

ceedingly complex if it is even approximately complete. In practise, the definition of such a word is designed to serve merely as an aid to classification, and consists in the naming of only a few properties, in many cases of but one, that appear to be common to all units of the group and to be possessed by no unit belonging to any other group, all other properties common to the several units being connotated only. Definitions of this connotative kind can never be regarded as final, nor be used to prove that a given unit is properly designated by the word defined. If the properties of the unit in question are such as to conflict with the connotations of the definition, then the proper conclusion is that the verbal definition is unsatisfactory, that it does not serve to distinguish unambiguously from other units those of the group designated by the word defined. To adopt any other policy is to deny that there is any connotation, to claim that the word merely designates the property or properties named in the definition; in other words, to claim that the definition is of the kind previously considered.

As commonly used, "matter" and "material" denote a group of units that possess many properties; verbal definitions of them must be connotative. This appears to be recognized by Professor Compton. The use he makes of the definition is therefore invalid. In order to establish his thesis, he must show, by other than an appeal to verbal definitions, that radiation is indeed a unit of the group denoted by the word matter, that it satisfies the connotative demands.

In the first paragraph of the letter we find the expressions "conservation of matter," "conservation of mass" and "mass or inertia." The terms matter, mass, inertia appear to be regarded as synonymous. Certainly the concepts designated by "matter" and by "inertia" are quite distinct. The terms matter and material, as commonly used, refer to aggregations of what we are pleased to call atoms. Such aggregations have been found to possess both weight and inertia. It is the first of these, the one that determines the value of m in the gravitational equation, that has been found experimentally to be conserved. The second term, inertia, determines the work that is required

to give the aggregation a specified velocity. The two concepts are quite different and should not be confounded. Experiments indicate that the ratio of the weight of such an aggregation to its inertia is a universal constant, the same for all such aggregations; but it should not be forgotten that this truly surprising relation has been established solely for aggregations of atoms. I know of nothing that will justify the conclusion that the possession of inertia universally implies the possession of weight. When these different concepts are kept clearly distinct, the difficulty of establishing the proposed thesis is increased. In truth, the thesis in general appears untenable.

If the words "matter" and "inertia" are redefined as identical concepts denoting a single property the quantity of which differs from energy by only a universal constant, then, and probably only then, can the thesis in general be maintained.

Redefinitions appear to be essential to the relativity theory, but they are in general unavowed and unrecognized by the expositors of that theory. Terms so redefined do *not* denote the same concepts as they did before, and much of the utter nonsense that has been written about relativity is attributable to a failure to recognize the differences so introduced. Is it superoptimistic to hope that in the near future expositors of relativity will consider carefully and inform their readers of the actual significance of the terms they use? Care in this respect, combined with the elimination of inconclusive and invalid arguments, will be of great service to both the physicist and the layman. Incidentally, it will reduce the volume of relativity literature that one has to read; but that need not be considered here.

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RIGHT AND LEFT HANDED SPEAKERS

THE subject of right and left handedness periodically has evoked interesting discussion in the columns of SCIENCE, but I do not recall mention of a fact which I frequently have verified by observation, namely, that there are right and left handed speakers. Given an audience hall of oblong dimensions where the

speaker stands in the center of one side and not at the end, unless he be a practiced speaker he usually will address the majority of his remarks, be they written or impromptu, towards one or the other end of the hall, depending upon whether he be right or left handed. In illustration, I recently listened in a hall of this description to two cultivated Englishmen. One was an orator accustomed to speak in the House of Parliament, where the audience surrounds the speaker on all sides. He turned equally to the right and left of his audience, but the other, a general, more accustomed to the battlefields than the rostrum, gesticulated with his right hand so forcefully that he pulled himself around to face his audience upon his right, to the almost complete ignoring of those seated upon his left. Meanwhile, in his embarrassment, with his left hand he clung to the lapel of his coat, which further precluded his turning towards that side!

In a medical lecture hall into which an adjoining room often is thrown open to accommodate an overflow audience, there is a narrow but tall reader's desk at the center of one side. It is amusing to note that the right-handed speaker often leans upon this desk with his right arm, thereby turning himself to address his audience upon his left, but should be remove his right arm to gesticulate (which medical speakers from the nature of their subject rarely have occasion to do), he pulls himself around to face the opposite end of the wide but narrow hall. The left-handed speaker does the reverse. As the majority of speakers are right handed, I have found it an advantage for hearing to sit in the audience upon their right side, unless there be a tall reading desk, when it is safer to sit upon their left!

Related to this topic is the question of right and left eyedness, which was discussed in *SCIENCE* some time ago. Apart from any question of possible difference in acuteness of vision is the fact that many persons can not close the two eyelids with equal facility, which sometimes may account for poor marksmanship. In sighting a shotgun, for instance, from the right shoulder, if one instinctively closes the right eyelid much more readily than the left, in order to use the left eye one must bring the head much further over toward the stock of the gun, and failure to do this quickly and

completely results in poor aim, particularly in rapid firing, as in taking birds on the wing.

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THE BIRD COLLECTOR

FROM the article of Joseph Grinnell in your December 15th issue, one would infer, first, that the toll taken by collecting ornithologists is negligible; and second, that it makes no difference anyway since the factor of safety is so large. However true this may be with respect to the dominant species, it certainly is not so when it comes to forms that are rare, either absolutely or locally. When a species once gets on the down grade, the hand of every man with a gun, especially if he be an ornithologist, is against it. There is no deadlier adventure for a rare bird or one which has ventured out of its ordinary range than to meet a bird lover of the collecting type. One might think that the ornithologist-conscience would prevent abuses in this line, but my experience indicates that in this variety of the human species that mental organ is purely vestigial; while among commercial collectors, for whose existence the ornithologist is chiefly responsible, it is non-existent. For example, a few years ago a pair of avocets (formerly abundant, but now very scarce in western Nebraska) bred in a marsh near Grand Island. The following year, this colony was increased. The news of this brave attempt to regain some of its lost territory reached the ears of a collector in Lincoln, who promptly went out and exterminated the colony.

The last specimen of the British sea-eagle passed away not long ago. Paid persecution brought its numbers to the danger point; but after the reward for killing it was withdrawn, it might easily have maintained itself but for the selfishness of collectors, who shot every available specimen for "preservation." To this the scientific bird-man will doubtless reply: "Tush! When a species is dying out or trying to extend its range, it will do so regardless of collectors." But to the non-partisan mind such protests naturally raise a question as to the protestor's sincerity or accuracy. The indictment of Douglas Dewar anent the hoopoe will strike many a responsive chord. In his