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this handout and some of the references quoted at
www.unice.fr/scheer/

REPRESENTATION VS. DERIVATION

Structure and Process

1. Definition

(1) Derivation
or better: computation
a. is carried out by computational systems
b. transforms an input into an output
c. von Neumann - Turing
d. computation is based on distinct
1. short-term (working) and
2. long-term memory
(this is the essence of the Universal Turing/von Neumann Machine)
e. pre-determined, symbolic and machine-specific language
==> programming language
==> domain specificity in Cognitive Science
f. instructions written in this language are independently stored in long-tem memory
==> software
g. computational action cannot modify the code of instructions
h. literature
Herken (1995), Clapin (2002), Pylyshyn (1984, 1989), Haugeland 1989: 133ff)
introduction from the linguistic perspective: Boeckx (2010: 33ff)

(2) properties of computation under debate
computational action may be
a. 1. serial (original von Neumann-Turing conception, SPE, pre-GB syntax) or
2. parallel (PDP, connectionism, OT, GB=move alpha, Bromberger & Halle 1989)
b. 1. symbolic (all generative linguistics) or
2. colourless (connectionism, a piece that OT did not take over)
c. inclusive relationship
computation > derivation > serialism
1. computation = mapping input-output
2. drivation = monodirectional computation
3. serialism = monodirectional with intermediate steps (logical & chronological)

(3) Representation
a. Marc
b. Tobias
==> something that can be ill-formed
Goldsmith (1976a,b)
c. ill-formedness is *the* innovation introduced by representations:

(3) Representation
1. concatenation or computation can cause a structure to be ill-formed for grammar-internal reasons
2. there is no such ill-formedness before: a feature matrix cannot be ill-formed (because of concatenation or computation)
3. non-phonological precursor (SPE): Morpheme structure constraints

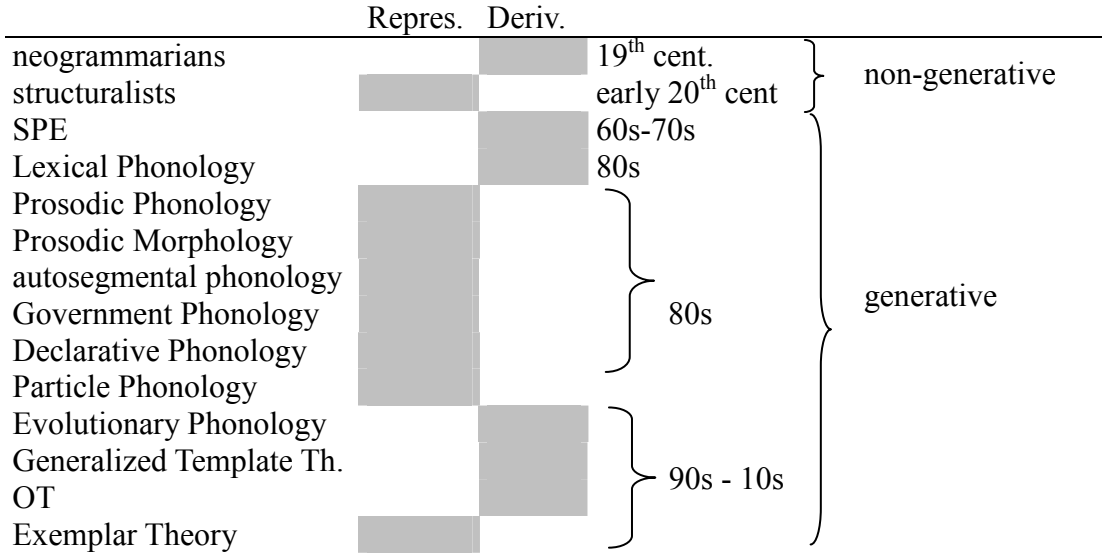
(4) a third player: Storage
a. there may be representations without storage
representations may be created by computation (syllabification algorithm)
b. there is no computation without storage
1. items to be computed
2. computational instructions
come from the lexicon
c. computation and storage are independent
d. not in connectionism / "Cognitive" Linguistics / Exemplar Theory
connectionism: only neurons and synapses
Langacker 1987 (Vol.1: 42): the rule-list fallacy
==> backlash of computation on stored items, and of stored items on computational instructions.

