

A Critical Review of Fractal Time Concept of Greg Braden

Gabriel Makuei,

RMIT University, Australia

Abstract

Gregg Braden observed certain cyclic temporal patterns in some past events and some natural phenomena. He theorized a fractal time concept based on these observations and developed equations and software to calculate years in which cyclic patterns of specific types of events can occur in future. Has he given tabulated data on predicted and actual times of occurrence of some events? If the answer is yes, his theory works well and the method can be applied for some future events also. Will such predictions come true? So far, it is science. Predictability of short-term cycles could be valid as the conditions defining the variables and their predictability do not change appreciably. However, that may not be the case for its long term applicability. Defining conditions of variables and their predictability can vary significantly over time. Braden seems to consider only the time-event relationship and does not appear to consider the conditions determining the mathematical relationship between time and event. This serious limitation can limit its validity and therefore applicability to all conditions including cyclic events which occur over long periods of time. It appears that the fractal time theory of Gregg Braden has not been subjected to any scientific verification test so far.

Keywords: Fractal Time, Future Prediction, Cyclicity, Age Cycles

Critical Review

Braden (2009) notes that five cycles of world age cycles over the last 26000 years have preceded the current generation of human beings. This observation is based on the study of the historical records and literature of Mayan, Hopi and Hindu cultures. But he relies primarily on the Mayan culture of South America. His fractal time concept links known events with the time scales prescribed in Mayan form of astronomical calculations. Accordingly, each world age cycle lasts 5125 years. The current world age began in 3114 BC and ended on 21 December 2012. On the earlier occasions, catastrophic signs were noticed marking the nearing world age end. They had made efforts of high levels for successful survival against these signs past the end of world age. The end date of 21 December has been clearly noted 2000 years ago as has been firmly established in Mayan inscriptions.

Braden used the long count calendar of Maya. When read from left to right, it consists of decreasing time scales of baktun = 144000 days, katun=7200 days, tun=360 days, uinal=20 days and kin=1 day. The end of world age given by Mayan calendar is: 13.0.0.0.0 or 13 baktuns. The author back-calculated and converted this scale into the Gregorian calendar to arrive at 21 December 2012.

Several questions need answers here. There had been other astronomical calendars by other civilisations as well like the Egyptian, Arab, Hindu Vedic, and Chinese etc. from which also such calculations are possible. Each may give a different answer. Why did the author choose the Mayan system? Did he compare the different methods? There is no indication of such a comparison in the book.

The author seems to accept Maya calendar in preference to Hopi or Hindu calendar (only these two are mentioned, other cultures not even mentioned) only because it defines perceivable cycles of 5000 years and not astronomically large numbers, which can reduce predictability. For example, the Hindu astronomy prescribed four yugas-time periods before the world ends. These yugas-krita, treta, dwapara and kali-last 1728000, 1296000, 864000 and 432000 years respectively and together the mahayugas or chaturyugas. Now we are in kali Yuga which started on 18 February 3102 BC of Julian calendar or 23 January 3102 BC of Gregorian calendar. Adding 432000 years to this, it is clear that the end of this period is very far away. It needs 71 cycles of these four yugas for partial destruction of this world. Now we are in the 28th of seventh mahayuga. Thus different cultures give different answers for world age. It is very difficult to say one is correct and another is wrong. Thus his statement that all cultures indicate an imminent shift from current age to a new one (p12) is not correct.

Braden proposed some so called time codes as the basis of his fractal time concept. The first six are reviewed as numbered and subsequent ones are reviewed by topics later.

1. The current world age will end on 21 December 2012 as per Maya calculations.

Last cycle ended in 3114 BC. The fact that the author could not give a specific date as the current case is amusing. He seeks the support from the interest of modern scientists on the concept of world age. However, the interest of modern scientists on world age is for an altogether different purpose. It is to help them in studying astronomical evolution and origin of life and its evolutionary processes.

2. Mayans have recorded precisely the events associated with end of world age and steps they adopted to mitigate adverse effects of such events.

