

## Who Knows?

Todd Alexander

Does anyone really know anything? I postulated in my previous essay that we, man in general, can never know anything. Our knowledge and so-called truths are but creations of our society used as tools to predict the phenomenon of our perceived surrounding. This knowledge itself and truth for that matter is subject to radical change, citing examples of both biblical and scientific nature previously for evidence. This makes our so called truths and innate knowledge as fragile as an air track subject to contortion and blunt change by man' ideas. Yet for this essay in order avoid a repeat of my last essay I will assume that we can in fact know something about our world and the phenomenon we observe daily. This knowledge is not to be thought like Ten Commandments, stone slabs given to the various scientists by God. Instead think of this knowledge we glean as a set of tools. Both a chain saw and an awl can be used to trim wood, the chain saw is less accurate and faster, just as there are numerous ways to solve physics problems, again some being more accurate or faster than others, but nonetheless they both arrive at a similar solution.

Physics tends to be a less tangible subject to asses what one knows, than for example woodcutting. It is obvious from the noise and finish product that a chain saw has been turned on, used and put away, your result be it good or bad is right in front of you. You know you have cut down a tree, or trimmed a doorframe, your result is perceivable with in your limited sensory capabilities. Physical insights tend to be less obvious. Personally I feel that I know a part of the knowledge labeled physics, when I can use that thought or idea to solve problems. Not merely the problems given to us at the end of each chapter but the problems we find in the textbook of life. For example I knew that I had fully mastered elastic collision theories when I used the concept of momentum to win a pool game in the common room, thus adding five dollar. Although pool sharks probably have no idea about the concept of conservation of momentum, they use them in what they would call common sense and trial and error to determine the angle ?t they would shoot at. For me by applying this concept to something not related to "the classroom", I generated an internal sense that I had some knowledge witch could be used other than to do the problems assigned.(anyway how do we know these are not special altered or "fudged" problems generated to give students a false sense that they have actually learned something?).

I therefore feel there are varying levels of which I know things; the first is that of a computer or robot, it is the knowledge of memorization, regurgitating facts or ideas without truly understanding them, not being able to apply them to a problem without being told how, (can I call this knowledge by my definition?), the second level is where the fact or idea that I have memorized becomes comprehensible, a tool that I can use to solve the problems of the textbook and similar "classroom world" or perfect problems, the third level is obtained when this idea can be taken with me outside of this ideal world into life and used to solve non-classroom related problem, as I described previously with the pool game. Each level in this three-tiered analogy becomes more difficult to achieve and thus reflects various degrees of learning. The first step is so simple and easy to obtain that we can get a computer to do it, the second level requires more thought, but again mechanical objects can be programmed to perform similar functions. It is the third level of knowledge, the most difficult to obtain, which appears to be selectively human. It

describes the ability to take something learned in one context and apply it to a totally different occurrence in order to explain it or to predict what may occur.

The way in which we learn physics varies; it can be learned from textbooks, taught in a lecture or discovered by oneself through laboratory work. Generally when one reads a textbook the sort of knowledge they get is the first type I described, an ability to regurgitate facts, examples and ideas similar to those they read in a textbook. When one is taught or lectured, having problems explained to them and methods by which to solve them, they tend to receive the second type of knowledge, the ability to solve text problems on paper and on tests. This results in decent class averages and high test scores but how much is really learned. It is learning through labs, discovering relationships and ideas for oneself that produces the third type of knowledge the most useful and pure. Unfortunately there is no way to evaluate this type of knowledge and students are not therefore forced to achieve it, limiting themselves to being human computers, solving problems by the method their teacher has programmed into them. It is not impossible to achieve the second and third level of knowledge from reading and being lectured, it merely requires additional time and effort spent thinking and doing abstract and different problems.

Therefore in order to study for tests and exams I read the information and memorize the important concepts, examples and ideas in case we are given a regurgitation question which is basically free marks if the time and effort is spent. Then I go through the problems at the end of the chapter making sure I can do them, by getting the textbooks results I know I am answering the questions the way the book wants me to. I then also realize that I should be able to answer any test questions since they are but variations of the books questions. Finally I attempt to take the ideas and apply them to different problems not those from the textbook but that I encounter in various situations around my boarding house. If I can do this successfully, a difficult task, I know that what I have learned is useful and that I have an ability to use it as a human, not a computer made of flesh. This enables me to answer the test questions that ask us to explain various situations. I do well on a test if I am able to do all of the preparatory work as well as explain a removed situation. I do poorly on a test if I forget to memorize part of the text, miss a type of textbook problem, but most importantly I do very badly when I can't take my knowledge and explain a different phenomenon that displays similar qualities.

Primarily my physics teacher and I differ, in that he has a mustache and a stupid sounding accent. Yet these physical ??? present between students as well. The physics teacher assigns tests, readings and assignments. Yet again this seems to be a trivial difference. Our teachers in general differ from us in that they already know what it is we are supposed to be learning, they are merely aiding us to learn these ideas ? S and concepts they already know. They can try and explain their own knowledge and show us what happens during a specific instance, but we must somehow process the ideas just as we must process the ideas from a book in order to make them useful later on in explaining similar phenomenon. Physics teachers also differ from students in that they tend to have a general aptitude towards this subject, they find it easier to visualize the concepts and do so faster than the average person.

Thus, I believe students effectively are acting as teachers in lab group instances. For when one member of a group figures out something they are trying to discover he can, most likely just as effectively communicate the idea to his partner(s), or teach them the

required material. As previously discussed lab work tends to produce a higher level of knowledge than the other forms of learning discussed, therefore it is a more useful, producing a better understanding of the work that is covered on that lab. This is coupled by the fact that you receive extra teachers, your lab partners, to aid you with difficult problems. Hence lab groups tend to produce a more useful, better understood knowledge than from a text. Students also learn how to express their ideas and to teach them to other students when they are in a group situation. By forcing students to teach each other ideas the student teacher himself must have a very good understanding of the concepts to be presented. This forces the student to think through the ideas over again in an attempt to explain them. This process is almost as good as applying their ideas and concepts to practical situations, but not quite. Unfortunately lab group settings allow for greater freedom, where students can slack off, not inquiring into concepts and ideas they don't understand allowing for the group to learn things they don't themselves. This atmosphere also allows for the omission of inconsequential boring textbook equations and definitions. Thus when standard tests are introduced whole groups could be missing certain textbook ideas, and individuals could be missing all the ideas of both the class and group. This produces lower test scores and grade averages, something Appleby has a distaste for, thus this method is thought of as a poor learning method, not for proper learning. My analysis is that this method weeds out the lazy people and those who can't apply their knowledge to life, but who merely regurgitate the facts.

Although there is no real way to test one's true knowledge, other than life itself I am sure there are better ways than to ask redundant text book questions and to ask for the definition of textbook words that have little or no meaning for students. I propose therefore a new evaluation technique. Students having experienced all three types of learning, reading, lecturing and lab work on a specific subject, instead of writing a test filled with the same studied questions that a computer could answer, would instead be forced to generate for themselves a problem within the specific area studied at the time and to answer it for themselves. Upon completing these questions they would exchange their question with another student's question answering finally both their own and the other student's question. The evaluation would be based on the ability for the student to apply their knowledge outside of a textbook context, accurately and precisely. The time to complete the question would be limited to a number of days but the resources used would be up to the student's discretion.

In the completion of this essay I find myself at the beginning, asking myself "Self, now that I know physics, how do I do it?" I conclude thus as I began with a chain saw. When a tree has been cut down and chopped up there are signs, no more tree and a pile of logs, woodcutting has been done. Although the signs are less obvious in the application of physics they exist nonetheless. Many times physics is done without the doer actually being aware of it. Instead of loud buzzing, the yell of timber and the crashing of trees, the physicist inside of us calculates the angle and velocity to shoot a pool ball before we shoot. We naturally judge the angle to place the ball against a wall so that its torque doesn't either flip us or the lack of friction, allow the ball to slip and fall down. When down hill skiing we calculate the number of turns naturally to make as the pitch of a slope changes in order to keep our speed constant. Thus it seems physics is done by our minds through visualizing ideas and concepts and calculating the right choice to make every day of our lives, if we realize it or not.

De Luce Loquat;  
Todd Alexander

"And, God said, Let there be light: and there was light. and God saw the light: that it was good:" As far as we can remember man realized that there was something that allowed us to perceive the world in which we lived, this something was also a provider of heat, man called this thing light. How much more do we really no about light than we did in the ancient world? Both societies knows of its existence, neither can explain where it came from or what it is made of. The best explanation of its existence, which is the only one that I am aware of is that God willed it to exist and so it did. The fact that it is good comes most likely from the second property, the ability to provide heat or energy, a necessary substance in our world and the ancient world for man's existence. Since it was useful to man and helped him to survive it is therefore a good thing. Many philosophers over the ages attempted to explain the ways in which light behaved. In actuality, creating a means by which to explain the way in which we perceive things, a difficult task to say the least. By the twentieth century after two major ideas had been at odds for ages, finally both were accepted for there validates but there faults were also noted. These theories included the particle nature of light, and the wave nature of light, in connection with these theories comes the particle and wave nature of matter, in particular sub atomic matter. Since this essay is about learning and knowing, I will go through the three levels of knowledge, of which I detailed in my previous essay and explain what I learned at each level.

