Scalar Motion

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Whenever a new physical theory appears, one of the first objectives of the supporters of that theory is to find a crucial experiment, an experiment whose results agree with the new theory, but are definitely in conflict with its predecessors. This is a difficult undertaking, not only because it is hard to find an experiment of the right kind, but also because the results of that experiment, if an experiment *is* found, can usually be accommodated to existing theory by *ad hoc* assumptions of one kind or another. And the scientific community prefers to accept a modified theory of that kind, in preference to an entirely new theory, even if the modifications require such wild ideas as black holes or charmed quarks. Nevertheless, a crucial experiment occasionally does make its appearance.

Perhaps the most famous was the Michelson-Morley experiment. The constant speed of light disclosed by that experiment was devastating to the Newtonian system, and created a conceptual vacuum that cleared the way for the acceptance of Einstein's relativity theories. My associates and I have naturally been on a lookout for a crucial experiment of this kind, and many leads have been followed up. Dr. Huck has an electrical experiment underway. Dr. Cramer has been working with a project that involves measuring the positions of the moon, and many other ideas are in various stages of development.

Last year at Huntsville I gave a preliminary report on what will be my contribution to this project. I was not able to devise a crucial experiment, but what occurred to me was that we could reach exactly the same point by identifying some previously unrecognized result of some *earlier* experiment. After all, we are not interested in the crucial experiment itself. What we want is the crucial piece of information that is derived from that experiment, and it actually makes no difference whether we get that from a new experiment or an old one. The public library in my home city is currently featuring a sign that says, "A book is always new if you have never read it." The same is true of physical facts. A physical fact is always new if it has never before been recognized.

In the course of my investigations over the past forty or fifty years I have uncovered a great many hitherto unrecognized or disregarded physical facts—a surprisingly large number of them. But the one that fits our present requirements is a hitherto unrecognized property of scalar motion. Scalar motion itself is well known, although not by that name. For example, when the recession of the distant galaxies was first discovered some years ago, the astronomers needed an analogy to help explain the nature of that motion, and they knew right where to look for it. Almost every such explanation reads something like this one, which was taken from a current astronomical text: The common analogy likens the galaxies to spots on the surface of a balloon that is being inflated. As the rubber stretches, all the spots move away from each other. The widespread use of this analogy testifies to the general understanding that the motion of the spots on the expanding balloon and the motion of the distant galaxies is, in some way, different from ordinary motion; but the importance of that motion is not seen to be sufficient to justify any systematic exploration of its properties. After all, nobody is very much worried about the physics of expanding balloons. But that situation was changed very drastically by the development of the theory of the universe of motion, because scalar motion plays a very important part in that theoretical structure. So it was necessary for me to undertake the full-scale investigation of scalar motion that had not hitherto been attempted.

If we examine the motion of the spots on an expanding balloon in isolation, without placing the balloon in a reference system, or introducing a reference system into the balloon, or if we construct a similar mental picture of the recession of the distant galaxies, there is no way by which we can distinguish the motion of any one spot or of any one galaxy from the motion of any other. Each spot and each galaxy is simply moving outward away from all others at a constant rate of speed. That motion has only one property—a scalar magnitude. Such a motion is, by definition, scalar. The scalar motions readily accessible to observation are not isolated in the manner of those I have mentioned, but are connected to a physical reference system in some manner, as for instance by placing the balloon on the floor of a room. That physical coupling to the reference system provides the directions that the motions themselves do not *not* have. If the coupling is fixed, so that the directions are likewise fixed, then the combination of a scalar motion and a coupling to the reference system behaves in most respects in the same way as an ordinary vectorial motion, and it is not currently distinguished from a vectorial motion.

Here is a place where a very important point has been overlooked. It is recognized that the balloon can be placed anywhere in the room, and it follows that the motion of any particular spot can take any direction in the reference system. But what has not been recognized, or at least not clearly recognized, is that the ability to take any direction is not limited to a constant direction. For example, the balloon may be rotated. The effect of a continuous rotation of the coupling to the reference system is to distribute the scalar motion over all directions in the dimension or dimensions of rotation, thus producing a *distributed scalar motion.* The properties of that distributed scalar motion are quite different from the properties of combined vectorial motions in different directions. In vectorial motion the magnitude and the direction are interrelated. For example, if a vectorial motion of magnitude X in a specific direction is superimposed on a vectorial motion of equal magnitude in the opposite direction, the resultant is zero. Similarly, vectorial motions of equal magnitude in all directions add up to no motion at all. But the magnitude of a distributed scalar motion is not altered by the changes in direction.

