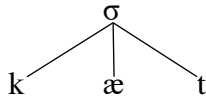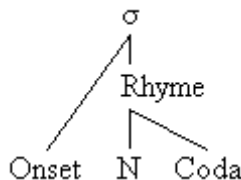Fonologia
Prof.zw. dr hab. Jerzy Rubach

# Syllable Structure Algorithm (SSA): NOTES

## Syllable structure

**1. Flat syllable structure** that we reject, e.g. *cat*. Note: the Greek letter sigma σ means 'syllable'.



**2. Syllable constituents** (Kuryłowicz 1947 and Pike & Pike 1947). (The representations below are simplified by omitting reference to the X-skeleton.)



Examples from Polish:

| | | |
|---|---|---|
| *pot* [pɔt] | = | Onset, Nucleus, Rhyme and Coda |
| *po* [pɔ] | = | Onset and Nucleus (no Rhyme) |
| *ot* [ɔt] | = | Nucleus, Rhyme and Coda |
| *o* [ɔ] | = | Nucleus (no Rhyme) |

The constituents Onset and Coda need not be marked formally because they can always be identified from the syllable structure: the Onset is a consonant or consonants that stand before the Nucleus; the Coda is a consonant or consonants that are under the Rhyme. Note: the term "consonant" is used here to mean either a true consonant or a glide.

Arguments for syllable constituents:

3. **Two arguments for the Rhyme as a syllable constituent.**

    *(1) Rhyming*

[and ˈsmaːlə ˈfuːləz ˈmaːkən ˈmɛlɔˈdiːə
ðat ˈsleːpən ˈal ðə ˈnɪçt wɪθ ˈɔːpən ˈiːə
sɔː ˈprɪkəθ ˈhɛm naˈtyːr ɪn ˈhɪr kʊˈraː**dʒəz**
ðan ˈlɔgən ˈfɔlk toː ˈgoːn ɔn ˈpɪlgrɪˈmaː**dʒəz**]

It looks like to achieve rhyming whole final syllables must be identical (here the syllable [ə] and the syllable [dʒəz]). That is not true because the following two lines rhyme even though the final syllables are not identical:

[and ˈbaːðəd ˈɛvrɪ ˈvæɪn ɪn ˈswɪʧ lɪˈ**kuːr**
ɔv ˈhwɪʧ vɛrˈtyː ɛnˈdʒɛndrəd ˈɪz ðə ˈ**fluːr**]

The onsets are different not only in the type of the consonant but also in the number of consonants: [k] in the first line and [fl] in the second line.

Conclusion: lines rhyme if the coda and the nucleus are the same. The coda and the nucleus are grouped into a constituent ('część składowa sylaby') called *Rhyme*.

(2) *Collocational constraints* = constraints on allowable combinations of segments. Languages have collocational constraints on the type of segments that occur in the nucleus and in the coda, that is in the Rhyme, but there are no constraints on the type of segments that may occur in the onset and in the nucleus.

*Example*: English does not permit diphthongs followed by two consonants of which the second is a labial or a velar. That is, there are no words such as *[keɪmp] or *[keɪŋk], where an asterisk means 'impossible word'. (Note: diphthongs may be followed by two consonants if the second consonant in coronal, as in *paint* [peɪnt].)
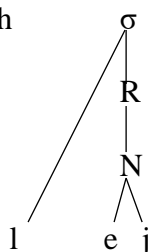
**4. An argument for the nucleus as a constituent.**

The English word *lay* [leɪ] can also be transcribed [lej]. It thus appears to have the same structure as the Polish *lej* [[lej] 'pour' (imperative). A difference comes to sight when we add a vowel, so in the words *layer* and *leje* 'he pours'.
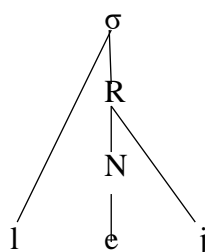
In English [ej] cannot be separated so the syllabification is [lej-ə]. In contrast, Polish puts the [j] into the second syllable; [le-je], not [lej-e].

