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Abstract

Certain ailments such as schizophrenia are more common among winter births or at times of lesser solar activity. There would seem to be no point in adapting to the season of birth for a lifetime, but if births in earlier times were seasonal, at least for some of our forebears, the adaptation would not be to the season, which would be the same for all births, but to the climate. Periods of less solar activity are the cause of ice ages, so schizophrenia and tallying ailments may be adaptations to ice ages or due to such adaptations. During ice ages in Europe there would hardly be enough to feed on in winter, so creatures such as neanderthals may have hibernated. The loss of brain cells in schizophrenia may thus be understood as a phase in hibernation which, if interrupted by daily activity or suppressed by medication, may become pathological but is otherwise healthy and should be allowed.

Introduction

The brains of songbirds adapt to seasonal needs by changing their capacities.

Oscine songbirds (e.g. zebra finches, canaries, and white-crowned sparrows) learn their song by imitating those of older members of their own species … The acquisition and production of learned song is made possible by a group of discrete brain nuclei and their connecting pathways, referred to as the “song system”, which has similarities in three groups of birds – songbirds, parrots and hummingbirds – that evolved learned song … Several of these telencephalic nuclei that participate in the production and acquisition of learned song are small in nestlings, before the onset of song development, and their volume, cell number, cell size, and connections grow during the subsequent weeks or months. As a result of these changes, many of the components of the circuits for the acquisition and production of learned song are formed and connected during the very period when song first develops … We now know that the volume of brain structures can change seasonally and in response to blood hormone levels.1

Similar adult neurogenesis has since also been confirmed in fish, amphibians, and reptiles … Swedish neuroscientist Peter Eriksson gave BrdU (a marker) to human cancer patients in an attempt to quantify the progress of their disease by tagging proliferating cancer cells. Unexpectedly the BrdU labeled not only cancer cells but also neurons in the basal ganglia and in the hippocampus.2

Schizophrenia is likewise seasonal:

A study by Tramer in 1929 … showed a greater incidence of winter or spring births in patients.3

This may be true of non-deficit schizophrenia, but:

This study confirmed an association between deficit schizophrenia and summer birth in

1 Nottebohm F. The neural basis of birdsong. PLOS, Biology, 17 05 2005
3 Demler TL. Challenging the hypothesized link to season of birth in patients with schizophrenia. Innovations in Clinical Neuroscience, Sep 2011, 8(9): 14-19, with reference to:
Tramer M. Über die biologische Bedeutung des Geburtsmonates, insbesondere für die Psychoseerkrankung. Schweiz Arch Neurol Psychiatr. 1929; 24: 17-24
the nontropical regions of the Northern Hemisphere.\(^4\)

The seasonality of songbirds and that of schizophrenics differ insofar as that the latter tallies with birth, so seasons come and go and the adaptation remains. This seems to be an error but not necessarily. If, in earlier times, birth was always in spring, the reaction would not be to the season but to the climate – to whether it is an ice age or a green age. But Homo sapiens sapiens was at home in the tropics, where seasons hardly vary:

Reproductive cycles in tarsiers, apes, and many monkeys continue uninterrupted throughout the year, though seasonality in births is characteristic mainly of monkey species living either outside the equatorial belt (5° north and south of the Equator) or at high elevations in equatorial regions, where dry seasons and seasonal food shortages occur.\(^5\)

Seasons vary notably north of the Mediterranean, where during the ice ages children had to be conceived in spring to be born before winter, and schizophrenia occurs more often among loners, adapted to bleak regions, so apparently, when temperatures drop, they change into their ice-age phenotype, whose behavior is often taken to be abnormal or schizophrenic.

The difference between deficit and non-deficit schizophrenia may be that some humans are more biased toward the ice age phenotype than are others, so in some cases the balance can be tipped only by winter birth whereas in other cases the bias is enough to tip it in all seasons. In other words there are not too kinds of schizophrenia, one harmless and one harmful; there is only one kind, but some humans are more biased than others so are more resistant to treatment.

A change of phenotype is common among locusts.

Desert locusts … undergo a Jekyll and Hyde transformation. In their solitary phase, locusts are unassuming insects. Their brown-green bodies are camouflaged to blend into the background and they walk slowly with a low creeping gait. They generally avoid other locusts unless they are mating or … forced together by food shortage. When this

\(^4\) Kirkpatrick B et al. Summer birth and deficit schizophrenia in Dumfries and Galloway, Southwestern Scotland, (Am) Psychiatry 2002; 150: 1382-1387

\(^5\) Napier JR. Primate, breeding periods, Encyclopædia, Britannica, 2016

\(^6\) Photo: Tom Fayle, University of Cambridge
happens, the crowding of solitary locusts together induces a change. The insects transform into what's known as their gregarious phase. Gregarious locusts are colorful, move faster and are attracted to other locusts.\textsuperscript{7}

Solitary locusts fly at night, the gregarious by day,\textsuperscript{8} and the gregarious also feed on each other:

Individuals move in order to reduce their own risk of being cannibalized.\textsuperscript{9}

**Sunspots & ice ages**

The amount of greenery available varies not only from season to season but also from ice age to green age, and ice ages seem to be due to a fall in the mean level of solar activity, as in the 1600s.

Several studies have shown that the Maunder Minimum coincided with the coldest phase of global cooling, which was called “the Little Ice Age”. During this period there were very cold winters in Europe and North America. In the days of the Maunder minimum the water in the river Thames and the Danube River froze, the Moscow River was covered by ice every six months, snow lay on some plains year round and Greenland was covered by glaciers,” says Dr Helena Popova.\textsuperscript{10}

If cells could sense the level of solar activity through atmospherics, this would serve as a further clue to the climate. Distinguishing between ice ages and green ages would be useful even to infections, since hosts are more numerous and come into contact more in green ages. If infections are too virulent in ice ages, they may kill a host before being able to move on, but if not virulent enough in green ages, they are wasting an opportunity.

The number of sunspots varies not only from ice age to green age but also from year to year in a 22-year cycle. Spots begin appearing near one of the sun's poles then appear in increasing number toward the equator, reaching it in about 11 years, then the same happens at the other pole, so in the course of 22 years, there are two minimums and two maximums. Did infections tally with sunspots in the 1900s?

This was checked by the physicist Fred Hoyle for a different reason. He surmised that viruses may form in the tails of comets and be blown to earth by the solar wind, which increases with the number of sunspots, so epidemics of influenza may match the sunspot cycle.

Periods of maximum sunspot activity and influenza pandemics both appear to occur in cycles of approximately 11 years … and since at least 1761, these cycles have often coincided … Sir Fred and Dr. Wickramasingh theorize that electrically charged influenza virus molecules floating through extraterrestrial space might be driven into the earth's atmosphere by the intense solar wind created during sunspot activity.\textsuperscript{11}

The lethal wave of influenza in 1918/19, said to have killed more than the murderous assaults of the first World War, was first detected on the same day in Boston and

\begin{itemize}
\item Bates M. How locusts learn to be part of a swarm. Science, 19 Dec 2013
\item Desert Locust. Wikipedia, 2016
\item Diminishing solar activity may bring new Ice Age by 2030, Astronomy Now, 17 July 2015
\item Browne MW. Flu Time: When the sunspots are jumping? New York Times, 25 Jan 1990
\end{itemize}
Bombay. Yet in spreading within the United States it took three weeks to go from Boston to New York. And of the influenza epidemic of 1948 an Italian doctor (Professor Magrassi) reported of the then remote island Sardinia:

“We were able to verify the appearance of influenza in shepherds who were living for a long time alone, in solitary open country far from any inhabited center. This occurred at just the same time as influenza appeared in the nearest inhabited centers.”

In January 1919 Governor Riggs of Alaska reported to a committee of the U.S. Senate that influenza had spread over an area the size of Europe and with only a small thinly spread population of about fifty thousand. This was despite conditions for human travel being worse than anybody could remember.

“The territory had to be reached by a dog team. You have the short days, the hard, cold weather, and you only make 20 to 30 miles a day. The conditions are such as have never happened before in the history of the territory.”

Solar activity peaked in 1917 and influenza in 1918/19, then solar activity peaked again in 1947 and influenza in 1948. The correlation between solar activity and influenza was later confirmed at the School of Public Health at the Chinese University of Hong Kong:

Influenza pandemics in the century (1946-1947, 1957 and 1968) have fascinated some people for the idea of 11-year pattern pandemic cycles. In solar physics, it is well known that sunspot cycles also have regular periods of around 11 years. This study therefore aims to investigate the association between sunspot cycles and the occurrences of pandemic influenza. The hypothesis here states that sunspot numbers can detect pandemic influenza A between 1700 and 2000 A.D. … The agreements on pandemics were good to excellent … The sensitivity of using SSN>50 to detect influenza pandemics was 85.7%.