Since cyclic pattern of end is noticed, it also marks the beginning of next age. To know the beginning of next age, the end of current age must be known or vice versa. For short term events like seasons, lunar phases etc. it is easy, but not for long term astronomical indications. Braden has merely stated that both Hindu and Mayan and other cultures describe about periods of darkness, ignorance, cruelty etc. as landmark of imminent world age end. He has failed to recognise the deeper significance of the statements in Hindu epics or other stories.

Here again the effect of earth's position in its elliptical orbit is only temporary during certain times of the year and not permanent, as it completes its rotation around the sun on the elliptical orbit within one year. Thus modern science does not help him.

The archaeological evidence of sleeping dolls in Indus Valley excavations do not any way relate to the Mahabharata story as the author claims for two strong reasons: Mahabharata happened long before Indus Valley civilization and they do not necessarily depict war-fleeing as they are individual dolls. Not only Mayas, but other astronomers also knew astronomical configurations that marked time lines.

The whole theory disintegrates when the author states-

“To be absolutely clear, this is not an event that happens suddenly in a single day. In other words, our crossing of the imaginary line that divides our galaxy does not suggest that we'll all go to bed on December 20, 2012, in one world and wake up the next morning to a radically different world on the 21st. Rather, the winter solstice appears to be the astronomical marker that the Maya chose to designate the centre of the transition zone. That zone begins well before and ends well after 2012. “

The last sentence indicates that the end of age begins much earlier and last longer on either side of 21 December 2012. Thus the date is not absolute. A specifically disastrous astronomical positioning of different planets and/or sun is possible. This is what Maya would have indicated.

The author cites the work of Jenkins to establish that the progress of the sun along the equator of the Milky Way started in 1980 and will end in 2016. If a different calendar like that of Hindu is used, accurate prediction to the exact date is possible.

3. New discoveries open the way to think of time as an essence to follow the same rhythms and cycles that govern everything from particles to galaxies.

Although this is true to a large extent, time is also relative and there are non-rhythmic events also happening. These allow for variations to differentiate one specific rhythm from another. Two era changes may not be the same. The differences are due to non-rhythmic elements.

4. Events happening in specific times can be considered as places within cycle points, which can be calculated, measured and predicted.

Here specific events are placed and measured along a time scale consisting of a series of events. Time connects the past with the future. This is not a new concept. If we know how to read the past, we may be able to read the future if the parameters express the same way. But difficulty arises when they do not and in most cases, it is so.

Here the author admits that the Mayan calendar indicates only probabilities and not certainties. Only, he insists that knowing the situations which prime the event will help us to prepare for it.

In that case, why this was/is not being used to stop attack by terrorists?

5. If we know our position in the cycle, we can predict what to expect when the cycle repeats.

Already we are always in a cycle as the cycle is continuous. End of one cycle marks beginning of another. If we know our position too late in the cycle, it may not help. We should know our position sufficiently early to take remedial steps.

6. The author has devised a time code calculator to find times when repeat conditions can be predicted to occur for any event.

The calculator also tells the most vulnerable time when effective changes can be made. Such choice made attack on the USA was made impossible in the third cycle repeat described in a later chapter.

It may not be safe to imagine that conditions that led to an adverse event can be pinpointed if the cycle is known. It is like saying that the 9/11 strike of USA in 2001 will happen again and again in regular frequencies. If it is known that precisely, why can it not be prevented?

The author cites the attack on Pearl Harbour by Japan in 1941 as the previous cycle event. An attack on USA is the similarity recognized by the author to consider that 9/11 was a repeat of 1941. However, 1941 was part of World War II in which USA had remained neutral till then. Attack by Japan drew the country into the War. On the other hand, actions by USA against terrorism, especially against Afghan Taliban through repeated bombing angered Taliban. This resulted in their taking revenge. Thus the two conditions differ.

The author lists three modes to identify the event which could precede the current event in a cycle.

Mode 1 tells when such conditions can occur to repeat a past event.

Mode 2 identifies the date on which similar conditions occurred in the past.

Mode 3 tells the date on which the conditions can occur again in the cycle.