From reading the text book and talking to class mates I am given the idea that light acts like a wave, the most obvious image and connection is thus made thinking about light as one thinks about the waves in water, having an amplitude, frequency, wavelength and velocity. As I continue reading I am told that light can be diffracted, refracted, polarized and reflected in a similar means to water waves and sound waves. Then I read about a number of experiments were by light is passed through single and double slits producing diffraction patterns consisting of maximums and minimum's, this coincides with the water experiments, hey maybe there is some validity in this idea, I began to think. Proceeding further through the text I got many equations, which supposedly could be used to describe the wave nature of light and for that matter the wave nature of sound and other waves. This equation is best summed up in that sine of  $\theta$  (the angle from the central maximum or minimum, depending on experiment, to the nodal lime we are talking about) is equal to  $X$  over  $L$  which is the distance in meters form the central maximum/minimum to the nodal line in question over the distance from point of refraction the slit to where the light is reflecting of off. This in turn is equal to the wavelength of the wave passing through our slit over  $d$ , the size of the slight multiplied by  $(n-2)$ , or  $n$  depending on specific experiment, this represents the nodal line number or the  $n$ th line from the central max/min. In summation

$$\sin \theta = \frac{L(n-2)}{d}$$

When light reflects it experiences a the wave length, similar to water. Now that I had this level one knowledge I continued to the next level by manipulating my equations. I figured out how to determine the wave length, frequency, node number and all the other variables described previously by rearranging the equation and using simple algebra in order to solve for the desired constant. This became tedious and boring continually rearranging equations to suit the

specific questions in my text book. Newton's rings and Snell's law presented some interesting ideas, when looking at the partial reflection and diffraction of light, which coincides conveniently with other waves. Again I always found myself as in the beginning comparing light to slinkies and the ripple tank which we observed in order to create a picture of what was occurring, I was in fact an attempt to rationalize what I was perceiving, not capable of actually seeing these small invisible light waves traveling through the air into my eyes and making me see things. This is when the third level of knowledge began to be sought, using our laser and ripple tank experiments. Yet there still remains the theory I had read about in Inventing reality, Newton seemed to have some good ideas was he wrong? I therefore decided I must look at the first two levels of knowledge relating to the particle theory where I might be able to obtain more ideas about light before I could come to some concrete third level notions on light and its application outside of the perfect textbook world and physics classroom.

Through more reading I found that there were a different set of circumstances under which scientists could not use the wave theory of light, instead Planck, Newton and others came up with the idea that light traveled in small packets called quanta. These packets of energy acted just as particles do, this was observed in a phenomenon called the photoelectric effect. This experiment had a number of electrons caught in a positive potential, light was shed onto these electrons, at a certain frequency or energy they were able to jump out of this well and flow in some form of a current, this current could be measured. The idea that the total energy of a particle was proportional to its frequency was put forth, tested by plotting the frequency versus the kinetic energy (measured in joules). This produced a constant value known as plank's constant and allows us to derive the equation that the total energy of a quanta is equal to planks constant times its frequency. Extrapolating on this idea we realize therefore that the kinetic energy, difference of total and potential energy is equal to plank's constant times the frequency minus the potential energy, also known as work. This allows us to explain the reaction of the potential well. By knowing the frequency of light going into the well, controlled with a filter (ie, blue, red...) and knowing the positive charge used to create the potential well we now know both the frequency and work done and are easily able to calculate the kinetic energy of a specific frequency of light. This experiment demonstrates light having qualities of particles, kinetic, total and potential energy, could it not therefore have a momentum? Hence more mathematics was done we know that momentum is equal to the mass of an object times its velocity. Using Einsteins equation  $E=mc^2$  and rearranging it to read  $m=E/c^2$  and subbing this into our momentum equation, the velocity of light being a constant  $c$  we get  $p=E/c$  but we also know that  $E=hf$  and  $f=v/\text{wavelength}$  or  $v/c$  therefore the momentum of a wave is expressed as  $h/c$ . The credit for this new light tool was given to a man named Compton, and this property of light is now referred to as the Compton effect. It was originally observed in the reaction of waves with sub atomic particles, producing waves with lower frequencies and faster moving or greater energy containing particles. This was taken a step further it seems, when a man named de Broglie suggested that if light could act as both a wave and a particle so could matter.

This wave nature of matter stems from the idea that since momentum was equal to  $h/\text{wavelength}$  then the wavelength of something should be equal to  $h/p$ .  $P=mv$  thus the wavelength is proportional to plank's constant over the mass times velocity. This theory was tested by shooting electrons through crystals and observing the same diffraction

patterns as in the slit experiment. These equations can be used to describe the wave nature of all matter. The particle equations can be manipulated according to the information given to do several level two text book problems. The wavelength, kinetic, potential or total energy, and the mass of sub atomic particles and different frequencies of electromagnetic radiation can be determined through the previously discussed ideas, but what does it all mean? How does it apply to my life outside of the perfect text book problem world?

I began level three, the application of light theories by thinking about what light is in relation to human beings. Since this is the one variable which is constant through out all of our experiments, perceiving things through human features. I realized that light was a means by which we perceived things optically, I was in fact trying to explain a perception, or perceive a perception. This is impossible to do obviously, and therefore explains why both the wave and particle models work. Since I was explaining my perception I could only explain it by means of things I could perceive, thus waves and particles. Continuing from there, I thought about windows at certain angles we see our reflection and at certain angles we see right through, this agreed with the partial reflection of waves I had read about and with Newton's ring idea, seeing different colours at different places. I then poured a glass of water, according to Snell if I stuck my toothbrush into it, it should appear bent due to the different velocities of light in water and the refracted indices, I was right again. Finally when squeezing my eyes closed I had always seen the light I was looking at appear stretched and contorted, effectively I had created a slit and was seeing partial refraction of light, this made sense. Now I had the wave theory what about the particle one, there don't exist any potential wells at, or near Appleby, is this really a useful tool? I began thinking about sun bathing, our skin heats up quickly when we are outside, I am often sun burnt. It doesn't seem likely that a wave could transfer this type of heat, doing some minor calculations assuming my body had a mass of 55 kg and using the  $E=hf$  equation, I figured it would take about two weeks to heat my body one degree Celsius I know that it doesn't take that long on a hot summers day to do, this doesn't agree with what the wave theory proposes, in this circumstance it seems the particle theory explains what the wave theory couldn't. In class we did a calculation determining the wavelength of Atif Zia, it was so miniscule this theory might make sense, since I don't perceive his vibrations.

In conclusion it seems that we have no idea what light is. We call it a form of electromagnetic radiation, and have created a bunch of interesting tools to predict its reaction during certain phenomenon. We know that it is the means by which we perceive the world around us, but includes other forms of radiation that we cannot perceive with human senses. Thus we see light reflected off of the objects in our world and not the objects themselves. Sub atomic particles seem to be tools as well to explain the reactions of visible things, again there is no perceivable proof of either existence. The tools we have used to describe there reactions are called the particle and wave theory but it seems that we still don't no where their existence stemmed from or even if they exist. We are left merely with the explanation that god willed them to be and so they were.

## Scientific Knowledge

Todd Alexander

"Worship with words, with sounds, hands, all joyful, playful and obscene"<sup>1</sup>, is this not in itself a perfect description of how we learn and perceive physics. Since our perception is a limited one, and our knowledge is obtained through our perception of things, the scientific knowledge we obtain cannot be artificial but very real. Granted it does not show nature as it really is since what we learn must be within our perceptions, not allowing us a totally unbiased view, or even more specifically the ability to look at nature totally objectively.

When someone drops something it falls towards the earth, we have chosen to call this phenomenon "gravity". For us this is a very real occurrence, ask someone parachuting for the first time. If his parachute doesn't open there is nothing artificial about his death, things fall towards the earth when dropped. The problems with science, arrive when humans attempted to predict and explain these very real, perceivable phenomenon. Velocity, acceleration and even gravity are just words, that men use to describe these phenomenon's and in order to help predict them. Thus since it is our perception that controls the way in which these phenomena are described, it would only make sense that they do not describe nature as it really is but in a way that is comprehensible for humans. You may ask in what way are our perceptions limited, our vision is limited to the visible light spectrum, our hearing between 20Hz and 20,000Hz we see in two dimensions only, and have little perception of time or more exactly the passage of time. Hence the laws and theories we study are but descriptions of actual phenomena within our human perception, a colourful story in a book. These laws don't actually exist outside of our minds, they are but a tool, a means by which we describe and predicted these very real perceivable phenomenon. So thus for us the "truth" is an impossibility to discover. This statement stems from the assumption that the actual nature of a thing is the truth about it. If we define truth as our collective agreed upon idea of something, ie there are 100cm in a meter then the truth is very easy to discover. It entails the observing of something and then proposing a way of describing it, in a way that a large number of people agree on. This makes truth a creation of man, acceptable to change by man. We need only look at the set of laws Newton proposed, which were thought to be the gospel "truth" until Einstein came along and altered man's truth with three relatively lineally of "Man's truth" is evident through out history, it was once seen thought that a woman's "desire shall be to thy(her) husband, and he shall rule over thee(her)"<sup>2</sup>, Ecclesiastes even goes as far as to state "and I find even more bitter than death the woman, whose heart is snares and nets, and her hands as bands;"<sup>3</sup>. Societies ideas of women have obviously changed greatly over the last two centuries, none the less this was the truth at one time according to human kind, who is to say which is the way of nature or what nature intended. Similarly recently I have "disappointed" and upset people for having a beer. The law and the majority of the people think it is wrong for children to consume alcohol, and more specifically it is wrong to do so at school. Since most people believe this, it becomes the "truth" to drink under age or at school is wrong, again how do we know if this is nature's intention, or the way it is suppose to be. It is merely the way man has molded their ideas and thoughts (admittedly with reason and thought) into right and wrong, truth and falsehoods instead of, in agreement with society in general or in disagreement with the rest of society. Hence science creates and

destroys truths and in no way describes nature as it really is but in a way that is comprehensible to the human perceptions.