The balloon example is a relatively unimportant motion, originated and maintained by human action. But the fact that such motions exist means that the same kind of motions may originate from natural causes. So we thus arrive at the conclusion that there probably exist somewhere in the physical universe a class of distributed scalar motions that are not currently recognized as motions.

As soon as we reach that conclusion, it is almost immediately apparent that the reason for the lack of recognition is the prevailing attitude toward the concept of force. Force is defined for scientific purposes as the product of mass and acceleration. Motion itself is measured, on an individual mass-unit basis, as speed or velocity. That is, each individual mass-unit moves at that rate. On a collective basis, it is measured as the product of mass and velocity, which is currently called momentum, but in earlier days was known by the more descriptive name of quantity of motion. The time rate of change of the motion is an acceleration on the individual mass-unit basis, and the product of mass and acceleration, or force, on the collective basis. This obviously means that force is specifically defined as *a property* of motion; and it follows that force cannot be autonomous in the manner in which the so-called fundamental forces of nature are currently regarded. Every fundamental force is a property of a fundamental motion. But that creates problems for present-day science. For example, the electric charge produces an electrical force, and so far as we can tell it produces that force directly, with no sign of any intervening motion of the kind that is required by the definition of motion. Present day science handles that problem very simply—by ignoring it. But if we want to actually resolve the problem, what we need to do is to identify the electric charge as a distributed scalar motion. The charge itself is the motion, so we don't need that intervening motion that we don't find.

This process of identification is a necessary part of all scientific work, because the entities with which we deal don’t come equipped with labels. The process itself is simple enough. It operates on what is sometimes called the “duck principle.” You are familiar with that, I presume? If it looks like a duck, and it swims like a duck, and it waddles like a duck, and it quacks like a duck, then it’s a duck. We can illustrate the application of that principle by a simple example. Out in the depths of space we see certain objects that we call stars and planets. It is not obvious from visual observation what those stars and planets are—at one time it was thought that they were simply holes in the sky that let the light shine through. Since then the properties of matter have been determined, where we are in direct contact with it, and some of the properties of the stars and planets have also been determined. The two have been correlated, and whenever a comparison has been made, they have been found to be identical. That justifies us, on the basis of the duck principle, in concluding that the stars and planets are aggregates of matter.

In exactly the same way we are identifying the electric charge as a distributed scalar motion. This is the same conclusion that I reached earlier in my theoretical works; but the situation is now entirely different. That theoretical conclusion had no meaning to anyone who was not willing to accept the premises on which it was based; and any scientist, or anybody else for that matter, had the option of accepting or rejecting it. That option is no longer open. We have now demonstrated that the identity of an electric charge as a distributed scalar motion is a necessary consequence of positively established facts, and the scientist has no option but to live with the facts.

What I have said so far covers essentially the same ground that I covered in the preliminary talk last year at Huntsville, and it may be that I have been imposing on those of you who heard the previous talk by subjecting you to the same thing twice. But there are two reasons for so doing. In the first place I wanted to emphasize the status of these findings with respect to distributed scalar motion as the equivalent of the result of a crucial experiment. The other reason is that it has been possible to extend those conclusions very materially during the intervening twelve months, and I wanted to talk to you a little about those extensions. My original intention, as I mentioned to some of those who were present at the conference at Huntsville, was to write an article for some appropriate scientific journal that would cover the scalar motion findings—and as soon as I got home from the conference, I started work on that article. But, coincidentally, I continued the investigations. And the results of those investigations accumulated so rapidly that it was very soon apparent that the idea of an article was impractical, and that the amount of material that I had could not be covered in anything less than a book-length presentation. So I proceeded with the preparation of the text of such a book, and in thinking over the subjects that might be of interest to you tonight, I decided that perhaps you might be interested in a sort of a preview of the contents of that volume.

