



# Noesis

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# About the Mega Society

The Mega Society was founded by Dr. Ronald K. Hoeflin in 1982. The 606 Society (6 in 10<sup>6</sup>), founded by Christopher Harding, was incorporated into the new society and those with IQ scores on the Langdon Adult Intelligence Test (LAIT) of 173 or more were also invited to join. (The LAIT qualifying score was subsequently raised to 175; official scoring of the LAIT terminated at the end of 1993, after the test was compromised). A number of different tests were accepted by 606 and during the first few years of Mega's existence. Later, the LAIT and Dr. Hoeflin's Mega Test became the sole official entrance tests, by vote of the membership. Later, Dr. Hoeflin's Titan Test was added. (The Mega was also compromised, so scores after 1994 are currently not accepted; the Mega and Titan cutoff is now 43—but either the LAIT cutoff or the cutoff on Dr. Hoeflin's tests will need to be changed, as they are not equivalent.)

Mega publishes this irregularly-timed journal. The society also has a (low-traffic) members-only e-mail list. Mega members, please contact the Editor to be added to the list.

For more background on Mega, please refer to Darryl Miyaguchi's "A Short (and Bloody) History of the High-IQ Societies,"

<http://www.eskimo.com/~miyaguch/history.html>

and the official Mega Society page,

<http://www.megasociety.org/>

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*Noesis* is the journal of the Mega Society, an organization whose members are selected by means of high-range intelligence tests. Jeff Ward, 13155 Wimberly Square #284, San Diego, CA 92128, is Administrator of the Mega Society. Inquiries regarding membership should be directed to him at the address above or:

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# Editorial

Kevin Langdon

Since publication of *Noesis* #181 the Mega Society has been the subject of an attack which resulted in the deletion of our listing at Wikipedia. Some active participants in Wikipedia's editing free-for-all objected to the listing of Chris Langan, his theory, and his organization and failed to recognize that Langan and the real Mega Society went their separate ways several years ago.

Listing of the Mega Society was challenged on the grounds of lack of "notability," although the Wikipedia guidelines for deletion are unclear and don't make "notability" a central issue. Some of us mounted a spirited defense but the deletion was apparently done on the basis of a vote of experienced Wikipedia users, despite the fact that the guidelines clearly call for examination of the cogency of the reasoning on both sides of a deletion debate and our opponents didn't make a whole lot of sense.

The listing of a number of other high-IQ societies was also challenged but the Prometheus Society won its deletion debate and the deletion proposal for the Triple Nine Society was withdrawn by its author.

Details of the deletion debate are no longer available at the Wikipedia site, but it was nasty and became very personal. More information is available to members of the Mega Society on request.

We are working on a replacement article on the Mega Society, to be created after the excitement of the deletion wars dies down a bit. The current draft can be seen at:

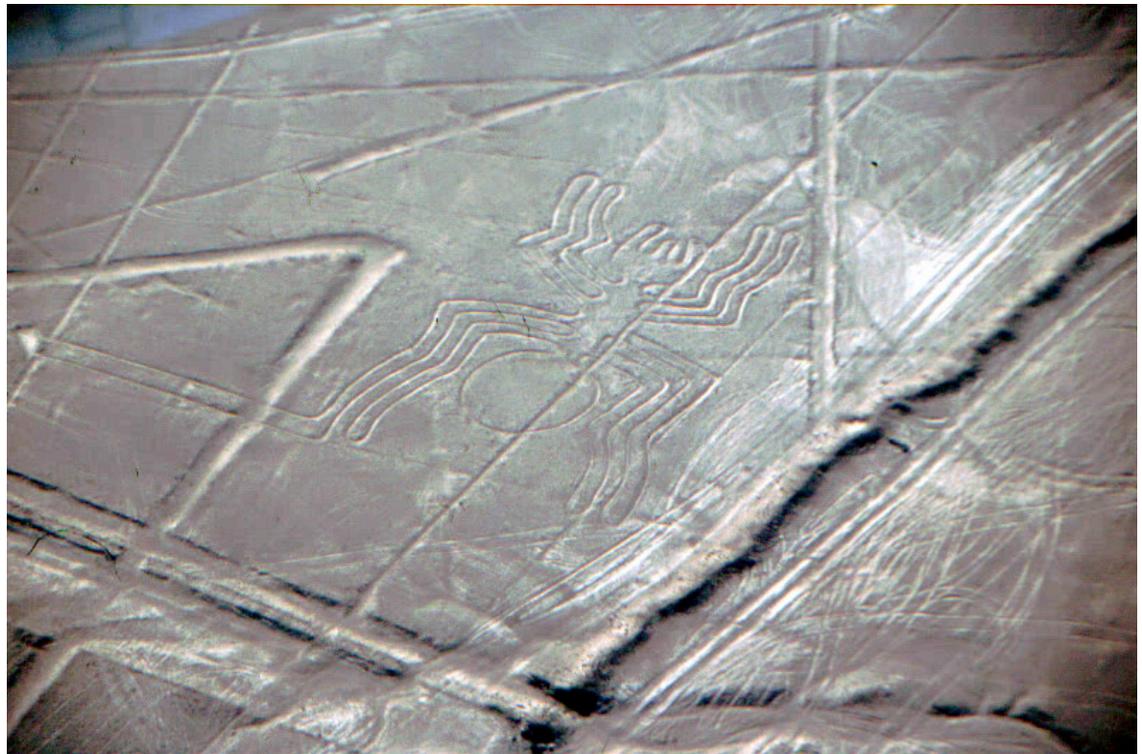
<http://en.wikipedia.org/wiki/User:MichaelCPrice/mega>

This issue of *Noesis* contains an article by Jeff Ward on the Nasca Lines, an article by Ian Goddard on out-of-body experiences, an article by Andrew Beckwith on his work in cosmology, one of Richard May's unique perspectives, and an appreciation of the life of my mother, Florence Lenore Carrasco Langdon, who died on July 31 at the age of 98, including some of my memories of my mother, my sister's eulogy which was read at the memorial service on August 13, and an essay my mother wrote for a small publication edited by my brother-in-law, Vincent Zukowski, in 1979.

The deadline for *Noesis* #183 is December 15.

**Cover:** "Cooperation," by Jeffery Matucha.

**Back Cover:** An image generated with "Basket," a routine in Hallucinations™, by Kevin Langdon.





## Going Over the Lines Once More (A Visit to Nasca)

Jeff Ward

In April of 2006, I visited the Nasca Lines (also spelled Nazca), a unique and mysterious archaeological site in Peru. This was my second visit (the first was in 1998). The site is in southern Peru about 75 miles from the Pacific Ocean. This part of Peru comprises the northern part of the Atacama Desert, the world's driest region (along with parts of Antarctica). It is so dry that scientists believe it hasn't rained in some parts of the Atacama since the Ice Age.

The lines, located between the towns of Nasca and Palpa, cover some 500 square kilometers on a plateau called the Pampa de San José. The plateau is extremely arid and very flat except for a few isolated small hills. As I recall, there are absolutely no plants; nothing but small pebbles and a little sand.