We are now forced to ask ourselves what shape do these tools and truths take and how are they used by us. The answer takes us to the beginning of this essay it is "with words, with sounds, all joyful, playful and obscene" that our scientific knowledge is based on. The language we create and use to describe our observations becomes the tool itself, by changing the language we not only change the law and principles of science is stating it but we also change a previously accepted truth and effectively make a new one. Thus it is language and the way in which we choose to define the phenomenon we observe that is at the core of our knowledge, it is through these words that we arrive at the images and ideas that allow us to predict and explain our observations. This holds true for everything in our lives it is through our language that we communicate our ideas thoughts and feelings and it is also through them that we are able to learn through the recreation of our perceptions within our minds.

In conclusion it would only make sense that a scientist's social environment would influence the content of the knowledge he proposes. As previously stated it is through our observations, which are limited to our perception that we discover nature's phenomena and then through our language that our ideas are communicated, to be used as tools by others. Our social environment alters at times our perceptions and observations, if these are altered the whole process is as well, thus affecting the knowledge presented. If a scientist is placed into an environment where the attitude is to accept authority not question it, or anything but to conform, his theories and ideas likewise blunt straight forward and unquestionable, a product of observation not questioning and thinking. Similarly if a scientist inhabits a very wild, crazy environment in which having a good time and partying is the number one priority instead of thinking and questioning, again the quality of the proposed ideas will be poor. Yet by no means is it necessary for this to be so, if the scientist ignores his environment, refusing to conform or accept things without question then the quality of his work can be just as good as anyone else's, (but who defines good and bad?).

## Reflections 7&amp;8

Todd Alexander

I find myself questioning what is "truth" through out these chapters. The idea that there is a common set of underlying facts that mold the universe and it's occurrences becomes a more difficult concept to grasp as new ideas are put forth by man and the old ideas, "truth's" are left by the wayside. I still disagree with the idea that all knowledge is relative and believe in a absolute set of laws which govern nature. Yet Bohr's comment that "the laws of physics are our laws and not natures", on the surface seems to contradict with my view however I find that it is in agreement with it.

Heisenberg's uncertainty principal which states that the position of an electron can be determined as accurately as desired with the cost of knowing less and less about its movement as we determine its position more accurately, creates dubious truths. This principal leads us to the ultimate conclusion that "position and motion do not seem to be properties of the subatomic world" but instead "seem to be our way of talking about the subatomic world." From these statements I realize that truth has always been for man, laws or facts that can be related to their perception of the world. The only truth we are able to get out of the subatomic world is that which we can derive from our own perception of it, it is impossible for us to understand and therefor relate to a world that is beyond our perception. This idea is difficult to grasp, we cannot perceive a world where position and motion are absent because these are qualities which we perceive. If we were bees and thus had the ability to see with in the ultraviolet spectrum, then we could not understand a human world which was void of this perception. From these examples we realize that truth for us a humans is that which we can perceive, combined with what we don't perceive transformed into the terms of our perception, ie, ultraviolet spectrum, light which we do not see however detectable form of energy causing skin cancer, subatomic world one which exists with the absence of our notion of position and motion.

I have also read about just-so stories with in this chapter. The example of photons that traveled for billions of years before they reached earth was given as such a story since it was generally accepted because it had already happened and there was no way of testing if it was so or not. These stories create the implication that truth for us is that which we accept to be true through logical deductions from different ideas set forth. Again we realize that truth is a human invention which is used to describe events that occur with in our perceptions or an attempted to describe events that occur outside of our perception using that which we are able to perceive.

Physics and science in general originally was an attempt to explain why things happened. The first thing we are taught in science class is to ask why? Why do things work as they do. Eventually as we proceed with our studies in science we encounter relationships which occur outside of our perception, certain ideas no longer answer the questions why but instead explain how things happen? Again as we proceed we discover that How things happen is impossible for us to explain and we are left merely with questioning what happens, and attempt to predict when it will happen. This is what contemporary physics evolve? int? ain what happens. The best example of this is quantum mechanics, since we are unable to perceive the subatomic world we are merely left with the task of attempting to explain what happens when we do certain things or when certain things occur. This has evolved from models which allows us to explain how or why they happen.

In conclusion truth is man's attempt to describe what happens and why and is no longer an absolute. Truth is a relative ideal which best describes what, why and how things occur outside of human perception. I know realize that it is impossible for it to be an absolute, since it is impossible for us to perceive such a great extent of the universe. Our truth changes and evolves as physicists find new, better ways to describe things since truth is a generally accepted concept which describes things that we cannot perceive. However I still believe that there are absolute laws which govern nature, as Bohr states "the laws of physics are our laws" Physical truths become the accepted ideas which contort these natural laws with in our perception. Thus truth is itself a relative concept of the natural laws with in the human perceptions, and individually we each perceive the generally accepted truths differently and thus our individual knowledge is also different from everyone else's, hence knowledge is not an absolute, but the personal understanding of truths derived from the natural laws. As you have just read Doc after much thought I have finally realized that truth can never be an absolute and nor can knowledge for man. I believe this because man lacks the perception necessary to determine the laws of nature, and also differs so extremely that each individual of the species learns things and understands the same concepts differently. Hence knowledge and truth are not absolute but relative to time and the individual, however I am not entirely convinced and I still believe that there is an underlying set of laws that govern nature.

## Concluding Reflections; Inventing Reality

Todd Alexander

Finally the Author comes forth and states exactly what he has been alluding to throughout his book. He begins by observing mathematics which "is a human invention", "invented not discovered" by humans. From this assumption he draws many conclusions, Laws become conventions "a way we use language", "there is no absolute relationship between physical theories and the world," for "how can we know how the world is really put together?", theories become tools "a way of speaking", "we only know what the world looks like from our point of view" and "the language that we are shapes the world, for language indubitably defines us more profoundly than we can imagine."

Mathematicians believe that "mathematical reality lies outside us". The author and I share a similar view, is not what we experience as mathematics a language used to describe our observations? How can we describe that which is "outside of us" for it is therefore outside of our existence and thus we in no way can relate to it. From this we realize that mathematics is invented and not discovered in order to describe that which we observe.

The truth of mathematics becomes similar to so many other truths, in the fact that it becomes closely tied to the way one uses language. We also find within this realm of knowledge certain conjectures which become neither true nor false but which must be taken as neither and just used to man's. Since laws and theories are invented by man to be used to describe man's observations (man, man... don't let Mrs. Raaflaub see this) laws and theories therefor become mere conventions, a way in which language is used. This idea is supported by numerous examples, the basis on which they're all similar lies in that through out the history of man numerous theories have been put forth and used for various lengths of times yet it seems that eventually a new theory replaces the old one. We know that the old one was of use and described our observations very well, for if they did not we would not have used them, yet the new theory which replaced the old did a better job of describing. Thus the "value of a theory is not that it fits what physics already knows but that it points to what they do not know."

Hence theories and laws are but tools of man kind to be used by man in order to speak about nature and what we observe in nature. After reading through our text we are lead to believe that the laws and theories studied their are engraved in stone they describe the universe without exception, similar in a way to the ten commandments inscribed in stone by God and given to Moses. Yet we realize that this is not so after reading this book. It appears that the "role of theory seems to be a tool, a way of speaking, appropriate or inappropriate to the task at hand" not perfect laws set down by god that describe our reality without exception. These laws are reality for man since "it is hard to work every day with an idea without being committed to its reality." this is best explained by Einstein when he wrote "without the belief that it is possible to grasp reality with our theoretical constructions, without that belie\_ in the inner harmony of the world, there would be no science.

By thinking about various organisms which exist in our world we realize that they perceive the world in a vastly different way than we do. Charles Darwin suggests that "we are organisms shaped, not by getting the world right, but by surviving to c?-?s? get offspring." Hence from our limited perception of a "casual world unfolding in space and time" it is not surprising to think that we cannot perceive a world absolutely independent of our own and are therefore forced to describe such a world within the boundaries of our

own perceptions. From this idea we realize that there "is no absolute relationship between physical theories and the world" thus "how can we know how the world is really put together" Instead our knowledge is but limited to what the world looks like from our point of view. If or if not there is a separate set of laws which relate to our world yet exist outside of it does not make a difference since science cannot be those laws and theories, but only that which we can say about nature from a human perspective. The author best summarizes this idea when he states "there seems to be no all-ready made world, waiting to be discovered. The fabric of nature, like all fabrics, is woven by human beings for human purposes.

The author takes these ideas one final step further in his concluding chapter where he suggests that our language is us, and that through this language our world is created. His justification for this is that through language, we achieve the best description and definition of ourselves and the world in which we live than by any other means.

Reflection Chapters 5-6,  
Does Language Define Reality?  
Todd Alexander

As I read further and further through this book we discover more laws which redefine the existing reality for those of a specific reality. I find myself asking continually does not the way in which we choose to describe what is occurring not in fact create our reality. Now that we have progressed in science to a point that we are determining the relationship of things that are no longer visible to us and are at times almost unimaginable it seems that reality becomes what man makes it. The way in which we describe things and think they are becomes what is real for us, until a time that a new better way is thought of to replace the old. This in turn becomes our new reality.

This becomes very evident as we read these two chapters. Newton's language must be discarded when Einstein develops his theories of general and specific relativity. We learn that the way in which Newton describes motion for very small and very large things is inconsistent with his theories, yet they are perfect for middle sized objects. His papers and theories make great advances and enable us to fix these inconsistencies and even go beyond and explain things we have not tried to explain before

Einstein's theories explain numerous phenomenon, they explain light is the fastest traveling thing in the universe and that nothing can travel faster than it. They combine space and time creating a fourth dimension which ultimately leads to the conclusion that the earth travels in a straight line around the sun. That matter warps time and space in the sense that the closer it is to matter the slower time moves. Energy can be converted and in fact is a part of matter or interchangeable with matter in the equation  $E=mc^2$ . Light is observed at the same speed no matter in what direction or speed the observer is traveling. The mass of things increases as the speed of it approaches the speed of light and thus time for that thing slows. However even though these theories and the Quantum mechanics theory which he contributed to describe many of the imaginable occurrences of our universe they are inconsistent and still incomplete. Thus in the future our reality will be altered yet again as the language changes to include new phenomenon and examples. Right now Stephen Hawking's is working on a theory which combines these two partial theories, if he is successful our reality will be changed yet again with a new language and way of discussing things is revealed to us in his Grand Unification theory. This is not merely observed here yet in the next chapter as well as the author continues to speak using phrases like "talk about the world..." and "way of talking about the atom..." to reinforce the idea that it is the way in which we talk about an idea and the language we use that molds the reality of a phenomenon for us. It appears as if language becomes the tool of physicists to provide a way for them to talk about the happenings of the universe, created by man to define our own reality and used by men to explain the world in which we live.

