TWO PHONOLOGIES

this handout and some of the references quoted at http://sites.unice.fr/scheer

1. Introduction

(1) what we are talking about

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Lexical → Surface</th>
<th>Creation of New Lexical Items (L1 Acqu. and Adults)</th>
<th>Contribution to Morpheme Identification</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. production phonology</td>
<td>yes</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>b. lexicalization phonology</td>
<td>no</td>
<td>yes</td>
<td>no</td>
</tr>
</tbody>
</table>

what we are not talking about

c. perception phonology                       | no                | no                                                | yes                                    |

(2) we have nothing to say about perception phonology

a. except that we conjecture that it is not a genuine system of its own but rather
b. opportunistic, i.e. using all phonological knowledge in the interest of morpheme identification, including production and lexicalization phonology.

C. examples

1. using production phonology
   in a language where k → f / _i,e occurs in production, surface [f] is converted into k before i,e and the resulting string is looked up in the lexicon.

2. using lexicalization phonology
   in a language where morphemes cannot begin with #RT clusters, the perceiver knows that a string such as …VRTV… will not break into […]morph [RTV…]morph

(3) motivation

for two distinct computational systems

a. phonology is more than just one single computational engine
   Contra the founding idea of OT that there is only one locus where decisions are made (the constraint chamber)

b. evidence for the presence of syllable structure in the lexicon

c. there is phonological activity upon lexicalization anyway

2. Phonological decisions are made in a number of different loci

(4) OT and the single locus hypothesis

a. foundational claim in OT, motivated by considerations regarding economy (Duplication Problem):
   all knowledge that speakers have of their language occurs in one single locus, the constraint hierarchy (Prince & Smolensky 2004 [1993]: 205ff, chapter 9)

b. computational (dynamic) properties of phonology

1. input-output mapping
2. analogy (OO faithfulness, paradigm uniformity)
3. interfaces, i.e. information exchange with other (non-phonological) systems:
   ALIGN etc.

c. static properties
   1. inventory definition
   2. systemic properties of inventories
   3. parameter settings
   4. regularities that are found in the lexicon
   
   Richness of the Base: grammatical inputs are universal

(5) phonology is made of a number of different systems
SPE, Government Phonology, …
Some examples (non-exhaustive)

a. MSCs - Morpheme Structure Constraints (SPE)
   restrictions that are imposed on what is storable
   e.g. #TR vs. #RT: in English non-existing blick is storable, but non-existing bnick and
   lbick is not (Rasin, 2014; Rasin & Katzir 2016; Becker & Gouskova (2016): Gate-
   keeper Grammar)

b. contrast
   in Dresher's (2009) and Hall's (2011) approach
   systemic properties are acquired and then stored as stable information in form of a
   contrastive hierarchy to which phonological computation makes reference – but
   which is not a piece of phonological computation itself.

3. Syllable structure in the lexicon

3.1. A much debated question

(6) Vaux & Samuels (2017)

a. documented overview of pros and cons, and of authors having taken either position.

b. syllable structure present in the lexicon (some selected references)
   2. Anderson (1982: 549
      "Syllabic structure is present at all levels of a phonological representation. We do
      not provide underlying representations in solely segmental terms, and then [...] impose a syllabic organization on them by rule."
   3. Government Phonology
      Kaye et al. (1990), Projection Principle
      Lexical items are fully syllabified. After the concatenation of morphemes, there is
      no resyllabification (Projection Principle). Definition of resyllabification: modifi-
      cation of constituent structure.

c. if syllable structure is present in the lexicon, it must have been created upon lexical-
   ization (more on that below).
3.2. Extrasyllabicity

