We often believe that our senses provide us a "real" understanding of the world. As we will discuss, this belief comes directly from our commonsense. This narrow view is literally shattered by what we are told by the physical scientists of our day. In order to help illustrate this point of view, below are the opening paragraphs of the introduction to his book, "The Nature of the Physical World," by Sir Arthur S. Eddington (1928), University of Michigan Press, Ann Arbor.

I have settled down to the task of writing these lectures and have drawn up my two chairs to my two tables. Two tables! Yes; there are duplicates of every object about me--two tables, two chairs, two pens. This is not a very profound beginning to a course which ought to reach transcendent levels of scientific philosophy. But we can-not touch bedrock immediately; we must scratch a bit at the surface of things first. And whenever I begin to scratch, the first thing I strike is--my two tables.

One of them has been familiar to me from earliest years. It is a commonplace object of that environment which I call the world. How shall I describe it? It has extension; it is comparatively permanent; it is coloured; above all it is substantial. By substantial I do not merely mean that it does not collapse when I lean upon it; I mean that it is constituted of "substance" and by that word I am trying to convey to you some conception of its intrinsic nature. It is a thing; not like space, which is a mere negation; nor like time, which is--Heaven knows what! But that will not help you to my meaning because it is the distinctive characteristic of a "thing" to have this substantiality, and I do not think substantiality can be described better than by saying that it is the kind of nature exemplified by an ordinary table. And so we go round in circles. After all if you are a plain common-sense man, not too much worried with scientific scruples, you will be confident that you understand the nature of an ordinary table. I have heard of plain men who had the idea that they could better understand the mystery of their own nature if scientists would discover a way of explaining it in terms of the easily comprehensible nature of a table.

Table No. 2 is my scientific table. It is a more recent acquaintance and I do not feel so familiar with it. It does not belong to the world previously mentioned--that world which spontaneously appears around me when I open my eyes, though how much of it is objective and how much is subjective I do not here consider. It is part of a world which in more devious ways has forced itself on my attention. My scientific table is mostly emptiness. Sparsely scattered in that emptiness are numerous electric charges rushing about with great speed; but their combined bulk amounts to less than a billionth of the bulk of the table itself. Notwithstanding its strange construction it turns out to be an entirely efficient table. It supports my writing paper as satisfactorily as Table No. 1; for when I lay the paper on it the little electric particles with their headlong speed keep on hitting the underside, so that the paper is maintained in shuttlecock fashion at a nearly steady level. If I lean upon this table I shall not go through; or, to be strictly accurate, the chance of my scientific elbow going through my scientific table is so excessively small that it can be neglected in practical life. Reviewing their properties one by one, there seems to be nothing to choose between the two tables for ordinary purposes; but when abnormal circumstances befall, then my scientific table shows to advantage. If the house catches fire my scientific table will dissolve quite naturally into scientific smoke, whereas my familiar table under-goes a metamorphosis of its substantial nature which I can only regard as miraculous.

There is nothing substantial about my second table. It is nearly all empty space--space pervaded, it is true, by fields of force, but these are assigned to the category of "influences," not of "things." Even in the minute part which is not empty we must not transfer the old notion of substance. In

dissecting matter into electric charges we have traveled far from that picture of it which first gave rise to the conception of substance, and the meaning of that conception--if it ever had any--has been lost by the way. The whole trend of modern scientific views is to break down the separate categories of "things," "influences," "forms," etc., and to substitute a common back-ground of all experience. Whether we are studying a material object, a magnetic field, a geometrical figure, or a duration of time, our scientific information is summed up in measures; neither the apparatus of measurement nor the mode of using it suggests that there is any-thing essentially different in these problems. The measures them-selves afford no ground for a classification by categories. We feel it necessary to concede some background to the measures--an external world; but the attributes of this world, except insofar as they are reflected in the measures, are outside scientific scrutiny. Science has at last revolted against attaching the exact knowledge contained in these measurements to a traditional picture-gallery of conceptions which convey no authentic information of the back-ground and obtrude irrelevances into the scheme of knowledge.

I will not here stress further the non-substantiality of electrons, since it is scarcely necessary to the present line of thought. Conceive them as substantially as you will, there is a vast difference between my scientific table with its substance (if any) thinly scattered in specks in a region mostly empty and the table of everyday conception which we regard as the type of solid reality--an incarnate protest against Berkelian subjectivism. It makes all the difference in the world whether the paper before me is poised as it were on a swarm of flies and sustained in a shuttlecock fashion by a series of tiny blows from the swarm underneath, or whether it is supported because there is substance below it, it being the intrinsic nature of substance to occupy space to the exclusion at least, but no difference to my practical task of writing on the paper.

I need not tell you that modern physics has by delicate test and remorseless logic assured me that my second scientific table is the only one which is really there--wherever "there" may be. On the other hand I need not tell you that modern physics will never succeed in exorcising that first table--strange compound of external nature, mental imagery, and inherited prejudice--which lies visible to my eyes and tangible to my grasp.

We must bid good-bye to it for the present for we are about to turn from the familiar world to the scientific world revealed by physics. This is, or is intended to be a wholly external world.

"You speak paradoxically of two worlds. Are they not really two aspects or two interpretations of one and the same world?"

Yes, no doubt they are ultimately to be identified after some fashion. But the process by which the external world of physics is transformed into a world of familiar acquaintance in human consciousness is outside the scope of physics. And so the world studied according to the methods of physics remains detached from the world familiar to consciousness, until after the physicist has fashioned his labours upon it. Provisionally, therefore, we regard the table which is the subject of physical research as altogether separate from the familiar table, without prejudging the question of their ultimate identification.

It is true that the whole scientific inquiry starts from the familiar and in the end it must return to the familiar world but the part of the journey over which the physicist has charge is in foreign territory.