But, given the correlation, are the infections due to new viruses or to changes of old ones? This could be checked directly or by looking for changes tallying with few sunspots. For instance the pianist John Ogden was born at a solar maximum and began his career by performing about 200 times a year, but as the sun quietened down, so did he:

Born in Nottinghamshire in 1937, he displayed absurdly precocious musical brilliance as a child and in due course became one of the highest-flying students at the Royal Northern College of Music. When he won the International Tchaikovsky Competition in Moscow in 1962 (he came equal first with Vladimir Ashkenazy), a star was born … Ogden suffered a severe breakdown in 1973 and was diagnosed as manic depressive with schizoid tendencies … Brenda (his wife) never forgave him for depriving her of the affluent high-life his intense concert schedule afforded them. He spent periods recuperating in the Maudsley Hospital, which Brenda didn't like much. “It was really irritating for me to see him so happy, surrounded by mental patients,” she said. “It was not nice.”

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12 Hoyle F & Wickramasinghe C. The dilemma of influenza, Space Daily, 21 Jan 2000
14 Sweeting A. John Ogden: Living with genius. The Arts Desk, 07 June 2014
Regarded as a “gentle giant,” known and loved for his kindness and generosity, he had tremendous energy … His illness was initially diagnosed as schizophrenia but then changed to manic depression (now referred to as bipolar disorder) … He died in August 1989 of pneumonia, brought on by undiagnosed diabetes.¹⁵

Competing against a pianist such as Ogden, 'who was sight-reading Chopin by the age of three',¹⁶ may be daunting, unless one has similar genes, but Ogden was not alone in this respect:

Variations of the DNST3 gene make Ashkenazi Jews 40% more likely to develop schizophrenia and other diseases.¹⁷

Ogden was hospitalized in 1973. How was the sun faring?

The highest level of activity in the 1900s was reached in 1957 with a mean value of 190.2 then it fell in 1973 to 38.0. Ogden's change in behavior was taken to be pathological, but slowing down if the climate cools and greenery becomes scarce is a key to survival. Ogden is said to have been bipolar, schizophrenic, diabetic and obese, so how might these be related?

**Bipolarity**

Now is the winter of our discontent
made glorious summer by the rose of York;
and all the clouds that lour'd upon our house
in the deep bosom of the ocean buried.¹⁸

As regards songbirds:

A key moment came in 1981 when he (Nottenbohm) showed that the volume of the part

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¹⁶ Leafe D. Mad maestro who attacked his wife in front of the queen, Daily Mail, 28 Mar 2014
¹⁷ Efrati I. Scientists discover gene that predispose Ashkenazi Jews to Schizophrenia, Haaretz, 26 Nov 2013
¹⁸ Shakespeare W. Richard III, 1592?
of a male canary's brain that controls song-making changes seasonally. It peaks in the spring, when the need to mate demands the most of a suitor's musical ability, and shrinks in the summer. It then starts expanding again in the fall – a time to learn and rehearse new tunes. Those fluctuations, Nottebohm and his coworkers later showed, reflected the death and also birth of thousands of neurons. “Astonishing,” Gage and a colleague recently wrote.\textsuperscript{19}

As regards humans:

The Gage lab concentrates on the adult central nervous system and unexpected plasticity and adaptability to environmental stimulation that remains throughout the life of all mammals. Out lab demonstrated that human beings are capable of growing new nerve cells throughout life in a process called Neurogenesis.\textsuperscript{20}

Fluctuations in brain-size are hardly surprising, since a brain is a costly luxury.

The brain uses more energy than any other human organ, accounting for up to 20 percent of the body's total haul.\textsuperscript{21} During hibernation (in bears, hedgehogs and mice) 20-30\% of the connections in the brain – synapses – are culled as the body preserves resources over winter. And remarkably those connections are reformed in the spring with no loss of memory.\textsuperscript{22}

The culling may be done by immune cells:

As the brain matures, a group of resident immune cells called microglia crawl between the growing neurons and engulf invading microbes or damaged cells. They are also thought to pluck off some of the synapses that connect different neurons … the microglia prune away weak or unwanted connections, allowing more productive ones to become stronger.\textsuperscript{23}

Seasonal variations are also typical of some humans, as if they periodically hibernated.

Approximately one fifth of people with bipolar disorder, mostly those with bipolar II, find their symptoms wax and wane with the seasons.\textsuperscript{24} The symptoms of hypomania are often mistaken for high functioning behavior...\textsuperscript{25}

Mistaken? Is it weird to become flirtatious in spring?

I lead a weekly bipolar student support group at the University of Virginia. Each year at about this time I often observe a couple of students in group whose mood and energy become obviously elated. At the beginning of group I notice the smiles, the legs that won't stay quite stationary and the ease of spontaneous, contagious laughter that seems to come at the slightest opportunity. Yes, springtime mania has just winked its eye at

\textsuperscript{19} Kiester E Jr., Kiester W. Startling evidence that the human brain can grow new nerves began with unlikely studies of birdsong, Smithsonian Magazine, June 2002
\textsuperscript{20} Neurogenesis in the adult brain, Gage Lab, the Salk Institute for Biological Studies, website, 2016
\textsuperscript{21} Swaminathan N. Why does the brain need so much power? Scientific American, 29 April 2008
\textsuperscript{22} Gallagher J. Hibernating hints at dementia therapy. BBC News, 15 Jan 2015
\textsuperscript{23} Yong E. Pruning synapses improves brain connections, The Scientist, 02 Feb 2014
\textsuperscript{24} Owen OG. Discovering a seasonal pattern in bipolar disorder symptoms may have implications for better management, www.meeicalnewstoday.com, 25 Oct 2007
\textsuperscript{25} Bipolar II disorder, Wikipedia, 2016
Like influenza, it also tallies with solar activity:

A total of 450 medical records corresponding to 299 patients (199 women) with depressive symptoms and 151 patients (73 women) with mania, were analyzed. There was a higher number of admissions for depression during the years with lower solar activity. Admissions due to mania tended to increase in the years with high solar activity. There was a negative correlation between the number of hospital admissions due to depression and solar activity (Spearman $r = -0.812$, $p < 0.01$).

There is also genetic evidence of periodicity:

Capra and his colleagues also found that a number of Neanderthal genetic variants influenced the risk for depression, with some variants increasing the risk and others reducing it.

The use of the word 'risk' is a hidden persuader, since depression is no more risky than elation. Which of the two is better depends on the situation or season. It would be futile to have genes increasing and decreasing depression at the same time, so they may rather have been part of a cycle. More verve is useful in spring, and less verve is useful in fall. And what about schizophrenia?

**Schizophrenia**

Is this a dagger which I see before me,
the handle toward my hand? Come, let me clutch thee.
I have thee not, and yet I see thee still.
Art thou not, fatal vision, sensible
to feeling as to sight? Or art thou but
a dagger of the mind, a false creation,
proceeding from the heat-oppressed brain?

Common phenomenological and neurobiological characteristics of these two states (schizophrenia and dreaming) suggest that data about REM sleep could help introduce a useful experimental model of schizophrenia.

Not only bipolarity but also schizophrenia may be related to hibernation.

Here is what one person living with schizophrenia, Catrina, said about the importance of sleep: “I know the only time I get unwell is when I am sleep deprived so this is an important marker in keeping me well”.

26 Federman R. Spring has sprung and so might your hypomania. Psychology Today, 14 Mar 2011
28 Choi CQ. Neanderthal-human trysts may be linked to modern depression, heart disease, Health, Scientific American, 12 Feb 2016
29 Shakespeare, W. Macbeth, Act 2, Scene 1, 1606
31 http://www.livingwithschizophreniauk.org/advice-sheets/health-living-sleep-problems/ 2016
Sleep disturbances comparable with insomnia occur in up to 80% of people with schizophrenia … Half of these individuals (20 out-patients with schizophrenia) showed severe circadian misalignment ranging from phase-advance/delay to non-24 h periods in sleep-wake and melatonin cycles.\textsuperscript{32}

Schizophrenics need more sleep but not for the sake of learning:

Sleep spindles, short waxing and waning runs of oscillations at about 12-14 per second, were one of the earliest patterns to be identified in human sleep and can be recorded easily from the scalp over the whole night in light sleep, and they diminish in deep sleep and in rapid-eye movement sleep … Now we know that the number and type of sleep spindles is related to learning ability, that they increase when learning has taken place during the preceding day, that this increase is related to sleep-dependent improvement in the learning task and that they may reflect efficient thalamocortical communication … Three important studies of sleep spindles and their relationship to cognition in schizophrenia have been published in the past 3 years … Sleep spindles were reduced in amplitude and duration in 49 participants with schizophrenia who were taking medication in comparison with 44 matched controls, and also in comparison with a group of 20 non-schizophrenia patients receiving antipsychotic medication.\textsuperscript{33}

In other words schizophrenics have smaller and fewer spindles, and the difference is due to no medication.