Conclusion: English has diphthongs while Polish does not. Polish has an accidental sequence of [e] and [j]. The difference is represented by assigning the English [j] to the Nucleus and the Polish [j] to the Coda.
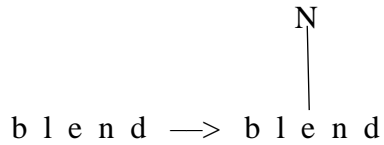
English

```
              σ
             /|
            / R
           /  |
           |  N
           | /\
          /  | \
         l   e  j
```

Polish

```
              σ
             /|
            / R
           / / \
          / N   \
          |  |   \
         l   e    j
```

**5. Rules of the SSA** and their application exemplified by the syllabification of the English word *blend* [blend]:

**a. N-Placement**:   Erect the Nucleus node over the vowel.

$$
\begin{array}{c}
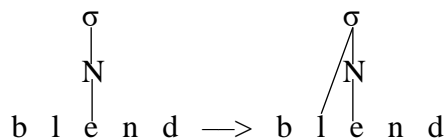N \\
| \\
\end{array}
$$

b l e n d  —>  b l e n d

**b. CV Rule:**   Action (i) Erect the sigma node (i.e. the syllable node) over the Nucleus node.
Action (ii) If there is a consonant before the Nucleus, adjoin that consonant to the sigma node to derive a CV syllable.
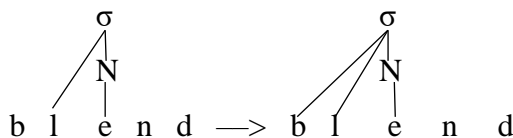
Action (i):

b l e n d  —>  b l e n d
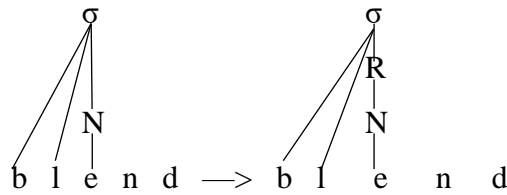
Action (ii):

b l e n d  —>  b l e n d
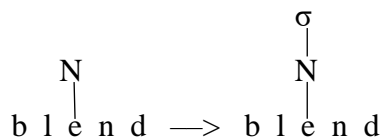
Note: the word *end* [end] has an empty onset, i.e. it has no onset, so only Action (i) is applicable.

(c) **Complex Onset:**   Adjoin a consonant to the syllable node sigma to form a CCV structure.
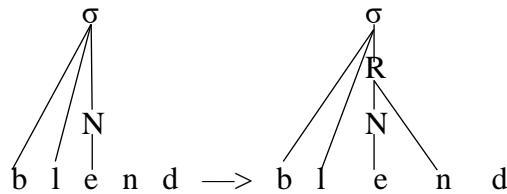
b l e n d  —>  b l e n d

(d) **Coda Rule:**       Action (i) If there is a consonant after the Nucleus, erect the Rhyme node between the Nucleus node and the sigma node.
Action (ii) Adjoin that consonant to the Rhyme node to derive a VC structure.
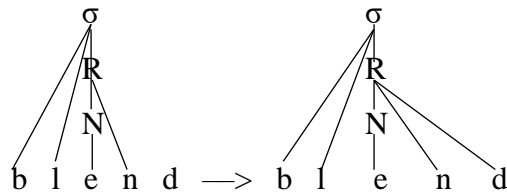
Action (i)



Action (ii)



(e) **Complex Coda Rule:**   Adjoin the second consonant after the Nucleus to the Rhyme node to derive a VCC structure.



**Observation:** The SSA is universal and innate but syllable structure differs significantly across languages. So how do we derive these differences. Answer: there are three parameters that each language sets for itself and thus derives its own SSA.

## Parameters to be set individually in each language:

## 1. Parameter 1: *Designation whether a given rule of the SSA is active or inactive.* Note: N-Placement and the CV Rule are active in all languages because all languages have syllables.

Examples:

(a) What is the SSA of a language such as Hawaiian that admits only CV syllables? That is, CCV and CVC as well as, obviously, CVCC syllables do not occur.

