Phonology

General Linguistics

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(Some slides Petra Hendriks)

Levels of language

• Text / Dialogue	ð	Pragmatics	(lecture 11)
• Sentences	ð	Syntax	(lectures 5 en 6)
		Sentence semantics	(lecture 10)
• Words	ð	Morphology	(lecture 4)
		Lexical semantics	(lecture 9)
• Syllables	ð	Phonology	(lecture 3)
• Sounds	ð	Phonetics	(lecture 2)

Structure of talk

1. Distinctive features
2. Phonemes and allophones
   - Distinguishing, learning
3. Phonological rules
4. Phonotactics
5. Language change
6. Syllable structure

Distinctive features

- Each speech sound can be described as a set of *distinctive features*.

- Examples:
  - [b] is a voiced, bilabial, oral plosive
  - [p] is a voiceless, bilabial, oral plosive.
  - What speech sound is a *voiceless alveolar fricative*?

Natural classes

- On the basis of the distinctive features sounds can be divided into natural classes with the same characteristics e.g..:
  - The class of plosives
  - The class of all voiced plosives
  - The class of all voiceless fricatives
- The same speech sound can belong to different natural classes,
  - e.g. [θ] belongs both to the class of voiceless sounds and to the class of fricatives

The pychological reality of features

Do adult language users know something about natural classes?

Yes, we see this in:

- Speech errors (Versprekingen)
- Rules for the pronunciation of sounds that follow

Speech errors

In almost half of all speech errors there seem to be a confusion between sounds from the same natural class:

- Transcedente medicatie (i.p.v. meditatie)

The sounds /k/ and /t/ both come from the class of voiceless plosives.

- Hysterisch (i.p.v. historisch)

Our mental lexicon is not alphabetically organized, but in clusters on the basis of natural classes

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Mishearings: “Verluisteringen”

- Website http://www.kissthisguy.com
- List of *mishearings* in pop songs
- Jimi Hendrix- Purple Haze:
  - Actual text: “Kiss the sky”
  - Heard as “Kiss this guy”

  è /k/ stemloze variant van /g/

- Vengaboys – We’re going to Ibiza
  - Actual text: Ohh, we’re going to Ibiza.
  - Heard as: Ohh, we’re going to eat pizza.

  è /p/ stemloze variant van /b/

Mishearings: “Verluisteringen”

- Red Hot Chili Peppers – Scar tissue:
  - Actual text: With the birds I’ll share this lonely view.
  - Heard as 1: In this purple shirt it’s a lonely view.
  - Heard as 2: When bird shit is all over you.
  - Heard as 3: We’re the bird of shade it’s a lonely view.
- System of a Down – Chop Suey:
  - Actual text: Why’d you leave the keys upon the table?
  - Heard as: Why’d you lose the ketchup on the table?

Phones, allophones and phonemes

- A phone is a sound that has a definite shape as a sound wave
- In a particular language, a phoneme is a basic group of sounds that can distinguish between words (i.e. changing one phoneme in a word can produce another word)

- Speakers of a particular language perceive a phoneme as a single distinctive sound in that language.
- One phoneme may be made of several phones

- An allophone is one of several similar phones that belong to the same phoneme. Thus an allophone is a phone considered as a member of one phoneme.

- From Wikipedia!

Phonemes

- Phonemes are speech sounds in specific languages
- Phonemes are written in between two slashes, e.g. / /
- Each language has a limited number of phonemes (10 – 140).
- Dutch has 12 vowels, 3 dipthongs and ± 20 consonants

Allophones

- Sound differences that don't lead to any distinctions in meaning are allophones
- Several allophones can be associated with the same phoneme
  - E.g.: /e/ in *beer* and /e/ in *beet*.
- The number of allophones a language can have is infinite
- For each phoneme, the allophones that compose it differ by language (in some languages /l/ and /r/ are allophones).

