50 years in the past and future: phonetics and phonology

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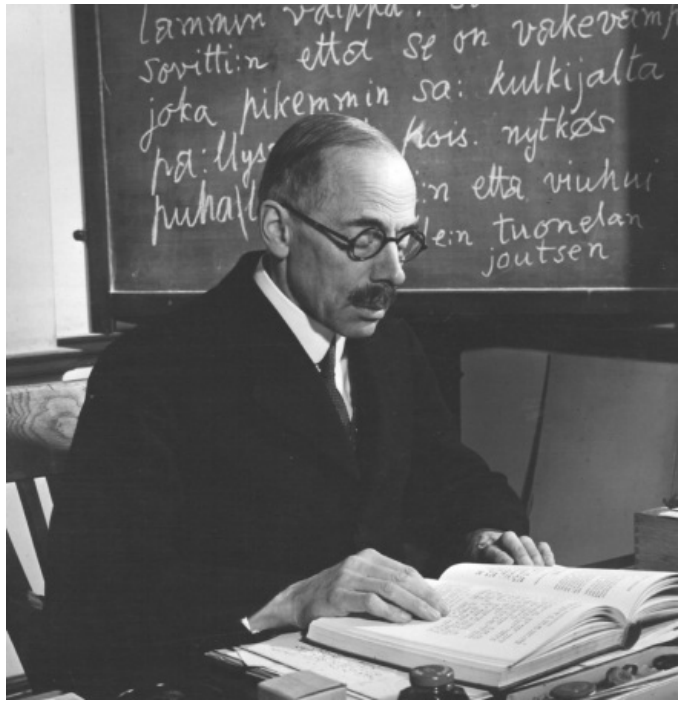
Outline

- Phonetics and phonology in 1959
- The work of J R Firth and Daniel Jones
- Developments in theories of
  - Phonological representation
  - Phonetic implementation
  - Phonological derivation
- Demarcative features
- The future

Firth and Jones

J R Firth and Daniel Jones

J R Firth (1890-1960)



Daniel Jones (1881-1967)

Firth and Jones

- Both active in the 1950s (Jones retired in 1949, Firth in 1956)
- Their students played a major role in
  - Establishing and developing phonetics and linguistics departments in UK universities
  - Establishing the LAGB
- Many differences between them and the traditions they helped foster
- But also some clear commonalities (not just in their work)...

Linguistics in 1959

- God's-truth linguistics vs hocus-pocus linguistics
- Realism
  - The structures and elements of language and speech are
    - Ontologically autonomous (they exist independently of the conceptual apparatus the linguist/phonetician uses to describe them)
    - Discoverable
  - Mentalism
    - Nativism
    - Non-nativism
- Nominalism
  - The conceptual schemes the linguist/phonetician uses to describe language and speech have no independent ontological status
  - They are mere names for idealisations designed to help us understand language use

Phonemic analysis (Householder 1952)

- The European: ‘Is it true?’
- The American: ‘Is it consistent?’
- The Englishman: ‘Does it help?’

Firth and Jones: philosophy

- Common philosophical themes running through Firth's and Jones's work
- Some of the shared ideas have largely disappeared from modern linguistics and experimental phonetics
  - Antipathy towards mentalism
  - Lack of interest in language universals (cf. Jakobson and generative linguistics)
- Some of the ideas live on in certain schools of linguistics and phonetics, e.g. empiricism, especially in Britain

The Jonesian legacy

Jones: WYSIWYG phonology

- Descriptive, practical
  - Phonemics as a tool for describing and transcribing languages' sound systems
  - Intonation analysis: practically oriented O'Connor & Arnold model (cf. the theoretically driven autosegmental H/L-accent model)
- Applications: L2 teaching, dictionaries, fieldwork
- Physicalist: the phoneme as a family of sounds that are
  - Physically similar
  - In complementary distribution

The Jonesian legacy

- Practical legacy in the L2 industry: orthoepy, pronunciation dictionaries
- Transcription of unwritten languages
- Methodology: ear training and transcription
- Continued used of the term ‘phoneme’ in psycholinguistic and speech perception research – but typically only the aspect of contrast is invoked

The Firthian legacy

Aspects of Firthian phonology

- Philosophy and methodology
  - Nominalism
  - Predictive power
- Representation (the content of phonological forms)
  - ‘Prosodic analysis’
  - Non-phonemic phonology
  - Polysystematicity
- Derivation (how one form is mapped onto another)
  - Non-derivational phonology

‘Renewability of connection’

- A phonological analysis must ‘renew connection’ with the language for which it was designed
- An analysis that has been established for a given set of phonological data must be able to encompass new data from the same language
- Predictive power

