Chapter 1
Physics, Metaphysics, Space/Time, & the Living Here/Now

In this, the first of four chapters, I want to propose some basic definitions with regard to topics I will return to in more detail in the other chapters.

What is Physics?

As I sit at my computer and look out of the window, I see a tree. How far is it to the tree? I don't know. So I walk to the window. It is five steps to the window. I look out of the window. I look back to the computer. It seems to me to be about the same distance to the computer as it is to the tree. Five steps to the computer plus five steps to the tree make ten steps from the computer to the tree. But this is a guess; I have not actually stepped off the distance from the window to the tree. So I go outside and step off the distance from the window to the tree. It is six steps. So the distance from me sitting at my computer to the tree is eleven steps. This is still approximate for my steps may not be exactly the same length, and I have not figured in the thickness of the window. Actually I should figure in the thickness of the wall, for I walked to the wall, not the panes of my window. I live in a house where the walls are made of bales of straw with stucco on both sides of them. I open the door so I can step off the thickness of the wall. I find it is one step. This is approximate, but that was true of all my steps. So I don't worry about the approximate nature of my measurements; I simply conclude that it is twelve steps to the tree--five from the computer to the wall, one for the wall, and six from the outer wall to the tree.

Now, what are these steps? They are a measure of distance. I have measured a dimension of what we call "space." I have not measured the width of the tree nor the height of the tree, but simply an approximate straight line from the computer to the tree.

It took what we call "time" for me to make these measurements. In fact, we could also call these steps I took "units of time." It takes twelve steps of time to walk at an even pace from the computer to the tree, providing, of course, that I could walk from the computer to the tree uninterrupted by that wall. Anyhow, I take notice that time and distance can be related in this manner. I recall that I sometimes say that the distance from my home in Bonham, Texas to Plano, Texas is one hour. By that statement, I mean that it takes one hour to drive my car from my house to Plano. If I assume that I drive my car over that course at a steady rate (or an average rate) of sixty miles an hour, then I can also say that it is sixty miles from my house to Plano.

But what is a mile and what is an hour? How is a mile or an hour related to the steps I took from my computer to the tree? Well, I don't know how many of my steps there are in a mile. And I don't know how many of my walking steps there are in an hour of car driving. So how do I find out? Well, I have to find a way to relate these two modes of measure: steps with miles and walking steps with driving hours.

I could find a piece of road that my culture agrees is one mile long and step it off to see how many steps there are in a mile. But my culture provides me with a quicker way. I have a book here that says how many feet there are in a mile. What is a foot? My culture tells me that a foot is the length of this ruler I have in my desk. So I step off one of my steps on the floor and I see how many ruler lengths there are in one of my steps. If I measure from my toe to where my toe is after a step, I find that one step is two rulers, plus a tiny bit more. Anyhow, I will conclude that my steps are approximately two feet long. So I divide the length of one step in feet into the length of one mile in feet and I find out how many of my steps there are in a mile. Specifically, I

divide 5280 feet by 2 feet and I find that equals 2640 steps in a mile.

So the distance to Plano might be said to be 60 miles times 2640 steps in a mile equals 158,400 of my two-foot steps. These steps are also steps of time, the amount of time it would take to walk from Bonham to Plano. It would take 158,400 steps of time walking at the same pace that I walked from my computer to the tree. Also, I notice that driving time to Plano and walking time to Plano are two very different measures of time. How does a step of walking time relate to an hour of driving time? Again, I could figure this out without leaving my office. If I know what an hour of time means and if I measure in fragments of an hour the time it takes to make one of my walking steps, I can figure out how many hours it would take me to walk to Plano. I don't know why I want to know this, since I do not plan to walk to Plano, but it fascinates me that I could figure this all out without leaving my office, my books, and my ruler.

Now all these gyrations of the mind that I have just done might be called "physics"--very simple physics, but physics nevertheless. Measuring the light-years to a distant star is done in a similar manner. A first thing we can notice about doing physics is that all our units of measure are arbitrary. Steps, feet, miles, hours, all these are arbitrary modes of measure. We might have chosen meters or breaths or something else. The real world of nature does not have "feet" in it somewhere. "Feet" is just an idea created by human beings. As I recall, using this unit of measure got started because it was the length of some important Englishman's foot. Hours, minutes, seconds--these measures of time are also arbitrary.