Minimal pair test

You can do the minimal pair test to distinguish between allophones and phonemes:

- [...end]: lend – rend

è If there is a difference in meaning then these two phones are phonemes in this language: /l/ and /r/

è Are /l/ and /r/ different phonemes in Dutch?

è Are /l/ and /r/ different phonemes in Japanese?

Perception of allophones

- [p^h] as in *pin* and [p] as in *cap* are allophones for the phoneme /p/ in English
  - [p] is unaspirated, [p^h] is aspirated
  - They occur in complementary distribution
  - English speakers treat these as the same sound
  - [p] is also found in words such as *spin* [spɪn]
  - Outside of contexts that plain p appears in English, speakers may hear it as b since English b is typically unaspirated
  - Chinese treats these two phones differently they are not allophones in Chinese

Aspiration in Dutch

– /...oren/: t^horen – toren

è No difference in meaning between aspirated [t^h] and unaspirated [t]:

è aspirated /t^h/ and regular /t/ are allophones in Dutch

è Because allophones are perceived as the same phoneme we often can hear that there are two phones (or more?) involved

/t/ & /ʔ/

- In English
  - glottal stop in "uh-oh" and "uh-uh“
  - in many dialects of English, glottal stop is an allophone of /t/ in final position
    - *habit* or *pat*
  - in Cockney and Estuary English an allophone of /t/ in medial position
    - *bottle* or *fatter*
- In Dutch the glottal stop is not *phonemic (is not a phoneme)*, but it is inserted in multi-morphemic words before morphemes that begin with a vowel,
  - *be* ʔ *amen* ("to endorse")

Categorical perception and allophones

- The difference between /b/ and /p/ is a difference in *voice onset time*.
- It's possible to gradually change from /b/ to /p/.
- Categorial perception leads listeners often hear a sharp change between a /b/ and a /p/.
- Each step before the change is an allophone

Categorical perception and language processing

- Categorical perception has been shown to be found in small babies, (Eimas et al. 1971).
- However, it isn't something that only humans have, also chinchilla's and quails have categorical perception
- This suggests that categorical perception is not related to our ability to speak

Processing language sounds

- Babies can already hear the difference between two phones
- Babbling babies produce all possible language sounds

How do children learn what phones are phonemic in their language?

- Determining what sounds are phonemic cannot be done on the basis of sounds alone
  - Simply hearing “rink” and “link” doesn’t tell you that /r/ and /l/ are phonemic

How do children learn what phones are phonemic in their language?

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  - Children need to be exposed to word meanings

Production in children

- If babies can produce all the sounds in the languages of the world, why do children have problems pronouncing some sounds
- Sounds that a child has problems with still occur in the child's speech
- A child can have problems pronouncing a given sound in some words, but not in others.
- The difficulty is in the context of the sound

Regularities in child language

- Sounds that are produced far back in the mout are replaced with sounds that are produced more anterior:
  - kat è tat
- Two different consonants are sometimes collapsed into one (harmonisatie):
  - Roel è loel

Phonological reductions occur all the time

- ...not just in child language
- In speaking we often go further than just general coarticulation

Dog?

- Is this a [hont] or a [hond]?

Phonological rules

Eindklankverscherping:

Dutch has the rule that voiced sounds on the end of a word are made voiceless:

- hond è [hont] (note plural is: honden)
- rib è [rip] (plural is: ribben)
- muis è [muis] (plural is: muizen)

What sounds are affected?

All voiced plosives and fricatives

Voiced nasals or glides are not affected:

- man è [man]
- bal è [bal]

Phonological rules

- Phonological rules also get applied to unknown words or loan words:
  - gond è [gont]
  - gib è [gip]
  - gan è [gan]
  - fal è [fal]

Phonological rules and children

- How do children learn what the underlying form is of a word is?

Phonotactics

- Basic form of phonological syntax
- Basis for phonological parsing (segmenting a signal: computational phonology)
- Permissible combinations of phonemes
  - Phonotactics explains why “meicties” is a possible Dutch word but “krlink” is not
    - Meicties is and ‘accidental gap”
    - Krlink is not!