Representation

Firthian sounds and prosodies

- Elements of Firthian ‘prosodic analysis’
- Structure: syllabic positions (C vs V), syllables, words, phrases,...
- Prosodies: phonetic properties with scope over more than one structural position (e.g. palatality, labiovelarity)
- Phonematic units: phonetic properties that contrast in particular structural positions (e.g. continuancy in **sip** vs **tip**)

Sounds and prosodies updated

- Structure: prosodic hierarchy
- Prosodies: autosegments spread over more than one syllabic position
- Phonematic units: segmentally contrastive features

Types of prosody

- Smeared features
  - Phonetic properties that extend over more than one structural position
  - E.g. palatality, labiovelarity, retroflexion
- Demarcative features
  - Phonetic properties that attach to fixed structural positions
  - E.g. aspiration in English

Feature smear updated

- Modern analogues of Firthian prosodies
- Neo-Firthian phonology: York
- Autosegmental phonology (Goldsmith 1976, *passim*): features associated with more than one syllabic position
- Articulatory Phonology (Browman & Goldstein 1989, *passim*): overlapping independent articulatory gestures

Phonetics in phonology

- Each prosody is realised by a particular set of phonetic properties (‘exponents’)
- To qualify for prosodic status, it is sufficient for a phonetic property to be located in a domain that is larger than the segmental position
- A phonetic property can be prosodic irrespective of whether it would count as contrastive or allophonic under a phonemic analysis

Phonetic exponence updated

- Classical generative phonology
  - Only phonemically contrastive properties (feature values) are coded in underlying representation
  - Non-contrastive/redundant properties are inserted in surface representations
- Phonetics in phonology (e.g. Functional OT)
  - All phonological representations are fully specified in terms of phonetically continuous parameters
  - ‘Contrast’ has no independent representational status; it emerges from the way the continuous phonetic parameters are divided up by particular constraint rankings

Feature smear: clear vs dark liquids

- Traditional description of liquids as having a primary coronal articulation and a secondary dorsal articulation (yielding a quality difference between clear and dark)
- The coarticulatory influence exerted by the dorsal component of liquids on neighbouring vowels extends over domains larger than the syllable (Hawkins & Slater 1994)
- These supposedly non-contrastive long-distance resonance differences can act as important cues in speech perception (Kelly & Local 1986, Whalen 1990)
- Listeners can recover the *l-r* contrast (e.g. **mallow** vs. **marrow**) when the liquids are replaced by noise in VCV sequences (West 1999)
- In Firthian terms, the resonances are the phonetic exponents of clear vs dark prosodies

Excursus: Dependency Phonology

- John Anderson
- Relational theory of phonological representations
- Head-dependency relations
  - Prosodic structure: syllable, word,...
  - Segmental structure: ‘components’, ‘gestures’
- Some impact in North America, e.g. Particle Phonology
- Major impact in Europe
  - Extended dependency theory
  - Government Phonology
  - Radical CV Phonology

Derivation

Phonological derivation

- Derivation: the mechanism that specifies relations between phonological forms, e.g. alternants of the same morpheme
- Models of derivation
  - Levels of representation
    - Stratal: underlying/input vs surface/output
    - Monostratal: no input-output distinction
  - Processes vs constraints
    - Procedural: phonological forms are subject to structure-changing processes (e.g. deletion, insertion)
    - Declarative: all phonological regularities are expressed in terms of structure-building constraints
  - Input- vs output-orientation

Serial derivation

- Input-oriented serialist models of derivation
  - Structuralist morphophonemics
  - SPE-style theory: extrinsically ordered phonological rules
  - Recapitulation of the historical method of internal reconstruction
- ‘Abstract’ underlying forms: serial models allow underlying forms to be phonologically distant from their surface counterparts
- Widespread and on-going antipathy to derivational serialism amongst phonologists in Britain, in keeping with the empiricist tradition represented by Jones and Firth

Firthian non-derivationalism

- Monostratal and declarative
- Phonological regularities captured representationally in terms of inherently static prosodies rather than derivationally in terms of potentially dynamic rules or constraints
- Nothing equivalent to rule ordering or underlying abstract forms

Non-serialism updated

- Reaction against derivational serialism
  - Output-oriented models
  - Parallel constraint evaluation
- Declarative Phonology
  - Monostratal
  - Non-destructive
  - Computationally implemented
- Optimality Theory (early version): non-destructive relation between input and output (‘Containment’; Prince & Smolensky 1993)

