I am sorry that you taboo the adversative "while." "While" can sometimes be used correctly in places where "although" or "whereas" could be substituted without material change of meaning. The "while" at the beginning of this note could be replaced by "although," but that casual "while" implies a shade more clearly that my agreement is a matter of course.

"Whereas" is rarely used at the beginning of a sentence except in leading up to a "Therefore be it resolved;" it is more frequently placed later, where the alternative is not "although" but "while." If you write "The west slope of the range is gentle, while the east slope is steep," you point out a contrast without marked emphasis; and it is sometimes appropriate to do just that. If you replace "while" by "whereas," you emphasize the contrast, which is appropriate if you mean to be didactic or argumentative—especially when, in a controversy, you want to imply that your dull-witted opponent is blind to the significance of the contrast. But the milder adversative "while"—which is a different word from temporal "while," though spelled in the same way—is supported by good usage, and I for one want to feel free to use it in places where it cannot be confused with temporal "while." Confusion can sometimes be prevented by the use of a comma; adversative "while" should usually be preceded by a comma, while [whereas] temporal "while" usually should not.

The commonest misuse of "while" (which you fail to point out) is putting it in place of "and."

Editors and writers of handbooks on composition are too ready to throw a word out of the language because it is often misused. As a result, many young writers are afraid ever to use "since" as a causal conjunction, or to write the word "case" unless they mean a case of liquor. The best cure for misuse of these words is to practice using them correctly. To abolish them is to be like the fond father in one of Sam Weller's anecdotes, who cut off his little boy's head to "to cure him o' sqvintin'."

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EDITORIAL NOTE: *The editorial changes that would normally be made in Dr. Calkins' communication are indicated, because "and" is available for coordinate clauses; "although," for subordinate clauses implying or making a qualification or reservation; and "whereas," for clauses pointing a contrast. Surely one word, "while," can be reserved for temporal clauses involving events occurring at the same time. The Editors are, of course, grieved that they cannot lay editorial pencil on misusages within quotations. Although they grant that the west slope was gentle and the east slope steep at one and the same time, they are certain that the author of the statement was not concerned with contemporaneity but with contrast.*

S. REID WARREN'S note on the "Dissa and Data" and your comment thereon invite further remark. One of the thought-control techniques of George Orwell's *1984* is to do away with various words so that they shall not be available to embody subversive meanings. In the process referred to by you, distinctions of meaning disappear, but the words remain and take on meanings duplicating those previously carried by other words. In addition to the instances already cited are "bullet" = "cartridge," "enormity" = "magnitude," "prone" = "supine," "will" = "shall." From the standpoint of scientific usage, "concept" is perhaps the chief loss; the word has become gobbledygook for "idea" or "notion."

Semantic change is, of course, always with us, but the speeded communication processes of our day accelerate it. The particular sort of change here considered looks like a function of cultural leveling associated with economic levelings of recent years. When the cultural milieu is no longer sensitive to a nuance of meaning such as is carried by "disinterested," it is natural for this meaning to disappear (the word's persistence in favor of "uninterested" may be due in part to phonetic qualities). As the weight of authority in usage passes to a more "common" source, the perceptivity connoted by these more specialized meanings no longer operates, and the words become mere synonyms for existing expressions, as above.

The history of the English language endowed it with an exceptionally large vocabulary, well suited to representing finer shades of meaning—some of them finer, apparently, than the general culture now finds it worth while to sustain. The end of this semantic fusion is a stock of ideas approximating that of Basic English, with a top-heavy vocabulary that has given up its differentiating function. From a Lowerarchical standpoint (C. S. Lewis), it is an improvement on thought-control; it is thought-atrophy.

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YOU may title this communication: "Etiology of Dorsalgia."

On Sept. 18, 1952, I read an essay by W. D. Grampp (*Sat. Rev.*, 9, Sept. 20 [1952]) decrying the gobbledygook, supererogation, and pleonasm that are the despair of those whose work requires that they read public documents and serious commentaries on public affairs.

How fortunate, I thought, are those of us who read largely in the field of science. But on that same day I read the announcement and rules of the 1952 Social Science Prize in "Association Affairs" (SCIENCE, **116**, 288 [1952]). Oh, my aching back! Even the rules are called "conditions of the competition."

