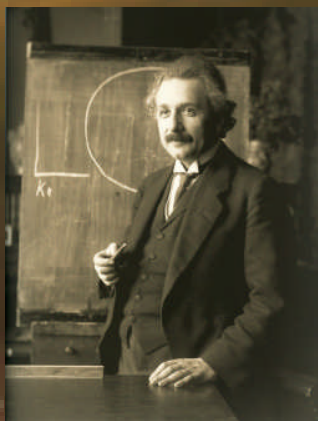


A WEEKEND WITH EINSTEIN AND AUGUSTINE



Roland Trujillo



*A Weekend with Einstein
and Augustine*



A Weekend with
Einstein and Augustine



Exploring God's creative
genius and finding love
everlasting



Roland Trujillo

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Albert Einstein during a lecture in Vienna in 1921 date 1921

ferdinand schmutzer

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*There are two ways to live: you can live as if nothing is a miracle;
you can live as if everything is a miracle.*

Albert Einstein

Train yourself to hear that small inner voice.

Anne Lamott

The Brain -- is wider than the Sky --

For -- put them side by side --

The one the other will contain

With ease -- and You -- beside --

Emily Dickenson

*Mathematics is the language in which God has written the
universe.*

Galileo Galilei (1564 - 1642)

*True religion is real living; living with all one's soul, with all one's
goodness and righteousness. Albert Einstein*

*Your time is limited, so don't waste it living someone else's life.
Don't be trapped by dogma — which is living with the results of
other people's thinking. Don't let the noise of others' opinions
drown out your own inner voice. And most important, have the
courage to follow your heart and intuition. They somehow already
know what you truly want to become. Everything else is
secondary.*

*Steven Jobs from his 2005 address to Stanford's graduating
class*

Preface

The most beautiful thing we can experience is the mysterious. It is the source of all true art and science. *Albert Einstein*

All my life through, the new sights of nature made me rejoice like a child. *Madame Marie Curie*

The American painter Norman Rockwell, who had a way of capturing the pathos of a tender individual moment of universal import, has a well known painting of an old sailor and a little boy, perhaps his grandson, standing on a hill looking out to sea.

We are behind them and cannot see their faces, but we know they are gazing out at the sea, and we imagine the marvels, the mysteries and the adventures hidden in the memory of the sailor and anticipated by the boy, as they look toward that great ocean.

It is my hope that this cosmological excursion will help you look at the universe and the marvels and mysteries it entails with fresh eyes. Please pardon my use of poetic license, I wonder and then I wander where my heart and my intuition take me. It is meant to be more like a tapestry in which I weave together and reunite with disinterested love what never should have torn asunder in the first place.

Introduction

One had to cram all this stuff into one's mind for examinations, whether one liked it or not. This coercion had such a deterring effect [upon me] that, after I had passed the final examination, I found the consideration of any scientific problems distasteful to me for an entire year. *Albert Einstein*

Science without religion is lame, religion without science is blind.
Albert Einstein

This book is about God, His universe, and his people--the human race--created by Him in His image and likeness.

It contains clues about God's relationship with the universe He created and about how he relates to people and about how He wants us to relate to each other.

It is intended to be heuristic: to help the readers begin to discover for themselves answers to some of life's deepest questions.

Imagine that you are going to attend a weekend conference and retreat. It was billed as *A Weekend of Learning, Discovery and Personal Growth* and you made reservations months in advance for this once in a lifetime event. Held at a beautiful conference center in the woods, it is to be an intimate gathering of no more than forty attendees. The facilitators are Dr. Albert Einstein and Aurelius Augustine of North Africa.

How stimulating it would be. There is a buzz in the audience during the first Friday afternoon conference,

and the excitement builds throughout the entire weekend.

It lives up to all expectations--from the gala opening gathering Friday night (where both Doctors Einstein and Augustine introduce themselves and talk about their current projects), followed by a full Saturday and Sunday of seminars, break out groups, and learning activities, to the closing conference on Sunday afternoon.

Even the meals, where the facilitators themselves always join right in, are the scene of lively discussions and uproarious fun. There is a spark in the air. People are even talking and debating long into the night around the fireplace or on the balcony under the moonlight.

After the final conference on Sunday afternoon where you shake hands with the hosts and say a heartfelt thank you, as you are driving home you have the distinct impression that you have just attended something very remarkable. You enjoy a natural high for days and you bubble over with ideas, insights, and a desire to tell everyone about them!

The next day, while it is all still fresh in your mind, you sit down and begin to write. What starts out as a few paragraphs about your impressions and major learning outcomes grows to become a daily journal and then a book, as you write down insights and observations that go way beyond the weekend conference.

Everyone said it would be life transforming, and it was. When you send a note to Albert and Gus (what they put on their name tags and insisted you call them), to thank them again for the conference which changed your life and opened up a whole new world of learning for you, each graciously responds. They are both pleased and ask you to stay in touch.

I hope that a weekend with this book may also awaken a heady, invigorating renewed interest in finding answers to the riddle of life and the mysteries of our universe.