The author used Mode 1 for 9/11 event. As explained in Appendix A, the author finds similarity of attack on USA by Soviet Union in 1941 after KAL flight 007 was destroyed on 1 September 1983. The author claims the knowledge of a pre-emptive nuclear attack in March 1984 planned by Soviet Union before US revenge, but did not take place. This plan is counted as an attack on USA. But the author has forgotten a similar first strike situation of the Cuban episode of 1962. There was a specific threat of Soviet Union and USA attacking each other during that time. The threat of attack on the USA existed at that time also.

He uses time code calculator to predict repeat attack on USA from 1984 and arrives at March 2001 without counting 1962 crisis. March 2001 is six months earlier than actual date of attack. If there was advance knowledge of this date, USA would have done everything to prevent it and finding that there was no attack it would have relaxed only to be attacked on 11 September. Thus, there is no use if the predicted date is earlier than the actual date even if within “acceptable limits”

Using March 2001 with the time code calculator, the author predicts September 2007 and April 2010 as the next two likely dates of attack on USA. There was no event which could be attributed as attempt on USA in 2007. A failed car bomb explosion in Times Square, New York on 1 May 2010. This may have killed several people in the area and may be considered as an attack on Americans as the culprit said his aim was to kill Americans. So this prediction was better than earlier dates.

The parallel for the 2012 end date was traced to 1155 BC, the time of collapse of 20th Egyptian dynasty. But the former is about the entire earth and the event of 1155 BC happened only in one small region of earth. Thus the two events are not parallel.

In chapter 2, Braden explains the doctrine of world ages. According to his time code 7, ancient cultures divided earth's 25625 years through the 12 constellations of the Zodiac into five world ages of 5125 years.

He has not shown how this is true, as for example, Hindu calendar treats the whole universe including all galaxies and not Milky Way only or earth alone in the time measurement. There is no specific mention of Age of Pisces as the current period or 5125 years due to this huge dimension.

The author is biased towards Western culture as he lists only Western version and the events of Western world as defining historical event of the Zodiac age. Did nothing major happen in other parts of the world? Chinese and Indian cultures are rich with major events during these periods. He cannot claim that only the events listed by him can give meanings to historical comparisons.

Time code 8 says that knowledge of cyclic changes brought about by the earth's position within the galaxy is known as the doctrine of world age.

Braden noted that ancient cultures could correctly identify the astronomical alignment due to a specific position of earth in space indicating the end of one cycle and start of the next one around the galaxy. He specifies this period as 5125 years based on Maya calendar. The changes in climate, civilization, sea level and life which herald a new age was considered as the end of the world existing at that time.

If this argument is accepted, the world should undergo drastic changes (or at least significantly noticeable) changes in its cultural, social, economic and ethical aspects in 2012. We could not see any such drastically significant changes happening in 2012. There is no indication that steps were taken by any country or region to prevent this, as the date of world end was an estimation of the author published only in 2009. According to Hindu concept of Yugas, each of which lasts much longer than the said 5125 years, there are noticeable changes in these aspects. The period of 5125 years is such a short time for any significant changes to happen. Thus, the world age of 5125 years cannot be accepted.

Braden considers the start of new age as 2012 to be a spiritual one. For a spiritual change, such a long time is not needed. Hindu Vedic scriptures offering different doctrines of worship evolved rapidly in succession (in written form) since 1500 BC or so. Each new doctrine could have developed within a gap of 300-600 years according to Vedic scholars (Macdonell, 1900).

It is highly regrettable that the author reproduces the highly distorted interpretation of Vedic ages given by Thompson. The statement that Kali Yuga is only 1200 years is non-sense, to say the least. The author has relied on distorted versions of interpretations. Vedic language is such that even a small change of a letter or accent in chanting mantras can give quite different meaning unlike any other language.

Just because it does not appeal to sensibilities and challenges some fixed Western ideas, the high figures cannot be labelled wrong, It is equally impossible to think that one Yuga is so short as 1200 or 2400 years.