Light-years is a measure of space; it is the distance that light will travel in a vacuum in the same length of time that it takes the planet Earth to make one rotation around the sun. I note this because it points out again that our measuring of space and our measuring of time are inseparably related.

Space/Time

In the real world of nature, we do not live in space only or in time only. We live in space/time. Without time we would have no way to measure space; space has to be measured by walking it off through a period of time. And without space we would have no way to measure time; time has also to be walked off through an expanse of space.

Like feet and hours, space and time are ideas in our heads, but these ideas are very old ideas. Before humans even thought of measuring space or measuring time, they lived in space/time, and they had some sort of very practical images with which they understood and navigated their lives within this mysterious environment of space/time. Even my cat, I surmise, operates with images of space/time. Perhaps all living forms organize their sensory inputs through some sort of elemental mental pictures of space/time.

To understand this elemental animal mentality, let us imagine two of us humans throwing a baseball back and forth to one another. We don't do this simple task with our linguistic minds. We don't need physics to do this. We don't need feet or seconds or any other mode of measurement. We just need to notice the thrown ball coming nearer to us in space over the course of a very short period of time. This noticing is accomplished through a type of mental processing that a dog can do as well or better than a human being. I have been amazed watching dogs follow the course of a sailing frisbee and then leap in the air at just the right time to grab the frisbee with their teeth. Even with two hands and an erect posture I cannot catch a flying frisbee better than these dogs.

So how do these dogs catch a frisbee? How do I catch a baseball thrown toward me? I have

learned through my scientific investigations, that I am seeing this ball through inputs of what we call "light" striking what we call the "retina" of my eyes. But this abstract way of thinking about it tells me very little about the experience of catching a ball.

From my alive presence in the here and now of catching a ball, I notice changes in the ball's position through time. I notice that these changes in position have direction, namely closer to me. I anticipate that the next change in position is going to be still closer to me. I move my gloved hand toward the position where I anticipate the ball will arrive at a specific time. I watch the ball into my glove, as we say. This is a remarkable feat. It has required millions of years of biological evolution to create a creature like me who can do this (as well as dogs who can catch frisbees). The capacity to catch a ball requires remarkable mental processing. How can we understand this process more clearly? And what does such processing tell us about the mystery of space/time?

The Metaphysics of Space/Time

The discussion of space/time in the last section cannot be called "physics." Let us call it "metaphysics." This combination-word adds "meta" which means "before" to "physics." So "metaphysics" means the sort of thinking that comes before physics, the thinking that goes beyond physics, the thinking that surrounds physics and provides physics with a context within which to dwell. Some use the word "metaphysics" to mean the existence of a supernatural world alongside the natural world, but that is just one form of metaphysics. I maintain that a belief in the existence of a supernatural world is poor metaphysics. So let us use the term "metaphysics" in a more general sense. Let us say that this funny word means any sort of thinking in broad overviews about the wholeness of our lives and the wholeness of what we call "reality."

First of all, let us notice that all our broad overviews are created by us, and that these broad overviews are intended to describe and/or order our actual experience. Let us notice that we have at least these two ways that we talk about experience: (1) scientifically and (2) contemplatively. In (1) the scientific approach to truth, we employ factual formulations of our experience, such as measuring distances from computers to trees, and in (2) the contemplative approach to truth we focus on inward experiences of our own attentiveness being attentive to our inner processes, to the processes around us, and to the mysterious actuality of attentiveness itself. To summarize, we might say that our metaphysical overviews are made out of (1) our physics and other scientific pursuits and (2) our attentiveness to inward states of being including attentiveness itself.

So "metaphysics," as I am defining this word, is thinking that encompasses in a larger context of thought what I have learned through physics and the other empirical sciences. Most importantly, metaphysics includes my own interior contemplation of my own life as I think and feel and choose to do or not do this or that response to the happenings that are happening to me.

Further, my contemplative attentiveness is happening in the living here/now. Here/now I look within my being, I look outside my body at my behaviors and at the surroundings in which I am behaving. Through this double looking, I experience myself experiencing the happenings of my life. Any linguistic thinking or artistic work that cannot be related to this fundamental personal experiencing is meaningless to me. Our human facility with mental abstractions includes an ever present possibility of perversion--the perversion of confusing our abstractions with reality rather than remembering that our abstractions are merely humanly invented pointers toward a reality that we have personally experienced, do personally experience, or may personally experience soon.