Because I write about creation, I must include a little science and specifically some physics and cosmology. Because I write about conscious and congruent living I must include some terms from the field of psychology.

There are few numbers in this book. I know that, as Sir Arthur Eddington said, science is all about numbers. But I also heard somewhere that Stephen Hawking's publisher told him that every equation added to a book cuts the readership in half.

The science, the cosmology, and the psychology are here, but only enough for the matter at hand.

This book is about the ideas behind the math, the principles that produce the beauty, symmetry, order, and congruency we observe and marvel at.

I understand that a person can appreciate a symphony without being able to read the musical score.

The layperson will be glad to learn that this book is easy to read by anyone who has an interest in and a love of such things. You do not have to be a science major.

Except for a few terms you might have to look up, you will find most of this book familiar and friendly.

After all, I write about our home—this great green earth, the sun and the stars. I write about the awe and wonder we have felt when we observe the marvels of nature. I write about a sense of adventure and a love of discovering things that we have all experienced when we were young (and some of us have not lost as we aged).

I write of patience and of love for one another we have known by their presence or their absence. I write of the Father some of us have never known but for whom we are searching.

Many of the passages may be suitable for scanning—for light reading to get the big picture or to search for clues to your questions. As you read, some things may leap out from the page and awaken immediate insight, as you grasp the breath and depth of what I wish to communicate through the medium of words.

Some passages will be familiar to you—things you have long suspected were true. All this book does is remind you of them, and I'm merely confirming what you already knew in your heart.

Other passages may need to be sipped, like a fine brandy, a little at a time in order to savor the bold or delicate essence that they contain.

You might then spend many happy, aimless hours contemplating what you have read.

My joy will be when something is illuminated for you, awakening a renewed delight in discovery, even perhaps an aha moment that begins a flow of insights and realizations.

If this happens, what you read will come alive for you, and you will discover the joy of science and cosmology as never before.

The physicist or science student may prefer to begin with the later chapters of the book about cosmogenesis.

The person who is interested in congruent, conscious living and holistic well-being may find the middle chapters of most interest.

The deepest and most profound understanding of a subject can be called profound simplicity. Thirty years ago I once attended a conference where Will Schutz, a pioneer in the human potential movement, mentioned, as I recall, that there are basically three types of understanding of a subject: simplistic, complex, and profound simplicity. What he said made a lot of sense to me and I have never forgotten it.

First, our understanding of a subject is simplistic. About all we can do is recognize the topic, but we can't explain it, let alone teach it.

After lots of study and thought, we develop a complex grasp, no longer simplistic but now complicated. We know more now, but we are all caught up in the details.

There is a third and higher level and it can be called profound simplicity.

Many of us who have taken many courses, gotten degrees, and read widely get stuck in the second stage, where things are complicated.

But things begin to clear up if we attain profound simplicity. Perhaps that is why people with wisdom, like Yoda in *Star Wars* or the Shaolin Master in the *Kung Fu* television series, say things in a simple way. It is clear to them. The renowned humanitarian and Nobel Prize winner, Dr. Albert Schweitzer, put it this way: "From naive simplicity we arrive at more profound simplicity."

As our understanding grows, it becomes simpler, but also more profound. Augustine said "The Bible was composed in such a way that as beginners mature, its meaning grows with them."

Einstein sums up profound simplicity in this, one of his famous quotes:

"If the solution is simple, God has answered."

In this respect, profound simplicity is also divine simplicity.

My spiritual mentor said: "for the person of faith, the way is always simple. He sees which way to go, what to avoid or what is right. It is clear. But for the egotist, life is always complicated." Einstein, as we will see, was a man of faith: he trusted in his intuition and did not doubt it.

The principles he realized were profoundly simple but heuristic--leading to deeper and deeper understanding.

Augustine was all too human—sentimental and exuberant, even given to anxiety. Today he would be diagnosed with anxiety disorder. But his saving grace was love.

He loved God. His love conquered his anxiety. In the Bible, Paul says: “perfect love casts out fear.” Perfect love also casts out anxiety. He became a man of faith because he was a man of love.

He loved God, and he realized that he was loved by God and that his insights were from God. These realizations made him love God even more.

Knowing that he was known and loved was the realization that permitted him to cast aside doubt and trust in the subtle insights he was given. The fruit of these intuitive insights was life changing, the story of which is contained in his famous *Confessions*, the world’s first spiritual autobiography.

Augustine realized some profoundly simple truths about God, about the nature of the created universe, and about the moral universe, and these profound realizations lead to many more insights and knowledge about God, the material creation, and about human psychology.

This book is an exploration--inspired by these men of science, both humanitarians, both men of faith and love—of the material and moral universes, and about the God Who created them.

It can be read by anyone, even someone who knows virtually nothing about cosmology, physics, or psychology. In fact, that person has the advantage of fresh eyes and an open mind.

The person more familiar with the science involved in my discussions of light, time, gravity, and cosmogony will have the advantage of already being conversant with the terminology.

