

PSYCHOLOGICAL REALITY AND THE CONCEPT OF PHONOLOGICAL RULE

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1. Phonology is concerned with the sound patterns of various languages. In each language we use different sounds according to different rules, and the task of phonology is to define these rules. Thus, phonology is language-specific phonetics.

2. However, the usual phonological practice of most contemporary scholars in the field does not fit this description exactly. For example, in orthodox generative phonology many "low-level" language-specific phonetic regularities are not seriously considered, while many regularities which should actually belong to either lexicon or morphology are erroneously treated within phonology.

Though phonology should be concerned with speech and though speech is behavior, linguists have not studied it as behavior. Rather (some aspects of) the products of behavior have been studied in abstracto, i.e. idealized phonetic strings (words) and their interrelations have been analyzed without regard to how they are actually processed in speech production and perception and acquired by children, etc. Normally, the analysis is also crucially dependent on some kind of graphic representation. On this basis, the phonologist sets up a model of representations and rules which express connections between various idealized linguistic expressions and between properties of such expressions at various levels.

3. The problem of psychological reality in phonology concerns the relations between the representations and rules of the phonological model and the speaker-hearer's ways of storing and processing information about the structures of strings of phonetic behavior (their construction, pronunciation, recognition) and their interrelations.

4. The claims for psychological reality can be quite different in scope and content, ranging from those who assume an almost isomorphic relation between representations and rules in the phonological model and actually stored information and actual processes in speech performance, to those who see the relations as extremely indirect (the claims being therefore empirically empty). As for syntax, Fodor et al. (1974) are inclined to conclude that only the

(analysis of the) output of a standard GTG is psychologically valid. No doubt the same is true of an orthodox generative-phonological (OGPh) model (where, in practice, outputs are classical phonemic representations!). Underlying systems and derivations have no psychological reality or can be psychologically relevant only very indirectly.

5. Entities which are claimed to be psychologically valid should have plausible interpretations within (or at least be compatible with) a theory of meaningful linguistic behavior (speech). If we concentrate on phonology, i.e. on the phonetic aspects (aspects having to do with sound structure itself), what are the main problems that such a theory should be capable of solving? Perhaps the following should be mentioned:

- 5 a) How can we explain the fact that, although manifestations vary, there are many features that recur in the various manifestations of what speakers (of the same dialect) recognize as the same word form? I would propose that there is one common phonetic plan that defines the linguistic (phonological) identity of the word, a plan which specifies the linguistically relevant properties that speakers aim at realizing and which listeners tend to reinterpret into what they hear. (This is, I believe, the proper interpretation of the concept of "phonological form".)
- 5 b) How is it possible to construct phonetic plans for new forms that do not already exist as memory-stored forms? I assume that speakers may perform morphological operations which use memory-stored information to produce new phonetic plans as outputs. (These operations are naturally subordinated to the major (semantic, syntactic) intentions of the speaker's utterance construction.)
- 5 c) What is the nature of the memory-stored information used by morphological and syntactic operations?
- 5 d) How can we explain the language-specific variation in the possibilities of actually pronouncing and perceiving utterances, i.e. in the execution of utterance plans? (I assume that the phonetic aspects of an utterance plan would include at least the phonetic plans of the constituent words and a

prosodic plan of the utterance). To explain all the language-specific details of a particular utterance token, we would have to assume the existence of a fully specified articulatory plan that accounts for all the features that cannot be automatically ascribed to inherent properties of the speech apparatus. (Thus, note that the terms "phonetic plan" and "fully specified articulatory plan" are not synonymous.)

6. I have argued elsewhere (e.g. Linell 1979) that underlying morpheme-invariant forms and OGPh type derivations cannot be fruitfully incorporated into a plausible theory of meaningful phonetic behavior. Instead, there is some evidence that

- 6 a) phonetic plans (cf. 5 a) may be characterizable in terms of phonemic forms (general conditions on such forms may be stated in terms of "phonotactic rules").
- 6 b) some such phonetic plans are stored as lexical forms (stems, base forms, and some phrases) (cf. 5 b).
- 6 c) morphological operations take such memory-stored forms as inputs and produce new phonetic plans as outputs. If morphological operations are analytically split up into components, the components may correspond to morphophonological rules proper, and the whole operation will have a certain similarity to the abstract part of an OGPh derivation (except that the inputs are concrete phonetic forms rather than morphophonemic forms) (cf. (1) below).
- 6 d) the language-specific variations in normal, careful speech vs. sharpened (formal, expressive) speech and informal, casual ("fast", reduced) speech can be characterized in terms of phonological rules proper. Thus, fully specified articulatory plans may be derivable from the word-form-invariant phonetic plans (cf. 5 d).

7. In this paper I will discuss the proper interpretation of terms like rule, condition, operation, and process in phonology within a theory of the kind envisioned in §5.

Often, the discussion of the psychological reality of phonological rules is confused by the fact that several quite different concepts seem to be mixed up in most treatments.