Within the subject area that it covers, the conclusions reached in this new work will be identical with those reached in my previous theoretical works; but they will be reached by a totally different route. In the theoretical works I began with a set of postulates as to the properties of a universe of motion, and all conclusions in all areas were derived entirely by derivation of the consequences of those postulates, without introducing anything from observation or experiment. In this new work I am going to do exactly the opposite. I am going to start with a set of positively established facts, including those that have been derived from the scalar motion investigation; and all conclusions will be derived entirely by development of the consequences of those established facts, without introducing anything of a theoretical nature. That means that the entire book will be factual, without any tie-in to any physical theory. But since the conclusions will agree with the conclusions derived from the theory of a universe of motion, whereas they will disagree in many respects with current physical theories, the work as a whole will constitute a significant confirmation of the validity of the theory of the universe of motion.

The discovery and identification of distributed scalar motion was, in itself, an important advance in knowledge. But it also opens the door to a better understanding of the entities that are now identified as distributed scalar motions. One important point that has been clarified is the existence of multi-dimensional motion. Vectorial motion is one-dimensional. It may extend into three dimensions of space, but as motion it is confined to one dimension. Any such motion is described by a vector, which is one-dimensional; and any number of these vectors can be combined into a resultant vector, which is likewise one-dimensional. But scalar motions in different dimensions cannot be combined in any way analogous to the addition of vectors. It follows that scalar motions in different dimensions are independent. An n-dimensional motion, mathematically speaking, is simply one that requires n magnitudes for a complete definition. Thus a one-dimensional motion, or other physical quantity, can be defined by one magnitude; a three-dimensional scalar motion requires three magnitudes for its definition. One of those magnitudes, and only one, can be further subdivided by the introduction of directions relative to a spatial reference system. That motion can then be defined by a vector, and it can be represented in the spatial reference system by a line.

Current scientific thought regards the whole of existence, physical existence at least, as being contained within the space and time of the spatial reference system. And that current thought denies the existence of what I have just been talking about; that is, multi-dimensional motion. But now that we have derived the existence of multi-dimensional motion from established physical facts, it is evident that this current scientific opinion, which was never anything but an assumption, is an erroneous assumption. What we now find is that the conventional three-dimensional spatial reference system is capable of representing only a limited portion of the total contents of the universe.

With the benefit of this information as to multi-dimensional motion, we can now complete the definition of the basic distributed scalar motions. A study of the properties of electric charges, which I will include in the new publication, but won't take the time to go into here, shows that the charge is a one-dimensional distributed scalar motion. A similar study of gravitation shows that gravitation is a three-dimensional distributed scalar motion. The situation with respect to magnetism is not as clear cut, because it is complicated by the existence of electromagnetism, which is a phenomenon of an entirely different kind. But we can identify the so-called permanent magnetism as a two-dimensional distributed scalar motion.

In present-day thought these phenomena are dealt with as fields, but just what constitutes a field has always been a matter of a considerable difference of opinion. From Marshall Walker we get this definition: "A field is a region of space where a test object experiences a specific force." But Einstein disagrees. Einstein says a field is something "physically real" in space, "for the modern physicist as real as the chair on which he sits." This difference in opinion as to the nature of the field is further complicated by differences of opinion as to how the field theory ought to be applied and as matters now stand, the whole status of the theory is in considerable doubt. From David Park we get this assessment of the situation: "This does not mean that the ultimate explanation of everything is going to be in terms of fields, and indeed there are signs that the whole development of field theory may be nearer its end than its beginning." The clarification of the scalar motion situation shows that the field is neither a region of space as indicated by Walker, or something like the physicist's chair, as indicated by Einstein. It is simply a distributed force. The force aspect of a vectorial motion is a vector; the force aspect of a distributed scalar motion is a field.

The failure to recognize important facts, such as the existence of distributed scalar motion, has a double effect in that it encourages the development of erroneous theories, and then causes a disregard of the facts that disagree with those theories. The situation with respect to gravitation is a good example. The observed facts with respect to gravitation are well known, and they are almost entirely disregarded. As nearly as can be determined from observation, gravitation acts instantaneously, without an intervening medium, and in such a way that its effects cannot be screened off or modified in any way. But those properties are so difficult to explain on the basis present-day theory that the physicists have resorted to the unusual expedient of constructing a fictitious set of properties that they *can* explain, and substituting those fictitious properties for the observed properties. Notwithstanding all evidence to the contrary, present-day physical opinion insists that gravitation *must* be propagated at a finite velocity, through a medium, or something with the properties of a medium. Einstein, of course, made space a medium—gave it the properties, as he said, of a medium. It is freely admitted that there is no evidence to support this present-day contention. As one prominent physicist puts it, “Nowadays we are also convinced that gravitation progresses with the speed of light. This conviction, however, does not stem from a new experiment or a new observation; it is a result *solely* of the theory of relativity.” Once it is recognized that gravitation is a distributed scalar motion, all necessity for this defiance of the facts is removed, because the properties of a distributed scalar motion are exactly those properties of gravitation that have proved so difficult to understand.