- Languages have specific restrictions about what sounds can follow each other
  - Often very helpful when doing crossword puzzles!!
  - In Dutch:
  - p_ ç /l/ of /r/ (d.w.z. vloeiklank)
  - *pm
  - ps: alleen in leenwoorden

- Rules about what sounds can follow what sounds have to do with natural classes

Assimilation

Sometimes a distinctive feature from one or two words is made similar to another nearby phone: *assimilatie:*

- inpakken è /impakken/

There is even assimilation across word boundaries:

- in Parijs è /imparijs/

Coarticulation vs. Assimilation

- Coarticulation is obligatory (try not doing it!), only changes phones into other allophones of the same phoneme, only occurs within words, and it never affects meaning

- Assimilation is optional, changes phones to new phonemes, can occur at word boundaries and can neutralize meaning contrasts

Language change

- Grimm's Law *first formulated by Jakob Grimm in 1822*
- A formula describing the regular changes undergone by Indo-European stop consonants represented in Germanic,
- Indo-European *p, t,* and *k* became Germanic *f, th,* and *h;*
- Indo-European *b, d,* and *g* became Germanic *p, t,* and *k;* and
- Indo-European *bh, dh,* and *gh* became Germanic *b, d,* and *g.*

Three shifts

- three parts which must be thought of as three consecutive phases:

1. Proto-Indo-European voiceless stops change into voiceless fricatives.
2. Proto-Indo-European voiced stops become voiceless.
3. Proto-Indo-European voiced aspirated stops lose their aspiration and change into plain voiced stops.

First shift

- *p?Ĵf
  - Ancient Greek: *p???̃(puš),* Latin: *peš,* Sanskrit: "*pađa*"
  - English: *foot,* Danish: *fod,* Dutch: *voet,* German: *Fuß,* Gothic: *foťus,* Icelandic: *fótur,* Swedish: *fot*
- *t?¨þ
  - Ancient Greek: *t?ä??ő(tritos),* Latin: *tertius*
  - English: *third,* Icelandic: *þriðji*
- *k?Êh
  - Ancient Greek: *?f?f?f(kýoñ),* Latin: *canis*, Gaelic *cù*
  - English: *hound,* Danish: *hund,* Dutch: *hond,* Faroese: *hundur,* German: *Hund,*

Second shift

- *d?êt
  - Latin: *decem*
  - English: *ten,* Dutch: *tien,* Gothic: *taíhun,* Icelandic: *tíu,* Norwegian: *ti,* Swedish: *tio*
- *g?Œk
  - Latin: *gelu+*
  - English: *cold,* Danish: *kold,* Dutch: *koud,* German: *kalt,* Icelandic: *kaldur,* Swedish: *kall*