There are five kinds of lines. Straight lines are by far the most common. Others are curved lines, trapezoids, swirls, and animal figures. They are really big. For example, the longest straight line is 65 *kilometers* long. They are also precisely made. The lines and the edges of the trapezoids are *perfectly* straight. The swirls and animal figures, each made with one continuous line, contain curves of machine-like precision. Yet, they were produced by local Indian tribes between approximately 200 BC and 600 AD.

Marks can be made on the plateau surface by simply scraping away the veneer of dark pebbles and sand to reveal the lighter colored hardpan beneath. This is quite easy because the loose surface material is only an inch or two thick. To protect the fragile environment, public access to the area is now very limited and tightly controlled.

After all these centuries, the lines still appear fresh. This is due largely to the extreme aridity. Since there is no plant or animal life, little wind, and virtually no rain, there is nothing to erode or otherwise disturb the lines. Another reason may be that the tribe that created the lines was eventually conquered and absorbed by the expanding Incan Empire. As a result, the cultural role of the lines as well as the technique for making them was probably lost. Because the lines meant nothing to the Incas, they left them undisturbed (if they knew about them at all). In fact, it is likely that no one visited this bleak, inhospitable place for many centuries.

The lines weren't discovered by the outside world until around 1920. This is somewhat surprising because the Spanish began settling Peru in 1531. The town of Nasca, located on a river flowing from the Andes, is only a few miles from the lines. Apparently, the town existed for centuries before anyone discovered the lines and recognized their extent and archaeological significance. There are probably two reasons it took so long.

First, there was simply no reason to go there. The plateau was not on the way to anywhere and, without water or mineral resources, was economically useless. Second, the lines are hard to see from the ground. A traveler on foot or horseback who came to the edge of the area would notice some lines but would be unaware of their size, number, and complexity, or that there were huge drawings. To see the lines properly, one must see them from above. Today, there are three convenient ways to do so. First, there is a small hill next to the Pan-American Highway that is easily accessible and provides a good view of a small portion of the lines. Second, there is a "mirador," a steel observation tower a little further along the highway. From the tower, one sees other lines and, because the tower is higher than the hill, the field of view is larger and the angle is better. Tour guides are available in Nasca who will drive you to both places for a reasonable fee.

The third possibility is to fly over the lines. This is by far the best way to see them. The planes are single-engine, propeller-driven, and seat four, six, or twelve passengers. On my first visit, I took a six-seater that was rather cramped and uncomfortable. On my second visit, only a twelve-seater was available because of a "fuel shortage." Although more expensive, the second flight was much more comfortable and lasted longer (about 45 minutes). My window was conveniently located (unlike the first flight), and I was able to take some nice pictures. Three of them appear at the beginning of this article.

From a tourist's standpoint, the animal figures are the most interesting. There are more than four dozen although only about fifteen are visible during the flight. The drawings are loosely termed "animal figures" because most are indeed animals. They include a monkey, a parrot, a spider, a condor, a lizard, a hummingbird, a whale, a snake, and a dog. But others illustrate a tree, a humanoid figure nicknamed "the spaceman," and an odd-looking mythical creature. The largest drawing is about 275 meters long.

One of the mysteries surrounding the lines is their purpose. This is especially intriguing because the lines and drawings cannot be properly viewed unless one is far above them. This is best illustrated by recounting how the animal figures were discovered. Although the lines were known for decades, they were not seriously investigated until a German archaeologist, Maria Reiche, came to Nasca in 1946. She found them so fascinating that she stayed in Nasca and devoted the rest of her life to unraveling the mysteries of the lines. She died in 1998, only a few months before my first visit.

One of Reiche's first projects was to take extensive measurements of many of the lines. While plotting the data in the lab, she discovered that some of the lines formed animals--a feature that was undetectable at ground level. (The difficulty in visualizing them is more understandable once you fly over them and see how big they are.)

The Nasca Lines are discussed at length in Erich von Daniken's *Chariots of the Gods*. In it, the author attributes many of the world's archaeological mysteries to visitors from outer space. Regarding the Nasca Lines, von Daniken theorizes that they represent landing strips for alien spacecraft. This seems extremely dubious given the large number of lines crossing each other at every conceivable angle. From the air, they form a chaotic jumble, hardly the kind of thing that would help a pilot land an aircraft. Furthermore, most of the plateau is so flat that one could land almost anywhere without the aid of markings. The trapezoids are von Daniken's prime candidates for landing strips because they are fairly wide, very long, and scraped clean of surface debris within the figure itself. However, one of the more prominent trapezoids is noteworthy for the large hill right in the middle of it.

The two biggest questions regarding the Nasca Lines are how and why they were made. Archaeologists believe they know how. The current theory is that they were made with three cane poles and a rope, "in much the same manner as a surveyor uses ranging sticks and a theodolite."<sup>1</sup> Not being an engineer, I am not sure what this means. Suffice it to say that archaeologists are satisfied that they know how the lines were (or could have been) made given the primitive tools available.

The why is certainly more puzzling. Dismissing the outer space theory, one is still left wondering why people would go to all this trouble to make something they couldn't see very well. It is possible, in fact probable according to some scientists, that the indigenous people built towers from which to view the lines. Even so, it is impossible to appreciate the high degree of artistic achievement from an elevation below that of an airplane in flight.

My theory is that religious beliefs led to creation of the lines. Religious beliefs can often explain behavior and attitudes that otherwise seem completely irrational (e.g., the 911 hijackings, opposition to stem cell research, rejection of evolution). I believe that the lines and drawings were made so that the gods could see them. Whether or not humans could see them properly was much less important.

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<sup>1</sup> Jenkins, Dilwyn, *Peru: The Rough Guide* (London: Rough Guides, Ltd., 1997), p.179.

# Out-of-Body Experiences

Ian Williams Goddard

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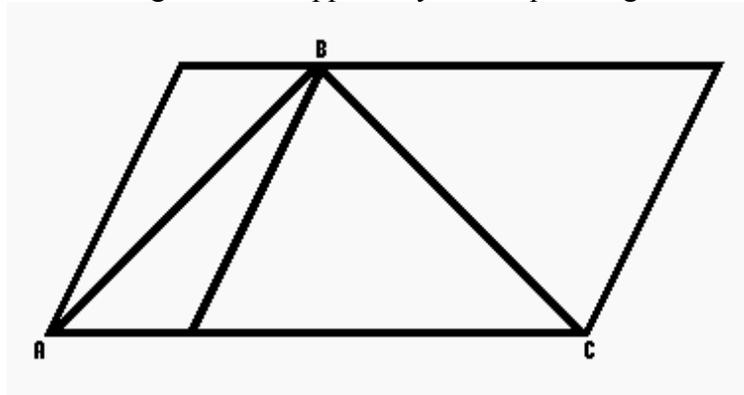
While extracorporeal existence of an individual ‘soul’ is generally held to be a spiritual proposition, such strong dualism is arguably a scientific hypothesis due to witness reports of out-of-body experiences (OBEs) involving observations of the physical world from an extracorporeal location. OBE claims that report states of affairs in the world are either true or false and are thereby amenable to scientific-hypothesis testing. Herein I examine the current state of scientific investigation into the nature of OBEs and consider the implications for strong dualist, physicalist, and other explanatory models.

