answer to the riddle of speech errors, but rather perspectives on studying them. The range of languages that have been examined is quite limited, and there is certainly a need for more cross-cultural work, especially with non–Indo-European languages. The models that have been proposed are interesting, but, as elsewhere in psycholinguistic theory, it is difficult to tell where neurology ends and metaphor begins; for instance, if speakers' linguistic systems contain a "prearticulatory editor," what are its neuroanatomical correlates?

In bringing together these papers, preceded by her own integrative introduction, Fromkin has provided a historical context for the study of errors in linguistic performance, clear examples of how to do this research, and much of what is known on the subject. The book is of general interest and will be of great value to other researchers who wish to set forth on this slippery path.

JEAN BERKO GLEASON
Department of Psychology,
Boston University,
Boston, Massachusetts 02215

Climatology

The Urban Climate. HELMUT E. LANDSBERG. Academic Press, New York, 1981. x, 278 pp., illus. $29.50. International Geophysics Series, vol. 28.

Changes in local, regional, and global air quality as a result of urbanization and industrialization are well documented. Whether or not a change in air quality by itself constitutes a change in climate is debatable, but it is now beyond debate that fouled air interacts with urban-modified fluxes of radiant energy, heat, and moisture to produce changes in the values of standard climatic variables such as insolation, air temperature, and humidity. Urban effects on precipitation have proved to be much less easily established. Urban-related climatic changes have been well known to and described by climatologists since early in the last century but widely known in ecologically sensitized industrial societies only since about the time of Earth Day 1970.

From his vantage points as elder statesman in urban climatology and leader of the international programs on the subject sponsored by the United Nations through the World Meteorological Organization, Helmut Landsberg has given us *The Urban Climate*. His book is intended to provide an informed overview of the progress of the science out of the early descriptive phase, covered so well in Kratzer's *Das Stadtklima* (first edition 1937, second edition 1956), and into the period of vigorous assault on the problems of explanation, especially the past 15 years. The book is welcome because there has been no monographic treatment since Kratzer's. It is timely because it makes a creditable, but flawed, attempt at resolution of several central points of dogma and contention that have developed in the last decade. On that, more presently.

The book includes a brief historical review and state-of-the-art summary (chapter 1) followed by a treatment of technical foundations, including air pollution (chapters 2, 3, and 4). Research results concerning temperature and wind (chapters 5, 6, and 7) and atmospheric moisture and surface hydrology (chapters 8 and 9) are followed by brief chapters on impacts and applications (chapters 10 and 11). The balance among chapters seems excellent, as does the selection of materials cited as examples and referred to as pivotal. In particular, Landsberg lays out most cogently the several recent lines of approach in the major areas of research and sets forth, as he has so well in the past, an implicit reminder to American specialists that many valuable results have been produced elsewhere by workers using relatively simple observational and computational tools.

Many of the problems with the book stem from the author's attempt to address a diverse audience while not having clearly in mind which part of it he is addressing at each moment. For example, the boundary layer meteorologists included in the intended audience scarcely need to have the mathematical expression for the Richardson number set out, as Landsberg does, and the city planners and "human ecologists" he likewise includes are unlikely to understand it. The comment that at least 25 meters is needed between the center of a roadway and a residence for satisfactory noise control by "solid surfaces with planted strips" is probably without much utility for any in his intended audience and arguably not even climatological.

Perhaps the greatest problems with the book are the results of Landsberg's having cited quite cogently and correctly some of the pitfalls of field experimentation in a milieu (probably typical for geophysical research) in which proper control is difficult to obtain and then having accepted without apparent question results that are clearly questionable on these grounds. For his neophyte readers Landsberg has thus done a disservice. The essence of the difficulty consists of ignoring the fundamental points that a correlation between two variables does not establish one as the cause of the other and that a difference between means may be due more to noise than to signal. Much dogma, mostly concerning the difficult-to-establish urban effects on rainfall and electrical storms, has developed through repetition of research wherein these points have been ignored and citation of the results of such research. Landsberg has not contributed in his own research to the dogma, but he seems to have unknowingly accepted it while at the same time warning against it.

As a research review, with all its shortcomings, *The Urban Climate* is unlikely to be surpassed. As a textbook, which Landsberg to judge by his style sees as one of the functions of his offering, it leaves room for improvement. As either, at this moment it is the only game in town.

WILLIAM P. LOWRY
135 South Davis Street,
McMinnville, Oregon 97128

Principles of Conservation

Conservation and Evolution. O. H. FRANKEL and MICHAEL E. SOULÉ. Cambridge University Press, New York, 1981. viii, 328 pp., illus. Cloth, $49.50; paper, $17.95.

In Andean Peru, Quechua and Aymara Indians customarily grow 15 to 45 potato varieties in mixed gardens of remarkable heterogeneity. These land races, with probable introgression from noncultivated taxa, harbor extensive genetic variation and persist in the center of diversity for potatoes. Peruvian government agencies encourage local growers to plant monocultures of high-yielding and blight-resistant "improved" potato varieties, despite greater market value of the local forms and despite the growers' preferences for their flavor (T. Johns, personal communication). Production increases with the improved potatoes, but so does need for pesticides and fertilizers. Where modern agricultural introductions are successful, for example in north central Peru, many potato land races are no longer cultivated, and their genetic diversity has been severely reduced. Against a background of similar stories around the world, Frankel and Soulé draw from evolutionary biology to estab-