

tinguishing humans from animals.

In the new chapter 8, explaining what is human about human communication, in the light of the recent interesting experiments on communication with apes, there is useful insight (for instance, the idea that classical stimulus-response psychology may be rejected as the sole basis for understanding humans, because such a restriction would rule out human communication and would fail to distinguish one's relationship to a person from one's relationship to a thing). The author also sets down an existentialist view of what it is to be human. However, in excluding computer 'languages' from the domain of true languages—and thus from human communication, preferring to call such constructs coding systems because they require no cognitive effort on the part of the machine — the author touches on an important point about human communication that is not followed up, despite being implied at numerous points throughout the book. The point is that we shall not truly understand human communication until we can understand what kind of cognitive effort is involved; until we can formalise just what changes occur in a receiver's world model, and know how to produce those changes most efficiently, or at least can state what kinds of signal strategies are most likely to be useful. A reference to work by Winograd, Winston, Charniak or Colby would seem relevant here.

The book is somewhat preoccupied with spoken and written symbolic forms of language, at the expense of graphical communication. It is still true that a picture is worth a thousand words, and some forms of dialogue are greatly facilitated by providing for much of the information to be communicated and manipulated in the graphical domain, as instanced by the work of Robert Spence, at Imperial College in London. Indeed, as far as communication between humans and machines is concerned, it is in this area that the greatest progress has been made, perhaps for the same reasons that pictures were used at an early stage in human-human communication. Pictorial representations can have just as rich a complex of syntactic, semantic and pragmatic rules, just as many paralinguistic features of various kinds, as written — if not spoken — forms of what is generally called language; but it seems probable that there is some fundamental difference in the way that picture or spatial reference information is handled by the human.

The general reader will undoubtedly wish to skip the mathematics, mainly in chapter 5, but will find the ground

has been carefully prepared for what follows at each stage of the developing argument. Great care has been taken with the choice of words and the form of expression, and the book is rich with insight and painstakingly collected background material. The historical references, the relevant asides, and the anecdotes are a pleasure and a real aid to understanding for all readers.

Pesticide ecology

Ecology of Pesticides. By A. W. A. Brown. Pp.525. (Wiley: New York and Chichester, UK, 1978.) £17.65.

THE title of this book seems highly relevant to the current interest in 'ecotoxicology'. The author is well-known and respected for his work on resistance of insects to insecticides, a topic that with its strong basis in genetics should lead easily into ecological considerations. In the event, I found the book a sad disappointment.

The first, introductory, chapter gives a brief outline of the main types of pesticide, the economic and medical reasons for their use, their potential hazards to man, and of resistance to insecticides. The bulk of the book, in thirteen chapters, takes insecticides, herbicides and fungicides in turn, and considers their effects on selected components of various habitats. For example, chapter 6 considers insecticides and fish, whereas chapter 8 considers insecticides and birds. This approach makes for a repetitive and superficial account of what could be unifying themes. Inhibition of cholinesterases by organophosphorus insecticides could provide one such theme. Instead, chapter 1 briefly states this as the mode of action, and chapters 6 and 8 give a few field observations on the degree of inhibition that is associated with death. There is little mention of the range of cholinesterases and acetylcholinesterases, and no mention of demyelination. There is no discussion of the possible implications for sublethal effects or of the difficulties in deducing from cholinesterase inhibition whether death is due to insecticide poisoning.

More important, there is a lack of ecology, which should surely mean a consideration of the interactions between pesticides and other factors, and their effects on population size and on community structure. Instead, a large part of these chapters consists of statements of the percentage reduction in population size for species exposed to pesticides in the field, of LD₅₀ and LC₅₀ values, and of residues found in

However, for the serious student of human communication, the book must be regarded as what it is in 1978 — only a beginning. Nevertheless, for pleasure or study, the book will prove a very sound investment.

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tissues. The amount of data is overwhelming, and seems more suitable for reference than for reading. This may reflect the author's prefatory statement that the book metamorphosed from a concise text into a detailed review. The relevance of this material to the understanding of ecological events is difficult to see: when one deliberately kills members of one species changes in other species are bound to occur, irrespective of any direct effects that the pesticide may have on these other species.

At least one ecological principle is invoked, that maximum species diversity gives greatest stability to an ecosystem. This is accepted in chapter 2 without question and without supporting evidence, whereas there are many who would argue the opposite.

Chapters 9 and 10 are devoted to more general themes. The first considers organochlorine insecticides and eggshell thinning. The second considers the movement of insecticide residues, locally and globally. Food chains are considered in some detail, and are shown to concentrate persistent organochlorine insecticides. The account is, however, somewhat partial. Important conflicting evidence is not quoted, and other evidence is not critically appraised. Thus, in one example, concentrations of DDT in predatory fish and birds are given for visceral fat, whereas the concentrations in plankton and small fish are for whole bodies.

There is something of a North American bias in the material considered, with some notable omissions in references to the literature, and readers from other continents may wish that latin names had been given for all species, as well as their common names. These comments aside, the subject index lists both individual pesticides and individual species effectively, and the book could be useful for quick reference to some information on the acute toxicity of pesticides, their persistence and breakdown products.

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