Third shift

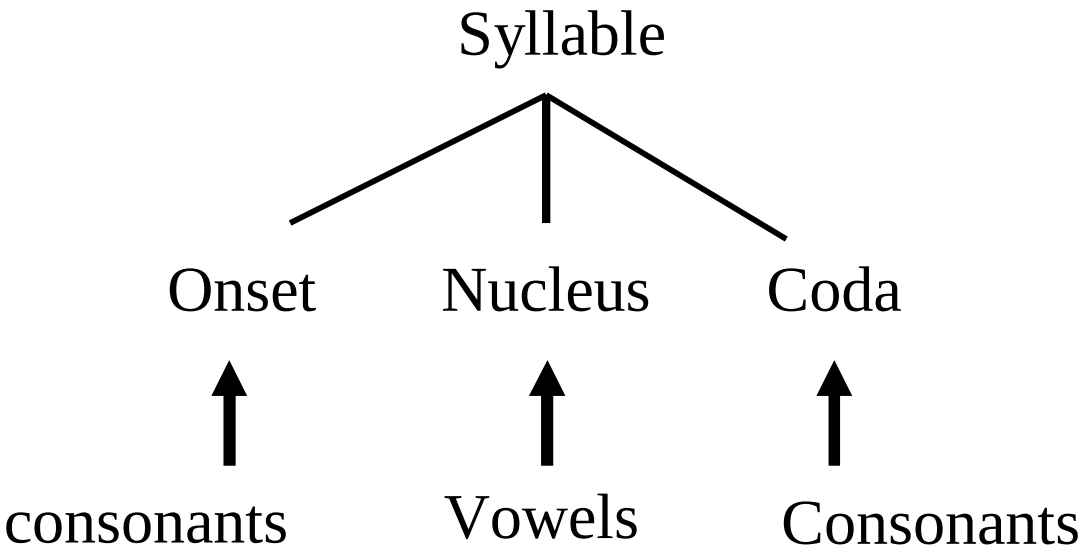
*b^{h}?áb

- Ancient Greek: *f˜?ãt??˜(phraťeř)*, Sanskrit: *(bhraťa)˜*
- English: *brother*, Dutch: *broeder*, German: *Bruder*,

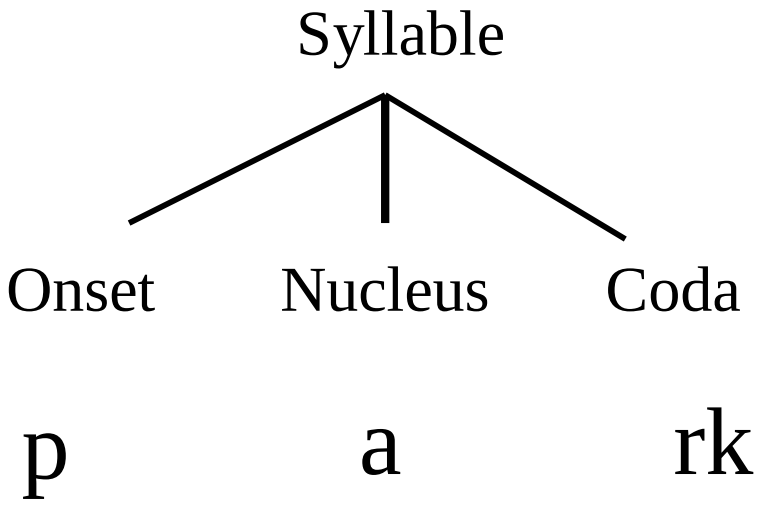
- *d^{h}?ád
  - Ancient Greek: *?ŸŸaT(thýra)*
  - English: *door*, Danish: *dør*, Dutch: *deur*, Frisian: *doar*, Norwegian: *dør*, Swedish: *dörr*
- *g^{h}?ág
  - Ancient Greek: *??f(khefi)*
  - English: *goose*, Danish: *gås*, Dutch: *gans*, Frisian: *goes*, German: *Gans*, Swedish: *gås*

Syllable structure

The strucure of syllables



Example



Restrictions on syllables

- Maximal Onset Principle
- Limits on complexity
- Sonarity hierarchy
- Other restrictions concerning following sounds

Maximal Onset Principle

- If a consonant can fall both under the CODA of the first syllable, or the ONSET of the second, then it will become the ONSET of the second