Coda

Having been so impressed with Einstein's theories I must continue to discuss them here. The idea that as things become closer and closer to the speed of light their mass gets larger is an interesting one to contemplate since light, which has the fastest speed obtainable has no mass. The idea that time is warped by mass is also an interesting one, making the idea of time travel become more and more realistic. The revelation that as our distance from matter increases the speed at which time passes does as well is also an

interesting idea. Yet I still find the idea that light travels at the same speed towards all things no matter the speed or direction of the thing it is hitting is traveling at a difficult concept to grasp at best.

## Physical Laws and God

Todd Alexander

After reading the first chapters of *Inventing reality* I noticed two things; first that man gave a term to the things they did not understand, this term was a God, and second once something which was previously misunderstood became understandable through the use of language in the form of scientific laws it no longer fell under the same title. Is not the relationship between things not the same one once it has become understood as it was before man became cogniscent of it. This is what distinguishes religion from physics for me, however I believe that God is a combination of all the laws which govern all of the different occurrences throughout the universe if they are understood by man or not. This book expresses similar views throughout the part which I have read. It begins when the author suggest that for King and his successors the laws became not those of kings set to govern their people but the "divine instructions directing the behavior of the world. To uncover them (the laws) was to discern God's blueprint for the universe." We see an obvious link drawn between God and the physical laws of our world which are just beginning to be discovered. Although there is no suggestion that in fact these laws are what God himself is made of as in my own personal opinion, we see the first connection between a supreme being and the man made laws which describe the way in which the universe behaves.

Again this idea of a connection or link between physical laws and God is conveyed in the discussion of Galileo, his battle with the church and his idea that the laws of the universe are written in the language of mathematics. Although I disagree with this view, and feel that man created the language of mathematics to describe the laws which in fact are each in themselves a part of God. Here the author suggests that God himself may be a mathematician, since the language of mathematics describes the way in which the universe functions. This specific idea is unimportant to me, the important aspect to observe is that there is an attempt here as in the first example to make a connection between the physical laws which describe the functions of the universe and God.

The final example which evidences that physical laws are in some way linked to the essence of God, for myself and the author of the book is during the discussion of Newton. He suggests that "Newton's laws describe an ideal world and not the one we encounter every day." Although this statement is false for these laws do describe the world we live in everyday the basic premises on which they are based describes motion in ideal situations, thus these laws appear inappropriate for the world we live in. Again this actual statement is not important it is the suggestion that these laws describe an ideal world, one which since it is ideal must have been created by God, and therefore the laws which govern this ideal world must be set down by God himself in order to allow his world to function. This is the opinion of the Author.

My personal opinion differs only slightly, I believe the laws which govern the universe are actually what constitutes the essence of God himself and are not created by God but in fact are God himself. My reasoning for this originates at the beginning of this discussion, we call God that which we do not understand, once it is understood however it is no longer called God but becomes a part of a physical law, which describes much of the universe which we can see and have had experience with. I see no need to change the title of the information recently acquired, from God to, the latest physical law, instead I

prefe. to think of the combination of all of the laws those understood by man and those not as the supreme being God himself.

Epistemology II: Todd I  
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From the Epistemology II project, interview with Todd Alexander

MR: You say here, scientific knowledge cannot be artificial it is very real, and then you say it doesn't show nature as it really is, that is basically an answer to this question. Now can you elaborate on that?

Todd: Ok, to us, basically what I am talking about, the way we perceive things we obtain, for us it becomes real, as if they actually exist, we use that every day to do things, in that sense it is real to us, in another sense it is not, in another sense it is not exactly what is going on, its contorted by our, it is contorted by our human perception, by our perceptions as humans

MR: how do you think that is contorted?

Todd: well just, for one we can't see everything, so we can't perceive X-rays and ultraviolet, like I write in the example, we see only the visible spectrum, but there is all this other radiation that is going on, beyond where we can perceive, so we just got that idea, we get ideas but we don't get a real perception, so our ideas are limited by our perception and we don't really perceive it all, so in a sense it is real, but we, it is tangible and we can figure it out, but we don't perceive it

MR: we do see something you say

Todd: we see examples, like we can measure it using machines and what not, but we can't perceive it, like with a gamma ray we don't see it, all this light, we see the light and we see the colors and what not, but we can't see other things

MR: what about when you go to other things, like light, like particles, like elementary particles, or subatomic particles, like electrons

Todd: like we think they exist, and we have evidence that they exist, but like we don't really realize it that they are just our, we put things that we understand in their position, like I put a small sphere for an electron, that glows and got a silvery mass, because when I see electricity jump through the air, you see a silver shine, and the blue radiate color, so I give that color to that little sphere because I think it is electrons, it is electricity, so that's what it looks like, but who knows what it looks like, we can't perceive it, we have an idea of its existence.

MR: no how do you link that to religion, every now and then you make those remarks to God?

Todd: oh, ahm, the thing with religion it's what you believe, I mean, I mean all of these theories and what not, they exist and they are real to every one, but they don't really exist, I mean we created them, like we create our own, we create almost everything, we create the language, we created the, we created everything in our world, everything in the world is created by us, we create God for ourselves to give an explanation of, it becomes an explanation of things that we don't understand, it becomes the good, it becomes an explanation for doing things, for explaining things why we wanna do good things or why we wanna help people, it becomes an explanation for what we can understand, and as long as we believe in it, then it exists

and enough people are doing that, for me God exists, but I know you believe in God, you don't think that there is a God

MR: which is not negative either way, you have to believe in you

Todd: ya, if I believe that electrons exist, or I have evidence that it exists, and I mean there are a certain number of examples that I know that God exists its not like some supreme form of human intellect, I mean there is people, a lot of things can't be explained by science that we may will be able to explain but we realize, I mean like look at untangible things, like love and beauty, and I think that equates to God for me, because, I mean these things, you don't understand why, but you know that it exists, you know certain things are beautiful, and you know you love certain things, like you can't explain why, you just do, and there is no scientific approach to it, and that becomes part of the religious thing it's almost like an emotional side, and emotional spiritual side to it, I mean, everyone's got one, I get that with my religion

MR: no one says that it is, at least I am not saying that it is any inferior

Todd: no, I know

MR: because there is also where you can perceive, where you know things through art, that you cannot know through science

Todd: I mean there is just its a belief, its our creation, the term God is our creation, but there is these things that exist like the gravity, the term gravity 9.81 for that constant are creations, but it exists, it is very real, you tell me when I fell off the tree, it's real you break your arm

MR: ok, you fall, but forces they are not so real, although we think that

Todd: no, we perceive them, we have that term

MR: we fall, that's what we perceive

Todd: ya, we feel ourselves dropping, and what not, and we get all these terms, this has a mass, and we create all these different things to be able to describe it, it becomes the chainsaw

MR: so how do you relate that to truth? In your essay you say

Todd: truth is bullshit, there is no such thing as truth, I mean, I thought about it a lot. Truth becomes what we want'da be, what man, man, when society gets together and decides, this is gonna be the truth, this is the way, and enough people agree on it, then that's the truth, I mean if you look at that, that is more than abstracting a general sense, like we are doing with laws, and what not, I mean there is a truth, like if someone knows if we are dealing with a life there is a truth or if we are talking about knowledge, I am talking more about the knowledge side of it. When society gets together and says that certain things are that way because that's the way it should be, that's a judgement by man, created by man and in that sense doing contrary to that you are doing something that is wrong, it's against society, that's just doing something that people say that's right, it's like, basically we are limiting ourselves by creating all these truths and not being able to do these other things, I mean, to a certain extent it is useful to the society, but to a certain extent they are going too far, it is limiting society, and that way people don't, are limiting by, they can't for example, I don't know, you can't go out naked into public, it's a truth, that's one of the truths of society, it's a law, you don't do it, I mean, it's dumb, who cares, one way or the other, everyone's been told that that's the way it is, but you are limiting yourself not being

able to do this, without any real rational reasoning, because everyone says that this is the way it should be. I don't know, to a certain extent, for some things it makes sense, and then for other things I don't like it, when you are talking about like it's wrong or the truth that we don't kill people, I mean it helps society, if everyone would kill everyone, it wouldn't work out too well, I mean, in that sense morals and ideals like truths and that and killing and stealing and crime is wrong, there is different kind of wrong, that's good for us, and even you can understand what they are saying about drugs, its like society is killing itself, but then again, as you create these truths, you are limiting people not to be able to go beyond, may be in some certain sense it's ok, but it's not, you gotto say that this is the way it's gonna be, it's not gonna be, and realize that this isn't any gospel thing and that you are not gonna burn in hell if you are against it, or what not, it's just our creation

MR: but social scientists say, or people who have observed scientists say that even scientists unless there are enough who agree and say, ya, this exists, this new thing, it doesn't exist. It only starts existing when there are enough people

Todd: believe in it. When we did the wave nature of matter, I don't figure this de Broglie, I mean for him, matter had waves, like for him everyone was walking around with a wavelength, and it existed for him, but it wasn't the truth until society who gave him the Nobel prize and Einstein and everyone looked at him and said, now it's the truth, it's like, hold on a second, there is a whole new, like give me a break, how can you say all of a sudden, one day that it is and one day it isn't: like I cite an example women in our society, it was the truth one time that they were, that they were inferior, they were to stay home and do the household, good, and now all of a sudden its turning around and they become, they are on another echelon, now that's a new truth, I mean, who is to say what's right and what's wrong, I mean it's just everyone's opinion.