## Nature and Scope of OBEs

During an OBE an observer appears to occupy a location *outside* her or his physical body, often seeing it from an external point of view. Occultists hold that the vehicle of OBEs is the *astral body*. When not projected outward, the astral body is said to occupy the same space as the physical body, extending outward several inches to form the ‘aura’. [1] OBEs have been reported across cultures and throughout human history. Given such universal existence it seems plausible that, as Thomas Metzinger argues, OBEs may have been the fundamental nexus of belief in a ‘soul’, which then called for explanatory ‘spiritual world’ models that then became religions. [2] In modern times, scientists generally see OBEs as a manifestation of *lucid dreaming* -- a state of self-awareness during a dream. Lucid dreaming is a central theme of the contemporary cult movie *Waking Life*. [3] For the observer having an OBE, the *prima facie* meaning of the experience is that the ‘self’ or ‘soul’ has extracorporeal existence. OBEs therefore constitute *prima facie* evidence of extracorporeal existence.

## Testability of the Strong Dualist Model

While OBEs constitute *prima facie* evidence for strong dualism, *scientific* evidence generally derives from data obtained from repeatable experiments. To appreciate the important distinction between *prima facie* and scientific evidence, consider an optical illusion involving two lines apparently of unequal lengths.



Line **AB** appears to be shorter than line **BC**, yet both lines are the same length.

*Image source:* [http://coolopticalillusions.com/optical\\_illusions\\_images\\_2/longer\\_line.htm](http://coolopticalillusions.com/optical_illusions_images_2/longer_line.htm)

The *appearance* that lines **AB** and **BC** are unequal constitutes *prima facie* evidence of inequality. But *scientific* evidence comes from testing that *prima facie* evidence by measuring the lines. Applying the ‘ruler test’ to the proposition “**AB** is shorter than **BC**” soundly falsifies that perception-representative proposition. The ‘ruler test’ constitutes scientific testing yielding replicable scientific evidence that proves, contrary to the *prima facie* evidence, that: “It is *not* the case that **AB** is shorter than **BC**.”

To the extent that OBE reports are propositions about states of affairs involving the physical world -- such as, “I was in a ‘spirit body’ looking down on my home” -- they are either true or false and as such are amenable to scientific testing. But what tests might we conduct? Reliable acquisition of accurate remote data *in conjunction with* OBEs would constitute scientific evidence (though not proof) that the claimed state of affairs *may* be taking place. It would not constitute proof since another explanation could be that such data acquisition derives from ESP in conjunction with an *illusion* of dislocation. But in either case, if someone could reliably access remote data in conjunction with OBEs, the strong-dualist model would have the support of scientific evidence.

Other tests that could be conducted to acquire scientific evidence for the strong-dualist OBE model would be verifiable (i.e., unambiguous and repeatable) detection of some kind of physical disturbance associated with the reported location of a projected ‘spirit body’. A few isolated studies have been conducted to look for such evidence.

### **Scientific Evidence for the Strong Dualist Model**

Scientific testing of the extracorporeal model is remarkably scarce. A few studies were conducted by Charles Tart of the University of California at Davis. In one case, during an OBE a subject presumably successfully read the random number 25132 that had been placed in a position only accessible from a position someone floating just below the ceiling would be in. Tart says the odds of guessing the number are 1 in 100,000, and he is confident that the subject did not cheat, though she was not continuously observed. That is the only remarkable result out of six small OBE tests Tart has conducted. [4]

Stanley Krippner cites an OBE study that also tested the ability to acquire remote data during an OBE. While the results were not statistically significant, Krippner feels they are “at least provocative given the small number of nights in this pilot study.” [5] Two studies cited by Karlis Osis purport evidence of a projected ‘spirit body’. In the first, a cat is reported to have shown signs of awareness of the presence of its owner’s projected ‘spirit body’. In the second, “strain gauge measures” purportedly showed signs of the presence of a ‘spirit body’ allegedly projected to the measure location. [6]

Those studies tested OBE claims in the ways suggested -- testing for remote-data access or ‘spirit body’ detection. However, the obscurity, lack of recognition by the scientific community, general weakness of results, informality, and lack of replication of those studies renders them of questionable meaning and value. As Carl Sagan says, extraordinary claims require extraordinary evidence. Yet the question is whether the extraordinary strong-dualist model has *any* supporting scientific evidence. Certainly strong dualism *lacks* extraordinary evidence. However, what’s most noteworthy is that

this lack has more to do with an overall *dearth* of OBE-claim testing rather than there being research explicitly falsifying extracorporeal existence. Strong dualism -- i.e., the belief that each person has an extracorporeal and postmortem 'spirit body' -- has possibly been one of the most widely held beliefs throughout human history and to this day. Given that, it's odd that so little research has tested witnesses claiming detectable instances of strong dualism, i.e., OBEs, along the lines of scientific testing mentioned above.

### **Scientific Evidence for the Physicalist Model**

The *physicalist* explanation sees OBEs as a manifestation, or symptom, of aberrant processing of perceptual data within a brain. So claims about the world arising from an OBE are assumed to *not* reflect any state of affairs outside an OBE-reporting brain. Scientific research supporting the physicalist model has been steadily growing. In 1963, Penfield and Perot demonstrated that mild electrical stimulation of exposed brain regions induced auditory and visual hallucinations in subjects, which demonstrated the brain's ability to manufacture representations of apparent yet unreal physical states of affairs. [7]

Then in 2002 Blanke *et al.* found that electrical stimulation of a specific exposed brain region in a patient repeatedly produced OBEs in which the patient reported floating above and looking down on her own body, exactly matching traditional OBE reports. Stimulation of a nearby region produced false perceptions by the patient that her body was moving in specific ways when it was in fact motionless. Blanke *et al.* concluded: "These observations indicate that OBEs and complex somatosensory illusions can be artificially induced by electrical stimulation of the cortex." [8]

Then Frank Tong noted a similarity between Blanke's patient and one of Penfield's patients who, back in 1941, reported "floating away" and said, "I have a queer sensation as if I am not here." Tong observes that in both cases "Both sets of stimulation sites encompassed the right temporal-parietal region posterior to the post-central gyrus, close to multisensory areas implicated in vestibular processing." [9] *Vestibular processing* involves processing data related to the position of one's body in its spatial environment. Clearly, disruptions in vestibular processing would be a predictable neurological basis for OBEs since they involve anomalous bodily perceptions.

More recently, Blanke and Arzy published a collection of reports from 10 subjects who had OBEs concurrent with right temporal and/or parietal lobe dysfunction, which encompasses the temporo-parietal junction (TPJ) already implicated in OBEs. [10] And it seems the TPJ is also where the brain models estimated points of view and thoughts of other minds. [11] [12] Also, positive schizotypal subjects with daily aberrant bodily perception given TPJ-processing tests demonstrate impaired TPJ processing. [13] Schizophrenia-spectrum disorders commonly involve confusion about self-agency, boundaries of self and other, and body perception likely to be associated with TPJ activity. Moreover, it has also been found that those reporting OBEs tend to have higher positive schizotypy scores than those who never had an OBE. [13] Taken together, the emerging evidence suggests that a broad spectrum of aberrant perceptions involving body position including OBEs may all have their origins in aberrant TPJ activity.