*Answer*: the Complex Onset Rule as well as the Coda Rule (and, obviously, the Complex Coda Rule) are designated as inactive.

(b) What is the SSA of a language that admits only CV and CVC syllables but not CCV and CVCC syllables?
*Answer*: the Complex Onset Rule as well as the Complex Coda Rule are inactive.

(c) What is the SSA of a language that admits only CV CVC and CCV syllables but not CVCC syllables?
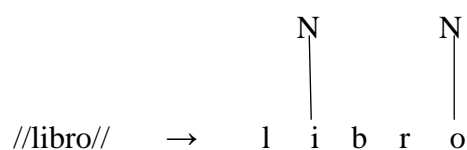*Answer*: the Complex Coda Rule are inactive.

## 2. Parameter 2: *The ordering of the Complex Onset Rule and the Coda Rule*.

If the Complex Onset Rule is before the Coda Rule, then a language maximizes onsets: VCCV → V-CCV, for instance Italian *libro* 'book' //libro// → [li-bro]. If the Coda Rule is before the Complex Onset Rule, then a language does not maximize onsets: VCCV → VC-CV, for example, Bulgarian *obraz* //ɔbraz// → [ɔb-ras].

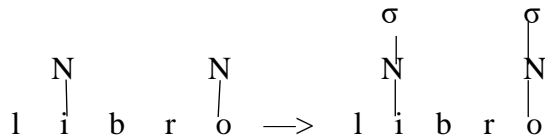Example 1: The syllabification of *libro* in Italian:

**a. N-Placement**:   Erect the Nucleus node over the vowel.

$$
\begin{array}{ccccccc}
 & & N & & & N & \\
 & & | & & & | & \\
 & & | & & & | & \\
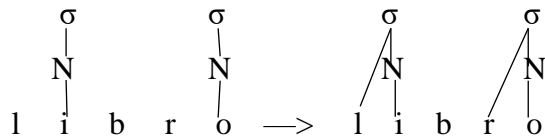//libro// & \rightarrow & l & i & b & r & o
\end{array}
$$

**b. CV Rule:**   Action (i) Erect the sigma node (i.e. the syllable node) over the Nucleus node.
Action (ii) If there is a consonant before the Nucleus, adjoin that consonant to the sigma node to derive a CV syllable.

Action (i):

σ         σ
|         |
N         N         N         N
|                   |         |
l   i   b   r   o  —>   l   i   b   r   o

Action (ii):

σ         σ         σ         σ
|         |        /|        /|
N         N       / N       / N
|         |      /  |      /  |
l   i   b   r   o  —>   l   i   b   r   o

(c) **Complex Onset:**   Adjoin a consonant to the syllable node sigma to derive a CCV syllable.

σ         σ         σ         σ
/|        /|       /|       //|
N         N       / N      // N
|         |      /  |     //  |
l   i   b   r   o  —>   l   i   b   r   o
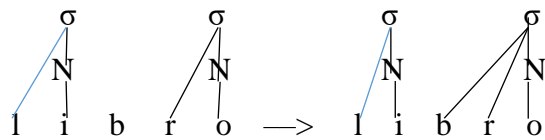
(d) **Coda Rule**:  does not apply as there is nothing to syllabify

(e) **Complex Coda Rule:**   does not apply because there is nothing to syllabify plus, more importantly, the Coda Rule has not applied, so there is no Rhyme node.

Example 2: The syllabification of *obraz* in Bulgarian:

**a. N-Placement**:   Erect the Nucleus node over the vowel.

```
                    N         N
                    |         |
//ɔbraz//  —>       ɔ  b  r   a  z
```