MR: so, to continue to the next point, is science also, like other areas based on presuppositions? And you sort of said, I guess you said that there are certain things that we don't question even in science, we just believe in it. For example, let's say, the electrons

Todd: we don't, I mean we have have examples of small particles and charges, and I think we can isolate that they are very small

MR: but we can never see them

Todd: we can't see them directly, so what we are doing is, I mean. I think geography is a better example, when you deal with, when you go back to the beginning of geography and it was a line, a continuous line through space, and two parallel lines never cross, there is no curve except that, that was a presupposition, and yet we didn't, I mean, it's the basis of a tool, a chainsaw, like a chainsaw

MR: presuppositions like that you also have

Todd: it becomes a tool, we're saying, this is the way it is, we accept it, and so we can use it to do different other things, I mean again, like e, the numbers e and  $\pi$  become this accepted, that's what they are, we are not sure why, no one knows why e is the way it is, I mean there is lots of theories behind it, they just are, and we use them to do

different things, so I mean, questioning them can be interesting, but it is not gonna help you, you can do it if you want to, but they become tools

MR: so the next one, scientific laws and theories exist independent of human existence, I think you already contradicted that up there by saying we invented that, and it takes man to invent, they don't

Todd: scientific laws and theories are man's tools, like a chainsaw, like a really good complicated chainsaw, like the laws and theories, I mean, they don't actually exist outside of, like I mean I remember i was sitting here last year and I had that image that God had chiseled out in stone and had taken Moses and then later on sat down with the chisel and chiseled out  $E = mc^2$  and then put them all in stone, and so they appeared. And when I think about it, and I am doing it more and more, well hold, hold a second, things happen, like fall, I fall, imagine I let this fall, what's gonna happen, if I light things on fire, it's gonna heat up, it's gonna burn if that happens, now the, everything else other than the actual occurrence the scientific laws and theories, we created them, they are invention, and so we can, so that we can describe to others, and in order to predict for ourselves, what's gonna happen when we do certain things, so they become like I said in my second essay, like a chainsaw, it's like a tool, we use it to explain things and in order to interpret things and to predict things

MR: you mentioned last year, when you look back, you realized yourself that you changed, that your ideas changed

Todd: oh, yea. My ideas are continuously changing, my idea o God is changing a lot in the last year or so, I mean, a lot of things have changed, the school, everything, it's just you learn that you come to realize that everything isn't as concrete as society would have us think it, society would love us to believe that this is the way it is, and that truth is like this, and you believe that and you do it or else you go to rotten hell, you're gonna be condemned, I mean I realize that it helps to follow the truth in order to get along in society and in order to help people in society, but you also realize that it is society's invention that you should be limited by

MR: what sort of things made you think about these issues, or how come this change, do you have an explanation for yourself?

Todd: ahm, I don't know, I read a lot of stuff, I read, in my philosophy last year we read a whole bit, I read a lot about the church fathers and read a lot of essays concerning the nature of matter, the nature of light and I don't know, I started doing, I take a lot of time talking to people and I realized that, as soon as, well after I got out of the fire, I think it started when I got burned in the fire

MR: but that was in grade 10

Todd: it was in grade 10, but that's when it all started for me, I mean I came out of the tent fire and I had the image of my Appleby that was like the perfect ideal institution, like there was nothing wrong with it, and then when I was staying in the hospital I had about 3 weeks to myself, there was nothing I could really do, I was on morphine and stuff a bit, but I didn't have a lot to do, and I just thought, and I had a lot of time and in those months after the fire I did a lot of thinking about, about Appleby and about life, and I realized that like, nothing is perfect and there is always 2 sides to everything. And I talked to a lot of people, I realized, hey the school is not different, it's got bullshit too, and it got its problems and it's not the ideal institution, but I also

realized that it had a lot of good to it, and then when I looked at it, and then I started applying that to school, I mean in the fall we had a discussion and I mean I hadn't thought about, I hadn't started applying, I just I limited it to school and my life in general, and then I started taking philosophy and doing some reading books outside of school and what not, and I started to realize life itself and society, and Appleby is kinda society, society is not perfect, there is no perfect society and I started to realize that I mean, in physics when we read our text, what was it, Inventing Reality and what not, I mean it's a lot like society at Appleby, it's not perfect and there's problems and its created, it's an invention of man, and therefore it's imperfect. And I mean just throughout (noises, lost about 2 sentences) And I guess after that

MR: what about the next one, does the social environment affect what scientists, scientists oftentimes think doctors or chemists you know what they find out, we often hear discrepant testimonies that they give when they are called by the environmental board or

Todd: I don't know, I mean I know what you are saying, the social environment where everyone lives they react to. I mean, there are cases where you have to deal with other people to survive or others

MR: but does it affect the kind of

Todd: but the knowledge put forth, I guess one if you are an (?) there are a lot of morons, a lot of people that don't have, it doesn't turn out that well

MR: but I guess, you have answered that already in the affirmative in that you said that we have to agree on certain things, and if we have to agree

Todd: we must agree on something to become knowledge,

MR: so it's society that sort of puts its stamp on, if society doesn't put its stamp on

Todd: society judges it, but no matter who you are, your ideas are still your ideas, and your knowledge is still your knowledge, and if society agrees with it or not, then it doesn't really matter

MR: I guess what I wanted to look at here is the accepted knowledge, the one that you share with a large part of the populace

Todd: I think that has to do with ability to present it, and if you can sell it to other people, if Einstein couldn't speak and couldn't explain his ideas, I mean  $E = mc^2$  probably wouldn't be here today. But in that sense, ya, your society will affect yourself and all other people. But I still maintain that nonetheless your ideas are judged by society whether's your ideas and other then doing a lot of drugs and destroy your mind we can't change it

MR: now, we talked a lot about you know, the knowledge being tentative and has to be agreed on by society also probably implies that there are as many different claims to knowledge as there are people, and yet the, on the questionnaire for example, you said that you wanted the teacher to show the correct method for solving problems

Todd: is there a correct method?

MR: to show?

Todd: right there, is there a correct method?

MR: and then you say, often, and then here, the teacher insist that my activities be done on time, why would you say often?

Todd: well the thing is with the, with the, when you are dealing with the stuff like in class and what not, on time, I mean if you set a date you have to do it, you have to hand it in on time, like anything, I mean as you have a reasonable time frame you should be able to hand it in on time and it's just like one of those things, it is part of society, you don't hand it in on time there are things you live in society you that you have always dealt with and you always will do, and if the teacher doesn't force you, people are not gonna do it, and the thing with this is, if you show me the correct method for someone, is there really a correct method, but I always want to hear, I don't know if there is a correct method, but I want the teacher to show me how he solves it, so that I can learn from him. So I would like to see how he did it.

MR: but if there are other methods, like if you came up with one and other students, what

Todd: I mean, I am not necessarily, the teacher, as I wrote in my essay, the teacher is like another student, and students become like teachers, you know, of course I wanna know how he solves it, I mean that's why I am interested in the method, is there a correct method?

MR: to come back to the question of time, and you already do that, anyway here, you sort of negotiate time-lines, I mean in that way

Todd: yea and once you have a time-line that should, you have to say

MR: so it's really you and the teacher that

Todd: as long as it is reasonable, it can't, because otherwise it can't

MR: but see, sometimes people look at this and say, he wants the teacher to do that often with me, so he is teacher dependent, but you are not really teacher dependent

Todd: I just want to make sure that if I say that I need something done by you, I expect you to have it done by, then I will have it done, I mean it's just, it is a courtesy thing, and you have to make marks, and you have to hand in marks, its also a part of discipline, you get it done, and it has to be done eventually, if people are putting it off it never gets done, so in that sense you really learn to focus your time and you concentrate on doing what has to be done, and I mean in that sense it is good

MR: do you do a lot of memorizing and regurgitating

Todd: what I try to do, I try to be at the third tier as much as I can, but often if I need marks, and most of the time I need marks, and I usually remember, and I usually do when I just read through it for a base knowledge, I usually remember, I don't usually do a lot of memorization, I did so in Latin, but in sciences I never did a lot of memorization, because usually the ideas make sense so I remember them, and then I apply them, and the regurgitation of facts, I mean, I don't think I have ever really done that, may be in an art or a history essay, but I can deal with that, I try to do the third level, but it is tough, as it is difficult to actually take a part of science, a part of what we call concrete textbook science and take it outside but if you do it, you can do it, you realize that you

MR: but you did it in a sense

Todd: when we did the labs

MR: when you do your own labs and when you decide

Todd: I like that, and it gives us some independence too

MR: ya, because then you can work at the third level, because you always apply your

Todd: knowledge

MR: how does it help to learn the mathematics that comes from the textbook and the concepts and the lab experience? Does it help you doing all three? Does it help you to know the concepts in order to learn the math?

Todd: if you do the experience you can figure out the concepts and you can figure out the formulas, we got enough basic mathematical knowledge that you can make your own, and may be you get a different variables, but its the same basic math. The experience alone allows you to discover the basic concepts in math, the text is only to check and see if you see if there is any fault or you can use other people for that if there is any fault with your reasoning. In the lab, which is the experience, I guess, like you can progress that way. You can do it the other way, but it is more, more difficult to get the concepts and then apply them to an experience

MR: so you first want to see them?