However, the physicist, the mathematician, the psychologist and the theologian also have a disadvantage. Having been involved in extensive study, they become immersed in facts and theories, and may find themselves impeded by the complexity. When this happens, the acquired knowledge actually gets in the way of understanding.

Lost in the labyrinth of learning, people sometimes have a hard time breaking through to the sought after stage of profound simplicity.

It is my fervent wish that this book may help restore understanding to your knowledge, as I put words together in a way that tends to awaken, so that the student or practitioner will be able to see the meaning, the purpose, the symmetry, and the power behind the findings and formulas.

Another drawback to too much study is that it fills the mind with second hand ideas the student has accepted because they are the intellectual coinage of the day or out of a sense of obligation to accept what they are told in order to get good grades, teacher's approval, or later for grants or promotion.

The nature of pride being what it is, the student is likely to defend an acquired idea, even if erroneous, as if it were his or her very own idea.

We shake our heads when we read about how the new and correct scientific findings that Galileo or Copernicus discovered were opposed by the intellectual status quo. Yet even as this book is being written anyone who questions the sacred cows of the big bang theory or evolution is ignored or marginalized, even as Copernicus was shunned when he dared to say that the earth revolved around the sun.

How right Mahatma Gandhi was when he said: "First they ignore you, then they ridicule you, then they fight you, then you win."

Even Dr. Einstein experienced some of this. His ideas were first ignored, then I'm sure ridiculed in some quarters, then fought, but finally he won. Truth won out, though it took years and in some cases even decades for him to be fully vindicated.

At work, in our research, with our friends and above all with our family, we owe it to others to honor the truth. Always be ready to admit it when you don't really know. But most of all, you must persist with the truth, even in the face of opposition. As Tolstoy said: "The strongest of all warriors are these two — Time and Patience." And I might add a third: "Faith."

There was a popular bumper sticker during the sixties which said "Question authority." It applies today just as much as it did then.

Don't be overly deferential to teachers, professors (and textbook writers). You may have to rely on them to learn some facts and formulas for a grade, maybe even a recommendation letter; but not for who you are, what you will become, or what you know in your heart of hearts.

Dare to be an Einstein. Otherwise you will be a second hand imitation of another. Don't resent opposition. Einstein himself said: *"Great spirits have always found violent opposition from mediocre minds. The latter cannot understand it when a person does not thoughtlessly submit to hereditary prejudices but honestly and courageously uses their intelligence."*

The study of math and science has its place. It acquaints the student with the jargon, the mathematical operations, and basic facts needed to express yourself.

In other words, such study provides the basics and the raw material to use as a platform for discovery and useful invention. Secondly, study permits you know what has been found already so you don't have to reinvent the wheel.

But once you have the raw materials, it is time to set sail. There are many good things I can say about teachers who stick to the knitting and teaching basic readin', writin' and 'rithmetic—so that the student is not overwhelmed or forced to accept what may not be true. As Mark Twain so aptly said: “It ain't what you don't know that gets you into trouble. It's what you know for sure that just ain't so.”

The professional cook learns the basics of cooking and how to use the right tools for the job. But he does not spend the rest of his life using cookbooks or, for that matter, even writing cookbooks. He cooks. The joy of cooking is discovering new things to make.

Use the math and science techniques you learn like the cook uses his blender, pans and utensils. Use your books like the writer uses his or her dictionary.

Enjoy your studies, but don't let a backpack full of books and a procession of endless quizzes, exams and finals rob you of the awe and wonder you had when you began your studies. Much learning is a weariness of the flesh, said the writer of Ecclesiastes.

Albert Einstein said: *The fairest thing we can experience is the mysterious. It is the fundamental emotion which stands at the cradle of true art and true science. He who knows it not and can no longer wonder, no longer feel amazement, is as good as dead, a snuffed-out candle.*

Einstein retained a childlike quality his whole life. All we need do to confirm this is to see pictures of him with unkempt white hair riding his bicycle or sticking his tongue out at the camera. He refused to wear socks, even to a stuffy graduation ceremony. If he was a rebel, it was because he remained true to the truth--the truth behind the marvels of the universe he loved.

You must be like Einstein and hang onto your individuality and an almost childlike sense of awe, wonder and joy.

Fortunately, in the words of the good Dr. Einstein: *Study and in general the pursuit of truth and beauty is a sphere of activity in which we are permitted to remain children all our lives.*

Learning is supposed to be an adventure.

Remember the opening lines of the television series Star Trek: *"Space . . . the Final Frontier. These are the voyages of the starship Enterprise. It's five year mission: to explore strange new worlds; to seek out new life and new civilizations; to boldly go where no man has gone before."*

Einstein knew intuitively. He also knew when he did not know. When he did not know, he waited until he did know.

He waited until he realized the answer. Sometimes he waited for years. When the answer came it was simple.

He saw clocks in Bern, or he pictured a man in free fall, then he had the aha moment of a simple but profound solution to the problem he had long sought an answer to.

Augustine's and Einstein's works leave an enduring legacy, and their lives are an enduring testimony to intuition.

Einstein's discoveries came in the form of sudden flashes of insight, the Eureka moment.