(7) Extrasyllabicity is hidden syllabification in the lexicon
   a. typical pattern analyzed with extrasyllabicity:
      1. l-vocalization occurs in both internal and final codas
         Brazilian Portuguese
         \[ \text{V}_-\text{V} \quad \text{V}_-\text{C} \quad \text{V}_-\# \]
         sa[l]eiro    sa[w]-gar    sa[w]   ‘salt cellar, to salt, salt’
      2. l-vocalization occurs only in internal codas
         Old French
         \[ \text{V}_-\text{V} \quad \text{V}_-\# \quad \text{V}_-\text{C} \]
         cheval-ier  cheval       chevaw-s ‘knight, horse SG., hors PL.’
   b. when l-vocalization only occurs in internal codas, word-final L is said to be extrasyllabic. This means that it must not be a coda when l-vocalization operates.
      cheva<l>  \(\langle l\rangle\) indicates that L is extrasyllabic
   c. then
      1. the string is syllabified, but \(\langle l\rangle\) is not
      2. l-vocalization occurs - but L is not a coda
      3. it somehow gets back into syllable structure, e.g. by "adjunction"
   d. hence
      1. the L does not behave like a coda
      2. but in systems where syllable structure is absent from the lexicon this cannot be encoded in the lexical entry since there are no onsets and codas.
      3. \&lt;\X\&gt; is a way to give an instruction about future syllabification in an environment (the lexicon) where syllable structure does not exist.
      4. \(\Rightarrow\) extrasyllabicity is a patch whereby syllable structure is encoded in the lexicon when syllable structure does not exist in the lexicon.

3.3. Yers

(8) all (autosegmental) analyses of vowel-zero alternations in Slavic ("yers") use (pieces of) syllable structure in the lexicon.
This cuts across theories (Lexical Phonology, Government Phonology, OT, …)
   a. all vowels except yers have a mora in the lexicon
   b. all segments except yers have a skeletal slot in the lexicon
      Rubach (1986)
   c. the string is fully syllabified in the lexicon, but yers are empty nuclei or floating pieces of melody

(9) underlying representation of vowels that alternate with zero (yers)

<table>
<thead>
<tr>
<th></th>
<th>x</th>
<th>x</th>
<th>O</th>
<th>N</th>
<th>O</th>
<th>N</th>
<th>O</th>
<th>N</th>
<th>O</th>
<th>N</th>
<th>O</th>
<th>N</th>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>p</td>
<td>e</td>
<td>s</td>
<td>e</td>
<td>p</td>
<td>s</td>
<td>p</td>
<td>e</td>
<td>s</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.4. Watt - ouate

(10) French watt - ouate

<table>
<thead>
<tr>
<th>elision</th>
<th>liaison</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. [wat] &quot;watt&quot;</td>
<td>NO</td>
</tr>
<tr>
<td>le watt</td>
<td>le*[z] watts</td>
</tr>
<tr>
<td>b. [wat] &quot;cotton wool&quot;</td>
<td>YES</td>
</tr>
<tr>
<td>l'ouate</td>
<td>le[z] ouates</td>
</tr>
</tbody>
</table>

(11) analysis

Kaye (1984)

a. we know that liaison and elision depend on the availability of an empty onset
   1. liaison: le*[z] cafés vs. le[z] amis
   2. élision: *l'café vs. l'ami
b. "watt" "cotton wool"

\[ \begin{array}{cccc}
\text{R} & \text{R} \\
\text{O} & \text{N} & \text{C} \\
\text{\_\_\_\_} & \text{\_\_\_\_} & \text{\_\_\_\_} \\
\text{w a t} & \text{w a t} \\
\end{array} \]

3.5. Length contrast

(12) phonological length

a. in an autosegmental environment, length is a syllabic, rather than a segmental property.

<table>
<thead>
<tr>
<th>simple</th>
<th>geminate</th>
<th>short vowel</th>
<th>long vowel</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>C</td>
<td>V</td>
<td>V V</td>
</tr>
<tr>
<td>\text{____}</td>
<td>\text{____}</td>
<td>\text{____}</td>
<td>\text{____}</td>
</tr>
<tr>
<td>C</td>
<td>C</td>
<td>V</td>
<td>V V</td>
</tr>
</tbody>
</table>

b. if you subscribe to autosegmental representations, you necessarily have syllable structure (to some extent, depending on your theory) in the lexicon.