Todd: it's easier that way, I find then just memorization

MR: what in terms of interest, how is it more interesting? Or what is more interesting

Todd: well that way, if you do the experiments, you think a lot about the experience, you are doing something you wanna know, and you are asking questions you wanna find out instead of being told something and then trying to figure out how it applies, I remember there is the curiosity level like you are saying how dos this work, and figure something out instead of getting something and have to apply it to something

MR: but if you had to you could learn a subject, I don't know, whatever it is, it doesn't even have to be science from the textbook

Todd: ya, which would be annoying and boring

MR: because basically you wrote in the essay that may be leads to level, tier 1 or tier 2 learning

Todd: and you'd pass the course and you'd get an A in it, and it wouldn't be of any value to you. When you get into life, regurgitating a textbook isn't gonna help you

MR: that's right

## Science &amp; Religion

MR: let's look at question 1, Landforms like the Grand Canon were created by God and have not changed since then. You said that's a yes/no [answer]

Todd: Ahm, I just think the question, if you are trying to allude to the fact that God, ## it is not that simple, in essence, God created the universe, this is God's universe, it is from God, but the universe is changing, and it has constantly changed through time, and all that is part of God's world. I mean, of course it get's changed, but I mean, it still is created by God. And it is a part of God, and man also is a part of God and was created by God.

MR: so that's then the same for the next one [question]? Living things were created during a short period of time

Todd: living things are in essence, are parts of, living things are part of God similar to the universe and like and the world, for me, and I don't know. God didn't sit down and make things, if you read Genesis, it is rather bluntly stated that God did this and this and this one day after another, its more that where things had come form. Like, the essence is that things came from God, and they are part of God, God doesn't have two hands, doesn't have a face, doesn't have a mind, God just is, and he should have sat down and done all this stuff? This is all very naive, and a church way of thinking, and these questions are really pointed, it just doesn't work that way.

MR: I think that ultimately gets down to evolution, whether you believe for example that God created the universe and then developed, or if all living things were just put there, or did they evolve?

Todd: they evolved through God and with God

MR: but how was it created? I mean, what do you think?

Todd: in essence, I have seen a lot of stuff like scientists how life and how the earth came about and the universe, and they proved this and proved that and back and forth. I mean, in essence, all these things out there, somehow, all these things got started, something got the ball rolling, somebody threw the first ball and it all got started, and along the way, that's the first snowball still in there. When you study Aquinas or when you study (?ansem?) and Augustine you got the prime mover, the first cause. And we attribute, that's one of the proof of God, the prime mover, in essence, that might be, there might be a simplistic proof of God for some poor to justify God, but that's not a very fundamental aspect of God, here there, or wherever we came from

MR: but do you then believe that our lives as it is described in [question number] 16 and 17 predetermined by a master plan, are nature and human life predetermined, or?

Todd: that is determinism and free will, personally I studied both, if I am choosing to do something, I think that I have a choice, but I am choosing what I am supposed to choose, then I guess that would be determined, I don't know, and I don't think we can know, if there is a master plan set down by God. I mean there is no way to look at, one way or the other. It's been argued, and I read a lot of stuff that we have the freedom of choice in order to differentiate between good and evil free choice is a necessity. And Augustine said for deciding between good and evil, free will is a necessity. If you don't choose good then, then its not doing you any good, its the choosing rather than the actual action and so the necessity is the ability to choose and what not. But I am not inclined to stick to this, I am not decided, I don't know if it is

a fatalistic society. I wish it was predetermined, I know, I wish if I had the choice or not, if I could, but I don't know

MR: because some people say that the laws of physics are this predetermined master plan

Todd: I find this hard to believe, just because there is so much change, like just from what I have read and from what I have seen I find it really, I find, may be there is an underlying essence in force which comes from God, that derives how things react and how they occur. However, once we start defining them and start defining and placing human, our finiteness upon infinity, then that is, it doesn't work, it is an impossibility.

You can't perceive ultraviolet light, you just can't, we can't perceive it, that's just the way it is we can't do it. And just as we can't perceive God and we can't perceive the master plan. But we can create things to help us on our way, we can create things that can pick up ultraviolet light, and say hey, that's what looks ultraviolet, and I wish I could pick up that, or X-ray or gamma ray, but we still can't perceive it. That's like the, the idea

MR: I sort of remember from your last conversation you talked about things being not absolute.

Todd: ya, nothing is, it makes, there is no truth

MR: so when you think about it again, man makes up theories, what can we know about reality then?

Todd: we create our own, like we create our own reality, as long as we all agree that its reality. Are you saying reality in the sense of, the essence of everything, this is an impossibility, you can't like know, this is an impossibility, it just doesn't work, we are finite

MR: so you are saying then, basically we make up this knowledge, what about God?

Todd: what about God? God?

MR: where does that fit in?

Todd: God is the knowledge, God is the truth, God is the light, His universe, our universe, we are living in His universe and he's made our universe, and He has given us thought, the ability to define reaction to the unknown in order to better ourselves and so we can get ahead. But he, if we can perceive God, if we knew God, then we would know the truth, but we can't, its an impossibility, it doesn't work, you can't move the essence of the light. The only person, we have to transcribe it into our perception

MR: so you are saying that we never have access to the essence

Todd: to what's going on, ya, what, ## our limited physical and mental, I am saying, in the evolution of human being right now, we don't have the access, the essence of what is going on. If we evolve so that we got all the entire emotions, that we could hear all levels of sound have minds capable of conceiving infinity, have bodies capable of running through the hades, then we will, but that wouldn't be a human being any more, that would be something new that had evolved. I can see that happening I can see us evolving into many, our species may be evolving into something similar to that, but that's millions of years away

MR: but then, I think I don't understand your notion of God

Todd: what's God? God is truth love goodness, right

MR: So is it something, what is the extent of it then?

Todd: the extent, how far does God go? It will be everything

MR: is it outside the universe or is it the universe

Todd: it is the universe

MR: so its nothing outside the universe?

Todd: no, God is the universe, God is everything and more, I mean that's God

MR: so we are part then of God

Todd: ya, God is a piece of all of us, we have the ability to do good, we have the ability to do what's right, we have the ability to think, and that stems from God which is the heart of it all. God is not, we can't perceive him, like we can't create, whenever I think of God I get a picture of nothing, but try to think of nothing, and that's God, and that's: well think of nothing that's as close as you can get to everything, and that gives you God: that's sort of how I rationalize it. ## It's tough, we can't do it, so it drives you nuts

MR: but when you think in terms of truth or knowing, is that a basic assumption then that you make?

Todd: I just know it, I just feel it, like it's not, it's not, it's not a tangible thing, its like beauty, some things are beautiful, it just is, its no, if you are trying to justify or rationalize or whatever, you can't, it doesn't work, its like, it's like beauty: I mean, if you are sitting at night down by the lake, having a beer or a smoke or whatever, and all of a sudden the sun goes down, and the color in the sky and the horizon, I mean it's beautiful, that's it, that's beauty, you can't say why, you can't define it, it doesn't work: you can't do it

MR: so, what then, when you think of yourself, and you think of God and science, or are these completely

Todd: God is science, # God is in science, # God works with science to help, God has given us the mind in order for us to do what is good and what is right for the betterment of the world and for each other, and science is very much an aspect of that, even though science might try to disprove His existence # or belief in him ultimately there is more good created from it than evil, and therefore, I don't really like what's happening with, probably the idea that atheism's what's going on, but there is so much good coming from it, so we can't really

MR: earlier on you said that the universe is still evolving, we are evolving, then if God is the universe, is He or She evolving too?

Todd: is God evolving? God is part of us, it ## I don't ##, God is infinite, so I mean in that sense, can infinity change? it's constant change, it's everything, it's everything, it's tough, I mean you can't define evolution and change the planet thing, if you are infinite then there is no such thing as change, but is all-encompassing, so we can't apply change to infinite things, I mean that's like saying is God good-looking, or is God plain, or, I don't know tall, we can't apply the term to infinite things ##

MR: that almost sounds like, what some people say, like Einstein's theory of relativity. If you plot, if you could perceive in 4-dimensional space time, there would be no movement ## because in, the time would just be the 4th dimension and there would be a whole that we could perceive, which is sort of static, because you don't need time to change, or what we experience as time

(inaudible sentence)

MR: what, earlier on you mentioned that scientists, or some people try to take science to disprove God. And some people use sort of a dichotomy God versus atheism, or science versus God. How do you, do you ever experience any struggles there, when you take your science courses, do you ever feel that there is something working against your beliefs?

Todd: nothing really at all, I am being left alone. I have read where they have got people burning science textbooks, physics that somehow disproved genesis and stuff like that, I've read stuff about down in the South the bible, they themselves aren't listening to God, you have to have tolerance, everyone has to have the ability to (?), we have to have the ability to accept that, no one criticises me for my beliefs, and no one told me that I am not, not directly to me, that I am not bothered with that, and if they did, well hey, they disagree with me, I disagree with them

MR: where then do you see truth? How is it revealed, or is it revealed?

Todd: are you talking about scientific truths?

MR: scientific truths

Todd: if we are talking about scientific truths, it is an impossibility, its more society's general, everyone gets together and we say, ok, this works like this, and I see this relationship happening, so we say, you can't, I don't want to name it truth, name it a law, because for me truth is a much more emotional spiritual type thing. Truth for me is, is, if you get a few bucks extra back on your bill, you give them the dollars back, you don't walk out, hell, they made a mistake, the truth, that's the truth, that's the way it is, and the truth is standing up on someone's feet who's being picked on and saying you are an ass hole, the truth is, you are not a brick, the truth is you know what is right, truth is more on an emotional level, a spiritual level, not so much on a factual level, that, it changes so quickly, so rapidly in the modern world

MR: you sort of mentioned, and I had in mind the moral and ethical that you mentioned, but is there moral and ethical are there truths, are there things that are right?

Todd: yes there are.

MR: but who sets these?