The insistence on viewing gravitation as a transmission process also involves a wholesale disregard of the physical facts. That viewpoint likens gravitation to electromagnetic radiation, and we hear about gravitational waves in the same way that we hear about electromagnetic waves. But the two processes are entirely different, and it is very difficult to understand why anyone should ever connect the two. Electromagnetic radiation is an energy transmission process. A photon leaves an emitting object with a certain amount of energy. The energy of the emitting object is decreased by that amount. The photon travels through space and reaches an absorbing object, delivers the energy, and the energy of the absorbing object is increased by that amount. The intervening space, the distance, has nothing to do with the process, except in determining the time it takes for travel. The process is independent of the distance. In contrast to that process, the gravitational process is totally dependent on the distance. If there is no change in the distance, that is, if the two apparently interacting objects don’t change their separation, then there is no change in the energy at all. And even if an energy change does take place, as happens in a case of an object falling towards the Earth, the increase in the kinetic energy of the incoming falling object is not obtained at the expense of the Earth: it’s derived from the potential energy, the energy of position, of the falling object itself. Much the same considerations apply to electricity and magnetism.

There are a number of other direct consequences of the scalar motion existence that have an important bearing on various physical problems, and I intend to cover them, that is, all those that I have so far identified, in this new book; but I don’t want to take the time to talk about them here, because I want to leave time for adequate consideration of another very important finding, which, like the existence of distributed scalar motion, is significant enough to justify classifying it as the equivalent of the results of a crucial experiment.

This second important finding is a result of a well-known experiment, but it has not previously been recognized because a recognition of distributed scalar motion was a prerequisite for recognition of the new fact. As a preliminary, before starting to talk about that particular subject, I want to say a few things about speed limits. The present scientific view is that nothing physical can move faster than the speed of light. That belief is based on Einstein’s interpretation of certain experiments in which an electric force was applied to the acceleration of light objects, such as electrons. It was found in those experiments that the acceleration did not continue at the same rate as might be expected from Newton's second law of motion, but decreased at high speeds at a rate which indicated it would reach zero at the speed of light. That indicated, of course, that either the force must decrease at high speeds, or the mass must increase. There is no physical evidence of any kind to indicate which is the correct alternative, so Einstein had to make a guess, and he guessed in favor of the mass alternative. According to his theory the mass increases at high speeds and becomes infinite at the speed of light. On this basis it is, of course, impossible for any higher speed to exist.

So far as present-day theory is concerned, it makes little difference which of these alternatives is correct, because there is obviously a limit on a one-dimensional basis in either case. Since present-day theory does not concede the existence of multi-dimensional motion, the existence of a one-dimensional limit is equivalent to the existence of a limit on speeds in total. But when we recognize the existence of multi-dimensional scalar motion, then it's equally evident that the limit on speed in one dimension can be reached in each of the three dimensions. That does not mean that it's possible to achieve a speed greater than light by electrical means, because, as I pointed out a little bit earlier, the electrical force is one-dimensional. That accounts for the fact that the electrical force was unable to reach any higher speed. But it does not preclude acceleration to higher speeds by means of some other process, such as, for instance, the release of large quantities of energy in violent explosions.

This brings me down to that second important physical fact that I have been talking about. But I want to pause for a moment to emphasize the continuing factual nature of the development of thought. The reason I need to do that is that the conclusion that I am now ready to pull out of the hat appears in the theory of the universe of motion as a postulate, and it has some far-reaching consequences. Those who realize that both the conclusion itself and the consequences are a part of the theory of a universe of motion are likely to suspect that I may have smuggled some theoretical considerations into the development of thought at some point along the line. So I want to assure you that that's not the case. We're sticking entirely to the facts.