4. There is phonological activity upon lexicalization anyway

(13) creation of a new lexical entry

(children during L1 acquisition, adults when integrating loans, acronyms etc.)

a. transformation of the auditory signal into a linguistic representation

<table>
<thead>
<tr>
<th>input</th>
<th>output</th>
</tr>
</thead>
<tbody>
<tr>
<td>gradient</td>
<td>discrete</td>
</tr>
<tr>
<td>non-symbolic</td>
<td>symbolic</td>
</tr>
</tbody>
</table>

b. all kind of irrelevant information is stripped off the auditory signal:
   1. male / female / child
   2. emotional state
   3. other distortions (influence of alcohol, other drugs…)

c. note that the auditory signal may not be the only source of a new lexical entry:
   1. existing lexical entries may be copied d'une entrée lexicale existante vers une nouvelle entrée lexicaleand non-phonological properties modified (noun → verb)
2. the output of production phonology may be stored
   - "lexicalized phonology" (i.e. if electricity were a single lexical item)
   - parallel to syntax, where idioms are old computation that was stored.

(14) the creation of a new lexical entry includes
   a. making decisions about syllabically relevant properties, which may be mistaken:
   b. vowel-zero alternations (Czech)
      when hearing pes, les ‘dog Nsg, forest Nsg’, the e must either be stored as a yer (non-
      moraic) or as a regular vowel (moraic), without knowing whether it actually does (pes
      - ps-a) or does not (les - les-a) alternate with zero.

(15) lexicalization vs. production
   a. this lexicalization process is necessarily distinct from production: the two systems do
      not have the same input: auditory signal vs. symbolic representation.
   b. we contend that just like the production system the lexicalization system imposes
      well-formedness restrictions on its output.
   c. this appears to be the zero hypothesis: it would come as a surprise if anything and its
      reverse could be lexicalized.
      Indeed, restrictions on lexicalization are even part of Lexicon Optimization according
      to Prince & Smolensky (1993: §9.3), Bermúdez-Otero (2003): “don't store things that
      have no chance to ever appear on the surface.”

5. Syllabification upon lexicalization

(16) creation of novel entries
   a. under the present view, prior syllabification cannot be modified in production pho-
      nology, upon morpheme concatenation.
   b. …but not the creation of novel lexical entries (lexicalization)
   c. new verbs in Modern Hebrew
      i. kinfeg ‘configure’        v. inbel ‘enable’ (<Eng. [ænərbl])
      ii. flirtet ‘flirt’          vi. kitleg ‘catalogue’ (<loan [katalog])
      iii. histrim ‘stream’       vii. bilef ‘bluff’ (< Eng. [blʌf], Heb. [blof])
      iv. hispim ‘send spam’      viii. χιντρέφ ‘talk nonsense’ < χανταρίφ ‘charlatan’
      v. dibeg ‘debug’

   d. (base forms are not necessarily words that “exist in Modern Hebrew”.)
      (the lexicalized aspect of these item is the arrangement of C’s in templatic positions –
      the vowels may change because the express grammatical meaning)
   e. for theories who endorse codas, (c.i) are alterations of the basic syllabification – the
      second consonant is an onset in the noun but a coda in the verb.
   f. (c.vi) is such an alteration for anybody – [bl] is a complex onset in the noun, but se-
      parated in the verb.
   g. conversely, in (c.viii) a complex onset is created in the verb that is not there in the
      base.
      = In creating a new entry, the syllabification of the input can be ignored
   h. arguably, because it’s not there!
(17) Not so in production: Syncope in suffixed bases

| 3MSG | 3FMSG |  
|------|-------|---|
| i. ʔilef | ʔilfa | ‘tame’ |
| ii. biləf | bilfa | ‘bluff’ |
| iii. kiter | kit.ru | ‘complain unproductively’ |
| iv. ʃiəbed | ŋiədu | ‘enslave’ |
| v. kinter | kint.ru | ‘taunt’, *[kintru] |

- syncope in 2-sided open syllable
- loan verbs not exempt
- syncope can give [t.r]
- syncope can occur in 4 radicals
- syncope cannot yield [n.tr]

a. syncope in Hebrew is the result of *production Phonology* (single-cycle concatenation of /kiter+a/) (Bat El 2009: interaction of size and syllabification constraints)

b. compare the impossibility of *[kin.tru] (</kinter+u/ with the existence of [χin.ʃref], related to [xyantari]).

c. Given the same task (= "syllabify RTR"), lexicalization can output R.TR, while production phonology outputs RTvR. Hence they must be distinct computational systems.