Let me quote from Grampp:

> Finally, there are the cloud-cuckoo words, phrases, and verbal gestures which snatch us off the ground and lift us into a realm of giddy abstractions. Such are "socio-economic considerations" . . . "political and psychological realities" . . . "in the context of dynamic factors." Hardly ever can we know what the user *means* to convey. Almost always can one know what the words *do* convey, which is everything, and therefore nothing. Instead of following the excellent advice of the semanticists, to be-

come more and more specific whenever possible, the employers of cuckoo words become more and more abstract. Onward and upward we are carried until at last we are left floating about a cuckoo-land of verbalisms, flattered perhaps at having risen so high but utterly at a loss to know where we are.

Please, no more "space-time frame of reference" . . . "the manner of theoretical-factual construction that can be studied in the line of progress" . . . "liberation from traditional philosophic-linguistic conventions" . . . "framework of the best-formulated evolutionary naturalism."

These leave me flattered but utterly lost.

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Destruction of our Cultural Heritage

WITH a widespread program planned or already under way in the vast Missouri Basin, as well as in the Ozarks region of Missouri and Arkansas, for construction of flood-control reservoirs and hydroelectric dams by the U. S. Corps of Engineers, serious thought should be given to a program of scientific research that has as its aim a complete, cooperative study of the historical, archaeological, geological, and botanical resources of the areas to be inundated. There has been no joint scientific study by the interested agencies to determine if these dams are really the most satisfactory and most economical answer to the problem of river control and electric power production. The Corps of Engineers has, in most instances, gone ahead with construction without advice and without the scientific information that is available on the rivers involved.

Science can play an important role in the planning of adequate river control and utilization. For example, Weather Bureau records on the climatic conditions of a given area rarely go back more than 60 or 70 years. Careful examination of available historical documents as to climate and river conditions may carry the record back another hundred years, although such information also is scanty and incomplete. Yet, the rivers in the Missouri Basin and in the Ozarks, such as the Missouri, Osage, White, Current, Eleven Points, and others, have been the scene of human occupation for 10,000 years—perhaps longer. Through archaeological research, information can be obtained as to how these early people lived with respect to the rivers, and how stream and climatic conditions changed and varied over thousands of years. Such information, provided through scientific research, could give river planners a tremendous amount of highly valuable data that cannot be obtained from any other source. To plan the control of a river intelligently, engineers must know how that river has acted and what it has done over as long a period as possible. Yet, under the present system, dams are being constructed and reservoirs are being formed that are flooding the only—and the last—information available as to the past history of these midcontinent waterways. Present river planning is based largely upon inadequate information and guesswork.

In the recently completed Bull Shoals Reservoir area on the White River in Missouri and Arkansas, some 400 archaeological sites were located by scientists from the University of Missouri and Arkansas University. Even this number is little more than a fraction of the total, and only three or four of the known sites were partially excavated. Funds were not available to either university to make a more thorough study of the region. No historical research was done in the Bull Shoals district, and very little botanical exploration. Thus we have an area in the center of the Ozarks, covering thousands of acres, about the prehistoric and historic inhabitants of which we have almost no knowledge. Future archaeological and historical research in the Ozarks will suffer because of this void in cultural knowledge. We cannot go back now and learn more, for the Bull Shoals Reservoir site will be inundated for an incalculable period of time.

With the Congress of the United States appropriating hundreds of millions of dollars for the continued construction of flood-control and hydroelectric dams, some provision should be made for the adequate study and preservation of the archaeological, historical, botanical, and geological records about to be destroyed. One half of 1 per cent of the money spent on the construction of Bull Shoals Dam would have been enough to conduct many such essential scientific studies. And, from such study, it would have been possible for the Corps of Engineers to acquire vitally important information upon the past behavior of White River and to plan the project more intelligently. In addition, Missouri and Arkansas would not today be in the dark as to the ecology of the men, plants, and animals that once lived in the inundated area. Archaeological research, carried on in close cooperation with geological, botanical, and historical studies, can contribute much important knowledge to our present-day planners and to future generations. Only by studying the past can we hope to cope intelligently with the future.

The people of the United States, especially those engaged in scientific pursuits, should exert their influence to see that in future river projects we will not destroy critical relics of our cultural heritage.

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Interrelation of Succinic Acid Dehydrogenase with Apodehydrase and Codehydrase[1]

ALCOHOL dehydrogenase and, as we have found, succinic acid dehydrogenase require for their action the presence of a codehydrase, diphosphopyridine nucleotide. Theorell and Bonnichsen (*1*), working with crystallized alcohol dehydrogenase from horse liver, established that the coenzyme is bound by its pyridine

[1] The technical assistance of Friedrick Roewer is gratefully achnowledged.