Augustine's discoveries came from a sustained flow of insights and from an abiding love and trust in the source of his inner knowing.

It is my hope that you may find this book refreshing, as it helps reawaken the awe and the sense of adventure you once felt when you began your scientific explorations.

While that this book facilitates thinking outside the box, I believe you will find that my approach is solidly grounded in the conviction, which I share with Albert Einstein, that the universe is knowable, that it is comprehensible, and that its phenomena are subject to discoverable and rational causality. Moreover, I believe,

as did Einstein, that any science must be linked to and grounded in reality.

Einstein's intuitive realizations were not mere flights of fancy or "creative thinking" exercises. What he realized was verifiable and verified--math, expeditions, experiments and practical applications vouchsafed the principles he intuited.

Likewise, Augustine's autobiography *Confessions*, wherein he chronicles how he first began to see reality for himself, was grounded in realistic self knowing.

The first truths he saw were not imaginary but were hard, tough realities of his own wrongs, misguided beliefs, and errant lifestyle.

Yet, both of these men, each in his own way, discovered truth, and this book is intended to elucidate how intuition helped them do so. It will also give you a glimpse of just how far intuition can take you.

More than anything else, I hope this book will remind you of your intuition and convince you to begin to pay attention to it, as Einstein and Augustine did, and learn to trust its quiet authority.

After four important chapters on intuition and its role in the lives of Albert Einstein and Augustine of Hippo, almost two hundred pages are devoted to an examination of the nature of time, a subject both Augustine and Einstein were very fond of.

We are all acquainted with time, with energy, with gravity, with motion, with light, and with space.

We know about waiting for the mail to arrive. We know what getting older means. We know what it feels like to accelerate in a car or airplane. We know about the noonday sun and the starry sky at night. We are intimately acquainted with gravity, especially when we fall on our behind at the skating rink.

But of the aforementioned--time, energy, motion, light, gravity and space--the one that holds the key to

our well being and happiness, and the one which holds the secret to eternal life is--time.

How you relate to time and how you use your time determine your future. Look carefully and see how anxiety, dread, and impatience have to do with our relationship with time. Note also how the beautiful virtue of patience connotes giving someone time to learn, to grow, and to recover.

Impatience robs us of time. Patience gives time.

What is more welcome than mercy? Or more welcome than forgiveness? How happy and grateful we are when someone gives us a break.

A pardon or reprieve means being given another grace period—the slate is wiped clean and you are given time to yet turn things around and to enjoy the gift of life.

Life is a school. We are given a limited amount of time to develop character and to learn what we need to know to transcend time.

Nothing could be more important than to look at time, at what God intends for us, and how we might relate to the gift of time He has given us.

In this book I will talk about both time and timelessness. I will go from physics to cosmology to psychology and then back to physics again.

You will learn both about God and about yourself. This book could mark the beginning of the most wonderful journey of discovery you will ever take.

If you are relatively unread in such things as physics and cosmology, your lack of knowledge will do you no harm. In fact, it might be well that your mind is not cluttered with theories and preconceived ideas.

You will be able to look with fresh eyes, and you may be joyed to discover that you intuitively grasp the beauty of what you read here; and you will be like

Einstein, an intuitive who sees in a lightning flash what it takes others decades to see and some never.

Read lightly until something sparks a flow of insights. That might be a good time to put the book down and spend the rest of the day with insight following you around like a delicate strain of music as you go about your daily activities.

Of course some people have a hunger for the kind of insights here and will want to devour the whole book. Afterwards they can return to different parts of the book that interest them.

This is a book to return to often over the years. It's okay to scan it and find something that interests you and just read that—even a line of poetry or a quotation.

It's okay to just open the book, start at any page, and quit when you have an insight. Keep it light hearted and fun.

The Introduction and the first four chapters contain important information about the intuitive process behind the discoveries of Einstein and Augustine. I also illustrate how the same intuitive faculty assists us in realizing principles which are heuristic, useful, and transforming--both in the realm of science as well as principles that help people see where they are erring in their personal lives. Such principles also provide guidance in resolving troubling personal issues.

These are key chapters for any reader, and they contain valuable insights into the lives of Einstein and Augustine in such a way as to give the reader clues about how Einstein and Augustine went about making their discoveries, and direction about how to apply the same processes in his or her own life.

Next follows my treatise on the topic of time, which I first published some twelve years ago, and have now newly edited and expanded. This section of the book contains insights into how we humans must relate to

time in order to find peace of mind, develop character, and discover, through searching in the time we are given, the secret to life.

The remaining chapters are physics, cosmology and metaphysics: a glimpse into the making of the universe and into the nature of light, time, and gravity.

I have added some carefully selected additional material at the end of the book.

Included is some poetry, some readings from the Scriptures, two Thomas Aquinas proofs for the existence of God; Isaac Newton's *General Scholium* where he acknowledges the Creator in a most eloquent way; and Book Eight of Augustine's *Confessions*, wherein is his famous discussion about the nature of time.

I present these public domain writings because the interested reader will find them thus convenient to look through or even read, most likely for the first time in his or her life.