**b. CV Rule:**   Action (i) Erect the sigma node (i.e. the syllable node) over the Nucleus node.
Action (ii) If there is a consonant before the Nucleus, adjoin that consonant to the sigma node to derive a CV syllable.
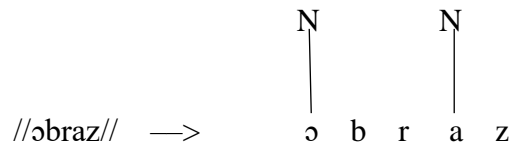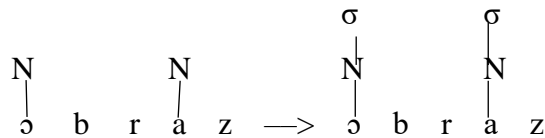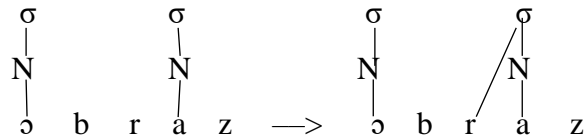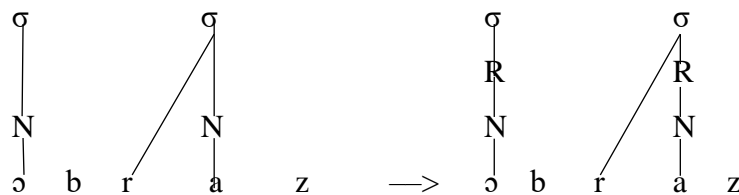
Action (i):

```
                            σ           σ
                            |           |
    N         N             N           N
    |         |             |           |
    ɔ  b  r   a  z   —>      ɔ  b  r   a  z
```

Action (ii):

```
    σ         σ             σ           σ
    |         |             |          /|
    N         N             N         / N
    |         |             |        /  |
    ɔ  b  r   a  z   —>      ɔ  b  r  a  z
```

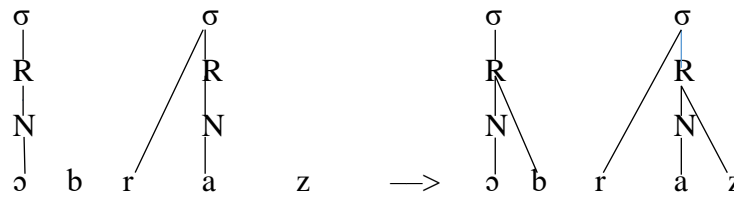(c) **Coda Rule:**       Action (i) If there is a consonant after the Nucleus, erect the Rhyme node between the Nucleus node and the sigma node.
Action (ii) Adjoin that consonant to the Rhyme node to derive a VC structure.

Action (i)

```
    σ         σ             σ           σ
    |        /|             |          /|
    |       / |             R         / R
    N      /  N             |        /  |
    |     /   |             N       /   N
    ɔ  b  r   a  z   —>      ɔ  b  r  a  z
```

Action (ii)



**(e) Complex Onset Rule: does not apply because there is nothing to syllabify**

**(f) Complex Coda Rule: does not apply because there is nothing to syllabify**

3. **Parameter 3:** *Iterativeness*. The Complex Onset Rule and/or the Complex Coda Rule may be designated as iterative or not. "Iterative" means that a rule keeps reapplying.

> Iterative Complex Onset: the onset may contain more than two consonants,
>
> > for instance, VCCCV —> V-CCCV. Example: Polish *pstry* 'gaudy' has an onset made up of 4 consonants, so the Complex Onset Rule must apply more than once (three times)
>
> Iterative Complex Coda: the coda may contain more than two consonants,
>
> > for instance, VCCCCV —> VCCC-CV. Note: the CV Rule is obligatory, so the structure VCCCC-V is not possible. Example: Polish (or English) *tekst* – three consonants in the coda, so the Complex Coda Rule must apply twice. Polish may have 5 consonants in the coda: *przestępstw* (gen.pl.) 'crime': [pšɛ-stɛmpstf].

**THE PRINCIPLE OF STRAY ERASURE**

In order to be pronounced, a segment (consonant) must be **prosodified**, that is, it must be included into prosodic structure. Prosodic structure encompasses syllables, phonological words (PWs) and phonological phrases: syllables are gathered into PWs and PWs are gathered into phonological phrases.

Simplifying things, we might say:

In order to be pronounced, a segment (consonant) must be syllabified. Segments that have not been syllabified (prosodified) are automatically deleted by the Principle of Stray Erasure.