## Other Models

The research just reviewed is problematic for the strong-dualist model because it implies that the nexus of OBE activation resides in the brain. To see the problem let's consider another model. Suppose that you have a 'spirit body' that is activated by way of your brain. Just as your brain signals your arm to reach out for an apple, suppose your brain can signal your 'spirit body' to extend out and view the world from an otherwise remote location. But then your 'spirit body' is not anything like the 'soul', instead it's just another limb, an appendage, a mere tool that the brain can use to probe the world.

That example introduces an alternative extracorporeal model that, unlike strong dualism, may be compatible with the scientific evidence. In this model, brain activities linked to OBEs occur in brain regions that direct the activities of some kind of information-gathering extension of the physical body. This extension might be a continuous projection from the body or a detachable subtle body. If OBE claims are true, it stands to reason that the brain would have regions via which it can activate such projection. So perhaps all the research showing a correlation of OBEs to specific brain activities is simply a progressive articulation of parts of a real mechanism of 'sensory protection'. I doubt that's the case, but of course we don't know everything and that model probably can't be ruled out at this time due in large to the lack of research explicitly testing the view that OBEs constitute some extracorporeal projection.

Another highly speculative alternative model holds that *no* 'spirit body' exists and *all* OBEs are activated and contained within the brain. However, in this model the brain accesses remote data by means locating 'self' in corresponding remote locations in its model of the world. This model assumes passive ESP that is somehow activated by modification to the location of 'self' within the brain's own model of the world. Both this and the previous model could be tested by success or failure of remote-data access. The previous model could also be tested by way of success or failure in detecting some kind of 'spirit body' or subtle projection. However, lacking such testing and successful results, I see no reason to invest any degree of belief in these two other models.

## Conclusion

The evidence we've observed shows that both exogenous (in the case of open-brain electrical stimulation) and endogenous (in the case of brain disorder) activation of the temporo-parietal junction (TPJ) corresponds to the onset of OBEs. That weights heavily *against* the strong-dualist model. If touching an electrode to the TPJ can cause an OBE, it seems that the causal mechanism of OBEs is in the brain. But strong dualism implies that the 'soul' should be the causal mechanism. It is at best difficult and at worst impossible to reconcile a strong-dualist model with the unfolding scientific picture. The other extracorporeal models suggested seem ostensibly compatible with the recent finding, but are not in any way indicated by them. They are like empty efforts to "save the theory" in light of growing momentum toward another and easier explanation.

The emerging scientific evidence shows a link between OBEs and aberrant TPJ activity. The only OBE model gaining evidentiary support by those findings is the physicalist model. As we've seen, the TPJ is independently associated with processing

data regarding body position in space and estimated points of view of other minds in space. It stands to reason *a priori* that any brain region that might be found to cause OBEs ought to be involved in computing ‘self’ and ‘other’ positions. Therefore, since mounting evidence suggests exactly that may be the case, confirmation of a key prediction of the physicalist model appears to be unfolding. It stands to reason based on that evidence, that an OBE may constitute a computational mismapping of the spatial region defined ‘self’ in a brain’s internal model of the world. If so, the only world an OBE witness travels into is a mere model *in* her or his brain of the real world outside.

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# How Sundrum Brane World Effective Potential Influences the Choice of Initial Conditions for Inflationary Cosmology

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This is an abbreviated version of an article at <http://arxiv.org/abs/gr-qc/0603021>.

## Introduction

We are in this paper introducing the implications of change of graviton production in early-universe conditions with respect to inflationary cosmology. We show three models, one of which is a brane world scenario, and link the latter to increased graviton production. We also look at the standard lore, as well as ghost condensate models which do away with graviton production from a relic graviton production standpoint altogether.

## What is a higher dimension and its impact upon cosmology?

In 1919, Theodor Kaluza (1885-1945) wrote a paper which showed that if you assume that there is one extra dimension of space, and you further assume that everything is independent of the extra fifth dimension, then you can integrate out the extra dimension to recover a four-dimensional theory which consists of Einstein's theory of gravity, plus Maxwell's theory of electromagnetism, together with a scalar field which he incorrectly set equal to a constant. Thus, by starting with Einstein's theory of gravity in five dimensions, you can recover Einstein's theory and Maxwell's theory of electromagnetism in four dimensions simply by assuming that nothing depends on the fifth dimension.

Gravitational quantization has changed all this. We make this claim because in most of the modern approaches to quantizing gravity we are led inevitably to the conclusion that there exist extra dimensions of space. Indeed, in eleven-dimensional supergravity, the low-energy limit of M-theory, there are ten dimensions of space and one dimension of time. Of course, we need to explain why these extra dimensions are not observed, and to do this we typically invoke the old ideas of Kaluza and Klein. We assume that the extra dimensions are curled up on such a small length scale that we are unable to detect them. String theorists assumed that the extra dimensions were curled up,

or compactified, on the order of the Planck length,  $L_{pl}$ ,  $10^{-33}$  cm, which is the distance at which gravity becomes equal in strength to the other forces.

Now, about gravitons. The graviton, a spin-2 particle, is a closed string, meaning it is a little closed loop that is not attached to a D-brane. According to this theory, gravitons are then not attached to our universe, and can wander off into other dimensions. The result would be that gravity would be diluted as it spread throughout the entire higher-dimensional spacetime. It would therefore appear far weaker. From the point of view of our brane, it would appear weaker than the other forces that are restricted to our brane. Models where the universe is a surface moving in some higher-dimensional spacetime are called brane-world scenarios.

Another example of a brane-world scenario was developed in 1999 by Lisa Randall (Princeton) and Raman Sundrum (then at Boston University). Their theory states that the real home of gravity is a brane. This otherwise inaccessible brane is separated from ours by an extra dimension not much bigger than the Planck length. Gravity feels weak to us because it's mostly confined to this other brane. The gravitational effect of this other brane on the metric of spacetime would exponentially attenuate gravity as a function of the tiny separation between the branes. In order for this theory to work, gravity would have to be mostly confined to the other brane, and they achieved this using the curvature of the extra dimension. Their insight was to use the fact that the curvature of spacetime itself is something that can confine even gravitons. Following this intuition, they constructed an explicit model where there is a single infinitely large extra dimension of space, and yet a massless graviton is confined to the brane-world by the effects of the curvature of the bulk spacetime.

The discovery of this model is very important because it resolves conceptual questions which have been around since Kaluza and Klein wrote their papers. According to this view, what we call the Universe could be thought of as a giant D-brane.

If the extra dimensions were compactified on the Planck scale, as had been previously assumed, they would be outside the reach of experiment. The Planck length is  $10^{-33}$  cm. Examining such tiny distances would require probing energies of the order of the Planck mass,  $M_{pl} \sim 10^{19}$  GeV. This is far beyond the capabilities of any conceivable accelerator. However, according to what is called ADD theory, the extra dimensions might be curled up on scales as large as a few millimeters. This would make it possible to detect departures from Newtonian gravity with tabletop experiments. Also the Large Hadron Collider (LHC) will provide experimenters with 10 TeV ( $10^4$  GeV) protons. This should provide evidence for the large extra dimensions, if they exist.