Todd: it's on a personal level, no one sets, a different God, we know at a personal level, each of the human beings is, you know within yourself what is right and what is wrong and, it is kind of being, it's part of having God within you. I know a lot of people, I've read plays and what not where you've got the mode of this, a character is just evil for being evil, I don't see it, I mean, you see things, a lot of greed, a lot of lust, I mean, there is always a rational behind it, people don't just hate, people just aren't evil, it doesn't make sense

MR: so you believe that man is fundamentally good?

Todd: they have the ability within them, they can ignore it, or they can't.

MR: because if I think back to my own growing up there was in Germany the Red Army Faction, and they believe that they were right in their cause against, what they believed to be an oppressive government. But what they also did, they robbed banks, they went and got money from banks, they hijacked planes, they abducted people, and try to get ransom, and they also killed people. Now they said they are right to do that because they knew the truth. And it was a sizable group, a few thousand people

Todd: that's at a personal level, I mean I've never been in a situation where I've been, I mean, is, that that, is that like, is it a necessity ## there is some basic fundamental truths, like one knows that no one likes to kill someone, everyone knows that, I find it difficult to believe that a human being could actually do that, but sometimes there are times in our lives where the truth must be ignored for a higher truth, on scales and obviously for them, the truths, the final answers are being looked for at a higher level, for to strike out against that government that was oppressing the people. I am not, I am not going to judge them, I don't know whether they were right or wrong, I don't think anyone can know that, but on a moral, that's just like taking different levels of the truth and of goodness. There might even be grieve, like greed, greed, its in the nature and responsibility of God, may be they wanted money, where people were using this moral ethical truth level just to get the money, hijack people, rob banks, if I am trying to justify this, I am taking this for a cause and say, ok, this is ok, because it is for this cause, but really the underlying tone was they wanted the money, and they did this for greed

MR: let's look at some of the things that directly bring in the ethical issues, for example, abortion or genetical engineering. What are your stands on, for example, genetic engineering? You are

R: doing genetic research this summer

MR: and then you want to become a doctor. What is your position then, there?

P: well, right now, human genetic engineering is an impossibility, you can't create, you can't specify, but research and development must be done into genetics to do the discoveries of how it functions, otherwise, there is so much good that can be wrought from it, there is that so, there is such an infinite of good that can be done, for example, if you choose AIDS, there can be a cure for AIDS, we can cure so many things with genetic engineering. At the same time, there is such a huge possibility to do evil

MR: so what do we do in this case? And who will do sort of, do we need to control? and will scientists be the controllers? or philosophers? theologians? Who will make those ethical decisions? Who will take the responsibility?

P: well ultimately the government has to, but economics as it always has will make the decisions, whether you like of not, economics always does. The money, I don't think the people, I don't think the people who have the money now are going to put it into, specifically into genetic engineering for, that isn't related to economic reasons, or isn't related to a commercial and industrial reasons. I don't think we have think about it a lot, for the next little while, it's gonna be our government to decide that they want to genetically engineer people for olympic teams, and they decide they want to genetically engineer, for war purposes they want to create a soldier. In war, the United Nations which sucks, it doesn't have any power at all, it is going to have to, the world is going to have to say stop to genetically engineer people for that sort of thing

MR: but who will decide what is right and what you can do? And what is wrong that you shouldn't do? That you should, because then there are a whole range of activities

P: like you are saying we shouldn't be genetically engineering a special human being, or should we genetically engineer that person to have 4 arms and no hair, I mean, those finer points are just scary, its getting different in every country, and its

gonna be, throughout the world its gonna be, there is gonna be a huge problem, and the decision is gonna be probably done by my generation and by my children's generation. And all I can hope is that they control it, if not, its just like killing ourselves. I think we can cure (some inaudible)

MR: if you had in your future job, if you had to make a decision now, how would you go about making such difficult and ethical decisions? As a scientist or a doctor, on what kind of knowledge would you draw, or would you bring in God, or is there room for God in your deliberations?

Todd: obviously you draw on , God is where you draw your beliefs out: that is the only way that you can deliberate

MR: but is that consciously

Todd: God reveals itself, God is with you always, if you consciously figure or not, he will influence your decisions

MR: he won't influence?

Todd: he will. 'Cause he is part of you, so whatever you do, it will be influenced by God. And I, what I probably choose and how far I would go, I, you have to turn to God, I mean, for that kind of decision, there is no place else to go, there is no, like when you ask this question you have to look inside yourself, you have to look at all the aspects, and think about it clearly, because ultimately you can find it only inside you, then its not so much a cognisant thing, it's an emotional thing, a spiritual thing

MR: so inside you, is spiritual, emotional, but also God?

Todd: ya, that's where God is

MR: and that's where you would look

Todd: ya, that's where you have to look. That's when you know, that's where the right is

MR: would you say that one of the issues we had in the past regarding difficult decisions was the manufacturing of the atomic bomb, and some of the scientist that were engaged were completely opposed to future nuclear development after politicians had made the decision to drop the bomb, and after Nagasaki and Hiroshima you know, had been destroyed. Now, as a scientist, how would you feel, when you make a medical or genetic engineering kind of decision, and then you leave it to politicians, and then they do something that is equivalent to

Todd: what you didn't want

MR: ya, what you didn't want

Todd: you're pissed off and you wouldn't like it at all. You have to leave with God in the hands what's right, ## that's a tough one, of course you're not gonna like it, you can't do any better than that, it's for the better, you have to think of it that way, if you can't do any good

MR: and other things, when you go through with your medicine, medical studies, other issues you might have to face are abortion and euthanasia, as a doctor and as a human being you have to make, I don't know whether you make these decision as one,

Todd: that would be case related, that is the only way that decision would be made for one person on a case, as a doctor, I will know before an operation and I can see both sides, all the arguments, and I ride the fence pretty much to all of them, if I disagree with an abortion then I wouldn't perform it, if I disagreed with euthanasia then I wouldn't perform it. However, I still think that people have a right, I have, I mean I

know it's free choice euthanasia, you have to give, I go the free choice route, but I am not gonna perform it, if I don't agree with it

MR: but you then think that you have to make a decision case by case

Todd: ya

MR: and you have to look at the case, you don't

Todd: it's not black and white, just like with genetic engineering, it's not a black and white subject

MR: so you are not saying that there is one set of standard that everyone has to be measured against, but there is sort of a situational ethics

Todd: very very situational, I mean, it's totally situational, both are prime examples, with huge grey areas and I think for me I would be very very internally very case related, I'd have to be. And I mean, laws, if they could, I'd like the laws be case related and have specific rules for each one, have just a general outline and have a committee and make 2 or 3 people, but it probably would be too expensive, that wouldn't work, but I think that would be the best way to tackle

MR: that is something that I also believe that our standards, ethical deliberations that they have to be

Todd: situational

MR: situational, depending on the, on each individual case

Todd: it has to be. There are just so many variables, if you write a law to include all of them, you'd probably have 4 or 5 textbooks, may be that's the way to go about it. But there's still gonna be someone who's gonna twist the laws

MR: another thing that we talked earlier about, truth in terms of science you said, that is something we agree upon, or what is right or more acceptable

Todd: it's like a social truth, its something of this social, science is like a social truth in reality, at a party it is socially acceptable not to puke on the table, I mean, you just don't do it, that's like science, we know in society when it doesn't function at all, if you don't have these things, like, if you happen to do it, its not like if you go somewhere else wherever, just so that our society will function, just so that science will function we agree, but it is not carved in stone, it was not like Moses who brought down the stone tablets, it just didn't happen like that

MR: are there similar things at the level of religious beliefs that people agree on commonalities, or do you think that

Todd: it is pretty personal. I think that religion is much more personal, there are certain socially accepted religious beliefs and that's why you get a religion, I mean, some people follow the teachings of Christ, I mean if you agree with what Jesus had to say, you know, then you do that with your life, then we all take that as a rationale for our life, but has really ambiguous laws too, so there is variations with it

MR: so for yourself would you label yourself a Christian

Todd: I am very Anglican, very Anglican, for me its a spiritual, I am attached to the church, and for me there is so much more, I draw so much strength from the church, there is this, my faith lies there and there is so much power and strength that I get from the church, so I have to, it's an emotional thing, I feel that, I don't get that in another church

MR: but you are aware that there are a number of different churches, even Christian churches

Todd: oh, there is vastly different ones

MR: and but where do you see differences then

Todd: differences are at a very small personal level, some people, I mean, it's just a small, a very very small personal, some, like in nature there is like, in the (?) church they decided that there is homosexuals as priests

MR: like what

Todd: you can have homosexuals as priests, I mean, I disagree with that and I don't think we should have them ## I don't think we should have them in church or in society, but by having them in the church and in society, I am a little right wing in that, in that regard, but that's just a small point, I mean, they also agree in the teaching of Christ and the fundamentals and that's what makes them Christians. And all the different churches have fine differences

MR: but these differences, I wonder where they lead to, you say on the one hand, God is something personal and teh, but there are differences in the way you go, or is it just like a family, you go people who know that they believe in the same thing, and who want to share a ritual, or how do you explain the different, the different churches

Todd: there exist different interpretations of Christ's words there are so many different interpretations and enough people feel strongly about it, but they segregate themselves, but it's not huge, they create a new church, they say, so its not really all that big, its still Christian, and I still feel very much, and I still agree very much what most of them believe, its just that there is some minor points where we disagree, just as there are minor points on which a lot of scientists disagree, and I mean, it's not, its just a personal thing, its probably more the finite, the fact that we are finite and God, that's basically the same with them all, and if God's basically within all of us, were basically all the same, why, if God is within ourselves, it's one entity, why do we all have these different ideas? and we have different churches, and my answer to that, ## as finite beings, we all have different experiences, and we have different emotions, we are not all the same, and therefore our cognisance are being interpreted, they all exist in different ways than others, and so there will be certain one of us who will interpret these feelings, these ideas in a similar fashion, and they may not interpret them differently

MR: ok, that is all within the Christian

Todd: and then, God's within any, God's common, I mean, I feel that my God, the God I believe in, it's basically the God that's perceived around the world, like everyone else's its just a different group of people who have different relationships and evaluate and interpret this relationship in different ways

MR: would you then see that there are cultural differences?