Patients with schizophrenia, when compared with controls, did not show the normal improvements in a motor task (a finger-tapping sequence) after a night's sleep ... The lower the spindle number and density, the smaller were the improvements in the task.\textsuperscript{34}

They may have been saving their resources for a greener season. As mentioned above, there is also a correlation with the season of birth:

\textsuperscript{32} Wulff K. Sleep and circadian rhythm disruption in schizophrenia, Br J Psychiatry, Apr 2010, 200(4): 308-316
\textsuperscript{33} Wilson S, Argyropoulos S. Sleep in schizophrenia: time for closer attention, British Journal of Psychiatry, Apr 2012, 200 (4) 273-274.
\textsuperscript{34} Same
Research suggests people who develop schizophrenia in Europe and North America are more likely to be born in the winter or early spring (February and March in the northern hemisphere). The season of birth often leaves lasting marks:

The Southampton study, published in the journal *Allergy*, conducted epigenetic scanning on DNA samples from a group of people born on the Isle of Wight. They found that particular epigenetic marks (specifically, DNA methylation) were associated with season of birth and still present 18 years later. The research team was also able to link these birth season epigenetic marks to allergic disease, for example people born in autumn had an increased risk of eczema compared to those born in spring. The results were validated in a cohort of Dutch children.

If marks are adaptations, those outlasting a season must be adaptations to the assumed climate, not to the season. Further examples of research into schizophrenia are:

Comparison of the months of birth of the Scottish patients with those of the general population indicated that there was a 9% excess of affective births in the first 3 months of the year.

Data on 4,207 patients with a hospital diagnosis of schizophrenia were obtained from a mailed survey to public departments of adult psychiatry in metropolitan France ... The seasonal distribution of schizophrenic births was significantly different from that of the general population (P < 0.01). An excess of schizophrenic births was found in the first half of the year, with a peak in April (+13%).

There is a narrower peak in Scotland than in France. Among Japanese the correlation with the season of birth is slighter, and in Finland it varies from year to year and from decade to decade:

Patients with schizophrenia have a winter-spring excess of births compared with the general population, the cause of which is unresolved. Fluctuations in the magnitude of the seasonal variation may provide clues to its aetiology ... Seasonal variation of births among patients born in the 1950s, especially between 1955 and 1959, was marked, but decreased among patients born in the 1960s ... The incidence was higher among the rural-born than the urban-born, but declined more slowly among the urban-born than the rural-born.

In the 1900s sunspots were most numerous from 1958-59, as shown on the graph earlier, so the decrease in variation of births in the 1960s tallied with a drop in the number of sunspots. The findings can be explained by assuming that schizophrenics are more often born in winter or at times of less solar activity. If the level of solar activity rises, fewer are born and these are born in winter.
so the seasonal variation is greater. Seasons are less noticeable in cities, with round-the-clock illumination and central heating, but the level of electrosmog is higher, so even when the level of solar activity falls, the overall level of activity remains high, so likewise few schizophrenics are born and these persist in being born in winter. In New York the variation is no longer noticeable:

The cause of schizophrenia is unknown; however, one hypothesis is that seasonality of birth contributes to its development with an excess of winter-spring births observed in those with schizophrenia. There are over 200 studies exploring this issue at the writing of this article with most of the studies revealing a decrease in late summer births and an increase in winter-spring births of those individuals with the disease.

The primary objective of this study was to evaluate the seasonality of birth for 376 institutionalized patients with schizophrenia receiving clozapine treatment in a New York State psychiatric hospital … The author found that the seasonality distribution did not reflect any difference in percentage from that which would be expected in the general population.41

The role of electrosmog is also plain from the following case:

Janice Tunnicliffe … cannot bear to be near electromagnetic fields of any kind and, as a result, she cannot watch television, listen to the radio or talk on a mobile phone and has been left completely isolated from the modern world by her condition. Mrs Tunnicliffe, 55, was struck down with the illness after receiving chemotherapy for bowel cancer three years ago. Since then she has suffered constant headaches, chest pains, nausea and tingling in her arms and legs whenever she is near electrical devices or items that emit a signal. Her only relief at this time was when her village, near Mansfield in rural Nottinghamshire, suffered a temporary power cut. She said: “Different things give me different feelings but it's mostly headaches and nausea. iPhones make me feel really sick within about 20 minutes of being near one so even though I might not realize that someone has one straightaway, I soon find out … The Council of Europe Committee on Monday called for a dramatic reduction in exposures to phones and other wireless devices.42

It might also call for a dramatic reduction in chemotherapy, which seems to have ruined the fine tuning of cell sensors. A loss of synapses and neurons, typical of hibernating mammals, is also a feature of schizophrenia.

Observers have repeatedly noted pathological features involving excessive loss of grey matter, and reduced synaptic structures on neurons … Schizophrenia's strongest genetic association at a population level involves variation in the major histocompatibility complex (MHC) locus … Here we show that this association arises in part from many structurally diverse alleles of the complement component 4 (C4) genes.43

41 Demler TL. Challenging the hypothesized link to season of birth in patients with schizophrenia. Innovations in Clinical Neuroscience, Sep 2011, 8(9): 14-19
42 Bloxham A. Meet the woman allergic to electricity, The Telegraph, London, 18 May 2011
43 Sekar A. Schizophrenia risk from complex variation of complement component 4, Nature 530, 177-183, 11 Feb 2016
As regards genes and climate, schizophrenia is not evenly spread.

It is more common along the equator than in temperate zones. Indeed:

Seven male schizophrenic outpatients in remission maintained on depot antipsychotic treatment and eight healthy comparison subjects completed a heat tolerance test that consisted of two 50-minute bouts of walking a motor-driven treadmill at 40°C (relative humidity = 40%). A significantly higher rise in rectal and skin temperatures was observed in the patient group. No differences in heart rate, blood pressure, or perspiration were detected.\(^4^4\)

Schizophrenics seem to be better at staying warm than at staying cool, but hibernation calls rather for a drop in body temperature:

Barnes and Team Squirrel (as he calls his collaborators) have recorded the lowest body temperature of any living mammal — 26.6 degrees Fahrenheit — in an Arctic ground squirrel\(^4^5\)

This is -3°C in a warm-blooded creature. Schizophrenia is more common in the tropics, but in the tropics it is more common in southeast Asia than in Africa, as are neanderthal and denisovan genes. Most black Africans have no neanderthal genes but:

Researchers also have found a peculiar pattern in non-Africans: People in China, Japan and other East Asian countries have about 20 percent more Neanderthal DNA than do Europeans.\(^4^6\)

The correlation between schizophrenia on the one hand and the tropics and neanderthal genes on the other implies that schizophrenia may be due to overheating the ice-age phenotype of neanderthal


\(^{45}\) Nordrum, A. What does a hibernating brain look like? www.scienceline.org, 27 Mar 2014

\(^{46}\) Zimmer, C. Why do East Asians have 20% more Neanderthal DNA than Europeans? New York Times, 23 02 2013
and denisovan hybrids and specifically the complement parts of their immune system:

Complement was discovered many years ago as a heat-labile component of normal plasma that augments the opsonization of bacteria by antibodies and allows antibodies to kill some bacteria. This activity was said to complement the antibacterial activity of antibody, hence the name. Although first discovered as an effector arm of the antibody response, complement can also be activated early in infection in the absence of antibodies. Indeed, it now seems clear that complement first evolved as part of the innate immune system, where it still plays an important role.47

In other words some features of schizophrenia may be typical of healthy hibernation but others to overheating. Schizophrenia is widely taken to be a degenerative brain disease but

… basal ganglia volumes relative to total brain volume were larger in schizophrenia subjects than healthy comparison subjects.48

The report neglects to mention the season of measurement. More recently:

Researchers found evidence that suggests the brains of schizophrenia patients have the ability to repair themselves to fight the mental illness.

Once more we are treated to a hidden persuader, in this case that healing is a military activity. The relevant point is that schizophrenia seems able to reverse itself.