We are not at the end of Kali Yuga now as the author states; but only in the first quarter of it. According to the Hindu calendar, the current Kali Yuga started on 18 February of 3102 BC as per Julian calendar. Till 2005 AD it has passed 5107 solar years out of total 432000 years (Wikidot, 2014). The mantras chanted for rituals (Sridharan, 2004) contain time specifications giving these details clearly. Thus the author's contention is definitely wrong. He could be equally wrong in interpreting Maya calendar as it is also interpreted as per one's limitations of comprehending such cosmological calculations and implied meanings contained in a language unknown to oneself.

It is already well-known that Lord Krishna's disappearance to regain his original form of Mahavishnu marked the end of Dwapara Yuga as described in Vishnupuranam in detail (Wilson, 1870).

The sub-cycle after 5000 years of Kali Yuga, which Braden discusses indeed has happened. The bhakti period, the Nam Samkirtan (singing the names of deity) has become very popular now as the only salvation in Kali Yuga as prescribed by (SarvamSrikrishnarpanam, 2013). This trend is seen in the case of other religions also, even to the extent of being fanatic.

On his time code 9, he states that the Vedic traditions escribe an extended time of bhakti from 1898 to well beyond 2012. Mayan end date.

Thus the age has actually extended beyond 2012 with greater devotion and therefore, 2012 as the end date is definitely wrong.

This proves that Mayan calendar giving end of age as 2012 or its interpretation by the author is definitely wrong. When all other calendars give longer periods of ages, Maya cannot be different. Therefore, it is more likely that the interpretation of the author about Mayan calendar could be wrong. There may be some implied or hidden code which is the truth. This is the case with Hindu scriptures. The truth is hidden in mystical language, accessible only for those who learn then correctly.

People like the author are responsible for panicky actions of others arising out of their doomsday predictions. There is no justification to claim later that he did not mean world will end after causing enough damage.

It has been pointed out by Mayan scholars that Mayan calendar did not forecast any such doom. The very idea that Long Count Mayan calendar ends in 2012 was rejected as misrepresentation of its history and culture. These observations relate to (MacDonald, 2007), (Stuart, 2012) and (Webster, 2007). Especially, David Stuart categorically established that the cosmic theory (based on which 21 December 2012 catastrophe was predicted) is complete non-sense. According to him, "For the Maya, Dec. 21, 2012, would have been a red-letter date, the completion of a 144,000-day (or nearly 400-year) period called a bak'tun, and it would have been marked with ceremonies presided over by their kings. But the milestone—known as "13.0.0.0.0 4 Ahaw 3 K'ank'in" on the Long Count calendar—would not have signalled the end of the world. Rather, it would have heralded the beginning of a new bak'tun, a resetting of the cosmic odometer analogous to the one we marked on January 1, 2000". It is clear that Braden's interpretation is totally wrong.

Stuart also adds, "the Maya calendar was inseparable from the ancient world that created it: a lost worldview of kings, gods, and ancestors. By wrenching this special vision of time and cosmology away from that particular cultural and historical milieu, we do nothing more than manipulate the past for our purposes and messages. Their genuine accomplishments—in astronomy, mathematics, architecture, art and writing—are more impressive than the silly predictions attributed to them." According to (Brown, 2008) intuitive reasoning (pseudoscience) falls flat when describing exterior reality. Since Braden states his work is not a scientific work, it is not pseudoscience either. Even elementary astronomy could not support the claims as was observed by no less authority than NASA (NASA, 2012). It also noted that Mayan connection was a misconception from the very start. Neither Mayan calendar end on that date nor it predicted end of the world that day. It also unequivocally declared that the planetary alignments said to occur that day will not happen for decades even if there is a very feeble chance. When such an alignment occurs, its effect on earth will be negligible. It was also assured that the earth and the sun align with approximate centre of the Milky Way every December and thus a usual annual event. The fact that nothing happened on 21 December is more than proof for these scientific facts. A sudden or a major change of any kind was not predicted by Mayans on this date and the idea that a great cycle coming to an end is not real, observed (van Stone, Undated). It is also noted that Mayans could not predict the Conquest, which was the most disastrous event of America and there was no word about it anywhere in their documents. The solar calendar of 365 days did not account leap years and hence inaccurate compared to the present tropical calendar. The 260 days sacred calendar cannot also be called accurate. Maya prophets do not tell anything about galactic alignments, transformation of consciousness, fall of nations or action of