A D<sub>p</sub>-brane is a configuration that extends along p spatial dimensions and is located in all other spatial transverse directions. From the point of view of superstring theory, a D-brane is a soliton on which open string endpoints are attached, and whose mass or tension is inversely proportional to the string coupling  $g_s$ .

The implications of Dp branes are quite startling.. In the presence of matter with energy density  $p$ , the evolution of the universe is controlled by the equation  $H^2 = (a'/a)^2 = 8\delta p/3M_p^2$ , where  $a$  is the scale factor and  $H$  is the Hubble rate. This implies that for an expanding universe,  $p$  and  $H^2$  are proportional. They would increase or decrease together in time. This is true only if  $M_p$  is a constant. In the weakly coupled string theory where all the compactified dimensions have size  $\sim M_s^{-1}$ ,  $M_p$  is controlled by the dilaton, and it's possible to have growing  $H$  while  $p$  decreases..

Given this, let us now review what can be said about the effective potential in Randall-Sundrum theory.

## Randall-Sundrum effective potential

The consequences of the fifth-dimension show up in a simple warped compactification involving two branes, i.e., a Planck world brane, and an IR brane. Let's call the brane where gravity is localized the Planck brane. The first brane is a four-dimensional structure defining the standard model 'universe', whereas the second brane is put in as structure to permit solving the five-dimensional Einstein equations. Before proceeding, we need to say what we call the graviton is, in the brane world context. In *physics*, the graviton is a hypothetical *elementary particle* that mediates the force of *gravity* in the framework of *quantum field theory*. If it exists, the graviton must be *massless* (because the gravitational force has unlimited range) and must have a *spin* of 2 (because gravity is a second-rank *tensor field*). When we refer to string theory, at high energies (processes with energies close or above the *Planck scale*), because of infinities arising due to quantum effects (in technical terms, gravitation is *nonrenormalizable*), gravitons run into serious theoretical difficulties. Some proposed theories of *quantum gravity* (in particular, *string theory*) address this issue. In string theory, gravitons (as well as the other particles) are states of strings rather than point particles, and then the infinities do not appear, while the low-energy behavior can still be approximated by a quantum field theory of point particles. The high concentration of the graviton near the brane—let's call the brane where gravity is localized the Planck brane—leads to a natural solution to the hierarchy problem in a universe with two branes. For the particular geometry that solves Einstein's equations, when you go out some distance in an extra dimension, you see an exponentially suppressed gravitational force. This is remarkable because it means that a huge separation of mass scales—sixteen orders of magnitude—can result from a relatively modest separation of branes. If we are living on the second brane (not the Planck brane), we would find that gravity was very weak. Such a moderate distance between branes is not difficult to achieve and is many orders of magnitude smaller than that necessary for the large-extra-dimensions scenario just discussed. A localized graviton plus a second brane separated from the brane on which the standard model of particle physics is housed provides a natural solution to the hierarchy problem—the problem of why gravity is so incredibly weak. The strength of gravity depends on location, and away from the Planck brane it is exponentially suppressed.

We should briefly note what an effective potential is in this situation. In *classical mechanics*, the *equations of motion* can be derived from the *action* by the *principle of stationary action*. This is not the case in *quantum mechanics*, where the amplitudes of all possible motions are added up in a *path integral*. However, if the action is replaced by the effective action, the *equations of motion* for the vacuum expectation values of the *fields* can be derived from the requirement that the effective action be stationary. For example, a field  $\phi$  with a *potential*  $V(\phi)$ , at a low temperature, will not settle in a local minimum of  $V(\phi)$ , but in a local minimum of the effective potential which can be read off from the effective action.

In our arXIV paper, we postulate and try to show that a large surge of gravitons occurs in a relic graviton setting. Assuming this is a given, let us now consider how this would impact upon detector technology as we can present it.

## Detecting gravitons as spin-2 objects with available technology

To briefly review what we can say now about standard graviton detection schemes, as mentioned above, Rothman states that Dyson seriously doubts we will be able to detect gravitons via present detector technology. The conundrum is that if one defines the criterion for observing a graviton as

$$\frac{f_\gamma \cdot \sigma}{4 \cdot \pi} \cdot \left( \frac{\alpha}{\alpha_g} \right)^{3/2} \cdot \frac{M_s}{R^2} \cdot \frac{1}{\epsilon_\gamma} \geq 1 \quad (1)$$

here,

$$f_\gamma = \tilde{L}_\gamma / \tilde{L} \quad (2)$$

This has  $f_\gamma \approx \tilde{L}_\gamma / \tilde{L}$  as the graviton sources luminosity divided by total luminosity and  $R$  as the distance from the graviton source to a detector. Furthermore,  $\alpha = e^2 / \hbar$  and  $\alpha_g = Gm_p^2 / \hbar$  are constant while  $\epsilon_\gamma$  is the graviton potential energy. Here,  $\tilde{L}_\gamma$  – luminosity of the graviton-producing process  $\geq 7.9 \times 10$  to the 14th ergs/s, while  $\tilde{L}$  – general background luminosity is *usually*  $\gg \tilde{L}_\gamma$ . At best, we usually can set  $f_\gamma = .02$ , which does not help us very much. That means we need to look elsewhere than the usual processes to get satisfaction for graviton detection. This, in part, is why we are looking at relic graviton production for early universe models, usually detectable via the criteria developed for white dwarf stars of one graviton for  $10^{13-14}$  neutrinos.

We should state that we will generally be referring to a cross-section which is frequently the size of the square of Planck's length  $l_p$  which means we really have problems in detection, if the luminosity is so low. An upper bound to the cross section  $\sigma$  for a graviton production process  $\approx 1/M$  with  $M$  – Planck scale in  $4+n$  dimensions  $\equiv (M_p^2 / \hat{V}_n)^{2+n}$ , and this is using a very small  $\hat{V}_n$  – *Compactified* early universe extra dimension 'square' volume  $\approx 10$ -15 mm per side.

This leaves us to either up the intensity of the graviton itself via its association with early universe neutrino production, or else we don't have a solution. And to up the intensity we need to go to relic gravitons, and nowhere else. Fortunately, our early universe model does postulate such a large initial surge in graviton production.

## Similarities/differences with ghost inflation, and inquiries as to the role of condensates for initial vacuum states

Arkani-Hamed recently has used the ghost inflation paradigm to eliminate using slow roll as a way to initiate inflation with far lower energy scales than is usually associated with standard inflation models. His prediction (which we disagree with) does postulate far fewer gravity waves/relic gravitons than are associated with standard models of inflation. We postulate MORE, rather than less, assumed relic graviton production. However, we also think that his analysis makes many cogent points, which we will enumerate here, which are pertinent to the initial condensate nucleation, which we will put forward below.