So with regard to the experience of a thrown baseball, what do I see and how do I see it? Light waves hitting my eyes do not explain the experience I am having. I need to also notice that these inputs are automatically translated into meanings by my wondrous brain, a brain which I experience from the inside as a process of images. How can I describe this? My brain seems to have the capacity to rerun sensory experiences which I have already had. My brain also has the capacity to imagine or prerun sensory experiences which I may have in the future. I know in my immediate here/now that the ball has been where it is not now, that the ball is where it is now, and that the ball will probably be at another place a very short time from now. I am not better than a dog at this process of remembering and anticipating the flight of the ball, but I am certainly better than a dog at the process of reflecting upon such an experience as I am doing now.

A dog, as far as I can tell, does not think about space and time or about inner and outer realms, or about mental images and their apparent rerun and prerun functioning. A dog just watches and catches the frisbee without any metaphysical reflection about how in the world this amazing thing can be done. Nevertheless, this process of imaginal reruns and preruns goes on in both dogs and humans. This process is far more complex and mysterious than any of my faltering descriptions will encompass. Nevertheless, I will try. I am curious to understand this strange imaging process in which I am involved. I would also like to better understand this strange space/time environment in which I live.

So the ball is coming at me, and my image-making brain is giving me interior images of ball past, ball present, and ball future at specific spatial distances from me. Space and time are not separated in my experience of the ball, but distinguishing space from time is helpful to the thinking me even though I realize that such distinguishing means ripping apart those imaginal reruns and preruns of my brain in which space and time are inseparably linked.

When I stop to think about space/time, I can, for my abstract purposes, delink them and distinguish them from each other. Time, I notice, has a quality that distances in space do not have. Time is a one-way street--past to present to future. Time never runs future to present to past. Space on the other hand has a back and forth quality, an up and down quality, an away and near quality. A spatial dimension is not a one-way street. I can go to Plano and I can return to Bonham. I can walk from my computer to the tree and I can walk back from the tree to my computer. I must do this spatial traveling through a period of time, but space as space can be distinguished from time by noting this two-way-street quality. In my rerun-prerun imaginal mind, space is three two-way streets: out and back, up and down, and back and forth. A dog, like a human, apparently functions with images organized in these same three two-way streets of space. The dog, however, does not think about them as we are doing now. A dog, like a human, can also image the one-way street of time, but the dog does this with very concrete image packets in which time and space are inseparably joined. A dog does not distinguish space from time. A dog does not distinguish outer process from inner processing. For the dog all this is just one united joy of grabbing that frisbee. Nevertheless, the image-processing that I am describing appears to we humans who watch dog behavior to be taking place in the dog's consciousness.

Dogs are not metaphysicians. Dogs are not physicists. Dogs just live their immediate lives in the space/time packets of imaged sensory input. Humans are very much like dogs when we do things like catch a baseball. But when we stop to think about catching a baseball, humans have entered into their uniqueness as symbol-using animals. What do I mean by "symbol-using"?

One of the more important breakthroughs in the philosophical thinking of the last century has been the distinction between image-using intelligence and symbol-using intelligence. I am

continually surprised at how many thinkers still ignore this breakthrough, for it has profound ramifications for our understanding of animal and human intelligence, language, art, human culture, religion, science, space / time, and much more.

Let me briefly summarize this vast topic on which philosophers like Susan K. Langer have written entire books. Images function like signals to guide concrete behavior. I like to think of images as sensory reruns. Experiences we have had in the past rerun like tapes in our present consciousness. These reruns can very complexly associate with one another to provide very practical guidance for our behaviors. We could not walk across the room without the aid of this primal functioning of mental images.

Symbols are made out of these rerun sensory images, but symbols function differently. Rather than **signal** practical behavior, symbols **stand for** specific groupings of images. "Space," for example, is a linguistic symbol, an abstraction lifted out of the space / time packets of imaginal reruns. Similarly, "time" is an abstraction. "Inner" and "outer" are also abstractions. Dogs appear to get along fine without any of these abstractions. Dogs, as far as we can tell, operate entirely within the image-using mode of intelligence. Within the human species (and perhaps a few other species), there has evolved a form of intelligence that distinguishes humans and makes possible both their greatness and their destructiveness to themselves and their planet.

Yet the fact that symbol-using can lead to destructiveness does not mean that we can or should get rid of it.. Even if we wanted to, we could not return to an images-only mental processing. Humanity is stuck with being a symbol-using species. Our rather over-sized biological brains evolved, I believe, in order to handle this symbol-using process.

