untaught talents are due to their brains' ability to scan the universal cerebral field level for behavioural memories established in that level by others who probably did at one time learn them the "the hard way."

Calendar counting, an ability frequently found in Type A savants like Kim Peek and sometimes in Type B as well, is one skill in which "the-mind-is-the-brain" proponents may think they find refuge. After all, assuming the brain is a computer, what does a computer do best but count and calculate? Unfortunately for hardwiring advocates, calendar counting is not simply a matter of calculation because calendars are not merely formal mathematical structures but *products of cultural choices.* In order to determine on what day of the week March 12th occurred in a particular year, the counter has to take into account the historical idiosyncrasies of calendars. If the March 12th in question was prior to February 24, 1582, then the day of the week on which it fell would be determined by the Julian Calendar but after that date it would have to be calculated in accordance with the Gregorian calendar, which was introduced by Pope Gregory XIII in a Papal Bull known by its opening words as "Inter Gravissimas" ("Among the most serious things . . .") The point is that, although there are

rules for calculating dates with any calendar, those rules have been established by historical convention and not by mathematical formalisms inhering in the brain, whether hardwired or softwired. They establish, for example, when the first day of the year is. Prior to the Gregorian Calendar it was March 25th, afterward, January 1st. The other most important rule is the one for fixing leap years. Those rules cannot be part of an innate calculating ability but must be *learned.* By definition, however, a savant calendar calculator has not learned them in his lifetime. Consequently, he (most if not all are male) must have acquired calendric rules in a way that does not depend on a calculating djinni in the brain. Treffert notes that,

> Another early case report on Savant Syndrome appeared in the medical journal *Lancet* on June 5, 1909. According to the journal, at a meeting of the Society for Psychiatry and Neurology in Vienna, Dr. A. Witzmann "showed a man, aged 20 years, who possessed an extraordinary memory for certain of the data recorded in calendars. This individual, who, moreover, was an inmate of an asylum for idiots, could with utmost readiness tell what day of the week it had been or would be on any given day of the month in any year during the long period from the year 1000 of the Christian era until the year 2000." The report goes on to indicate that Witzmann, even after considerable study, "has not yet succeeded in finding out by what means the young man has acquired this facility, at once so marvelous and so rare" (Treffert, 1989, p. 7).

Furthermore,

> Witzmann believed, however, that the patient had found some kind of code by which he worked because his arithmetic was faulty when asked to set down figures of a computation based on ordinary tables seen on some calendars . . . Remarkable was the fact that the man's knowledge of the calendar did not extend beyond the year 2000. In addition to knowing the day of the week for each day of the month, *he also* knew *the patron saint of each day of the month* (p. 8, emphasis added).

It seems Witzmann's calendar calculating ability had its own Y2K problem but apparently he employed a "code" that was not simply based on formal arithmetic but on historically established calendar rules, for which *saint's days were probably the key.* It should be noted that one of the innovations of the Gregorian calendar was to adjust the calendar minutely by omitting

the leap day in years divisible by 400. The only years divisible by 400 since 1582 were 1600 and 2000.

When we come to the musical and artistic savants, the hardwired structural explanation becomes increasingly fragile and finally simply self-destructs. I doubt that anyone could seriously suggest that Leslie Lemke's hearing of Tchaikovsky's *Piano Concerto No. 1,* elicited a "hardwired" structure in a "primitive" part of his brain so fine-grained that it taught him the layout of a piano keyboard, where to place his fingers to make melodies and chords, and all the subtle motor and sensory skills a concert pianist requires. The same doubt militates against any hardwiring explanation of artistic precocity as in the cases of Wawro, Clemons and Wiltshire and even more compellingly against the skills of the child Boone who "taught himself" to read, calculate and use a computer beginning at the age of a year and a half. My claim is that they access behavioural memories that simply do not happen to be their own. *They do things they never learned how to do by accessing structural memories of biomechanical and cognitive skills in the universal field of cerebration.*

There are, of course, alternate ways of accounting for Savant Syndrome. Perhaps May Lemke was correct when she heard Leslie playing the Tchaikovsky concerto: "It's a miracle from God." Or, perhaps we might simply write off Savant Syndrome as one of those extremely rare anomalies that do not demand an immediate solution. That is, "Leave the djinni in its bottle and stop fiddling with the cork." Unfortunately, that refuge is not available because Savant Syndrome is not alone in calling the "memories-are-in-the-brain" view into serious question. Linguistic and sensory processing rules, the persistence and transmission of archetypes and mindsets, and telepathy contradict it. As I have argued elsewhere (2002a) telepathy is simply a process that accesses, under certain special conditions, short term memory configurations of another person in the universal cognitive field. It is merely due to an unfortunate physicalist dogma that we have become accustomed to thinking of human memory as something "stored" in the bulging container perched atop our spinal chords. In the emaciated view of physical realism where else can memory be except in the electrochemical processes of our cranial wetware? Contrariwise, the argument in this paper has been that there is no credible physical realist doctrine with respect to memory formation, storage and retrieval. Mental realism—or another member of the same metaphysical family, since no one has *final* answers—offers the only alternative for understanding memory.

CONCLUSION

My explanation, then, of Type B artistic and musical performance skills is that they are derived from *behavioural forms without content,* i.e., behavioural "attractors", established in the cerebral field level.

baupläne: uncapitalised plural of German *Bauplan*, an architectural drawing or construction plan, adapted in biology for the developmental pattern of an organism.

Such derivation differs from that of biological *baupläne,* psychological archetypes, and civilised mindsets only in which levels of the cosmogenic field each mode accesses. In effect, Drs. Snyder, Mitchell and Young are not wrong in maintaining that savants have "privileged access" to a reservoir of skills that other people ordinarily do not, but wrong in their speculation that such mature skills are potentials hardwired in some primitive part of the brain. They are, in effect, behavioural patterns *of a high order* located in the universal field level of human brains (not the brains themselves).

In the mental realist view, such enablers or attractors "*in*-form" the brain/body at every level of human accomplishment and they are, to a limited extent, accessible by others than savants. It is reasonable to surmise that pianists who began as "child prodigies"—Mozart, Liszt, Paderewski, Chopin, Cliburn—shared to some degree Lemke's "privileged access." The Malaysian study previously cited suggests that the younger the age at which children begin learning to play the piano, the faster and more proficiently they are capable of developing the necessary biomechanical skills. This is compatible with the parallel fact that the younger a child begins to learn a second language—or even a primary language—the easier it is. During a child's early years, the left frontotemporal lobe's suppression of access to structural field configurations has evidently not gained the ascendancy it will have in most children's later life. The implications and opportunities for research presented in this view are, in fact, enormous. Following them up, however, does require that we slightly adjust our thinking to allow one concession:

The brain is a scanner, not a thinker. Mentation and memories just ain't in the head!

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