=> *Production phonology* cannot not tamper with base syllabification

\[\Rightarrow \text{heterosyllabic } /t.r/ \text{ must remain so} \]

=> *Lexicalization* can tamper with base syllabification (arguably because it ain’t there)!

6. Note on Phonologically-motivated class assignment

(18) Active transitive verbs in MH

a. can be formed in one of two templates: hiQTiL (c,d) or QiTeL (all others).¹

b. new verbs in MH - 2

| i. kinfeg | ‘configure’ |
| ii. fliɾtɛt | ‘flirt’ |
| iii. hispim | ‘send spam’ |
| iv. ʰiʃliʃt | ‘to fart’ (< [flɔts] ‘fart’) |
| v. disbel | ‘disable’ |
| vi. kitleg | ‘catalogue’ |
| vii. bilef | ‘bluff’ |
| viii. ʰiʃtɾeʃ | ‘talk nonsense’ |

c. the bases of HiQTiL verbs involve much more often than not initial cluster CCVC: class-assignment is sensitive to the phonological form of the base! (Laks 2011)

d. But the bases [blof] abd [flirt] are thus also eligible for hiQTiL. Why then not lexicalize */hɪblɪʃf/ or */hɪfliɾtɛt/ instead of [bilef] and reduplicated [fliɾtɛt]?

=> labial plosives are avoided in underlying coda position in MH /hɪblɪʃf/ would yield exactly that: compare [hɪfliʃt] [hispim] to *[hɪblɪʃf].

=> /hɪfliɾtɛ/, or any other cluster-final verbal stem in any type, would be problematic with C-initial suffixes, such as 1PL-PST */-na/: /hɪfliɾtɛ-na/, with CCC.

e. /bilef/ and the reduplicated /fliɾtɛt/ allow one to avoid these problems.

¹ Some verbs are formed in QaTaL. New middle verbs are usually formed in hitQaTeL,
Crucially, not so in production, where “coda” [b] does not seem to pose a problem

a. as the result of syncope: [kibed, kibd-u] ‘he/they respected’.

=> Again, different phonological preferences in lexicalization and in production.

b. …and stem-final clusters are avoided in Modern Hebrew only in verbs, not in nouns e.g. [neft] ‘petrol’ (<Arabic), [werd]-[word] ‘Microsoft Word’.

c. If so, in the assignment of class upon lexicalization, only verbs are going to be subject to *CC# constraint.

=> Category-sensitive phonology in lexicalization.

d. It is not possible to leave class assignment to production: template selection is unpredictable.

e. (note that the divide is not simply between native and loaned, with verbs being native: verbs based on loans also have special traits: only such verbs may involve branching onsets, as in [flirit] of [χintre] ).

Phonologically-motivated class assignment =>

a. There is phonology upon lexicalization.

b. This phonology is unlike production phonology, because

=> within the same language, the two phonologies can be different.

=> Lexicalization can be category-specific. Production phonology cannot (arguably)

7. Morpheme Structure Constraints (MSC)

MSCs and the Duplication Problem

a. MSCs are constraints on the shape of underlying forms within the lexicon

1. Static patterns are often also involved in dynamic alternations

2. Duplication Problem: the constraint needs be stated twice, in the lexicon and in the phonology (McCarthy 2002)

3. The OT-ROTB approach avoids duplication: constraints on surface forms handle both static and dynamic patterns.

b. According to Vaux (2005), ‘perhaps the most invoked OT argument against [derivational phonology]’

c. But surface constraints are not able to handle all such cases: we still need MSCs.

Ancient Greek OCP restriction on aspiration

a. Static pattern: in AG, there is at most one aspiration feature per morpheme

1. *trepʰ- (but see below d.)

2. The restriction does not apply across morpheme boundaries

pʰ-a-tʰi ‘say!’ (Imp.)

e-kʰ-u-tʰ-e:n ‘pour’ (Aor. midd.-pass.)

trepʰ-estʰai ‘breed’ (Inf. midd.-pass.)

b. Dynamic alternation: some roots alternate between CVCʰ and CʰVC depending on the 1ˢᵗ segment of the suffix

1. trepʰ-o: ‘breed’ (Pres.) ekʰ-o: ‘have’ (Pres.)

trep-tos ‘bred in the house’ hek-so: (Fut.)