Symbol-using is much more vast than language-using and mathematics. Music is another form of symbol-using. The virtual space created on the canvas of a painting is another form of symbol-using. Dance is symbol-using. Sculpture is symbol-using. All the arts, the presentational arts as well as the linguistic arts, are illustrations of symbol-using intelligence.

I will focus in this essay on language-using and mathematics, for these are the types of symbol-using that are most useful for exploring what we mean by space and time.

We humans are so immersed in symbol-using that it is not easy to stop and think about symbol-using. Thinking about symbol-using is using our symbol-using intelligence to think about our symbol-using intelligence. This is abstract thinking about abstract thinking itself. Human minds that venture in this direction have to be willing to experience their potentialities for madness. But also, this adventure can help human minds experience the limitations of symbol-using intelligence and thus restore some balances between symbol-using and image-using. We tend to be overbalanced toward abstract symbol-using thought and thus somewhat out of touch with the living natural world coming into our consciousness through image-packets of concrete space / time experience.

Physics as Objective Knowledge

Let's move next to a more thorough discussion of physics and the form of knowledge with which physics is dealing. In the opening of this essay I illustrated in simple terms the type of thinking we call "physics." It has to do with abstractly distinguishing aspects of our environment, measuring them, dealing with these measurements mathematically, and then relating all this abstract thinking back to our practical everyday living.

The scientific method of thinking has been well characterized by Richard Feynman as this

four step process: (1) in terms of our current objective knowledge we create a guess about what we don't know, (2) we then create an experiment with which we can test our guess, (3) then we do the experiment and interpret whether it has supported our guess or rejected our guess. (4) If one single factor rejects our guess, we count our guess wrong and guess again, guessing better perhaps because of this negative input.

In terms of this summation of the scientific method, a natural law is simply a human guess which decades, perhaps centuries, of factual verification still support. Nevertheless, a "natural law" is not without vulnerability of being negated by future factual inputs. This means that all objective knowledge is approximate and progressive. Objective knowledge is approximate because our various measurements are always approximate and because we have only guessed our theoretical overviews in the midst of an environment of boundless mystery in which potential learning experiences still remain. Objective knowledge is progressive because once new factual experiences have been taken into our consciousness, we cannot simply forget them; we are stuck with this new knowledge. For example, once we have seen the destructiveness of an atomic bomb, we might wish we could return to a physics that did not know that energy and mass are two forms of the same stuff. But we cannot go back: we are stuck with this new state of objective knowledge.

So what is objective knowledge? It is a fabric of symbols which is well grounded in packets of our actual space/time experience. We speak of "facts," but facts are also abstractions from immediate experience. For example, our image-using intelligence includes pictures of ball past, ball present, and ball future as we watch a ball thrown our way. But this is not yet a fact that science can deal with. Facts emerge from doing some abstract symbol-using--that is, doing some thinking about these immediate sensory and imaginal experiences. We could, for example, measure the speed of a thrown ball. To do this we would have to define "speed," define "feet" (or some other measure of space), define "seconds" (or some other measure of time), and then figure out how to measure speed defined as movement through a line of space at the rate of a certain number of feet per second. Now we have a fact. A fact is not an obvious thereness; a fact is an interpretation of our immediate sensory and imaginal experience. This interpretation is an abstraction from our sensory experiences made by the human effort of our highly sophisticated symbol-using minds. Objective knowledge, the objective knowledge we are talking about in scientific investigation, is an abstraction from immediate experience.

The Living Here/Now

The abstractness of objective knowledge can be clearly illustrated with respect to the concept of time that is a necessary part of objective knowledge. In objective scientific knowledge, the present is pictured as an infinitesimal point on a line with past on one side of that point and future on the other side of that point. This is obviously an abstraction, and this abstraction must not be confused with experienced reality.

In our immediate experience, the present moment clearly exists. We might even say that only the present moment exists. Whatever we mean by the past is only a memory in the present moment. And whatever we mean by the future is only an anticipation in the present moment. The past is no longer. The future is not yet. From the point of view of our inward contemplative attentiveness, there is no past and there is no future. The time is always NOW. In our contemplative experience the present is everything, while in the layouts of objective knowledge the present is nothing. No contradiction could be more glaring than this. What does this mean?