Standard slow roll is premised upon the following quantum fluctuation assumptions:

- 1) Quantum fluctuations are important on small scales, if and only if one is working with a static spacetime (i.e., no expanding universe )
- 2) For inflating spacetimes, quantum fluctuations are 'expanded' to be congruent in magnitude with classical sizes ( classical fluctuations)
- 3) Simple random walk picture: In each time interval of  $\Delta t \equiv H^{-1}$ , the average field  $\phi$  receives an incremental adjustment via quasi-thermal influences in the condensate state. This increment is superimposed upon the classical motion, which is downward.
- 4) Quantum fluctuations are equally likely to move field  $\phi$  'up or down' the well of a 'harmonic' style potential.

Those who read the presentation should note the conclusion which is something which raises serious questions, i.e.,

$$\frac{H^2}{|\dot{\phi}_{cl}|} \sim \frac{\delta\rho}{\rho} \Rightarrow (\text{scalar}) \text{ density perturbations are of order } O(1) \quad (3)$$

Enter in Arkani-Hamed's ghost inflation paper. He configures the evolution of de Sitter phases via a ghost scalar field  $\hat{\phi}$  condensing in a background with a non-zero velocity along the lines of (assuming M is a generic mass term)

$$\langle \dot{\hat{\phi}} \rangle = M^2 \Rightarrow \langle \hat{\phi} \rangle = M^2 t \quad (4)$$

This leads to a density fluctuation along the lines of, assuming an upper bound of  $M \leq 10MeV$ ,

$$\left. \frac{\delta\rho}{\rho} \right|_{Ghost} \approx \left( \frac{H}{M} \right)^{5/4} \quad (5)$$

As opposed to, when  $\epsilon$  is a slow roll parameter proportional to  $(V'/V)^2 \ll \text{small value}$ ,

$$\left. \frac{\delta\rho}{\rho} \right|_{Inflation} \approx \left( \frac{H}{m_P \cdot \sqrt{\epsilon}} \right) \quad (6)$$

This would mean that Eqn. (6) predicts a far larger right-hand side value for density fluctuations than Eqn. (5) above. This also corresponds to the ghost condensate prediction that few relic gravitons are produced. Why? The ghost inflation paradigm so outlined postulates that there exists a maximum energy scale of the order of  $V_0 \sim (1000TeV)^4$  which allegedly rules out relic gravitons. The model outlined here which we are working with assumes a massive relic graviton production surge. So it appears that we cannot ignore some variant of inflation. We need to do additional investigations as to whether or not it is realistic to suppose that time restrictions below Planck time are enough to lead to a ‘temporary’ violation of part of the slow roll condition..

## Conclusion

The brane world scenario we claim would lead to increased graviton production. We claim that this is detectable, if the graviton production surge is sufficiently dynamic and tied into a very large initial density fluctuation. If we know that, we can show whether or not, in the presence of matter with energy density  $p$ ,  $p$  and  $H$  squared would increase or decrease together in time. If the string scale is much smaller than the Planck mass, we should have a period of inflation on our brane driven by the larger extra dimensions, so we have to recover pre-Big-Bang cosmology where we have a growing Hubble constant, called the Hubble rate, This is true only if  $M_p$  is a constant. In the weakly coupled string theory where all the compactified dimensions have size  $\sim M_s^{-1}$ ,  $M_p$  is controlled by the dilaton, and it’s possible to have growing  $H$  while  $p$  decreases. This is the basis of pre-Big-Bang (PBB) cosmology, and we claim that investigating the relative relic graviton rates would give us unprecedented access to the structure of the universe prior to inflationary cosmology, by giving us insight as to energy density and energy density fluctuations in the early phases of cosmological evolution.

# Universe Had No Unique Beginning

**Richard May**

Universe had no unique beginning. Instead, they [Hawking and Hartog] argue, it began in just about every way imaginable (and maybe some that aren't). Out of this profusion of beginnings, the vast majority withered away without leaving any real imprint on the Universe we know today. Only a tiny fraction of them blended to make the current cosmos.

—from an article called “Hawking rewrites history . . . backwards—to understand the Universe we must start from the here and now ,”  
by Philip Ball.

I've always suspected that both atheists and theists were partially correct and now also perhaps to degrees varying over time. Presumably some proportion of the Multiverse beginnings were entirely naturalistic, occurring according to various physicalistic M-Brane scenarios, which for convenience we may call uncircumcised M-Branes origins. The remaining unknown proportion of the Multiverse beginnings occurred according to every conceivable and inconceivable *theistic* scenario. Some Multiverse beginnings were Created by Osiris, others by Zeus, others by Ahura Mazda, yet other Multiverse beginnings were Created by the adorable Yahweh, which for convenience we may refer to as circumcised M-Brane origins.

Perhaps in a sense the Gnostics were correct, the universe, actually a Quasi-Creation, neither fully Created nor arising by pure chance alone, is a botched job, as if Created by the idiotic Demiurge, not the work of one God. No one was responsible for the final product, no one was accountable, as if a Cosmic government committee, consisting of both mathematical Strings and every conceivable and inconceivable god, had been running the show. Instead of the Multiverse being a Pythagorean symphony on Strings in the mind of God, it is the product of an infinite but entirely unrehearsed orchestra, the composition of which varies over time.

I once wrote that our only real hope for the ‘future’ is whatever hope we have for the ‘past’! But Hawking and Hartog (who are obviously socialists possessed by Satan) don't go far enough, because the ‘initial’ moment of *both* naturalistic origin of the universe and of Creation by pantheon is continual, unending and on-going now, not a unique now-point in some hypothetical ‘past’!

This ‘topdown’ view of Hawking and Hertzog that the present selects the past and that quantum mechanics forbids a single history will eventually lead to the development of new art forms and new academic disciplines, such as top-down autobiographies and top-down approaches to psychology and history, based upon macro-level approximations to summation of all paths! But is sum-over-history a path with a heart?

*In Memoriam*



*Florence Lenore Carrasco Langdon*  
*July 16, 1908-July 31, 2006*

# My Mother

Kevin Langdon

My earliest memories are of the terrifying, unknown world in which I found myself—experienced by all infants but remembered by very few—and the way my mother reassured me.

I remember mom taking me in a stroller to the park. I loved the fresh impressions that came from being out in the big world.

My sister Valerie was born when I was a little over three years old. I remember mom putting us in the bath together, playing with bath toys, talking with her when she was very little, and telling her about the world. I felt very protective of my little sister.

Both mom and dad used to play with me for hours at a time and they both told us elaborate stories, with endless sequels. I wish now that these stories had been written down, as they were quite extraordinary, and fascinating to my sister and me. My mom also introduced me to the world of literature. I was very strongly influenced by the books she gave me, both children's books and more adult fare.

I attended nursery school and kindergarten without running into too much difficulty, but by first grade I already hated school. It was mind-numbingly boring, not at all like the interesting and supportive conditions my mother created at home, and I began to tune out. I've recently been in contact with a teacher I had in one of the early grades, Miss Rosalie Goldstein (later Mrs. Jerry Gayne). She told me that I was very uncooperative and used to hand in blank papers when I was bored with an assignment. She helped me to connect with the educational process and socialize with the other children. I am very grateful to her and to the other good teachers I had, because my mom had set a very high standard and most of my teachers were sorely lacking when it came to recognizing my special needs and providing appropriate stimulation.