Otherwise, if the reader has to go look for them, they would likely remain unread. Few of us have ever read a proof from Aquinas or any of Isaac Newton's works, and the brief excerpts I have included here may be a rare treat for some readers.

There are different ways to say the same thing; and I believe that the passages from the Old Testament, the lyrical poetry, and a selection from Augustine express in beautiful literary form what today might be said more scientifically.

It is my sincere hope and prayer that this book *A Weekend with Einstein and Augustine* will be a milestone for you in a life well lived, with this book bearing witness to the wonderful discoveries that await you.

- 1 -

How Could Einstein Be So Sure?

The intellect has little to do on the road to discovery. There comes a leap in consciousness, call it intuition or what you will, and the solution comes to you and you don't know how or why.

Albert Einstein

"Great spirits have always found violent opposition from mediocre minds. The latter cannot understand it when a [person] does not thoughtlessly submit to hereditary prejudices but honestly and courageously uses their intelligence." *Albert Einstein*

The purpose of science is to discover what is true, to explore nature, and to apply the principles learned to some useful good for others. The purpose of science is not to promote or defend someone else's ideas, nor is it to mindlessly repeat what we have heard said without questioning it.

As a child and a teenager, Einstein learned math and already had an interest in physics. As he says in his autobiographical notes, he mostly learned at home on his own. He was given a geometry book, which became

his constant companion, and then some physics books which he devoured. Thus he acquired the basic tools and raw material he would need to express what he was soon to discover after long hours of quiet contemplation.

Einstein needed freedom; he did not get along well with authoritarian teachers who resented his care free spirit. He actually dropped out of high school.

Here are Einstein's own words: "One had to cram all this stuff into one's mind for examinations, whether one liked it or not. This coercion had such a deterring effect on me that, after I had passed the final examination, I found the consideration of any scientific problems distasteful to me for an entire year."

Fortunately he went to Switzerland and there found a friendlier school climate for a free spirit like himself.

Einstein succeeded in spite of school. He somehow survived the stifling atmosphere for someone curious and creative like himself.

Here's how he put it: "It is, in fact, nothing short of a miracle that the modern methods of instruction have not yet entirely strangled the holy curiosity of inquiry; for this delicate little plant, aside from stimulation, stands mainly in need of freedom."

Einstein speaks of the awe he felt when he first saw a compass and how its needle moved under mysterious magnetic influence. He knew there had to be something behind this sort of phenomenon.

He later commented on how he learned what interested him, not in school, but on his own. A student who came to eat with his parents every week gave him a book on geometry which Einstein loved and studied all the time. Seeing his interest and aptitude, the man also brought him other science books. The boy is father to the man.

Einstein informs us: "I learned mostly at home, first from my uncle and then from a student who came to eat with us once a week. He would give me books on physics and astronomy."

Einstein found school boring and stifling. He wanted to learn what he wanted to learn, but they wanted him to learn for the exams. From the age of 12 he began to distrust teachers and be skeptical of authorities. He did not do well in some classes and several times, he says, he was asked to leave. He did in fact drop out of school. But that did not stop him. He continued to learn on his own and things arranged themselves so that he found a freer atmosphere in Switzerland.

He wondered, he questioned, he imagined, he pondered, and suddenly, seemingly out of nowhere, an insight would come. Einstein said: "The intellect has little to do on the road to discovery. There comes a leap in consciousness, call it intuition or what you will, and the solution comes to you and you don't know how or why."

Just like that, he intuitively knew something. He knew what he knew, even though he did not know why he knew it. Then he found the math to express what he intuitively grasped.

It was intuitive. It was gut level. Most importantly, he trusted that knowing.

The term some colleagues used to describe Einstein was unbudgeable. He trusted and did not doubt what he knew in his heart, even in the face of opposition or skepticism.

In the year 1905, like a flash of lightning across the scientific sky, this young rebel produced his magnificent papers that would revolutionize the world. It is called the *annus mirabilis*—the year of wonders, or wonderful year. The miracle year. Albert Einstein made important discoveries concerning the photoelectric effect,

Brownian motion and the special theory of relativity. His articles, collectively known as his Annus Mirabilis papers, were published in Annalen der Physik in 1905.

The special theory of relativity was proposed in 1905 by Albert Einstein in the paper "On the Electrodynamics of Moving Bodies"

Einstein's theory of Special Relativity is based on two postulates:

1. Relativity Principle: The laws of nature are the same in all inertial reference frames
2. The speed of light in a vacuum is the same in all inertial frames

From these two simple principles we get length contraction, time dilation and the relativity of simultaneity; in other words, time cannot be absolutely defined, and there is a relation between time and signal velocity. Length is also relative.

The two postulates of special relativity predict the equivalence of energy and mass, as expressed in the formula $E = mc^2$, where c is the speed of light in vacuum.

In a fourth short paper, in what astrophysicist Dr. Michio Kaku calls "The greatest afterthought in history," Einstein added that matter and energy are interchangeable. In the words of Dr. Kaku "His extraordinary ability to see far ahead is shown by the fact that his equation was not verified . . . until some twenty-five years later."