The study showed that while schizophrenia is generally linked to a widespread reduction in brain tissue volume, certain regions of the brain among those with the condition showed a subtle increase in tissue over time. The findings suggest that in terms of gray matter volume, the brains of schizophrenic patients become more 'normal' the longer that they have the condition.49

**Diabetes**

Schizophrenia tallies negatively with diabetes mellitus type 1 and positively with diabetes mellitus type 2:

A new Finnish study has identified a possible negative association between schizophrenia and type 1 diabetes. The results suggest that individuals with this type of diabetes are less than half as likely as those without to develop schizophrenia. A positive link between schizophrenia and type 2 diabetes is well established … The Helsinki team concedes that the negative association between the two illnesses revealed in their study is puzzling.50

This implies that the two kinds of diabetes typify two kinds of humans. Type 1 occurs more often in cooler regions:

48 Marnah D et al. Structural analysis of the basal ganglia in schizophrenia, Schizophren Res, 2007 Jan 89(1-3): 59-71
49 Lee R. Brains of schizophrenia patients attempt to self-repair, MRI scans reveal, Tech Times, 28 May 2016
The frequency of type 1 diabetes varies widely in different countries, from less than 1 case per 100,000 people per year in China and parts of South America to more than 20 cases per 100,000 people per year in places such as Canada, Finland, Norway, Sweden and the United Kingdom.\(^{51}\)

It is also seasonal:

Analysis of the seasonality in diagnosis of Type 1 diabetes was based on the incidence data in 0- to 14-year-old children collected by the World Health Organization Diabetes Mondiale (WHO DiaMond) Project over the period 1990-1999), one hundred and five centers from 53 countries worldwide provided enough data for the seasonality analysis. The incidence seasonality patterns were also determined for age- and sex-specific groups. Forty-two out of 105 centers exhibited significant seasonality in the incidence of Type 1 diabetes (P < 0.05). the existence of significant seasonal patterns correlated with higher level of incidence and of the average yearly counts. The correlation disappeared after adjustment for latitude. Twenty-eight of those centers had peaks in October to January and 33 had troughs in June to August. The seasonality of the incidence of Type 1 diabetes mellitus in children under 15 years of age is a real phenomenon.\(^{52}\)

Type 1 diabetes mellitus is characterized by loss of the insulin-producing beta cells of the islets of Langerhans in the pancreas, leading to insulin deficiency. This type can be further classified as immune-mediated or idiopathic. The majority of type 1 diabetes is of the immune-mediated nature, in which a T-cell-mediated autoimmune attack leads to the loss of beta cells and thus insulin. It causes approximately 10% of diabetes mellitus cases in North America and Europe.\(^{53}\)

Type 1 consists in a drop in the number of cells producing insulin so lessens the amount of energy supplied to all organs, whereas type 2 consists in a resistance to using insulin so maintains a supply of energy to some organs while tranquillizing others:

Despite the ill effects of severe insulin-resistance, recent investigations have revealed that insulin-resistance is primarily a well-evolved mechanism to conserve the brain's glucose consumption by preventing muscles from taking up excessive glucose.\(^{54}\)

In effect type 1 is suitable for a race of humans whose activities go on throughout winter but slow down, and type 2 for a race of humans who hibernate and need energy only to maintain their brains. Type 1 may be typical of Homo sapiens sapiens, and type 2 of Homo sapiens neanderthalensis. Indeed type 2 is now known to have come from neanderthals:

The team known as the SIGMA (Slim Initiative in Genomic Medicine for the Americas) Type 2 Diabetes Consortium, performed the largest genetic study to date in Mexican and Mexican American populations, discovering a risk gene for type 2 diabetes that had gone undetected in previous efforts. People who carry the higher risk version of the gene are 25 percent more likely to have diabetes than those who do not, and people who inherited copies from both parents are 50 percent more likely to have diabetes. The

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\(^{51}\) Type 1 diabetes mellitus, Encyclopædia Britannica, 2016
\(^{52}\) Molchanova EV et al. Seasonal variation of diagnosis of Type 1 diabetes mellitus in children worldwide. Diabet Med, 2009 July, 26(7): 673-8
\(^{53}\) Diabetes mellitus, Wikipedia, 2016
\(^{54}\) Insulin resistance, Wikipedia, 2016
higher risk form of the gene has been found in up to half of people who have recent Native American ancestry, including Latin Americans. The variant is found in about 20 percent of East Asians and is rare in populations from Europe and Africa …

The frequency pattern of this variant of *SLC16A11* is somewhat unusual. Humans as a species first arose in Africa, so nearly all common human genetic variants are present in African populations. However, the *SLC16A11* variant – despite being common in Native American populations – is largely absent in African populations, and rare in Europeans. In order to understand this unusual pattern, the team conducted additional genomal analyses, in collaboration with Svante Pääbo of the Max Planck Institute for Evolutionary Anthropology, and discovered that the *SLC16A11* sequence associated with risk of type 2 diabetes is found in a newly sequenced Neanderthal genome. Analyses indicate that the higher risk version of *SLC16A11* was introduced into modern humans through mixing with Neanderthals.55

Diabetes should increase with a decrease in solar activity and the onset of an ice age, and since the peak in 1957 the overall level of solar activity has irregularly fallen, reaching its lowest point so far in 2008. New cases of diabetes in the USA peaked in 2008-2009.56

The trend began in 1959:

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55 New genetic risk factor for type 2 diabetes revealed, Broad Institute, 20 Dec 2013
56 Annual number (in thousands) of new cases of diagnosed diabetes among adults aged 18-79 years, United States, 1980-2014. Diabetes public health resource, Centers for Disease Control and Prevention, Atlanta, GA, USA
Here are the solar maximums over the last two centuries:
Visceral fat

Prince Henry to Falstaff: Here comes lean Jack. Here comes bare-bone. - How now, my sweet creature of bombast? How long is't ago, Jack, since thou sawest thine own knee?  

Diabetes mellitus type 2 also tallies with more visceral fat, though the extent varies with ethnicity:  

<table>
<thead>
<tr>
<th>% correlation</th>
<th>Chinese &amp; Japanese</th>
<th>Europeans &amp; Africans</th>
<th>Pima Indians &amp; Pacific Islanders</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>60-80</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

The Pima are:

North American Indians who traditionally lived along the Gila and Salt rivers in Arizona … From the time of their earliest recorded contacts with European and American colonizers, the Pima have been regarded as a friendly people.

The difference in percentages shows that the 'ailments' loosely tallying with each other are not caused by a single genetic anomaly but are adaptations to a set of conditions. As pointed out:

Neanderthals contributed more DNA to modern East Asians than to modern Europeans.

But, as shown below, the tendency to hibernate is greater among Europeans than among East Asians living on average at lower latitudes. Not only diabetes but also schizophrenia tallies with obesity:

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57 Shakespeare, W. Henry IV, Part 1. Before 1597?
58 Diabetes mellitus type 2, Wikipedia, 2016
59 The Editors of Encyclopædia Britannica, Pima, 2016
60 Wall JD et al. Higher levels of neanderthal ancestry in East Asians than in Europeans. Genetics, 01 May 2013, Vol194, No 1, pp. 199-209
In normal weight patients schizophrenia was significantly linked with visceral adipose tissue, visceral adipose tissue/subcutaneous adipose tissue ratio and lower fat-free mass. Men had over 5 times and women over 2 times as much visceral adipose tissue as body-mass-index matched groups … No clear conclusion can be made regarding cause-and-effect relationships between the dietary content of food served to our patients and visceral obesity.\(^{61}\)

To conserve heat in a colder clime, vital organs should be sheathed in fat.

A new genetic analysis reveals that our brawny cousins had a number of distinct genes involved in the buildup of certain kinds of fat in their brains and other tissues – a trait shared by today's Europeans, but not Asians … Europeans inherited three times as many genes involved in lipid catabolism, the breakdown of fats to release energy, from Neanderthals as did Asians.\(^{62}\)

In effect neanderthals built fat up and broke it down periodically. On the chart below the blue bars stand for 'genome wide sites' and the red bars for 'lipid catabolic processing' sites.\(^{63}\)

The extremes are exemplified by the Yoruba and the Spanish. The LCP sites among the Japanese are fewer than among Europeans, tallying with the slighter seasonality of schizophrenia in Japan. According to researchers in the Department of Biology at Indiana University:

Since the mid-1970's, Americans have been getting bigger. Not taller, just rounder. This is the "obesity epidemic." Of course, many Americans were overweight before that, but a larger percentage has become obese. The graph below shows a pretty clear change-in-

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61  Konarzewska B. Visceral obesity in normal-weight patients suffering from chronic schizophrenia, BMC Psychiatry, 2014; 14: 35

62  Gibbons A. Did Europeans get fat from neanderthals, www.sciencemag.org, 1 Apr 2014

63  Khrameeva K et al. Neanderthal ancestry drives evolution of lipid catabolism in contemporary Europeans, Nature Communications 5, Article number: 3584, 27 Sep 2013
slope at the "1976-1980" timepoint. We would like to know what happened at that time to cause this effect.