gods, kings or priests. They expected people to continue to live much the same way they did well beyond 2012. Only one monument predicts something happening on 21 December 2012. It is unique in many ways. Some scholars, Steve Houston and Anthony Aveni for example, do not believe it talks about future. They believe, the verb endings indicate description of some current events than future ones. Although it is non-trivial, two glyphs are obliterated making it difficult to decipher. Maya Long Calendar were different for at least three cities of Mayan civilization. The coefficients were 19 and 16 and not 13 for at least two of them. What happens to any prediction of 2012 in these different systems? This is not clear.

Braden states, "...now is the time of the most extraordinary conditions and opportunities that accompany the rarest of events, the shift from one world age to the next." As if some great things are going to happen beginning 21 December 2012; But nothing happened. This proves all his theories wrong.

The author states about a chaos created prior to the end of age cycle changes. But no such out of the ordinary chaos was created to portend 21 December 2012. This is another proof against reading too much into the Maya long calendar.

Braden draws help from some modern prophets like Nostradamus. Interpretations of prophecies are always subjective as the prophecies are given in obscure brief codes. Even in the case of largely acclaimed, it is known that his predictions were based on historical facts, end of the world prophecies of biblical nature and astrological works mainly from Richard Roussat's book. Most of the predictions were undated disasters based on *Mirabilis Liber*, leading to the indirect conclusion of end of the world due to invasion of Europe by Muslim forces from the Eastern anti-Christ forces. There is no Nostradamus prophecy which predicted a specific event before it occurred other than in vague generalities which can easily be applied to any number of other events. No quatrain of his suggested the world end date of 21 December 2012. Only interpretations of vague statements for events that have already occurred have been claimed that he prophesied many happenings accurately. Such arguments apply to other prophecies also. Thus Braden cannot claim support from modern prophets.

Already the problems with the calendars and time measurement of Maya have been discussed adequately above. Thus it cannot be proved that Mayans possessed special powers of calculating astronomical times very accurately. Rather they have been wrong on many counts. This is why Mayans are forced to keep current local calendar along with their classical calendar.

Time code 10- The present age of world began on 11 August 3114 BC and will end on 21 December 2012. E C Krupp simply said that the Mayan calendar completed its count in 2012. He has not said anything about the galactic happenings, as the author claims using this citation. Magnetic pole reversals have been described as regular phenomena by astronomers as already said above. Vedic calendar does not say Kaliyuga lasts only 5000 years as was said earlier. Hence, the two calendars do not coincide. They need not, as the two cultures made and used calendars for different purposes.

The very idea of mixing science with tradition is arguable. Thus using time as cycles of events is erroneous. Use of any other sequencing method rather than King Wen sequence of I Ching may give different results. Thus McKenna's method need not be the best one. This is also a cause of error.

The thought that universe operates like computer is not novel, as we see near-regularity of astronomical events. It is possible to simulate astronomical positions on any date in the past, present or future and this is what is more acceptable than trying to mystify the scientific facts. It is surprising that Braden relies on anthills rather than scientific aspects related atmospheric physics which can tell many more things than what he gained by wondering at anthills.

Braden uses fractals to identify patterns and uses the golden ratio to estimate the frequency of any one pattern. These are simple mathematics. The danger lies in the possibility of identifying non-sense patterns which do not really exist. He uses $\phi = 0.618$ for his time code calculations. As said before, this is expected to turnout the frequency of a pattern.

No scientist has said time does not exist below one Planck; only it is so small and immeasurable. Just because, we cannot measure it with our present instruments, we cannot say it does not exist. This logic applies equally to very large astronomical times given in Vedic scale. We cannot simply misinterpret and reduce the time scale to our will.