The return of serialism

- Later versions of OT
- Correspondence Theory (McCarthy & Prince 1995): input elements can be removed from outputs
- Stratal OT
- 'Intermediate' reference forms
  - Sympathy Theory (McCarthy 1999)
    - Certain constraints evaluate the relation between output candidates and a specific reference candidate
    - The reference candidate is equivalent to an intermediate form in an old-style serial derivation
  - Candidate-Chains Theory (McCarthy 2007)
    - Certain constraints evaluate ordered sequences of candidates, with the attested output form belonging to an optimal sequence that contains the reference form
    - The optimal chain of candidates typically recapitulates the order of forms generated by an old-style serial derivation

Demarcative features

Demarcative features

- Certain prosodic properties of phonological forms are widely acknowledged to have a demarcative function
  - E.g. fixed word stress
  - The properties help delimit particular morphological and/or prosodic domains
  - They thus provide listeners with potential parsing cues
- In Firthian phonology, any property can in principle have a demarcative function, including those traditionally thought of as segmental/non-prosodic
- Example: aspiration

Aspiration

- Languages with a two-way laryngeal contrast in oral stops where the voiceless ('fortis') series is aspirated under certain predictable phonological conditions, e.g. (most) English, northern German, Danish
- Voiceless stops are aspirated when initial in the foot or word (feet parenthesised)
  - English

Aspirated	(t ime), (de)(tail), be(tide)
Plain	(city), (sit)

  - Danish

Aspirated	([t^h]ale) 'to speak', a([t^hóm) 'atom'
Plain	(sæ[d]e) 'put', (sæ[t]) 'put (imper.)'

Phonemic-style analysis of aspiration

- The basic laryngeal contrast among stops in languages such as English is borne by [±voice]
- Aspiration is non-contrastive: it is an allophonic/surface manifestation of phonemic/underlying [–voice]
- All languages with a two-way laryngeal contrast in stops have the same underlying [±voice] distinction
- Initial prevocalic stops
  - Aspiration languages (e.g. English, Danish): plain vs aspirated
  - Voicing languages (e.g. French, Hungarian): plain vs prevoiced
- Underlying

	[+voice]	[–voice]
Aspiration language	Short/zero VOT	Long-lag VOT
Voicing language	Long-lead VOT	Short/zero VOT

Against [±voice]

- Long-lag VOT is known to be the most robust cue to laryngeal contrasts in initial stops in aspiration languages (Lisker & Abramson 1964, Kuhl & Miller 1975, Pisoni 1977, Keating 1984)
- Phonological behaviour, e.g. laryngeal assimilation
  - The '[+voice]' series can trigger assimilation in voicing languages but not in aspiration languages
  - The '[–voice]' series can trigger assimilation in aspiration languages but not in voicing languages
  - Plain stops are phonologically inert

Laryngeal realism

- Alternative to the phonemic-style analysis: laryngeal contrasts have different phonological representations in aspiration languages vs voicing languages
- Initial prevocalic stops — Feature specification
  - Aspiration languages
    - Aspirated (long-lag VOT) — [spread]
    - Plain (zero/short-lag VOT) — Unspecified
  - Voicing languages
    - Prevoiced (long-lead VOT) — [slack]
    - Plain (zero/short-lag VOT) — Unspecified
  - 3-way laryngeal contrasts (e.g. Thai): [spread] vs [slack] vs Ø
- The phonological inertness of plain stops follows from their lack of a laryngeal feature that could trigger assimilation

Aspiration as a demarcative prosody

- Laryngeal realism is consistent with the notion that aspiration in a language such as English is a demarcative prosody in the Firthian sense
- The very predictability of aspiration (which makes it redundant under a phonemic analysis) is what gives it its communicative value
- Long-lag VOT in stops adheres to the left edge of words and feet. Given the strong affinity between the foot and the word in Germanic (the minimal word consists of a foot), it thus provides one of the major auditory-acoustic cues to word boundaries
- Confirmed by perception studies, e.g. Davidsen-Nielsen (1974), Redford & Randall (2005)

Phon & phon: emerging trends

Methodological developments

- Increasing use of experimental methodology in phonology, blurring the distinction with experimental phonetics
- Experimental work facilitated by the increasing availability of instrumental techniques
  - Acoustic analysis software
  - Speech production, e.g. EPG, ultrasound, EMA
  - Brain imaging, e.g. PET, EEG, fMRI
- Increasing use of frequency data and speech corpora in phonological research

Ideas gaining ground in the P&P community

- Non-nativism
  - Phonological features are not part of some genetically endowed language faculty
  - Learners construct phonological categories on the basis of their direct experience of speech
  - Feature universals emerge from common experience
- Exemplar theory: phonological forms are stored not as discrete categorical entities but as clouds of phonetically continuous episodic memories
- Radical non-derivationalism
  - Alternating forms of the same morpheme (including regular ones) are stored as separate lexical entries
  - The relation between regular alternants is established by their physical proximity in the lexicon, resulting in their being retrieved in unison during lexical access