**Hibernation**

**Macbeth**
Methought I heard a voice cry 'Sleep no more! Macbeth does murder sleep', the innocent sleep, sleep that knits up the ravell'd sleeve of care, the death of each day's life, sore labour's bath, balm of hurt minds, great nature's second course, chief nourisher in life's feast,--

**Lady Macbeth**
What do you mean?

**Macbeth**
Still it cried 'Sleep no more' to all the house: 'Glamis hath murder'd sleep, and therefore Cawdor shall sleep no more; Macbeth shall sleep no more.'

The buildup and breakdown of visceral fat is a further sign that neanderthals hibernated, since fat is a store of energy. May there be further signs? If they hibernated, they had to mate and bear children within a single season, so:

1. Embryos had to mature fast, and the trend may have lasted throughout childhood.
2. Some modern hybrids may be amorous only in spring.

As regards (1):

It took the Neandertals 2.5 years to form their first molar crowns, compared with 3 years on average in modern humans. Second molars appeared by age 8 in Neandertals,
and 10 to 12 years on average in modern humans. This suggests that Neandertals reached adulthood a few years earlier than modern humans.\textsuperscript{64} Given the relative rates of development, the period of gestation may have lasted about $9\times8/11 \approx 6.5$ months.

Prenatal caloric malnutrition, low birth weight, and prematurity also increase the risk for neurodevelopmental disorders, schizophrenia, affective disorders, and schizoid and antisocial personality disorders.\textsuperscript{65}

The writer of the above takes a statistical correlation to be a causal link. The findings actually show that people more likely to have schizophrenia are those whose mothers ate little, who as embryos matured early and who are at ease alone. The first of these points suggests that the relevant people are not only those with inherited neanderthal traits but also those who have adopted the ice age phenotype. During an ice age the temperatures and the level of solar activity are unusually low and there is less to eat, so not only the temperature and level of solar activity at birth but also the diet may serve as a cue to the climate. If so, a period of fasting may be enough to cause an embryo to adopt the ice age phenotype and to mature faster and be born earlier. Indeed researchers calculated a daily birth rate of 11.9 and 12 in 1981 and 1982 at the Shaare Zedek Medical Center for the 15 days surrounding the Yom Kippur observance. The daily rates jumped to 22 and 26 births for the 24-hour period immediately after the daylong Yom Kippur observance in those two years, the researchers reported in Friday's issue of The Journal of the American Medical Association … No increases in premature births or low birth weight cases were noted in the study, and the researchers said they believed only near-term or at-term infants were affected.\textsuperscript{66}

The findings have recently been confirmed:

Women in an advanced state of pregnancy who fast on Yom Kippur (or for any other reason) are at higher risk for a premature birth, according to researchers at Soroka University Medical Center and Ben-Gurion University of the Negev in Beersheba.

The study by BGU's Natal Shalit and Prof. Eyal Sheiner, deputy head of Soroka and director of the obstetrics D department at the hospital, was published recently in the Journal of Maternal, Fetal and Neonatal Medicine. The team studied the records of thousands of pregnant Jewish women over a period of 23 years to determine the effect of the 25-hour fast.\textsuperscript{67}

As regards (2):

Schizophrenia occurs more often among so-called schizotypes or loners. Are any of their typical traits sexual? According to the World Health Organization their traits are:

1. Emotional coldness, detachment or reduced affect.
2. Limited capacity to express either positive or negative emotions towards others.

3. Consistent preference for solitary activities.
4. Very few, if any, close friends or relationships, and a lack of desire for such.
5. Indifference to either praise or criticism.
6. Little interest in having sexual experiences with another person (taking age into account).
7. Taking pleasure in few, if any, activities.
8. Indifference to social norms and conventions.
9. Preoccupation with fantasy and introspection.

The relevant point is (6). If courtship is seasonal and brief, it may easily be overlooked. This list might also serve as a questionnaire were it not so slanderous. Instead, the list used is the 'magical ideation scale', a set of 30 statements including:

I have had the momentary feeling that I might not be human.
People often behave so strangely that one wonders if they are part of an experiment.
Some people can make me aware of them just by thinking about me.
Numbers like 13 and 7 have special powers.

The feelings of alienation expressed by the first two statements would hardly be surprising from a neanderthal among non-neanderthals, since they were adapted to different conditions, and telepathy would be more useful among people thin on the ground, as in Europe in the ice ages. As regards 13 and 7, the number of days in a year are 364, which is $13 \times 7 \times 2^2$. so a year could be evenly divided into 13 months of 28 days. The period from new moon to new moon consists of 27.32 days, so 28 is a good approximation.

Blood glucose from diabetes may also be useful in hibernation:

While the Ohioan wood frogs could be frozen at -4 degrees Celsius (24.8 degrees Fahrenheit) and revived, the Alaskan wood frog was frozen at temperatures as low as -16 degrees Celsius (3.2 degrees Fahrenheit) before being thawed out and returning to its normal healthy state … The way wood frogs avoid freezing to death is due to so-called cryoprotectants – solutes that lower the freezing temperatures of the animals’ tissues. These include glucose (blood sugar) and urea and have been found in much higher concentrations in the Alaskan wood frogs than in their southern counterparts.

Present-day humans are not thought to hibernate, but this may be due mainly to clothing and central heating. As shown on the world chart above, East Asians are less likely to hibernate than Europeans, especially the Spanish, but:

A Japanese civil servant has described for the first time how he survived for more than three weeks in a mountain forest without food and water in what doctors believe is the first known case of a human going into hibernation.

Mitsutaka Uchikoshi went missing on Mt Rokko in western Japan on October 7 after a barbecue with colleagues. Rather than joining them for the return trip by cable car, the 25-year-old decided to walk down the mountain, but lost his way, slipped in a stream and broke his pelvis.

“On the second day, the sun was out, I was in a field, and I felt very comfortable. That’s my last memory,” he said, shortly before being discharged from Kobe city general hospital on Thursday. “I must have fallen asleep after that.”

68 Sirucek, S. How Arctic frogs survive being frozen alive. Weird & Wild, National Geographic, 21 Aug 2013
When a passing climber found him 24 days later, Mr Uchikoshi's body temperature had fallen to just 22C (72F), he had a barely discernible pulse and he was suffering from multiple organ failure and blood loss.

Doctors who treated Mr Uchikoshi believe he lost consciousness after his fall and that his body's natural survival instincts kicked in, sending him into a state akin to hibernation as the temperature on the mountain dropped as low as 10C.

“He fell into a state similar to hibernation and many of his organs slowed, but his brain was protected,” Dr Shinichi Sato, head of the hospital's emergency unit, told reporters. “I believe his brain capacity has recovered 100%.” …

In 2001, Canadian toddler Erika Nordby wandered outside at night in sub-zero conditions and was later found by her mother, almost frozen solid. Despite the fact that she was pronounced clinically dead – her heart had stopped beating for two hours and her temperature had dropped to 16C from the normal 37C – Erika made a full recovery.

As regards Erika, whose mother has native American forebears:

It was -24C in the early hours of February 23, 2001 – a week after the toddler's first birthday – when Erika Nordby slipped through an unlocked door at her rented 12213 46 St. home into the night wearing only a pink t-shirt and a diaper. Leyla (her mother) woke after 3 a.m. confused as to why Erika hadn't woken her an hour earlier begging for her bottle. After a frantic search, Leyla looked out into the snow and saw Erika, collapsed and curled up into a ball.

“She was so cold,” Leyla recalls, remembering screaming “don't let my baby die,” while wrapping blankets round her frozen daughter, afraid to hold her too tightly for fear of breaking off her frozen limbs. Paramedics and police officers flooded the scene, grabbing Erika out of her mother's arms. Leyla will never forget the solid thump she heard of her frozen daughter hitting the table.

Doctors were astonished when she showed no signs of brain damage. Her recovery drew attention from around the world.

Erika seems to be something of a loner 'constantly tormented' by other children at school.

But through the ridicule, Erika looks back with a sense of pride and uses it as a source of strength when faced with bullying… Like the scars from frostbite and skin grafts on Erika's hands and feet, Leyla hopes her daughter's emotional scars from the constant teasing will also fade with time.