Timelessness of early cultures was not about disappearing time, but about eternity in some philosophical aspects. For example, Hindu religion believes in one Supreme Being as the ultimate power of the entire universe and this Supreme Being is eternal and thus not bound by time. While all others are its manifestations, they are created and destroyed in different forms and properties again and again and thus specified by time-contexts. This is also different from Brahma's inhalation or exhalation. This cycle of creation and destruction is different from Braden's concept of event cycles. This is the way most ancient cultures believed about time. Einstein's words in 1931 also reflect this concept rather than what the author thinks. No physicists will say that it is subjective physical experience. If so, all equations related to time become meaningless.

The shape of things are not all exactly spiral, but can be elliptic as in the case of celestial bodies (due to inter0attraction or repulsion). There are so many flowers and leaves which are not spiral, but opposite or alternate. The spiral patterns he attributes to others are only partly so. Thus there are equally or more non-spiral things in the world than those are spiral. Thus, the spiral theory of nature (and therefore, time) is not valid.

Assassins often mimic past events or predictions exactly to fool people like Braden into "discovering" patterns, curses or validating prophecies. Thus it is not surprise or some miracle that so many US presidents were victims of deadly attacks.

The Tibetan women might have heard some educated people saying like this even casually and merely repeated it. Casual conversations cannot be the basis for scientific conclusions, but can be investigated and applied if scientifically true.

There is no surprise in bad time being described as unfair seasons resulting in resource shortage, ailments and tragedies and natural disasters. These events are predicted for any tragic period and not specifically for 2012.

The author says conditions of events repeat in cycles and can be predicted. It was already said above that the Maya calendar would only have given indications of conditions rather than the world end itself. Same was argued with respect to prophecies. Only Braden's assertion that patterns repeat in greater intensity over time is not proven. The intensity of 9/11 event cannot be regarded as greater than that of a direct conflict with another superpower with a possible global war. Remember, 9/11 affected only USA. On the other hand, col war escalation would have

affected many countries, if not the entire world. According to Braden, the coincidence of two nested cycles occur together in 2012. These are: completion of one cycle (26000 years) of earth passing through all zodiac signs in space and the completion of a world age. The first one is a regular occurrence and scientists look at it as normal astronomical event. The second is a matter of belief from a subjective interpretation of Maya calendar, which has not specifically said that the world age will end on that day.

The earth events described are just normal variations occurring at various levels. We need not read mysticism into it. Magnetic fields have changed 171 times in the past 76 million years, as the author himself states. Such a frequency in astronomical terms is quite normal and there is nothing unusual about it.

As magnetic field reversals can change ocean movements, impact on climate is possible. No one denies that. Only adding mysticism to this relationship and attributing special effects on human life, consciousness are criticized by scientists.

Saying that planetary magnetic field affects human life is like believing in astrology. Magnetic field of moon is so weak and far away that its effect on human mind is exaggerated. Compare the frequency of bizarre behaviour on full moon and other days. Very strong solar magnetic storms occurred only in 1958 and likely to occur in 2012 as per the author citing scientific findings. There were strong solar magnetic storms in March 1989, July 2000 and October-November 2003. But Braden conveniently ignores them to justify his 2012 theory. A solar magnetic storm of very high magnitude was predicted for 2012 as part of Maya world age events. However, although a high magnitude solar magnetic storm occurred on 23 July 2012, it escaped the earth (Sanders, 2014). So this prediction missed the target.

The way Braden tries to connect list of repeated conditions of global and personal events, it looks like “heads I win, tail you lose” type of argument. It is well-known that the recent global financial crisis was not due to oil crisis, but sub-prime mortgage of housing loans in USA. If the predicted even happened on another date, Braden conveniently says it was foreseen and some events or steps taken delayed it (note: did not avoid it?). If it happened on the predicted date, it is very good. All the examples have this limitation.

With respect to global tensions and economic crisis of 2008, 2010 is given as the likely date of next happening. But nothing happened, except that financial crisis extended in certain countries and its effect declined in some others depending on their economic strengths. The Middle East and African regions and Afghanistan were hot spots, but nothing different from earlier or later years can be traced in these matters. Of course, for persons who look microscopically into them may exaggerate some small variations and say that it would have caused global war.

Braden goes on amplifying on the effects of so called end date of 2012. Many of these are usual scientific observations and no alarm is necessary as NASA assures. So, the negative situations predicted by Braden are only mere exaggerations of what is known to science as common observations.