2. Not all roots alternate: trukʰ-o:; fut. truk-so: ‘consume’

3. Thus 3 types of roots: CʰVC, CVCʰ, alternating (CVCʰ)

c. Pb 1: analysing the OCP restriction as a surface constraint necessarily violates modularity.

1. Kiparsky (1973), Steriade (1982) analyse alternating roots as /CʰVCʰ/, and posit a rule of regressive dissimilation
2. Violates modularity: the analysis needs to restrict dissimilation to the root and hence devise a root-specific phonological rule.

\[
\begin{align*}
\text{Laryng. neutr.} & \quad \text{--} & /t^h\text{rep}^h{-}\text{o}/ & /t^h\text{rep}^h{-}\text{tos}/ & /t^h\text{rep}^h{-}\text{est}^h{ai}/ \\
\text{OCP-asp.} & \quad \text{trep}^h{\text{o}:} & \quad \text{--} & \text{trepest}^h{ai} & \text{[trep}^h{\text{o}:]} & \text{[trep}^h{\text{tos]}]} & \text{*[trepest}^h{ai}] \\
\end{align*}
\]

2. Establishing a single surface grammar requires a very complex grammar, distinguishing different types of aspiration features on the surface, and with ad hoc constraints (Jatteau 2016)
3. The relevant generalisations are that these aspiration features are non lexical, and that the OCP restriction applies within the lexicon.

(23) Solution: the OCP restriction holds within the lexicon
a. In the lexicon:
   1. MSC: morphemes in the lexicon can have at most one aspiration feature.

\[
\begin{align*}
\text{Root} + h & = \quad \text{h} & \text{or} & \quad \text{h} & \text{or} & \quad \text{h} \\
\text{C} & \quad \text{V} & \text{C} & \quad \text{C} & \quad \text{V} & \quad \text{C} \\
\end{align*}
\]

   2. Predictable information is not stored: $\#_{u-}, \#_{r-}$

b. In the production phonology:
   1. The alternation in $\text{trep}^h{-}/ t^h\text{rep}-$ results from a surface constraint on multiply-linked structures (not on the number of aspiration features in the surface form)

\[
\begin{align*}
\text{Production} & \quad \text{phonology} & \quad \text{UR} \\
\text{trep}^h{-}\text{tos} & \quad \text{trep}^h{-}\text{o:} & \quad \text{trep}^h{-}\text{est}^h{ai} \\
\text{[trep}^h{\text{tos]}]} & \quad \text{[trep}^h{\text{o:]}]} & \quad \text{[trep}^h{\text{est}^h{ai]}]} \\
\text{by laryngeal neutralisation} & \quad \text{by delinking the branching aspiration feature}. \\
\end{align*}
\]

2. $/t^h\text{arreo}/ \rightarrow \text{[t}^h\text{arr}^h{\text{eo:]}]}$: no OCP restriction on the surface forms.

c. Advantages of the present analysis:
   1. Does not violate modularity
   2. Allows for a simpler, more elegant analysis distinguishing clearly the behaviour of lexical, contrastive features and derived, non contrastive features
d. The analysis of the OCP restriction on aspiration in Ancient Greek requires both an MSC and a surface constraint
   1. which are stated differently
   2. (partial) duplication is not a problem, and may simply result from the way languages change (Paster 2013): see for ex. Bermúdez-Otero’s (2015) case for ‘scattered rules’.

8. Poverty of the base

(24) No ROTB
a. If perceived inputs are restated upon lexicalization in terms of what a possible lexical entry is in the language, there are many configurations that never reach production phonology.
   b. This view therefore contradicts Richness of the Base.