A tendency to hibernate if chilled seems to be widespread among humans:

Hibernating animals will often dig or burrow into a small, enclosed den to spend the winter… Humans, in the final throes of severe hypothermia, exhibit a somewhat similar behavior known to researchers as 'terminal burrowing'. In a 1995 article in the

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69 McCurry J & Jha A. Injured hiker survived 24 days on mountain by 'hibernating'. Guardian, 21 Dec 2006
70 Theobald C. Years later Edmonton 'miracle baby' still feels stigmatized. Edmonton Sun, 28 Aug 2014
71 Saskatchewan tragedy strikes painful chord with city mom. Edmonton Journal, 06 Feb 2008
International Journal of Legal Medicine, researchers from Germany described hypothermia victims ‘in a position which indicated a final mechanism of protection, i.e. under a bed, behind a wardrobe, in a shelf, etc.’

Autism

The World Health Organization’s characterization of schizotypes suggests that they are autistic in the sense of being self-sufficient. This is suitable for life in bleak regions in ice ages, so autism should be increasing with the decrease in solar activity, and indeed this seems to be happening.

The increase in prevalence is so enormous that efforts have been made to cut it down to size by ascribing it to changing definitions and a more active medical service, but the general view seems to be that adjustments are more likely to lessen the slope on the graph than to eliminate it altogether. In fact it offers an explanation for wide-ranging political changes.

Isolationism

The following graph shows that the traditional distinction between radical and conservative is becoming less of a distinction between poor and wealthy than a distinction between gregarious and non-gregarious.

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72 Lallanilla, M. Get naked and dig: the bizarre effects of hypothermia. Livescience, 05 12 2013
According to a Gallup Poll in 2012, 22% of democrats and 02% or republicans were black. If people are now changing into their ice-age phenotype, and this is happening sooner among people with neanderthal DNA, there should be a notable rift between the two sets of phenotypes, not a single bell curve with radicals and conservatives as the two extremes. Indeed, this too tallies with findings.
Not surprisingly resistance to immigration is increasing, since the density of population is much too high for comfort as well as for the ecology. There is no point in having fewer children if others then come from elsewhere.

**Sunspots & ailments**

As shown above, there are correlations between levels of solar activity on the one hand and influenza, schizophrenia and diabetes on the other. Are there any further correlations? Alberto Saco Álvarez in Galicia has checked.  

**Tabla 1: Correlación entre enfermedades de transmisión genética y actividad solar**

<table>
<thead>
<tr>
<th>DIAGNÓSTICO</th>
<th>POR MESES</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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<td>Alzheimer</td>
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<td></td>
<td>Ingresos</td>
<td>0.85</td>
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<td>51-60</td>
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<td>Anomalías congénitas</td>
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<td></td>
<td>1er año</td>
<td>-0.56</td>
<td>54-60</td>
<td></td>
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<td>Cáncer de colon y mama</td>
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<td>54-60</td>
<td>0.80</td>
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<td>54-60</td>
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<td>Esclerosis</td>
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<td>20-30</td>
<td>0.88</td>
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<tr>
<td>Esquizofrenia</td>
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<td>54-60</td>
<td>-0.89</td>
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<td>54-60</td>
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<tr>
<td>Diabetes</td>
<td>-0.82</td>
<td></td>
<td>10-13</td>
<td>-0.62</td>
<td></td>
<td>9-20</td>
<td></td>
</tr>
</tbody>
</table>

Fuente: Estadística de Morbilidad Intrahospitalaria 1999, INE y NOAA (Elaboración propia)

73 Álvarez AS. Radiaciones atómicas y enfermedades de transmisión hereditaria, Ourense, 23 Feb 2010

74 En el caso de las anomalías congénitas sólo es posible detectar la relación mes a mes el primer año de vida (cuando se detectan). Después de esa edad las correlaciones se ven distorsionadas por la mortalidad. Por eso, el coeficiente de correlación es negativo en la cohorte de 54 a 60 años.
The correlation for autism was -0.83 in the first year of life. Since 1957 even the incidence of diabetes type 1 has been increasing:

Researchers are baffled by the worldwide increase in type 1 diabetes, the less common form of the disease. For reasons that are completely mysterious, the incidence of type 1 diabetes has been increasing throughout the globe at rates that range from 3 to 5 percent a year … No one knows exactly why type 1 diabetes is rising. Solving that mystery – and, if possible, reducing or reversing the trend – has become an urgent problem for public health researchers everywhere.\(^{75}\)

\[
\text{T1D Incidence (# new cases/yr) is doubling every 20 yrs}
\]

(From: Improving lives, curing type 1 diabetes. JDRF Tornot, 2016)

Within Europe the highest rates of childhood diabetes are found in Scandinavia and north-west Europe, with an incidence range from 57.4 cases/100,000 per year in Finland to 3.9/100,000 in Macedonia for children aged 0–14 years. Genetically related populations may differ in incidence: for example, type 1 diabetes is more common in Norwegians than in Icelanders of largely Norwegian descent, while Finnish children have a threefold risk compared with Estonians.\(^{76}\)

Winter temperatures in Norway are lower than in Iceland, which is warmed by the Gulf Stream, and Finland lies north of Estonia. Álvarez’ two sets of correlations – positive and negative – were confirmed by Antonio Ventriglio in the south of Italy:

We collected data on diagnoses and birthdates of psychiatric patients born between 1926 and 1975 (N = 1954) in south Italy for comparison with yearly solar activity as registered by the International Observatories. We found a strong inverse correlation between high solar activity (HSA) and incidence of schizophrenia and bipolar disorder in a 20-year period whereas the incidence of non-affective/non-psychotic disorders was moderately associated with HSA in the same period.\(^{77}\)

\(^{75}\) Diabetes mystery: Why are type 1 cases surging? [https://healthsolutions.com](https://healthsolutions.com), 2016
\(^{76}\) Epidemiology of type 1 diabetes, Diaepedia, 2016
\(^{77}\) Ventriglio A et al. Birthdates of patients affected by mental illness and solar activity: A study from Italy, Advances in Space Research 47(7): 1135-1139, April 2011
Further positive correlations have since been found by Simon Wing and Lisa Rider in the USA in researching into rheumatoid arthritis (RA) and giant cell arteritis (GCA):

The findings found increased incidents of RA and GCA to be in periodic concert with the cycle of magnetic activity of the sun … The research … tracked correlations of the diseases with both geomagnetic activity and extreme ultraviolet (EUV) solar radiation … Correlations proved to be strongest between the diseases and geomagnetic activity. GCA incidence – defined as the number of new cases per capita per year in the county – regularly peaked within one year of the most intense geomagnetic activity, while RA incidence fell to a minimum within one year of the least intense activity. Correlations with the EUV indices were seen to be less robust and showed a significantly longer response time.  

This implies that organisms are reacting to atmospherics, not radiation. As Ventriglio noted, high levels of solar activity tally with ailments and low levels with modes of behavior, so it is not as if humans had adapted to a mean level of solar or geomagnetic activity. Low levels seem to be harmless and high levels harmful. But how do they cause harm? Are they harmful as such or do they merely increase the virulence of infections?

As regards congenital anomalies:

The possible effects of transplacental viral infections are several. Fetal loss may occur by means of abortion or stillbirth. There may be infection of the fetus, with clinical manifestations such as rash, or without clinical manifestations. The infant may be born with congenital defects, including such deformities as cataracts, cardiac anomalies, mental retardation or cerebral palsy.  

Alzheimer's too may be due to infection:

The possibility of an infectious etiology for Alzheimer's disease (AD) has been repeatedly postulated over the past three decades. We provide the first meta-analysis to address the relationship between bacterial infection and AD … We found over a ten-fold increased occurrence of AD when there is detectable evidence of spirochetal infection (OR: 10.61; 95% CI: 3.38-33.29) and over a four-fold increased occurrence of AD in a conservative risk estimate (OR: 4.45; 95% CI: 2.33-8.52). We found over a five-fold increased occurrence of AD with Cpn infection (OR: 5.66; 95% CI: 1.83-17.51). This study shows a strongly positive association between bacterial infection and AD. Further detailed investigation of the role of bacterial infection is warranted.  

Indeed defense measures have a cost-benefit ratio, and Alzheimer's may show the cost:

The protein globs that jam brain circuits in people with Alzheimer's disease may not result from a sloppy surplus, but rather a bacterial battle, a new study suggests. Previously, researchers assumed that the protein – beta amyloid – was just a junk molecule that piled up. And efforts to cure Alzheimer's focused on clearing out clogs.