Todd: the moral and ethical are basically pretty close, the culture is rather different, it's a shame that we are so emotional, because it's such an emotional thing they take it so personally and they get so upset with it that they fight each other

MR: but actually Ghandi brought all of these religions together, he said that we all believe in the same

Todd: we do, but

MR: whether it is Hindu or Buddhist or Zen

Todd: it's all basically the same religion it's the same essence within us, the differences exist in the culture and in the different

MR: like we eat different things in different cultures, we believe in different sort of rituals

Todd: and that's where the difference lies, but all of them have the same basic religion

MR: some people associate science with atheism, or a different sort of belief, then religious, in you I can see that you have both, you are deeply religious and at the same time science, you see that as something that can be one

Todd: one, they are part of each other

MR: and yet other people

Todd: have to segregate the two

MR: or think that science is associated with atheism

Todd: the haven't, I mean I don't want to accuse anyone, I don't want to, but I just can't condemn something that's been good. I mean, science has been so good to the world, and it has been so much # there are so many interesting things, I can't condemn it, and I don't, I mean I see a threat to my faith, but on a personal level I am not afraid, not at all, it is not even bothering me, its a shame that religious people of my faith and of other faiths attack this threat instead of working with it, just as it is a shame that we attack other faiths that are different

MR: but ultimately from what you said it seems that people combine the two that it's not really a thread

Todd: for me it's not a threat but for other people, it becomes, they feel it as a thread

MR: but do you think that is because they don't understand science?

Todd: ya, I think very much that they are ignorant of science I think we should have said that the people in science who are atheist have not had a good experience with religion or either they become so rational that they ignore the emotional and the spiritual side, which can be done, I mean science becomes such a rational, such a thought, so common so lower, what's below our head. And I think that's a shame that these people because we've got so much strength, so much energy within our faith, I mean if they find that strange, I know you are not an atheist, you are nothing, but you have so much strength, you have to draw that from somewhere

MR: you mean, you are talking about me?

Todd: ya, you draw so much energy and so much strength from somewhere, and I don't think, it's gotta be, it's gotta come from an emotional level, spiritual basis, its not, you might not profess to any faith or have any religion but you don't get all that emotion and all that energy from nothing

MR: but may be, I was thinking this afternoon while riding my bike, if Todd asked me, what would I answer, I guess, I don't like to use the word God, because I think it is used in so many different ways that if I was to say that,

Todd: you get the wrong idea

MR: i guess I am spiritual in a certain sense, and I know that other people draw a lot of, like you, a lot of positive things from their belief in God, and that's why I don't reject it, that's why I am not an atheist, I don't fight anyone, and in my own ways I am probably spiritual, so many people said that

Todd: I mean, you draw so much energy from somewhere you get, I don't know, a lot of time I feel that I got energy just from life, like living and nonliving things are made of similar materials but differ how the materials are organized, that's true, but there is so much more, I mean we grow and evolve and have life, in essence there is so much,

it's energy, there is so much energy there, like part of us, it's just unknown, and you can drop them

MR: if you had to explain that it's probably more from a spiritual side that you explain a lot of these things then from a science, because we talk in physics

Todd: obviously, energy  $E_k$  is  $m$  over  $2$   $v$ -squared, I mean, on an atomic level, ya they are different, and on a molecular level, like that, that's obvious, the differences are there, but there is so much more, I mean no matter what you study, biology or chemistry or physics you know where it is explained why one plus one equals 2, no where does it say where it was thought, where that notion comes from, nowhere does it say why the sky is blue, but these are facts, why the sky is beautiful, everyone says, so many people agree on it that's basically a fact, but it doesn't explain it, it's just energy, it's emotion, its spirit

MR: so it is spiritual, and that's where you draw on, that's probably liken to God

Todd: ya, the energy, the spiritual, the emotional, its there, I mean, even energy, we think about dead things, like its not the same, but it's still energy, it's like God is part of it all, like Grand Canon is, He is there, it's wrought from God, but it's not that God sat down and chiseled it out, it's just, I don't know, they can't conflict, we can't have it, it doesn't work, conflicts don't really accomplish much at all

MR: but other people they sort of do experience conflict

Todd: ya, I don't understand

MR: if you think of our friend Preston for example, for him it is so big that he feels completely lost

Todd: you mean between (?)

MR: ya, between his beliefs

Todd: and science

MR: and science

Todd: I don't know, I though about it for so long, that it's just been, I've been brought up in a household, in a school where they've been wanting to be part of each other, where science and religion, I mean I go to the chapel in the morning and then to physics class and then back to chapel, where it has just been with each other and they have been part of each other and I draw from both places, so my parents, have put them also together, so I have always grown up with them being unified, so I really didn't feel that conflict

MR: how do your parents combine that, do they believe? Are they regular

Todd: my mother is very similar to myself, she doesn't think about it as much as I do, because for her it is a difficult question and she was brought up not to think about it, because she said, she was told that she was just a girl and girls don't answer such questions, and she is a very pacifist person, and she doesn't like that, the conflict, neither do I, she doesn't like conflict and that's why she doesn't fight all that much, and therefore she, I mean she thinks about it now and she combines the two, she also brought me up going to church, but very much also because she is the head of nursing, she's got a masters degree in nursing and studied at lot

MR: at McMasters

Todd: no she got her masters at UoT

MR: and she works at?

Todd: she teaches nursing at Sheridan College, and she's been head nurse in the hospital, very bright, very able she coulda been a doctor because she is a scientifically minded woman, who has very very strong beliefs very similar to mine, I mean, we disagree more on the social truths

MR: what about your dad?

Todd: my dad is a different person, he ### he is a religious person, he draws from the spiritual energy from within himself in our family but he goes to church, but I talk mostly with my mother, he doesn't think about too much, he focuses on his family, and on his business and he is more into having a good time and just but when he does think, he doesn't think about science at all, he doesn't even like science that much, he was not very good at it and basically he had a tough life and he was brought up to fight and he just wanted to do well, and through that he has developed his beliefs, but he is a very religious person himself, but he is not very outward about it, and he doesn't really discuss it that much and it just is for him, it's just the way it is, and he has no, he just doesn't want to discuss it, and he doesn't have any reason to discuss it, it's not gonna change him, and he doesn't want to change anyone else, it just is for him, I just know how he feels and how I feel, but we don't talk about it that much, he is a really set, and he's got his religion (end of tape side 1)

MR: do you have a notion what your mother's position is

Todd: on religion and science?

MR: ya, and things like genetic engineering or abortion

Todd: she is a nurse and she is prolife, but as she said, when it comes right down to it she is very stubborn, but she will admit that there are cases where abortion is justified, and with genetics, very much for me to learn as much as I can, and I don't think she is really (inaudible), but I know she feels the way I do

MR: so you really developed your own ways of thinking. Do you have a lot of exchanges with your parents?

Todd: with both of my parents I talk a lot, I talk to my dad more about people and I talk to my mom more about, I talk to my dad about, people, we don't talk about energy but, not just about energy we are talking about energy but we are not going it a specific name, we talk about situations like this positive experiences, and with my mother we talk about science a lot, we talk about society and the way she was brought up. With my dad we like to spend time together, we don't talk a lot, but whereas with my mom she likes to talk and discuss and also she has similar to my ideas, and I am interested in hers, she is pretty stubborn

MR: but how does she react to your own ideas

Todd: she lets me, she says that, she listens what I have to say, but she lets me have my things my way, and as she says, I am not in her control any more, all she can do is sit down and talk to me, so that way she is cool, she is not very happy and says this is right and this is wrong, but it's my own thing. But I don't

MR: You were here a little over a year ago, do you think that your ideas

Todd: were developing

MR: I know certainly with the science side you have evolved

Todd: ya, I have been reading a lot of stuff

MR: but what about your religious

Todd: ya, my religious I have become more into the stuff, more resourceful, I find that when we have problems, we draw on our religion not on science, science is there just for man to use, but there is not the energy in it: like when we have problems and difficulties you draw on your religious and your spiritual side, and when you have a problem you look at your religious side and you are not looking for a textbook, you don't read a book about it, you look into yourself, or I do at least, and I've been looking inside myself a lot and I've evolved a lot, but my school's been, so many things have been happening here I disagree with and it set me so off, and they force me to evolve and take another chunk out of the apple and not say anything and try to do the best I can instead of giving them the race, or the race gets me, I don't know, it's been tough

MR: but you are very reflective, and you see yourself as evolving and so that's

Todd: well, we exist in 4 dimensions, not 3, so you have to look at it that way, you have to know where you came from in order to know where you are going, I always believed that, and I look back to September and I realize how much I changed

MR: like how?

Todd: I have given up now, in September I was so hoping I was so full of expectations what I wanted to do, and now I want, I look back and I am still full of expectations, there is still so much that I want to do, but it will be in a different direction, at a different angle, I know what I have done, and I believe in what I have done, and I know that it was right, and I don't regret what I have done, what I've said or how I have dealt with people, but there is no more that I can do, (????), the things I wanna go to, the things I want to accomplish, and so because I am still a part of it, I really can't look back, I can't look back at it, and I hope that I will be finished the next, 2 days and 9 exams. ### I am always thinking

Todd: that's where I think truth lies, within ourselves, in no one else, you can't run your life based on a book, you just have to look within yourself

Todd: I am always looking within myself for strength and energy, and I think about myself, but at the same time I am always thinking, and reading, and listening