(25) Final vowel shortening in Palestinian

<table>
<thead>
<tr>
<th>i.</th>
<th>kátab-u</th>
<th>‘they wrote’</th>
<th>iii.</th>
<th>ʔirmi</th>
<th>‘throw!’</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>katab-ū:li</td>
<td>‘they wrote to me’</td>
<td></td>
<td>ʔirmi:ha</td>
<td>‘throw her!’</td>
</tr>
<tr>
<td>ii.</td>
<td>nísí</td>
<td>‘he forgot’</td>
<td>iv.</td>
<td>ḥább-ha</td>
<td>‘he loved her’</td>
</tr>
<tr>
<td></td>
<td>nísí:t</td>
<td>‘I forgot’</td>
<td></td>
<td>ḥább-ha:ʃ</td>
<td>‘he didn’t love her’</td>
</tr>
</tbody>
</table>

a. McCarthy (2005) concludes that
   (i) underlingly, all final vowels are long; and
   (ii) the phonological computation shortens them.
   b. But this can’t be his entire case, because (i) is a MSC. If ROTB is true, it must be explained why an input with a final short vowel is excluded.
   c. In order to save ROTB, McCarthy restates the lexical restriction in constraints:

\[
\text{MaxV} : >> \text{FinalC} : >> \text{MaxV}.
\]
   d. In prose: Arabic dialects like PA want words to end in a consonant, and will accept the total deletion of final short vowels in order to achieve that goal; but final long vowels will have to be represented by something on the surface, and so they shorten, but are not deleted.
   e. Faust & Ulfsbjorninn (to appear) find two faults with this analysis.

\[\Rightarrow\text{Ad-hoc ordering of MaxV} : >> \text{MaxV} : \text{the inverse order is not attested…}\]

\[\Rightarrow\text{FinalC predicts languages in which all words end in a consonant on the surface.}\]

No language has been convincingly argued to illustrate this.²

(26) Alternative Strict CV account, with Msc
a. links this effect to \textit{final consonant extrametricality} as analyzed in the framework.
   b. Final empty nucleus is metrically-insignificant (Charette 1984, Scheer & Szigetvari 2005).
   c. All long vowels involve two CV units, the second of which is empty.
   d. The association of the second V-slot to the preceding vowel is dependent on it being metrically significant.

² Some Asian languages do exhibit this pattern, but it is probably motivated by stress considerations, rather than by FinalC (pace Blevins 2017:60): all of these languages have exceptionless final stress (see Phillips 2013 for Semai, and Burenhult 2001 for Jahai).
i. FEN, the vowel remains short

\[
\begin{array}{cccc}
| & | & | & -t \\
C & V_1 & C & V_2 & V_3 & C & V_4
\end{array}
\]

ii. not FEN, the vowel is long

\[
\begin{array}{cccc}
| & | & | & -t \\
C & V_1 & C & V_2 & C & V_3 & C & V_4
\end{array}
\]

e. The possibility of final short vowels is ruled-out by an MSC:
   “All lexical representations must end in an empty nucleus.”

f. ROTB is replaced by a MSC, and the phenomenon is tied with the general issue of right-edge extrametricality.

9. Conclusion

- Phonological considerations are important in both produciton and lexicalization.

- These considerations are not necessarily the same, as discussed in this handout:

<table>
<thead>
<tr>
<th>What is sure</th>
<th>Lexicalization Phonology</th>
<th>Production Phonology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input: acoustic, lexical</td>
<td>Input: only lexical</td>
<td>deals with concatenated morphemes (external sandhi)</td>
</tr>
<tr>
<td>does not deal with concatenated morphemes (external sandhi)</td>
<td>has no say about class</td>
<td>no MSC</td>
</tr>
<tr>
<td>What we argued</td>
<td>assigns a lexical class (in MH)</td>
<td>performs and creates syllabification</td>
</tr>
<tr>
<td>today</td>
<td>MSCs</td>
<td>is fed by syllabification</td>
</tr>
</tbody>
</table>

- possible differences that did not appear on this handout:

<table>
<thead>
<tr>
<th>Lexicalization Phonology</th>
<th>Production Phonology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some cases of minimality constraints?</td>
<td>sandhi</td>
</tr>
<tr>
<td>Some cases Paradigm Uniformity?</td>
<td>phonotactic epenthesis</td>
</tr>
</tbody>
</table>

...and what else?

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