I was born with hip dysplasia. It wasn't noticed by my doctors and only came to light through my great uncle when I was about a year old. I had several operations at that time but they were not very successful and I was left with a pronounced limp. My mother helped me to deal with my disability but I often had trouble with the other kids because I was different—handicapped physically but with a mind they couldn't understand.

When I was seven years old, it was decided that I would need another operation. I was afraid to go under the knife and on the day the operation was scheduled I ran away and hid for several hours before my mom finally found me and took me to the hospital. She understood how terrified I was and helped me to accept the situation.

Mom had lots of good friends. She met with a group of the girls she'd known in school for about 70 years, and her "Grattan Girls" were like family members to us. I remember many occasions on which our house was full of very interesting people, friends and relatives of my parents. I enjoyed these opportunities to converse with adults very much.

When my sister and I were old enough to be left in the care of a babysitter for more than an evening, my mom and dad took a number of trips. My mom always made up a grab bag for Valerie and one for me. We each got one present every day while they were away and that made having them away a little easier for us.

We were not always left at home, though we never accompanied our parents on their longer trips. We were included in vacations at Aetna Springs resort, Yosemite valley and Tuolumne Meadows in Yosemite National Park, Webber Lake, and other places in California. It was very interesting traveling with my parents; we saw many things that didn't exist in our urban life in the San Francisco Bay Area and the family interaction was more concentrated and intense when we took trips together. Somehow, my mother usually managed to keep things light and cheerful despite the stress that being at close quarters created.

When I was 12 years old we moved to Terra Linda, across the Golden Gate Bridge and about 30 miles north of San Francisco. Mom and dad wanted us to have the experience of a more rural lifestyle. The natural setting, before the valley was as built-up as it became later was wonderful, but the cultural level was distinctly lower than in the area we'd lived in in San Francisco. Later we moved to the next valley north, Lucas Valley. Valerie told me recently that one reason for the move was to get away from a family of screwy neighbors across the street from us—and that shortly after our move they moved to Lucas Valley, too, just a couple of blocks from where we were.

The early days in Terra Linda were very difficult. Construction was still going on. I remember seeing bulldozers rolling through our back yard. There was noise and dust everywhere. The builders had cut some corners and many things were not working properly. The school system wasn't ready for the influx of children due to this new development. My dad actually ran for and won a seat on the school board because he was so alarmed by the state of the schools. But through it all, my mom always made a wonderful, loving home for us, and she never complained.

When I was in high school, my mom went back into teaching. She taught English at the Dominican College High School in San Rafael, a girls' high school run by nuns. We graded the girls' papers together. We laid out 5x5 piles, corresponding to the grades A through F, in my mom's opinion and mine, then we argued about the essays that weren't on the main diagonal (I usually graded harder than mom). Sometimes her multiple-choice questions were amusing; e.g., one of the choices for the meaning of "inkling" was "a printer's helper."

I lived at home on and off into my forties, even (briefly) after I got married to my second (present) wife, and I always felt welcome in my mother's house. I moved out when she moved to the retirement condominium complex where she lived for the rest of her life, in her own (nice but small) condo for several years and then in the health unit downstairs, after a series of small strokes left her mentally incapacitated but still very much "there" emotionally.

I feel enormously privileged to have had such a mother, that she lived such a long life, and that I remained in close contact with her up until her death.

# Eulogy

Valerie Zukowski

Thank you all for coming today. We are gathered to celebrate, remember and honor the life of our mother, Lenore Langdon. Our Mom was a lady; she was somewhat prim and proper and knew all about etiquette, but what made her a real lady was her gracious and loving nature. She always was kind and giving in every situation. She could always make other people feel comfortable around her. She put others ahead of herself. Certainly no sacrifice was enough when it came to caring for her family. Whether it was her birth family or the family she created with my father she was always caring and giving, always ready to give of her time and energy and love.

I remember when I was about six years old she told me that now that I was a big girl she would no longer be able to pick me up. I was sad, but I could accept this. Soon I fell down the brick front steps of our house. I must have screamed like a banshee because out she came; she ran down the stairs and scooped me up and ran back into the house. It turned out I wasn't actually hurt at all. But I learned that even if she could no longer pick me up (big girl that I was) she would pick me up anyway if I needed her to.

She really tried to be a sport and humor my father. When I was about nine years old he got himself a cabin cruiser for cruising around the bay and up the delta. He would drive the boat of course, and it fell to my mother to leap from the bow onto the dock and tie up. She also gamely helped him varnish the decks. I guess she would do anything for him. And when it came to doing absolutely anything for Kevin—don't even get me started.

She was also very involved with her birth family. When her mother became very old and confused my mother and I would very often go to see my Granny during the day while my father was at work and Kevin was at school. Mom would organize things and do the housework. Later when her mother died Mom became the matriarch and held holiday events for everyone at her home. She loved to do that. She did it graciously.

My mother felt strongly about many things. She loved the mountains; she loved to go there and learned to ski and even mountain climb. She was very proud to be a Sierra Clubber. Whenever we would go to the mountains as a family, camping or staying with friends, she was at her very happiest.

Another thing she loved was tennis, or she kept saying she did. As far as I know she never played it during my lifetime.

My mother loved language and literature. She loved the sound of the English language and enjoyed hearing it spoken well. When she was a child she took elocution lessons so that she herself could speak English beautifully, and she did. She loved poetry

and could make it sound the way you knew it should. For a few years she enjoyed teaching high school English, reminding herself of the many books she loved as a young person.

One of my mother's hidden talents was dancing. She and my father danced really beautifully together and actually won prizes for their dancing, although they did not have many opportunities for dancing. She also liked to do little arts and crafts projects like candle making or mosaics, and she saved found supplies for these endeavors in jars in the garage. Another thing she kept in the garage was stray cats whom she enjoyed taking care of and who honored her by giving birth to many kittens at her house. Mom loved to travel, but she never did until Kevin and I were old enough to be left for a week or more. Then she and my father started traveling, and continued on, starting with Hawaii and moving on to Mexico and Europe and Africa. After my father died Mom kept traveling to Alaska and Peru and China, but I think the thrill was gone when her favorite companion could no longer accompany her. They took so many pictures, and we watched interminable slide shows in our living room.

One thing my mother felt very strongly about was her friendships. She held on to many friendships that went back to her childhood. She met with the Grattan girls, a group of friends from elementary school, all her life until one by one they all died. Mom may have been the last of the Grattan girls. She had many other lifelong friendships, and they were very important to her. She had strong commitments to these relationships, and they were very fulfilling to her. For many years she belonged to the PEO, a women's organization she enjoyed and through which she strengthened friendships that endured through many years. Her friends were loyal to her in the same way, and she valued these relationships very much.

My mother was proud of her education and many abilities. She was cultured and beautiful and charming. But she is most remembered for her sweet and loving nature. Everyone who really knew her loved her for these qualities. I would like to read a portion of a letter sent to me by Susan Fiori, who knew my mother here at Villa Marin.

