rest in the relevant inertial reference system. Light rays are sent at the same instant from one point to different locations where they are then reflected back. If all these light rays arrive back at the original point at the same instant, the different positions where each of them is reflected back are then considered to be of equal distance from the original point. By repeating this procedure, a space-grid can then be set up in any inertial system.

It can be seen that the atoms in solid state matter at rest in the same reference system will align themselves in such a manner as to define a similar space. From symmetry considerations, electromagnetic transmission from one atom to any two or more symmetrically placed atoms in the lattice, will, after reflection at these atoms, arrive back at the first atom at the same instant. This phenomenon is, of course, directly related to the electromagnetic mechanism determining the spatial configuration of all the atoms in the solid state lattice. Each atom cannot "know" the position (in space and time) of the other atoms in the lattice other than by electromagnetic transmission.

One may now perceive that as both time and space are directly related to electromagnetic transmission, a close relationship between the two must exist. However, before we can fully appreciate the synthesis of time and space, we need first to understand yet another arbitrary concept of man — simultaneity.

Simultaneity

Simultaneity is a concept required mainly to support man's notion that time is a pervasive entity independent of space.

This concept of time, of course, leads to the requirement that we be able to specify certain times at different positions as being the same.

We shall now look at how simultaneity has been arbitrarily defined by man. A method related to that used in defining space can be used to define simultaneity. Light rays are sent out from a point and reflected back at positions such that they arrive back at the same instant. The times, at the different positions, when the reflections took place are then considered simultaneous to each other. We note also that, as stated earlier, these positions are defined as being of equal distances from the point where the light rays originated. Therefore, the speed of light must be the same in all directions in space because we have arbitrarily defined it to be so.

To help us understand the reason for man's choice in his definition of simultaneity, we shall consider its definition assuming that the space-grid of the relevant inertial frame had already been set up. We send light rays at the same instant from a point, say, the origin. The times, when these light rays reach points considered to be of equal distances from the origin (according to the space-grid), are then designated simultaneous to each other. We note here that according to man's arbitrary definition of time, when light rays cross equal distances in his defined space, an equal amount of time is considered to have elapsed. From his notion of time as a pervasive entity, he concludes that since these light rays began at a single event, and that an equal time has elapsed during each ray's transmission, the arrival times of these rays must be simultaneous. He then proceeds to project this rule to cover all of space, thus defining a universal moment of time for his inertial system.

It is, however, proposed in this paper that there is no basis for assuming that there is a real pervasive entity such as time, which actually exists merely as an abstraction devised by man. Therefore, I wish to stress here that there is no unique scientific significance to two events being considered simultaneous, other than merely as it is defined.

The Interrelation of Time and Space

Both time and space are directly related to electromagnetic phenomena. I propose now to elaborate more fully on the earlier statement that they are also completely interdependent on one another.

From man's arbitrary definition of time, it is clear that its rate can only be determined if a demarcated space is also specified. It is not meaningful to talk of time at a single point in an inertial frame, other than in the context of the surrounding demarcated space-grid. The rate of time is determined by sending a light ray from the point through this space-grid and back. The distance traversed by the light ray in the space-grid is then the measure of the elapsed time. Hence time cannot be defined without space.

Likewise, space cannot be defined without time. Distances in space are directly related to the time a light ray takes to travel forwards and backwards between the two points demarcating the distance. In practical terms, this procedure can be considered to have been observed by the atoms in determining their alignment to one another in the solid state. Therefore, using solid state matter at rest to delineate space actually constitutes a similar process in defining space, and hence is also dependent on time.

The interrelatedness of time and space also becomes apparent when we consider the comparison of time and space between different inertial frames of reference. Two arbitrary concepts are required to carry out such comparisons — simultaneity and what we shall call positional correlation. (We shall define two events as positionally correlated if they have the same space coordinates in the relevant frame of reference.) These two concepts may be viewed as devices required to link up different events, thus allowing man to designate any event in terms of his arbitrary concept of pervasive time and space. Simultaneity provides a link between positionally uncorrelated events and positional correlation provides a link between events that are not simultaneous.

Due to the interrelatedness of time and space, it is actually impossible to compare only time or only space between different inertial systems. When we compare the rates of time between different frames of reference, we necessarily have to compare the designated times at positionally uncorrelated events of at least one frame of reference. Hence the space aspect must be considered and any such comparison of time is directly dependent on how we determine simultaneity between different positions in space for the relevant reference frames.

In comparing space between different inertial systems, two events must be used in the demarcation of any distance. These two events can be simultaneous in only one or other frame of reference. Hence a time factor must be taken into account. In the reference frame where these two events are not simultaneous, the distance used in the comparison will depend on how we determine their positional correlation to events which *are* simultaneous to each other.

From the above considerations, one may now perceive that time and space, by the way they are arbitrarily defined, are closely interrelated and cannot be divided. They are merely different aspects of the same underlying reality which is electromagnetic phenomena.

Electromagnetic transmission has been used by man for his arbitrary definition of time and space mainly because it is, by far, the fundamental phenomenon which most greatly influences his experience of the universe. It should be apparent, however, that any other fundamental phenomenon that is related in its actions to that of electromagnetism can also be used to define the same time and space.

In order to demonstrate that all the prior theoretical considerations regarding time and space are compatible with known experimental and mathematical observations, I shall now proceed to derive the Lorentz transformation equations using purely intuitive arguments based on the new theoretical insights which have been introduced. Hence, the Lorentz transformation equations will be shown to be direct consequences of man's arbitrary definition of time and space as outlined in this paper.