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78 Greenwald J. Researchers correlate incidences of rheumatoid arthritis and giant cell arteritis with solar cycles, Princeton Journal Watch, 15 June 2015
and banishing beta amyloid from the brain. But a new study conducted using mice and worms suggests that the protein clumps are actually microbial booby traps, sturdy proteinaceous snares intended to confine invading microbes and protect the brain.\textsuperscript{81}

In fact the globs may indeed be due to a surplus, though not to a sloppy one. The laying of booby traps may often be preemptive, to counter anticipated infections, and have the incidental effect of clogging the brain. The production of antibodies is likewise preemptive, since the immune system would have no time to invent matching antibodies in reaction to an attack. It has to stock a whole range of antibodies beforehand, then it can react to an attack by choosing the most suitable one.

The role of infection in colon and breast cancer is more dubious, the only two causes given at www.cancer.org being gene mutations inherited or acquired. As for sclerosis or multiple sclerosis:

Since initial exposure to numerous viruses, bacteria and other microbes occurs during childhood, and since viruses are well-recognized as causes of demyelination and inflammation, it is possible that a virus or other infectious agent is the triggering factor in MS. More than a dozen viruses and bacteria — including measles, canine distemper, human herpes virus-6, Epstein-Barr, and Chlamydia pneumonia — have been or are being investigated to determine if they are involved in the development of MS, but none have been definitively proven to trigger MS.\textsuperscript{82}

In effect the question remains open, but the disturbing effects of electrical gadgets on Janice Tunnicliffe suggest that higher levels of solar activity may not only cause more organisms to switch over to their green-age phenotype but may also interfere with cell regulation. But if so, how?

\textbf{Timers}

Pharaoh Akhenaten had a sunny disposition:

\begin{quote}
Thou appearest beautifully on the horizon of heaven,
thou living Aten, the beginning of life!
When thou art risen on the eastern horizon,
thou hast filled every land with thy beauty.
\end{quote}

Falstaff was more of a lunatic:

\begin{quote}
Let not us that are squires of the night's body be called thieves of the day's beauty. Let us be Diana's foresters, gentlemen of the shade, minions of the moon, and let men say we be men of good government, being governed, as the sea is, by our noble and chaste mistress, the moon, under whose countenance we steal.\textsuperscript{83}
\end{quote}

Álvarez surmised that atmospherics serve as timers and regulators:

\begin{quote}
This biological link (Schumann resonance) to the environment is presumed to act as a chronobiological mechanism or Zeitgeber or, even further, to act in the long term as a source of genetic diversity and adaptability.\textsuperscript{84}
\end{quote}

\begin{thebibliography}{99}
\bibitem{81} Mole, B. Brain infections may spark Alzheimer's, new study suggests. Ars technica, 30 May 2016
\bibitem{82} National Multiple Sclerosis Society, 2016, http://www.nationalmssociety.org/What-is-MS/What-Causes-MS
\bibitem{83} Shakespeare, W. Henry IV, Part 1, Scene 2. About 1597
\bibitem{84} Álvarez, AS. Effects of extremely low frequencies on human health, Advanced Research in Scientific Areas, Dec, 3-7.2012
\end{thebibliography}
In effect the earth and the ionosphere create a resonance body, but the waves thus reinforced are due to sporadic lightning so are useless as timers and regulators. Others, however, are due to the sun and moon. Do their frequencies tally with those of brainwaves? These cluster into wavebands, the main ones being delta, theta, alpha, beta and gamma, whose boundaries are shown below.\(^{85}\)

Each frequency is double the foregoing, so these are octaves. What tonic are they based on? Is it the basic frequency of Schumann resonance or of the regular rising of the sun or moon? The figures given for brainwaves are for boundaries, not median values, so octaves of a possible tonic must be multiplied by \(\sqrt{2}\) (since \(\sqrt{2}\times\sqrt{2} = 2\)) for the sake of comparison.

<table>
<thead>
<tr>
<th>Waveband</th>
<th>Brainwaves</th>
<th>Schumann res.</th>
<th>Solar day</th>
<th>Lunar day</th>
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<tr>
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<td>32</td>
<td>44.29</td>
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</table>

The best match is for a lunar day. This would be impractical for gregarious locusts, which fly by day, not at night, whereas solitary locusts should wake up only at sunset or moonrise. What about neanderthal hybrids?

Two pivotal studies have been published in this journal recently that specifically describe sleeping and waking behavior in schizophrenia ... there were indeed abnormalities in a substantial proportion of patients, with most showing longer sleep times than controls. The sleep phase in 50% of patients was out of synchrony with the environmental night-time, as was the rise and fall of melatonin (the biomarker for circadian rhythm). In general the patients had lower levels of daytime activity than the healthy unemployed group, and some also had an abnormally low amplitude of melatonin variation.\(^{86}\)

So indeed their cycles are not in phase with the sun's. What happens if researchers linger in caves, as if in hibernation? They would have to be neanderthal hybrids to put up with the solitude. The 24-hour cycle of sleeping and waking changes into a cycle of 24.2 to 25.5 hours.\(^{87}\) The mean value of 24.85 hours tallies with the mean length of a lunar day of 24.83 hours. The day's length varies on account of the earth's tilt and the moon's changing position and tallies with the variation in the cycle of sleeping and waking.

Why should neanderthal hybrids rely on moonrise rather than sunset? In the tropics it may be useful to come out only at night, to avoid the heat of the day, but in the cool north it may be useful only for

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85 The frequencies are given under separate articles on each waveband in the Wikipedia, 2016
86 Wilson S, Argyropoulos S. Sleep in schizophrenia: time for closer attention. The British Journal of Psychiatry, Apr 2012, 200 (4) 273-274
87 The Brain from Top to Bottom, www.thebrain.mcgill.ca
the sake of traveling under cover of darkness. If darkness were absolute, there would be little hope of finding the way without stumbling, so it would be wiser to rely on moonrise rather than sunset. Shakespeare lets Hamlet's father be nocturnal but maybe too custom-bound:

But, soft! Methinks I scent the morning air; brief let me be. Sleeping within my orchard, my custom always of the afternoon, upon my secure hour thy uncle stole, with juice of cursed hebenon in a vial, and in the porches of my ears did pour the leperous distilment; whose effecti hold such an enmity with blood of man that swift as quicksilver it courses through the natural gates and alleys of the body, and with a sudden vigour doth posset and curd, like eager droppings into milk, the thin and wholesome blood; so it did mine...

How do hibernating creatures know when to come out of hibernation?

Males (Arctic ground squirrels whose body temperatures can drop to below freezing), who wake up first, are thought to know when it's time to begin the warming process thanks to a circannual clock in their brains and also by detecting soil temperatures.

Why in their brains? Chemical processes vary with temperature but the sun's rate of rising is always the same, so the sun would be more reliable. However, the interval between the sun's rising and setting in the course of a year varies in the Arctic from 0 hours to 24 hours, so if cells can sense the sun's rising and setting, squirrels need only wait till 12- and 6-hour atmospherics due to its rising move into phase with 12- and 6-hour atmospherics due to its setting before welcoming spring.

**Resonance**

Atmospherics are extremely low frequency waves (ELFs) so bear little energy. Cells would hardly be able to sense them without having resonance bodies, one of which was found in the late 1970s. A printing works in München was making notable losses, since the quality of its graphics was varying with the weather. It turned out that organic gelatine in the copper rotogravure process was reacting to atmospherics.

The cause was the non-thermal influencing of the spatial structure of the polyproline-helix of the gelatine by the natural atmospheric impulse radiation. Polyproline-II helixes are involved in transcription, cell motility, self-assembly, elasticity, and bacterial and viral pathogenesis...

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88 Shakespeare W. Hamlet, Act 1, Scene 5, about 1600
89 Gough Z. Arctic ground squirrels supercool slumber. BBC, Earth, 18 Feb 2015
The time for osmotic diffusion through the natural gelatine varied non-thermally with atmospherics based on a frequency of one cycle in 24 hours, and most of them were octaves – frequencies of $2^n$ cycles in 24 hours, where $n$ is a whole number.\(^9\) Two of the spectral peaks were at 6,226.26 Hertz and 12,452.52 Hertz, the frequency of the second being twice that of the first. 6,226.26 Hertz means 1 cycle in 1/6,226.26 seconds and 1/(6,226.26 x 60) minutes, so there are $2^{29}$ cycles in 1437.115 minutes. The sun rises once in about 1440 minutes and an outer planet once in about 1436 minutes.

Since the gelatine is attuned to the sun and planets, it seems likely that these too are used as timers, but what could they time? Traditionally they were thought to time birth and be chosen according to a child's inherited temperament, as shown by the gospel according to Mateus, where the magi travel to find a child whose birth has been timed by the rising of a certain star or cluster of planets.