2. The landscape since the neogrammarians

(5)

	Representations	Derivation
neogrammarians	–	sound laws
structuralists	phonemic system	in prose, if any
SPE	–	ordered rules
Lexical Phonology	stock of the 80s	cycles
Prosodic Phonology	Prosodic Hiararchy	–
autosegmental phonology	in prose, if any	autosegm. repres.
Government Phonology	specific	in prose, if any
Declarative Phonology	specific	existence denied
Particle Phonology	specific	–
Evolutionary Phonology	–	equivalent of synchr. comp. in diachr.
Exemplar Theory	the cloud	no phonol. computation
OT	stock of the 80s	constraint ranking

(6) in other words…



3. The dualistic take

(7) the dualistic claim: Anderson (1985)

a. Anderson (1985) describes the see-saw movement in the history of phonology between computationally and representationally oriented theories, concluding that extreme positions are unlikely to hit close to the mark. And, writing in the early 80s in autosegmental furor, correctly predicts that what will be next is a strong swing of the pendulum towards computation.

b. "Our intent is to study this history [the history of linguistics] in relation to a particular issue: the balance between *rules* and *representations* as components of a theory of language and, more particularly, as components of a theory of sound structure."
(emphasis in original) Anderson (1985: 1)

c. "In this work, the history of the balance between the study of rules and the study of representations […] will be of primary importance. […] It is not our intention to argue that one sort of consideration is *right* and the other *wrong* in a linguistic theory. In fact, theories of rules and theories of representations deal with intimately interrelated and indissoluble aspects of the same linguistic structure. In order to understand the structure, however, both aspects must be appreciated, and this has certainly not always been the basis on which inquiry into sound structure has proceeded."
(emphasis in original) Anderson (1985: 9f)

d. "If current attention to the possibilities of novel sorts of representations leads to a climate in which the importance of explicit formulation of rule-governed regularities disappears from view, the depth of our knowledge of phonology will in all likelihood be poorer for it."
Anderson (1985: 350)

e. "We hope that this book has demonstrated that neither a theory of rules nor a theory of representations constitutes a theory of phonology by itself."
Anderson (1985: 350)

(8) independence of computation and representation
   a. to make a theory of phonology you need
      1. a theory of computation and
      2. a theory of representations.
   b. no cheating please:
      either theory must not be reducible to the other. They must be (ontologically) distinct.
   c. what is debatable is how much of the cake is representational and how much is computational – but both exist.
      [like other dualistic pairs: Langue vs. Parole, competence vs. performance, lexicon vs. online processing, brain vs. mind, diachronic vs. synchronic processes etc.]

(9) nature
   adult sciences, i.e. which are about natural phenomena
   a. in chemistry, physics, biology,
   b. there are always and in all theories, without anybody doubting
      1. objects
      2. forces
   c. forces act on objects so that the state of the latter is altered
      - particle physics (velocity acts on particles in a particle accelerator etc.)
      - chemical reaction (heat acts on substances that combine)
   d. crucially,
      objects and forces are independent and non-reducible to one another
      ==> they are ontologically distinct
   e. quantum uncertainty
      1. Heisenberg's original observation
         position (object) and momentum (force) or a particle cannot be known simultaneously (because the observation modifies the setting)
      2. light: particle or wave?
         Probably both.
      3. ==> the fact that it cannot some entities seem to be both does not mean that object and force are indistinct.

4. Examples

4.1. Affix classes

(10) párent - parént-al - párent-hood
   a. SPE
      representational management
      1. class 1 = +
         class 2 = #
      2. parént+al
         párent#hood
      3. main stress rule applies only to strings that do not contain #
   b. Lexical Phonology
      procedural management
      1. stratum 1 contains stress rule
         stratum 2 does not
      2. stratum 1 is ordered before stratum 2

4.2. Nasal assimilation in English

(11) un- vs. in-
  a. u*[m]-predictable vs. im-possible
  b. Lexical Phonology
     /un-/ = level 2
     /in-/ = level 1 affix
  c. /un-/ = PrW of its own, /in-/ = same PrW as the root
     Rubach & Booij (1984: 12ff) and Booij (1992: 53):