In Einstein's Cosmos: How Albert Einstein's Vision Transformed Our Understanding of Space and Time, Dr. Kaku quotes Banesh Hoffman, a physicist who worked with Einstein and wrote a biography of him, as saying: "Imagine the audacity of such a step.... Every clod of earth, every feather, every speck of dust becoming a prodigious reservoir of untapped energy."

Audacious it was, but the kind of audacity that Moses had, or David, or forgive me, Tom Sawyer. The American philosopher and essayist Ralph Waldo Emerson tells of this sort of self confidence in his essay *Self Reliance* (which was once required reading for every American school child):

To believe your own thought, to believe that what is true for you in your private heart is true for all men, -- that is genius. Speak your latent conviction, and it shall be the universal sense

A man should learn to detect and watch that gleam of light which flashes across his mind from within, more than the luster of the firmament of bards and sages

Yet he dismisses without notice his thought, because it is his. In every work of genius we recognize our own rejected thoughts; they come back to us with a certain alienated majesty.

I can't wait to look more deeply at the faculty of intuition in the next chapter. But I wish to tell you more about this great man of intuitive faith, Dr. Albert Einstein. Now we move forward to 1916, when he published the general theory of relativity.

General relativity provides a unified description of gravity as a geometric property of space and time. General relativity extends special relativity to geometric property of space and time, or space-time. His theory generalizes Isaac Newton's original theory of gravity, making it valid for bodies in motion as well as bodies at rest. The theory was able to explain the peculiarities in the orbit of Mercury and the bending of light by the Sun.

The amazing thing is that these discoveries were the result of a process of intuition and deduction, of an aha moment--a Eureka moment--of a simple principle from which the mathematical formulation and all the rest would follow.

It was by intuition—the realization or the aha Eureka moment—that the solution to the problem or riddle he wondered about occurred.

Most attention is paid to Einstein's thought experiments: for example, the mental picture of the train platform (to set up the relativity of simultaneity issue); Einstein imagining himself chasing a light beam; or his mental image of a man falling in an elevator (to set up the inertia and gravitation question).

I suppose that when writing about how Einstein came up with his insights, people would focus more on his mental images and thought experiments because they are easy to picture and they do help to make the problem understandable. But it is important to remember that the use of the imagination, to view the problem in picture form, was a way of visualizing the puzzle to make it easier to work with.

The solution to the puzzle, which is the most important thing, came by way of intuition. For example, Einstein's famous thought experiment where he imagines himself chasing a light beam occurred to him when he was 16 years old. But it was not until 10 years later that the insight came to him in Eureka moment right in the middle of a sentence as he was talking to his friend Michael Besso. *"It was a beautiful day, my friend, Besso and I were out walking. I was doing most of the talking, I told him that I had been struggling with a question and needed his help. But as I spoke, the answer came to me. I stopped in mid-sentence and ran home. The next morning I went to him again. 'Thank you,' I said, 'I have completely solved the problem.'"*

In describing his Eureka moment of intuition, he recalls having been on a streetcar in Bern, Switzerland, and looking back toward the clock tower. He wondered what would happen if his streetcar raced away from the clock tower at the speed of light. He imagined that the

clock would appear stopped, since light could not catch up to the streetcar, but his own clock in the streetcar would beat normally.

In his wonderful biography of Einstein, Dr. Michio Kaku adds the following: “The answer was simple and elegant: time can beat at different rates throughout the universe, depending on how fast you moved. Imagine clocks scattered at different points in space, each one announcing a different time, each one ticking at a different rate.”

The flash of insight was not the mental picture itself but the insight about the picture. Though Einstein’s imaginary picture is what we remember, the important thing is the realization. The mental picture is a tool of intuition.

In pondering and thinking about the picture, suddenly Einstein realized a basic principle that was the basis of his theory, math, and earth shaking conclusion.

His thought experiments, where for example he imagines himself riding on a light beam, or where he pictures a man in free fall are well known. But we must not forget that the thought experiments merely put the situation he was puzzling over into a picture in the imagination. But it was intuition that provided the solution. Many people imagine all sorts of images, but it is from the faculty of intuition that Eureka moments, profound realizations, and inspiration come.

This is so important and we tend to miss it. So I want to go over the ground one more time. Einstein wanted to understand the why of things. When he puzzled over some paradox or inconsistency, he had a question in mind.

His question then sometimes took the form of a mental picture. When he was wondering about light, he wondered what someone would see if that person were moving at the speed of light. His question then took the

form of an imaginary metal picture of himself riding on a light beam.

When he was puzzling over gravity, he wondered what a man would feel who was in free fall. This took the form of a picture of a man falling in space.

Imagination helped him to contemplate the question when it was in the form of a mental picture. But the solution is the main thing. The answer to his question—the sudden flash of insight—is what revolutionized the world. It was not a metal picture; it was a principle, a profoundly simple one, which explained what he was looking for an answer to.

And this realized principle was fertile and heuristic. It was robust enough to generate math, useable practical math, as well as to lead to postulates and then derivative findings.