It means that objective knowledge is a limited view of things. Being aware of the limitations

of objective knowledge does not invalidate objective knowledge; it just means that objective knowledge is only one aspect of the ”truth” we work with. This awareness of the limitations of objective knowledge puts objective knowledge in its place, so to speak. We humans do not have an objective rational world picture that is in one-to-one congruence with REALITY. We have objective knowledge on the one hand, and we have contemplative wisdom on the other. We do not function without them both; but when these two modes of truth contradict, we have to go with our contemplative wisdom. We cannot maintain our sanity and at the same time deny the actuality which we experience with our own inward attentiveness. But it is also true that our inward attentiveness can “see” that we would be impoverished without our objective knowledge. Objective knowledge is an enrichment of our lives.

Let us look harder at how our contemplative awareness views the presence of objective knowledge in our lives. Objective knowledge appears to our immediate awareness as part of our environment along with trees and computers and windows. We live within some sort of human culture, including that culture’s objective knowledge. For example, our culture contains an objective knowledge about the origin of life and human life on this planet. We have in our cultural memory banks a picture about this “line of time” with single cells emerging some 3.5 billions years ago, multicellular life emerging later, then plants and animals, then a whole era in which huge dinosaurs lived, followed by an era in which flowering plants, birds, mammals flourished, and then only a mere 3 or 4 million years ago upright-walking primates developing bigger brains through a number of forms of hominid life--one of which turned out to be us. This picture has been put together in the last fourteen decades. It is a relatively new picture in our cultural memory banks. It is still opposed by some people. But it is our objective knowledge, our evolving, still changing, objective knowledge. This knowledge exists as part of our cultural environment, and it serves as a lens thorough which we view our living experiences. We cannot deny the truth of this objective knowledge without denying a knowledge that we actuality do know. Claiming not to know what we do actually know is a form of insanity.

Nevertheless, this picture of a “line of time” is an abstraction, an abstraction that is in some measure untrue. For we do not actually live on a line of time. We actually live in packets of space/time experience in the present here/now of our actual existing. Nevertheless, as we in our present experience dig up some dinosaur bones, we interpret the meaning of these bones in terms of this abstract “line of time” that we have in our minds. And we may correct that picture in the light of our current examination of these bones. But without some picture, hopefully the most objectively verified picture that our culture can provide, we would be living in a very different sense of the world than the world we actually have on our hands. We cannot escape from this actuality of having current objective knowledge as part of our world. Unavoidably, we organize our immediate experience of the world with the aid of our objective knowledge.

Our metaphysics, in order to be a responsible metaphysics, must take into account the physics (and other objective, scientific knowledge) of our times. This is true even though it is also true that our physics is an abstraction, an approximation, and an ever-progressing body of thought.

A responsible metaphysics must also take into account the limitations of objective knowledge and never suppose that the abstract world of objective knowledge is the same thing as the whole of Reality. Reality is what we experience through our senses and attentiveness in the living here/now. Objective knowledge is one part of that overall experiencing.

In our living here/now we can distinguish four processes that have to do with our quest for truth: (1) our elemental attentiveness, (2) our stream of sensory inputs, (3) our mammalian imaginal processing of those sensory inputs, and (4) our symbolic abstractions with which we

order and expand our consciousness of all these experiences that we and our entire culture are having. Describing and relating these four processes as parts of one overview of human truth-questing is a basic task of responsible metaphysics. It is one of the tasks of this book.

So here I am still at my computer, still looking out my window at a tree twelve steps away. All my looking and my thinking about looking and my thinking about thinking is going on here and now in that mysterious present moment that never goes away. Here/now I type these last words of chapter one. In your here/now you are reading these words. For you and me and all attentive beings there is no other time than NOW. Time has depth through memory and anticipation in the living NOW.

Similarly, there is no other space but HERE. Space has expanse through memory and anticipation in the living HERE/NOW. If there were not depth of time there would be no depth of space. Space and time are inseparably yoked in each remembered, current, and anticipated sensory packet we image in the HERE/NOW of our consciousness.

I will do some more reflection on the mystery of HERE/NOW in chapter three. But next, in chapter two, I want to take us on a simplified journey into the objective knowledge of space/time as these abstractions have been revolutionized in contemporary physics. In the fourth and last chapter, I will describe a third way of viewing space and time-- the approach to reality we find in the pursuit of that discipline of learning we call “history.”