Braden mixes up modern science and Mayan and other predictions to leading to the world being saved in 2012 although conditions of annihilation exists. This is a safety clause lest nothing happens on 2012.

The theory that earth magnetic fields change due to heart-based emotions of people. So a large number of people can weep and change the magnetic field of the earth. Mere coincidences of

common phenomena are being correlated with human reactions here. If this cannot be called non-sense correlation (as statisticians say), then none else can. Out of the entire population to earth, only a small proportion of people mainly in the Western countries would have released the so-called human magnetic field affected by the extreme sorrow of 9/11 or death of Diana. A vast majority of people would not have been affected by these incidences any way. For most people in the developing countries like China or India, the news would have come late or may not have bothered as they would not have known even who Diana was or what is World Trade Centre. Remember, several people have anti-Western sentiments in these regions. The efforts of Global Coherence Initiative and others are seen by the author as the steps which help to reduce 2012 effect. However, these are too recent to affect 2012 specifically.

After revisiting his time codes, Braden tries to explain his calculations in the Appendices. These have been commented above adequately.

Summary

Gregg Braden himself admits that his book is not scientific. Yes, it is so. All he has done is to mystify some observations of early civilisations and seek support of modern science for some non-sense correlations of past events with current ones and predict big changes in starting 2012. Nothing happened on 21 December 2012. The changes he talks about are only normal ones happening over a long time due to various activities in the earth. There is no need to mystify them or try to make big things out of assorted events. Braden has failed to establish his concept concretely and convincingly.

References

- Braden, G. (2009). *Fractal time- The secret of 2012 and a new world age*. Hay House Inc.
- Brown, M. (2008, February 2). *I do not Pseudoscience*. Retrieved January 14, 2015, from Mike Brown's Planets: <http://www.mikebrownspanets.com/2008/02/i-do-not-pseudo-science.html>
- MacDonald, J. G. (2007, March 27). *Does Maya calendar predict 2012 apocalypse?* Retrieved January 14, 2015, from US Today: http://usatoday30.usatoday.com/tech/science/2007-03-27-maya-2012_n.htm
- Macdonell, A. A. (1900). *A History of Sanskrit Literature*. D Appleton & Co, New York.
- NASA. (2012, December 22). *Beyond 2012: Why the World Didn't End*. Retrieved January 14, 2015, from NASA: <http://www.nasa.gov/topics/earth/features/2012.html>
- Sanders, R. (2014, March 28). *Fierce solar magnetic storm barely missed Earth in 2012*. Retrieved January 16, 2015, from U C Berkeley News Centre: <http://newscenter.berkeley.edu/2014/03/18/fierce-solar-magnetic-storm-barely-missed-earth-in-2012/>
- SarvamSrikrishnarpanam. (2013, June 3). *Part 12 : Kali Yuga - Nama Sankeerthanam and Vishnu Sahasranamam*. Retrieved January 14, 2015, from <http://bhagavadgunadarpana.blogspot.in/2013/06/kali-yuga-nama-sankeerthanam-and-vishnu.html>
- Sridharan, R. (2004). *Shri Rudrekadasini* (3rd ed.). R Sridharanm Chennai.

- Stuart, D. (2012). *The Order of Days: The Maya World and the Truth about 2012* (2nd ed.). Three Rivers Press.
- van Stone, M. (Undated). *2012 FAQ (Frequently Asked Questions)*. Retrieved January 14, 2015, from Foundation for Advancement of Mesoamerican Studies Inc (FAMSI): <http://www.famsi.org/research/vanstone/2012/faq.html>
- Webster, D. (2007). The Uses and Abuses of the Ancient Maya. *The Emergence of the Modern World Conference, Otzenhausen, Germany*. Pennsylvania State University.
- Wikidot. (2014). *Vedic Time System* . Retrieved January 14, 2015, from <http://veda.wikidot.com/vedic-time-system>
- Wilson, H. H. (1870). *The Vishnu Purana: A System of Hindu Mythology and Tradition*. Trubner.