From the one simple principle realized in that moment of insight came more avenues of exploration, as well as real life inventions and processes for the good of humankind.

The answers came to him suddenly a flash of insight, and he realized the solution or answer in that Eureka moment—a moment of inspiration

Einstein was a thinker, a dreamer, but he was above all an intuitionist.

Many people think that he was primarily a mathematician, because of his famous equations. But he was first and foremost a theoretical physicist. The math was just a language to express in scientific terms the answer he had realized intuitively.

Likewise, educators and pedagogists almost always make much of Einstein's imagination, but rarely do they pay homage to intuition

In speaking about intuition, Einstein himself says it best:

The intellect has little to do on the road to discovery. There comes a leap in consciousness, call it intuition or what you will, and the solution comes to you and you don't know how or why.

Einstein realized intuitively what was true, deduced the consequences, found the math to express it, and then waited for someone else to prove experimentally the deductions stemming from what he had seen in a lightning flash intuitively

Many people do not know that it was sometimes years before scientists and astronomers, with newer technique and technology, would validate what Einstein already knew.

First he saw; then he stated what he intuitively saw in simple terms. Then he did the math. Later it was verified in experiments.

Einstein published his theory of general relativity in 1916, and one of his predictions was that gravity influences light. This was not confirmed experimentally until 1919 by Arthur Eddington who took an expedition to the Island of Principe to observe the eclipse of the sun, where it was seen that light beams did indeed bend near the gravitational field of the sun, confirming Einstein's GTR prediction.

Talk about faith! Talk about trusting your gut. Einstein, a young man at the time, came up with intuitive postulates and predicted consequences that stood physics on its head, overturned long held Newtonian ideas, revolutionized our thinking about time and space, and ushered in the nuclear age and quantum mechanics.

He knew what he knew, trusted in it, and never wavered. It was only after Eddington's expedition to observe light pass by the sun during an eclipse, years later, that reporters flocked to Einstein's doorstep and he became famous.

Yes, he was an iconoclast. He was a rebel. School cramped his style. He succeeded not because of school but in spite of school, which he called stifling. He refused to wear socks. He dared to be different and that is why we love him.

He did not believe something just because someone, no matter how great an authority, said so. He wanted to see for himself. He waited, sometimes years, until he realized the answer. And the result is history.

He did not revere authorities, and this got him into quite a bit of hot water with his instructors when he was young. But this left his mind free to then accept the real truth from the authority of intuition when it came.

Therefore, dear students, dare to be an Einstein. It is okay to study to learn the basics. Jargon, concepts and formulas provide the grist for your mill--the raw materials that you can then collate into meaningful, truthful, and useful thinking and discovery. But let intuition and conscience be your guide.

How was it that within a few weeks time, a 25 year old patent clerk came up with ideas that would shake the world? He questioned everything. He even questioned some of the most basic ideas of Isaac Newton. He loved and searched for truth, and he trusted and did not doubt (with one exception) his intuition.

Yesterday I watched a PBS documentary on the life and work of Einstein. It was very well done. Einstein's actual words were quoted and his basic findings accurately portrayed. What particularly struck me were two interviews with physicists.

At one point in the documentary, the interviewed asked physicist Dr. Martin Klein, Yale historian of Physics, what he would ask Einstein if he could ask but one question. Martin Klein said: "If I had the opportunity of asking Einstein one question, I would ask him how he could be so sure of the principles on

which he built his theories, how could he be so sure that the dear Lord requires that the relativity postulate be satisfied throughout nature? How could he be so sure that the equivalence principle really held everywhere and at all times. And if he could tell us how he did that, that would be something."

This physicist was earnest about his question: he really did want to know how Einstein could be so sure.

Of course I know the answer, and it's what I've been trying to tell people about for over 20 years. Like Moses, David, and Tom Sawyer, Einstein questioned external authorities, and this freed him to trust and follow what his intuition showed him. It is actually fortunate that he had bad school experiences because, as he said himself, from the age of 12 he began to distrust teachers and be skeptical of authorities.

We are all told to trust our gut, but few of us do. We go to external experts to tell us what to do, and when they mislead us, we resent them.

Few people know what it means to have faith. It is exactly what Einstein had.

He trusted and did not doubt what he knew in his heart, even if the whole world was arrayed against him.

The second interview that struck me was an interview with Abraham Pais, physicist, collaborator with Einstein, as well as Albert Einstein's biographer (*Subtle Is the Lord: The Science and the Life of Albert Einstein*).

In the documentary I watched, Dr. Pais was commenting upon how as soon as Einstein came up with his prediction that gravity bends light, he wanted to confirm it right away. But how? Then it suddenly came to him: apply the math of his gravitational field equations to the planet Mercury's orbit.

The orbit of Mercury is the most eccentric of the planets in our Solar System. The planet has an orbital period of 87.969 Earth days. At perihelion it is

46,001,200 km from the Sun and at aphelion it is 69,816,900 km, a difference of 23,815,700 km giving it an eccentricity of 0.21. No one could explain why the elliptical orbit of mercury was eccentric.