**Birth**

For the following investigation the names of composers were taken from lists in the Wikipedia then augmented by the names of recent British composers not listed. Dates and times of birth were then sought at [www.astro.com](http://www.astro.com). They were found for no medieval composers and for only one additional British composer – Delius. Results were best for the sun.

![The sun's rising at the birth of classical composers](image.png)

The significance may be measured with the chi test by treating the number of cases in the regular crests as one set and the number in the regular troughs as another and comparing these to chance. The likelihood turns out to be 0.0039, which is very significant. But the results are not only significant but also meaningful. There are four 6-hour carrier waves in a 24-hour envelope.

These results may be compared with others for Parisians in general: To find out whether or not children favor the same timers as parents, the researchers Michel and Françoise Gauquelin gathered data from Parisian hospitals.\(^9\) The parents' data are listed chronologically, the first being mainly from the 1880s, a period of few sunspots, as shown on a graph above. Here are results for the sun.

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\(^9\) These data are now available online at [www.cura.free.com](http://www.cura.free.com)
The four 6-hour waves have become one 24-hour wave and shifted to the left by about 3 hours. As shown by the author elsewhere, they shifted about 6 hours to the right in the 1960s and 70s after the number of sunspots peaked. In effect the time taken for cells to sense and identify atmospherics due to the sun increased with an increase in solar activity, as if this interfered with the typical atmospherics. To assess the level of solar activity and likely climate, cells need only check how long it takes them to sense and identify atmospherics due to the sun.

**Gene expression**

Traditional astrology includes not only the notion that human birth is timed by the rising of planets but also the notion that conditions at birth have lasting effects. This tallies with the finding, mentioned above, that epigenetic marks dating back to the season of birth are still present 18 years later in people with allergies; the author has shown elsewhere that the births of eminent French sportsmen are often timed by Mars with Neptune as a chance auxiliary, which then has a lifelong effect; and Álvarez has shown that correlations with sunspots at the time of conception are weaker than correlations a year later, nearer the time of birth. According to astrology, phenotypes also change in response to later conditions, which is likewise in line with Álvarez' findings.
Apparently astrology began as the science of exogenous regulation and should not be judged in terms of present misunderstandings.

Parallels

Where should this music be? i' the air or the earth?
It sounds no more: and sure, it waits upon some god o' the island. Sitting on a bank, weeping again the king, my father's wreck, this music crept by me upon the waters, allaying both their fury and my passion with its sweet air: thence I have followed it, or it hath drawn me rather. But 'tis gone...

Not only songbirds but also neanderthals are likely to have been seasonal, but to what extent should changes in their brains have been alike? Songbirds rely greatly on song in courtship, but could neanderthals sing or speak? A hyoid bone found in Israel in 1989 has recently been investigated:

To many, the Neanderthal hyoid discovered was surprising because its shape was very different to that of our our closest living relatives, the chimpanzee and the bonobo. However, it was almost indistinguishable from that of our own species. This led to some people arguing that this Neanderthal could speak … From this research we can conclude that the origins of speech and language are far, far older than once thought.

Deep-chested neanderthals are recalled by natives in Central America as howler monkeys, whose calls can be heard for three miles through dense rainforest.

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94 Shakespeare W. The Tempest. 1610-11
95 Talking Neanderthals challenge the origins of speech, www.sciencedaily.com, 02 Mar 2014
96 Howler Monkey, Wikipedia, 2016
The mantic values of the Chuen/Batz Artisan/Howler Monkey agree with those of the Aztec day Ozomatli (Spider) Monkey. For Ozomatli we read: And he who was then born they regarded favorably … And he would be, perchance, a singer, dancer, or scribe; he would produce some work of art. For the Quiché we have: ‘There is then some singing. There is then some flute and drum (sic), carving, painting [under which writing is probably subsumed], silver-work, weaving, spinning – very good days. For the Yucatec it is: ‘Wood carver. Weaver is its sign. Master of all crafts – very rich his whole life; very good everything he does; judicious.’

Neanderthals had red or russet fur and appear in the Chinese version of the zodiac as Red Monkey, the equivalent of the can-man Aquarius in the west. The Indian equivalent is the can-man or canoe-man Hanuman, bearing a cone of herbs. The herbs typify him as a medic and the cone as an astronomer, since cross-sections of a cone are ellipses, and planets move in ellipses round the sun. The cone also stood for Mount Meru, the wooded home of the pandavas or Pan and the divas, known in Buddhism as the heavenly musicians, the gandharvas. In fact there is

an association between the frequency of certain genes involved in brain growth and development (ASPM and Microcephalin) and the prevalence of tone languages … Since the variants of these genes associated with non-tonal languages seem to have been absent from neanderthals, it is reasonable to suppose that Neanderthal languages were most probably tonal.

Tonal languages rely on pitch. Neanderthals appear in the zodiac not only as the can-man Aquarius but also as the goat-man or satyr Capricorn, and a Greek tragedy was originally a goat-song (tragos-aeidein), a chorus of satyrs. In Sherwood Forest they appear as Robin Hood or robin redbreast and Will Scarlet. In Arthurian legend they appear as various characters such as Merlin, the merle noir, the blackbird. In Scandinavia they appear in the world-tree, the Yggdrasil (egg-thrush), as thrushes, and in northwestern Australia as the legendary painter Gwion.

Gwion is a Ngarinyin word for the Sandstone Shrike Thrush; legend has it that the Gwion paintings were painted by the Sandstone Shrike Thrush with a bloody beak. Their superb song is often amplified by their rocky environment.

In Arthurian legend Gwion has not a bloody beak but a red-hot finger, being

the son of Gwreang who was left by Ceridwen to stir her cauldron. Drops from it landed on his finger which he sucked and at once understood everything that had happened or was to happen. He fled to avoid Ceridwen, both pursuer and pursued changing into different shapes. Gwion eventually changed himself into a grain of wheat and she changed herself into a hen and swallowed him. She became pregnant with him and bore him as Taliesin.

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97 Braakhus HEM. Artificers of the days: functions of the howler monkey gods among the Mayas. Leiden, Bijdragen tot de Taal-, Land- en Volkenkunde 143, no: 1, 1987, p. 27
98 Dediu D & Levinson S. On the antiquity of language: the reinterpretation of Neanderthal linguistic capacities and its consequences, Front Psychol. 2013; 4: 397
101 Other characters of Arthurian legend, Gwion. King Arthur & the knights of the round table, www.kingarthursknights.com
Taliesin was a renowned bard who is believed to have sung at the courts of at least three Brythonic kings.  

Summary

To be, or not to be: that is the question: whether 'tis nobler in the mind to suffer the slings and arrows of outrageous fortune, or to take arms against a sea of troubles, and by opposing end them?

The correlations of low levels of solar activity with bipolarity, schizophrenia, diabetes, visceral fat and autism imply that they are no ailments but adaptations. Humans are parts of nature and their local terrain, to which they have adapted over thousands of generations, and in the course of their evolution they have passed through many ice ages and green ages. These they are better able to survive by choosing the matching phenotype according to conditions at birth like the number of sunspots.

Humans differ not only in their phenotype but also in whether or not they have neanderthal genes, and if so, which, so can hardly be expected to reflect the same norms. They have not a single norm with a few peripheral variants but two very different norms, the one being adapted to non-seasonal life in the lush tropics and the other to seasonal life in the bleak north. Efforts to change one kind of human into another with the help of medication have been disastrous:

Those affected with schizophrenia suffered the most brain tissue loss in the two years after the first episode, but then the damage curiously plateaued – to the group's surprise … The researchers also analyzed the effect of medication on the brain tissue. Although results were not the same for every patient, the group found that in general, the higher the anti-psychotic medication doses, the greater the loss of brain tissue.

The extent of the disaster is hardly surprising. If a person is packed in ice, he will shiver to stay warm, and if he is packed in more ice, he will shiver even more. Trying to drug a neanderthal into not hibernating or a nightingale into not sleeping during the day is genocidal.

About 280,000 people are currently being treated for schizophrenia in the UK. Of these 10% will die by their own hand within ten years of their diagnosis. With an annual death toll of between 800 and 1,800 in the UK alone, suicide is a major cause of premature death amongst people with schizophrenia and on a par with road deaths.

Billions of dollars are devoted to these ends by state authorities. Apartheid would be preferable.

102 Taliesin, Wikipedia, 2016
103 Shakespeare W. Hamlet Act 3, Scene 1, about 1600
104 Gustafson J. How schizophrenia affects the brain, Iowa Now, 10 Sep 2013