We know from observation that the electric charge occurs only in discrete units. We have identified the electric charge as a distributed scalar motion. Now there's no difference between this scalar motion and any other scalar motion so far as the motion itself is concerned: the difference is only in the nature of the coupling to the reference system. Once we have established that the electric charge, which is a scalar motion, is limited to discrete units, it then follows that scalar motion occurs only in discrete units.

Those of you who are encountering that conclusion for the first time may not be very much impressed by it. In fact, with all the build-up I have given it, it may come as somewhat of an anti-climax. But those of you who are familiar with the theory of a universe of motion will realize the great significance of deriving this conclusion from purely factual premises. At one stroke it raises a very substantial portion of the conclusions that have been reached with respect to a universe of motion from the status of theoretical conclusions to the status of established facts.

The only property of a scalar motion is magnitude; such a motion is a relation between a space magnitude and a time magnitude. Now we have further found that those are integral magnitudes, so that the properties of scalar motion are the properties of integral magnitudes. It then follows that we can derive the physical properties of scalar motion under any particular circumstances by translating the mathematical properties of reciprocal integers, which we already know, into the appropriate physical language. This, of course, is a general principle of extremely wide application.

In our ordinary view of motion the minimum amount of motion is zero; and zero is therefore the condition of rest, the condition from which effective magnitudes are measured. In a reciprocal speed system, on the other hand, the minimum speed is unity, because anything less than unit speed is not speed: it's inverse speed. Similarly, the minimum inverse speed is unity. It follows that in such a system unit speed is the condition of rest, the condition from which all speed magnitudes are measured. Expressing that in another way, we can say that unit speed is the natural reference system. The natural reference system for scalar motion is not a fixed system; it is a moving system.

The motion of the time component is universally recognized. We all recognize that "now" is not something that stays put. It continually moves forward. The essence of the new finding is that "here" is an entity of the same kind: it likewise continually moves forward. What this means, then, is that all physical objects are continually being carried outward at unit speed relative to the fixed reference system.

In most cases that outward motion cannot be recognized; but where the gravitational effect is absent, as in the case of the photons of radiation, we can observe the outward motion: photons move outward at the speed of light. The same is true where the gravitational effect is practically negligible, as in the most distant galaxies, which are likewise moving outward at almost the speed of light. Another important consequence of the reciprocal relation that we have now established is the symmetry around unit speed which means that there is motion in time as well as in space. An increase in the time, while the space is constant, results in a decrease in space per unit time, and therefore causes a change of position in space. An increase in space with time remaining constant decreases time per unit space and causes a change of position in time. So here we arrive at the concept of a motion in time. This concept is perfectly familiar to those of you who have been dealing with the theory of a universe of motion; and a great deal of what I am saying now is very much the same as I was saying years ago when I was first explaining that theory. So it's old stuff to you. But it has a quite different significance in the present context. The extent to which we can now derive these conclusions from established facts greatly strengthens the position of the theory. Many individuals have rejected our conclusions without any serious consideration simply because they conflict with ideas of long standing that have had no basis other than assumptions to begin with. But now that we are able to show that these conclusions are consequences of positively established facts, that option, as I said with regard to another item, is no longer open. Scientists have no option but to accommodate themselves to the facts.

The system of scalar motions that we can represent in the spatial reference system, the one-dimensional motion that I was talking about earlier, can be duplicated in time because of this space-time symmetry, so that we have another system equivalent to the scalar motion system that is represented in our reference frame. The derivation that I am giving you now deals only with scalar motion, and we'll have to leave vectorial motion for consideration at some other time, because I haven't brought that within the factual limits yet. But we can consider this point: that gravitation is a scalar motion, and that consequently all gravitating objects are included in the inverse system. This includes all material objects. It follows that the inverse system is at least co-extensive with the system that is open to observation, whether or not it is an exact duplicate. The inverse system that I have been talking about is a system of maximum speed. The system that we are well acquainted with, that we deal with on our ordinary reference system, is a region of minimum speed.