- a) One is the (normal) interpretation of rule in the social sciences, i.e. as norm (or sometimes merely regularity) of behavior.
- b) Another one is the notion of mathematical rule, a mapping (or an instruction for the mapping) of one formally defined string of symbols onto another one.
- c) Since rules of type (b) are often described (talked about) as processes, i.e. changes of something into something else, it is sometimes tempting to interpret rules as performance processes.

The situation is further complicated in that empirically quite different sorts of regularities have often been regarded simply as "phonological rules". Thus, the putative similarities between morphophonological rules within a morphological operation like (1) and the "fast speech" rules relating different pronunciations of one and the same expression as in (2) are only superficial (and formal).

- (1) formation of noun from nonsense adjective according to the obscene-obscenity pattern:

Operand:	/rijs/
Morpholexical rule:	/rijs+it/
Trisyllabic laxing:	/risit/
Vowel shift:	/resit/

- (2) (from Donegan and Stampe, 1978) /plæntit/ plant it

Regressive nasalization:	pIæt̩t
Flapping:	pIæɾt
Progressive nasalization:	pIæ̃ɾ̃t

8. The basic concept of rule should be (7 a). Speech is a stream of phonetic behavior or phonetic events (that produce certain effects). What distinguishes speech from "mere vocalizations"

is the fact that the behavior must fulfil certain conditions of syntactic and phonological nature (and both speakers and listeners "know" this). In our model rules specify these conditions. Although behavior and actions are inherently processual, they can be looked upon either from the point of view of the processes themselves or as behavioral products. The latter is especially motivated as regards actions which are intended to produce certain effects. Thus, the act of pronouncing plant it in a certain, casual way [pɪ̃æ̃ɪ̃t] may be analyzed as follows: The speaker must construct a certain phonetic plan that corresponds to his communicative intentions, i.e. plant it rather than, e.g., plan it. This construction is thus subject to certain rules or conditions, which may be construed either as conditions on the behavioral operation (construction process) or on its effect (the resulting phonetic plan). The plan is then executed (realised, pronounced) in a certain way ([pɪ̃æ̃ɪ̃t] rather than [plæ̃ntɪ̃t]); the specifics of this pronunciation may be characterized as conditions on (rules for) either the pronunciation as a process or the pronunciation (or, rather, the fully specified articulatory plan) as product.

9. Note that rules concern properties of the intended behavioral products ("surface forms") (not some mystical morpheme-invariants). What these properties are must largely be determined by linguistic analysis. Thus, we cannot dispose of the traditionally linguistic (structural) analysis of language products (§2), although I would argue that (provided we are interested in psychological reality) this analysis must concern the products in relation to what we know about their production, perception, and acquisition (which means that observations of actual performance under normal and experimental conditions, slips of the tongue and the ear, child language, etc., will be of vital importance).

10. Obviously, rules as generative systems (in e.g. the OGPh fashion) need not have anything to do with conditions on actual (or potential) behavior. Indeed, the idea that behavior could be governed by generative systems seems very naive. (The various figures of figure-skating could no doubt be specified by a generative theory of figures, but who believes that the skater's behavior is produced by means of processes corresponding to such generative rules?) Thus rules are not acts or processes, but conditions on behavioral acts or on their products.

11. Behavior can be talked about at several levels of abstraction. When we talk about the morphological operations of constructing e.g. /resɪtɪ/ from /rɪ̃s/ (cf. (1)) or /fɔksɪz/ from /fɔks/ (pluralization), we are not necessarily modelling the actual behavioral process. The only thing we can say is that there is evidence that speakers can (sometimes) form "correct" ity-nouns from nonsense adjectives, that they can form plurals of English nouns, and that the respective operations are subject to certain linguistically defined conditions. That is, we can assume that speakers actually carry out morphological operations and other linguistic actions (and our models specify the linguistic content of the actions), but we cannot speculate on how these operations are neuro-physiologically implemented. Operations and actual processes lie at two different levels of description and must not be identified. Operations are defined by their intended effects, and it is conceivable that there are many ways for the neural mechanisms to achieve the goals.

It follows that rules must not be equated with behavioral processes. Not even in casual speech phonology are we entitled to conclude that rules correspond to processes. After all, conventional phonological rules state nothing but regular correspondences between idealized representations of the same or related pronunciations. (Note that I am not using 'rule' and 'process' in the way they are used in Stampean "natural phonology".)

12. I started by defining phonology as language-specific phonetics, and later I characterized rules as norms. However, this means that the phonology of a specific language would not describe or explain all the details of actual pronunciations in that language, since not all facts are conventional; some follow from biologically determined limitations. (In casual speech phonology, most regularities are language-specific variants of otherwise universal phonetic tendencies.) This is a reasonable definition of phonology, since it confines phonology to those features that must be learnt. However, we could alternatively generalize 'rules' to cover all regularities, whether conventional or biologically determined. Such a conception seems to be accepted in Stampean phonology. Thus, e.g., children's incompetence rules (i.e. Stampe's inherited processes) are clearly not social conventions. But even

such rules remain correspondence formulas; the actual phonetic processes are probably more of general continuous adjustments along scales.

13. The analysis of concepts like "psychological reality", "rule" versus "process" and "operation", etc. is necessary if the relation of phonology to phonetics is to be properly understood.

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