4.3. At the interface

(12) Lexical Phonology vs. Prosodic Phonology
  a. peaceful coexistence
  b. gentleman-division of the cake
     1. Lexical Phonology: below the word level (syntax)
     2. Prosodic Phonology: above the word level (morphology)
  c. in other words:
     below the word: derivational management
     above the word: representational management
  d. attacks into the other's area
     1. Lexical Phonology is redundant and has to go:
        the labour of strata can also be done by prosodic constituency
     2. Selkirk (1984: 412ff), Inkelas (1990)

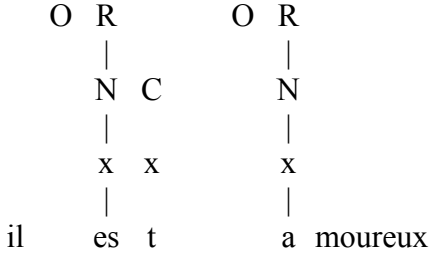
4.4. H aspiré

(13) properties of h aspiré words, part I
diagnostics for h aspiré

		h-aspiré	C-initial	ordinary V-initial
a.	liaison	**NO** les *[z] housses	**NO** les *[z] portes	**YES** les [z] hommes
b.	élision	**NO** la / *l' housse	**NO** la / *l' porte	**YES** *le / l'homme
c.	suppletion	**NO** ma / *mon housse	**NO** ma / *mon porte	**YES** mon / *ma armoire
d.	enchaîne-ment	**NO** quelle | haine, *quelle‿haine **YES** par‿hasard, *par | hasard	**NO** quel tableau * quel‿tableau	**YES** quel‿homme, quel *| homme

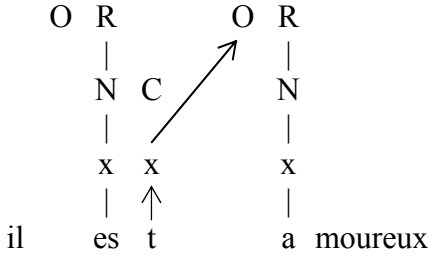
(14) optional liaison according to Encrevé (1988)

a. lexical ingredients

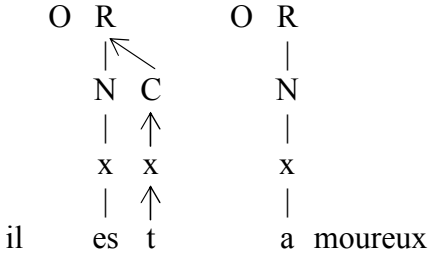


phonological computation

b. with enchaînement



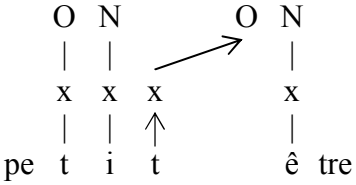
c. without enchaînement



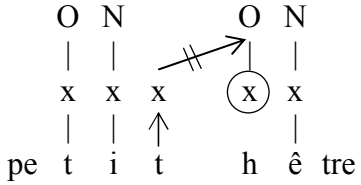
(15) h aspiré

according to Encrevé (1988) and Clements & Keyser (1983)

a. *petit être*: obligatory enchained liaison



b. *petit hêtre*: liaison impossible



(16) Côté's diacritic-based alternative

a. "Pater (2004) compares the diacritic approaches to lexical exceptions with structural approaches, which deficient-segment analyses of h-aspiré belong to. he concludes that structural accounts are not always possible and that diacritics cannot be avoided. In OT, diacritic analyses use lexically-specific constraints or lexically-specific rankings. I will follow Pater in adopting a lexically-specific constraint for the h-aspiré words."

b. ANCHOR (word, σ, R/L)$_{\text{h-aspiré}}$
At the boundary between a h-aspiré word and the preceding word, every segment at the edge of a lexical word has a correspondent at the same edge of the syllable.

c. ==>
a word-final segment in the input must be word-final in the output
a word-initial segment in the input must be word-initial in the output

(17) representation vs. computation

	Encrevé	Côté
distinction h aspiré vs. C	representation	SPE-diacritic
computation	not any specific for h aspiré	haspiré-specific

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