and I look forward to seeing a companion volume treating non-European names. [EDWIN BATTISTELLA, *University of Alabama at Birmingham.*]

Über Aspiration: Ein Kapitel aus der natürlichen Phonologie. By BERNHARD HURCH. (Ergebnisse und Methoden moderner Sprachwissenschaft.) Tübingen: Gunter Narr, 1988. Pp. vi, 179. DM 58.00.

As one might guess from its title, this book is a detailed study of the universal tendencies associated with aspiration. Under this term Hurch unites both consonantal aspiration per se and the consonant normally transcribed /h/, which he considers to be another aspect of the same entity.

The framework assumed is that of Natural Phonology (NP), a theory that has not suffered the attrition in Europe that it has in North America. Hurch in fact replies to NP's critics in several places, answering objections that have been raised both by more orthodox generative phonologists and by some phoneticians, and pointing out differences between the NP rule/process dichotomy and the lexical/postlexical dichotomy of Lexical Phonology.

The structure of this study is similar to the seminal work of Patricia Donegan (*On the Natural Phonology of Vowels*, New York: Garland, 1984). It begins with a review of the tenets of NP: processes vs. rules, fortitions vs. lenitions (although H's taxonomy of process-types is more complex than a simple dichotomy, and he prefers the terms paradigmatic and syntagmatic for this classification), and the nature of the relationship between phonetics and phonology. He argues cogently that phonology is not simply abstract phonetics; nor is phonology, on the other hand, independent of phonetics. Instead, phonology is the language-specific STRUCTURING of universal phonetic tendencies, both perceptual and articulatory. H then goes on to present what is known about the phonetic nature of aspiration in all its aspects—as /h/ when not associated with a consonant and as a 'raised *h*' when either preceding or following a consonant, both voiced and voiceless—arguing (contra Lisker and Abramson) that aspiration is not reducible to a simple timing scale of voicing and release, and (contra Ladefoged) that voiced aspirates do in fact deserve to be called aspirates.

The central chapters of the book deal with the paradigmatic process of deaspiration and the syntagmatic process of aspiration, with excurses into the development of aspiration from other sounds (such as Spanish *s>h* and Tuscan *k>h*).

Paradigmatic processes (originally called fortitions by Stampe and Donegan) select fundamental characteristics of ideal sounds in contrast with other sounds in a system. It could be argued (although H does not do so) that paradigmatic processes are prototypicality statements about sounds in isolation. H argues that, from a paradigmatic point of view, sounds are normally (unmarkedly) unaspirated. Thus children acquire aspirated stops after producing unaspirated ones, and /h/ is a sound that is often lost from phoneme inventories. Syntagmatically, by contrast, stops in particular are preferentially aspirated in syllable-initial position, and especially in stressed syllables. Additionally, /h/ occurs preferentially in the onsets of stressed syllables.

Both paradigmatically and syntagmatically, the occurrence of aspiration in the languages of the world is subject to hierarchical organization, and much of H's book is devoted to illustrating these hierarchies from large numbers of languages, both in synchronic description and in historical and first- and second-language development. Many of his examples are intriguing (such as the acquisition of German by Italian speakers) and deal with languages whose phonetics are not well known to nonspecialists (such as the historical development of aspiration in Basque).

In sum, this is an excellent study of the universal aspects of aspiration in all its manifestations, and an illustration of NP's claim that true phonological explanation can be achieved when we bring phonetics to bear on phonology and vice versa. [GEOFFREY S. NATHAN, *Southern Illinois University at Carbondale* and *Haskins Laboratories.*]

Language and number: The emergence of a cognitive system. By JAMES R. HURFORD. Oxford & New York: Basil Blackwell, 1987. Pp. xii, 322. $49.95.

In 1975, James Hurford published *The lin-guistic theory of numerals* (*LTN*) (reviewed in Lg. 53.212–14). This was an attempt, largely successful, to accommodate numeral systems into current linguistic theory, specifically by developing a series of phrase-structure rules and transformations, together with a few important constraints, which would generate all known numeral systems, except for a handful of difficult exceptions. (It is important to remember that NUMBERS are some sort of reality outside of language and that NUMERALS are the names of numbers in whatever language is under consideration.) The first third of *LTN* develops the theory on the basis of English, and the remainder shows its application to a group of problematic cases: Mixtec, French, Danish, Biblical Welsh, Hawaiian, Yoruba, and Ainu.

The present book is a sequel to *LTN*, broadening the discussion from its strictly structural basis to include two difficult questions: how numeral systems are learned, and how they originate in the first place. It will be seen that both of these questions raise the problem of innate vs. acquired knowledge. Is the human brain genetically equipped with an innate numeral structure to which it adapts the data of whatever language it is exposed to, or must each individual learn (or invent) the system of that language as he/she learns the large number of lexical items of the numeral lexicon as well as the recursive rules that allow the formation of numerals of any size?

The structure of numeral systems, as H points out, contains certain features common to all developed systems. They consist of three or sometimes four distinct stages. First come the digits, named by monomorphemic words having no etymological connection one to another. At a certain point, most commonly 10, an additive set begins, whose structure is DIGIT + M, where M is morphemically a form of the highest digit, in English *-teen* from *ten*. When the string of these is exhausted, the pattern shifts to a multiplicative one, DIGIT + M (+ DIGIT), this M being another form of the base (e.g. English *-ty*). Once more, when the two digit series are complete (at *ninety-nine* in English) a new M (*hundred*) is introduced, and the process of multiplication and addition continues. Successive M's after this set, which ends at *thousand*, are commonly produced by exponentiation, as in the British system where *million* = *thousand*^{2} and *billion* = *million*^{2}.

It is H's contention, expressed after a lengthy discussion of the Chomskyan innateness hypothesis, that this kind of structure is not innate but must be learned. Among the arguments he adduces are that there are languages which have only partial numeral systems (a few have none at all), that even well-developed systems have strange irregularities (e.g. English *eleven* and *twelve*), and that the child learns the system of his native language gradually, section by section. He claims that the names of the first two or three digits are individual lexical items, learned as the names of small 'collections' of items such as pebbles or blocks. At this stage, the child is not aware that 1, 2, 3 form a sequence, each equalling the preceding plus one. Next he/she learns the rest of the digits, usually in order, with the aid of already memorized ordered sequences of nonsense words (*eeny, meeny, miny, mo*). About this time he/she also learns that each item in the series (they are usually learned in order) equals the preceding plus one. Now counting is possible, and the learning process goes on from there. As H puts it, 'This style of explanation clearly requires an innate ability to form mental representations of the (in some sense abstract) objects concerned, yet does not seem to stipulate pre-existing knowledge of the connection between the objects' (65).

In sum, H considers the process of learning to count as a blend of three hypotheses which have been separately put forward: the Referential/Pragmatic, the Conceptual/Verbal, and the Ritual hypotheses (89f), all of which he discusses at some length.

The latter half of the book speculates on how numeral systems come to be the way they are. H sees this as a long historical process, with occasional innovations introduced by brilliant 'inventors' and gradually incorporated into the system. There is not space here to discuss his arguments, except to say that they are interesting to the point of fascination. A brief closing chapter, 'Denouement and prospect', sums up H's conclusions and relates the whole study to the primary question of language development and acquisition, and the degree to which elements of its structure may be considered at least partially innate. [W. N. FRANCIS, *Brown University*.]

General and Amerindian ethnolinguistics: In remembrance of Stanley Newman. Ed. by MARY RITCHIE