It suddenly came to Einstein that the reason was that at its perihelion (where it is closest to the sun) it is being influenced by the warping of space in the sun's gravitational field.

Einstein immediately sat down and calculated what Mercury's orbit would be according to his new gravitational field equations. To his great joy, the results confirmed his prediction.

The actual orbit of mercury matches perfectly what his gravitational field equations had predicted.

Now that you know the story, let's return to the interview with Dr. Abraham Pais (distinguished physicist in his own right and Einstein's biographer). I was astonished by what he said.

The interviewer asked him how Einstein thought of checking his field equations using the eccentric orbit of the planet Mercury.

Here is what Abraham Pains answered: "And I believe at that moment, Einstein said, 'I don't care what the world will say. I am right, because the Lord has told me, calculate the perihelion motion of Mercury and you will see.' And he did! And it came out."

I don't know what I was more astonished at--a physicist mentioning the word "Lord," that he suggested that Einstein would say "the Lord told me" to calculate the perihelion motion of Mercury, or how perceptive and intuitive Dr. Pais is!

He meant what he said about what he thought Einstein would say. After all, Einstein did refer to God on many occasions, and also referred to God as Der Alte (the Old One).

I have no doubt that his insights were inspirations from the Lord. He may have suspected so deep in his heart.

Einstein was not a religious man in the traditional sense. But he had a profound awe and appreciation for the order in nature. He loved the truth and had contempt for pretense and half truth. He made what is right more important than who is right.

It happens that when he followed his intuition, he was always right. He honored the truth. He was also a nonbelonger. And because he was a nonbelonger, he was free to give himself wholeheartedly to his calling, to his love of truth, and to the truth itself.

What is your calling? What is your mission in life? Learn what interests you and do what you love. As your life unfolds, you will discover your purpose.

Einstein received his illumination like sudden flashes of insight to help him solve a puzzle he had been seeking an answer to. The insight was like a simple principal, an axiom, or theme that solved the puzzle.

After the insight, he then used his intellect to make the deductions, form the postulates, develop the math, seek verification, and find applications.

His discovery began with an insight into a principle of truth which the Lord uses to create--a law behind the science and math that forms the basis of our physics and other sciences.

We are told that faith is important, and the Apostle Paul writes an entire chapter about the faith of Moses, Abraham, and Noah for example. Noah kept working for years on his ark even though others scoffed at him.

Einstein had so much faith in his intuition (which is wordless inspiration from God) that after his prediction that gravity would bend light was confirmed by Dr. Arthur Eddington's expedition to view the trajectory of light during the solar eclipse, he was asked if he would

have felt bad if his prediction was not validated—Einstein responded: “No, I would have felt sorry for God, because the theory is correct.”

Abraham was not particularly religious, nor was David when he slew the giant. The people that Christ chose to be apostles were not religious either, they were simple fishermen and tax collectors. Moses was not religious when God picked him, but he had a keen sense of justice.

Einstein was not “religious” but God can use a man like Einstein, who is committed to the truth and is persistent in his search for truth.

The pot of gold at the end of the rainbow does not go to cowards or quitters. God can use a person who stands for principle, when others doubt and ridicule what he believes.

We think of standing for principle as standing up for justice, honor or some moral value. But standing for principle really means standing for what you know deep down is right—whether it is a moral principle or a physics principle.

Here is one of my favorite Einstein quotes and one which reveals his faith in intuition and his unbudgeable commitment to rational order instead of chance:

"Quantum mechanics is very impressive. But an inner voice tells me that it is not yet the real thing. The theory yields a lot, but it hardly brings us any closer to the secret of the Old One. In any case I am convinced that He doesn't play dice."

In the next chapter we will take a look at what Augustine had to say about this "inner voice" that served him and Dr. Einstein so well.

"I have deep faith that the principles of the universe will be beautiful and simple." - Albert Einstein

A WEEKEND WITH EINSTEIN AND AUGUSTINE

We are all looking for love. What if love is at the very ground of our being? What if love has been there all along but we failed to recognize it? To find this love and its Source, author and speaker Roland Trujillo takes us on a weekend tour of the universe with Drs. Albert Einstein and Aurelio Augustine.

Fasten your seatbelts because you will explore outer space—even be present at the creation of the universe—and inner space—answers to our deepest needs for love, fulfillment and meaning. You will learn of the mystery of time and why it holds the secret to eternal life. You will find out what is the interface between matter and the spiritual source of creation, and you will discover the interface between human consciousness and Divine Providence.

Roland Trujillo, M.S., D.P.P., O.M. is the author of 16 books. He taught graduate and undergraduate courses for 20 years and has hosted a radio program for 24 years. About his book Roland says: "Nature and the cosmos are knowable. Stable, logical, orderly, predictable laws govern nature. Only a very smart benevolent, consistent and thoughtful Father Physicist and Master Mathematician could have come up with such a wonderful place. He made it, He sustains it; and He lets us discover it, study it and even major in it. Logic and reality, mathematics and what is, and religion and science are all part of one whole—a comprehensible universe."