*It's so sad to think about your mother not being on the earth any more. Her sweetness was so palpable and real. She certainly embodied the essential quality of love through all her levels of aging and dementia. To be in her company always made me feel calmer and safer somehow. I will surely miss her—the way she would look right into my eyes and smile at me—like an angel!*

# The Language of the Poet

Lenore Langdon

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The chief attribute of the poet is the creative energy or imagination that enables him to set forth in a concentrated or heightened form an idea or emotion that others recognize and share. The poet experiences moods, emotions, or ideas which he then phrases in appropriate words, musical, symbolic, or thought-provoking, which will most accurately reflect or express the feeling he wishes to convey to the reader. The poet perceives ordinary events and things in an extraordinary way, seeing meaning and beauty in them not usually apparent. Not only does the poet possess this ability, but with his fine ear and powers of discrimination he perceives the uncommon meanings and uses for common words, as well as the uncommon words that will most exactly transmit his thought, thus permitting the unusual way of employing language to make it memorable as well as beautiful.

In the words of Matthew Arnold, "Poetry is simply the most beautiful, impressive, and widely effective mode of saying things; and hence its importance." This is only one of a great many definitions given by a great many poets of equal stature. I like it because of its directness and simplicity.

According to T.S. Eliot, emotion and feeling are best expressed "in the common language of the people—that is, in the language common to all classes. The structure, the rhythm, the sound, the idiom of a language expresses the personality of the people which speaks it." He feels that the duty of a poet is to his language—to preserve, extend and improve it. This is important for the continuity of language so that the best will not be lost and so that the quality will not deteriorate. He also believes that poetry has a social function—"that in proportion to its excellence and vigor, it affects the speech and sensibility of the whole nation."

As an example of the poet's ability to choose just the right language to express his thought consider the following poem:

## The Lake Isle of Innisfree by William Butler Yeats

I will arise and go now, and go to Innisfree,  
And a small cabin build there, of clay and wattle make;  
Nine bean now will I have there, a hive for the honey bee,  
And live alone in the bee-loud glade.

And I shall have some peace there, for peace comes dropping slow,  
Dropping from the veils of morning to where the cricket sings;  
There midnight's all a glimmer, and noon a purple glow,  
And evening full of the linnet's wings.

I will arise and go now, for always night and day  
I hear lake water lapping with low sounds by the shore;  
While I stand on the roadway, or on the pavement gray,  
I hear it in the deep heart's core.

In this poem Yeats has expressed his desire for and dream of peace. He recalls a lake he has seen and imagines how he will enjoy the peaceful home he will make there. The auditory effects of the “bee-loud glade” and “lake water lapping with low sounds by the shore” are famous for their evocative music. No less evocative are the images of the simple home as it changes with the changing hours of the day. His desire for this serenity is so intense that even in the city streets he hears its music in his heart always. How beautifully he chooses his rhythm, rhymes, and the build-up to the final intensity of feeling is easily appreciated as one attempts a paraphrase in prose. The spareness in his choice of items in the first stanza demonstrates economy of example and exclusion of irrelevant detail. It is possible to see in this poem the importance of tempo. It starts out briskly, with his determination of what to do, and slows down with the use of long vowel sounds of the fourth line. The second stanza continues these long slow sounds and allows full savoring of the charm of the place. The third stanza stresses the strength of his need to effect his dream.

Robert Hillyer in his *First Principles of Verse* stresses the importance of using words in their natural order—not to force an unnatural or inverted order to meet the requirements of meter or rhyme, but rather to alter the poem altogether if necessary to find felicitous ways to express the thought without awkward and self-conscious forcing of the words into a given pattern.

An understanding of poetic language must include an appreciation of the intricacies of verse structure, involving the use of a multiplicity of tools. Thus the poet has to be an accomplished craftsman as well as a speaker of unusual thoughts.

First of his tools to be considered is rhythm, which consists of the repetition of stresses and unstressed syllables, creating a unit known as a foot. In English there are four basic patterns of feet: the iambic and anapestic, of two and three syllables respectively, with the accent falling on the last syllable, and the trochaic and dactylic, of two and three syllables respectively, with the accent falling on the first syllable. Each of these feet conveys a different tone to the matter of the poem, the iambic and anapestic giving a rising feeling and the trochaic and dactylic a falling one.

Each line of poetry contains a certain number of feet, according to the poet's need or desire. The five foot verse or pentameter is the one most frequently used, since it is the one that gives the most natural expression in English, particularly when used with the iambic foot. Iambic pentameter is the rhythm of Shakespeare's plays and Milton's *Paradise Lost* and is a suitable vehicle for noble and elevated thought.

It must not be thought that the poet must stay slavishly within the limits of his chosen metrical form. For this reason devices are employed to lend variety. The poet may occasionally change the stress in a line, he may use the pause, known as a caesura, in place of a syllable, or he may use the run-on line or enjambment. All of these devices, if

used with skill, enhance the enjoyment and prevent the dealiness of a jingly or sing-song delivery.

The sounds of poetry are of especial importance in achieving the musical effects that are central to poetic value. For these the poet depends on many devices, the most easily recognized being: *Rhyme* is the recurrence of sounds between two or more words, such as the familiar moon-June, night-bright, etc. *Refrain*, recalled from old songs and ballads, is a common ploy. *Assonance*, the repetition of vowel sounds that need not be identical, but close in sound, is often used. *Alliteration*, the repetition of sounds either at the beginning or concealed within two or more words, is the oldest and most common device of sound, going back to Anglo-Saxon times. Onomatopoeia is the attempt to make a world by simulating the sound of its referent—for example: buzz, ring, twitter, clang, etc.

Among other techniques the poet finds useful are those for purposes of comparison. The most common is the *simile*, containing the words 'like' or 'as', as when Byron says, "She walks in beauty like the night/Of cloudless climes and starry skies." The metaphor, omitting the words 'like' or 'as', is stronger than the simile. "There is a garden in her face," by Compton, gives a sudden vivid picture. The mind of the poet leaps to a comparison that is ordinarily not thought of, but is instantly recognized when the poet expresses it.

According to Lawrence Zillman, "poetic devices are the 'embroidery' of poetry. On or into the cloth of language these sounds are applied or woven. They give color, life, and often great beauty to the poems in which they are used."

The true poet has a natural ear for sound which makes his choice among the great number of poetic devices easier than it would be for one not so gifted. However, even in the appreciation of poetry some form of natural ear is necessary.

Thus we see that the poet's choice of form and device has a great effect on the language he employs. It must constantly be borne in mind that he has a thought he wishes to convey that must in no way be subordinated to the mechanics or versification. Indeed in every case the reverse must be true. He particularly wishes to avoid stilted or archaic expressions, forced rhymes or fillers. "The poet," according to Zillman, "must be master of his technique . . . so the poet must select wisely the elements of form with which he works. All elements must work together to make the poem: the mood of the poet, the nature of the subject, and the infinite variety of effects."

The poet enjoys a thrill of recognition in finding the words or phrases to express his ideas in a fresh way. As Robert Frost puts it, "For me the initial delight is in the surprise of remembering something I didn't know I knew."