Now I want to take a brief look at some of the things that happen in the intervening area. First, we need to look at some of the primary processes that are involved. The progression of the natural reference system is outward, a plus or positive motion in our usual language. It is limited to one unit, because that is the maximum that we can have in a system of discrete units. Gravitation is capable of extending to two units before it reaches a net resultant of one negative unit; and to that one negative unit we can apply outward translational motion in one dimension. Here we again have a range of two units. The same is true in each of the three dimensions. That gives us then a total separation of six units of speed from one zero to the other.

So far I have been talking about full units. Of course, when we exclude fractional units, we don't have anything *but* full units, but we can produce the equivalent of a fractional unit by adding units of the opposite kind, that is, units of motion in time. N units of motion in time are equivalent to minus 1/n units of motion in space—so that we accomplish a resultant of less than one unit by combining the one full unit with the oppositely directed fractional unit from the other direction. This is the first speed range, the range from zero to one unit. It is the range of our ordinary experience, the speed range that's represented in the spatial reference system. It's not possible, obviously, to exceed one unit by any kind of a subtraction from a single unit, which accounts for the limitation on the speed in one dimension. But there is nothing to prevent the addition of another full unit, so that in the next speed range, we have *two* units minus a fractional unit. The same is true in the third speed range.

It's necessary to keep in mind that the first of the two units is a unit of space and that there is a unit of time in the same dimension. There is a unit of space from zero space to unity, which is the unit of both space and time, and another unit from this unit level to zero time. Thus, the second unit of motion is in time. Then, in order to add a third unit, we have to go to a second dimension, so that again we have a dimension of space. On this basis the speed from zero to one unit is in space. That's the ordinary motion that we are acquainted with. A speed from one unit to two units is in the same dimension, but it is in time. A speed from two units to three units continues that unit of speed in time, but adds a unit of speed in space, so that it's two-dimensional.

These are the major characteristics of high-speed motion as we derive them from the reciprocal relationship that we have just found. In order to give this a meaning in terms of our physical observations, we have to resort to the identification process again. The most energetic processes that we know of in the universe are explosions of stars and galaxies. If any objects with speeds in these intermediate ranges that I have been talking about actually exist, they must exist as objects of that kind. So let's look at them. All violent explosions generate some low-speed products, and we see those low-speed products expanding away from the site of the explosion, usually at high speeds. Those products are not of particular interest to us now because they are in the lower speed range, the ordinary speeds of our everyday experience. But in motion in the second speed range, the change of position is in time. So that the motion in that speed range produces the same kind of a cloud of expanding particles, but this time they are expanding into time. Because of the reciprocal relation between space and time that I have just been talking about, the cloud of particles expanding into time decreases in size as seen in the spatial reference system, so that we observe such a cloud of particles as a very small object of a very high density, which remains in essentially the original location. Such an object can, of course, be identified with the stars that we know as white dwarfs. So here, then, we can identify objects in which the speeds are in the second speed range—from unity to two units. This is another conclusion we reached theoretically, but now we find that we have sufficient evidence to establish it as a consequence of positively established facts.

We also have evidence that there are explosions of galaxies, and since these are very much larger objects—our own galaxy contains something like ten to the eleventh power solar masses, a hundred billion times the size of one star—the explosion of a galaxy is very much more violent, we can therefore deduce that some of the products of that explosion will probably enter the third speed range. As I pointed out a short time ago, that should have two consequences. Because it has a two-dimensional motion, one dimension of which is in time and another in space, that kind of an object will be moving rapidly outward, as well as decreasing in size, like the white dwarf star. Such an object will therefore be the equivalent of what we might call a white dwarf galaxy; not a galaxy composed of white dwarf stars, but a galaxy that has the properties of white dwarfs. We can easily identify this as one of the objects known as quasars.

Now, to summarize what I said: I have not been able to find the kind of a crucial experiment that I and others have been looking for. But by means of a systematic analysis of previous experimental work, I have uncovered two hitherto unrecognized facts of a crucial nature—the kind of facts that would have been obtained from crucial experiments, if I had found such an experiment, or two of them. These new crucial facts are, first, the existence of distributed scalar motion, and, second, the limitation of all scalar motion to discrete units. With the benefit of these new crucial items of information, many of the unique features of a universe of motion, including multi-dimensional motion, motion in time, speeds greater than that of light, and a second half of the universe, can now be presented to the scientific community as established facts, rather than as theoretical speculations. This should aid very materially in the continuing effort to secure the serious consideration that has thus far been so difficult to obtain.