Some examples

- molen
- sigaar

- karot
- golen
- krapa

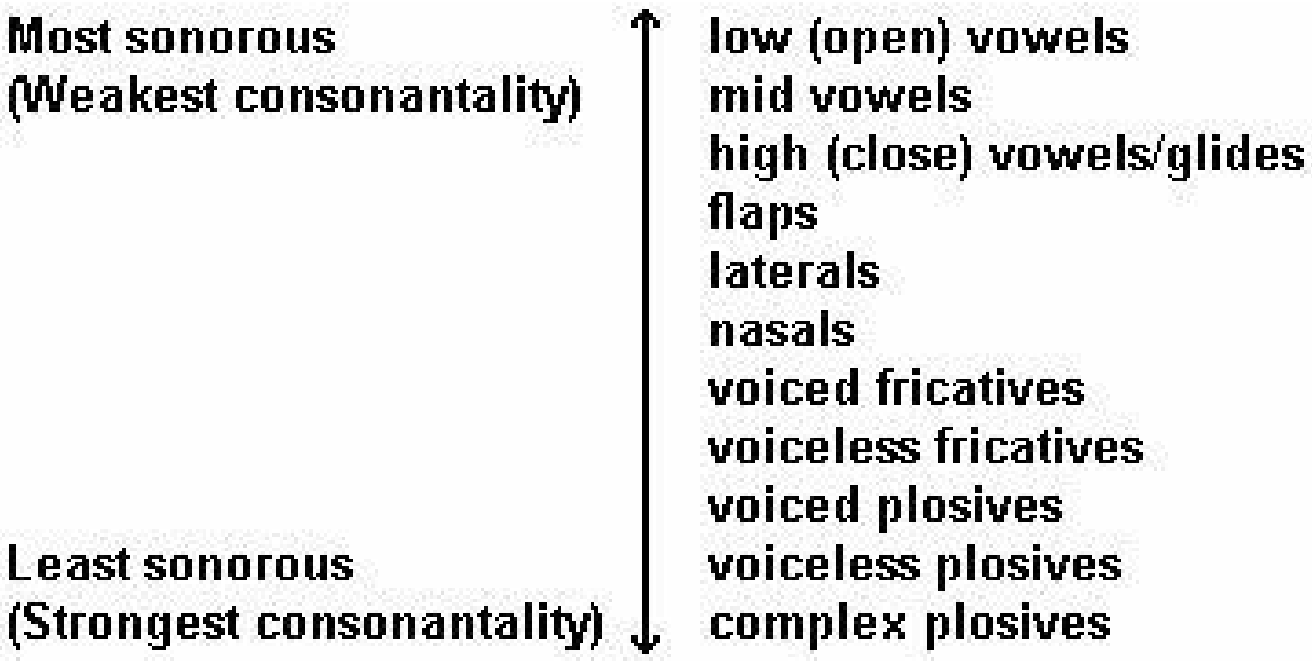
Limits of complexity

- Onset and Coda are not allowed to have too many consonants
  - In Dutch the maximum is 3.
- Exception: *herfst*.
- However the pronunciation is often /hE.r@fst/
- Other possibilities for too many consonants : *herfstig* è /hErf.st@g/

Sonority

- Dutch requires the following about clusters of consonants:
  - In the Onset the phones must increase in sonority.
  - In the Coda the phones must decrease in sonarity
- Sonority = quality of being resonant

Sonarity scale

- 

Sonority hierarchy/scale

- Sonority drops from left to right:

  Plofklanken < wrijfklanken < nasalen < vloeiklanken < halfvocalen < vocalen

- Onset: pr *rp è prak
- Coda: *pr *rp è karp

Syllable structure varies by language

- Many languages avoid CODAs
  - E.g. for /logi/ choose lo.gi over log.i as syllables
- Many language won't allow complex consonant clusters, e.g. only one consonant at word edges
  - NO COMPLEX
  - E.g. Yawelmani: sat.hin but not *strin
- Many languages won't allow a syllable to start with a vowel
  - ONSET
  - E.g. Yawelmani: xat.hin but not *xa.in or *a.ha

Phonological rules

- Phonological rules operate on syllables, not on words
- For example: Eindklankverscherping:
  - trudelp è [tru.delp]
  - trudnelp è [trut.nelp]
- This rule applies to consonants in Coda-position
  - Dus ook: [hon.den], [rI.ben], [mui.zen]

Star Wars Syllabification

- Three languages:
  - Ewok: Avoid Codas, Avoid Complex Onsets by adding vowels
  - Chewbacca's language: Complex onsets okay, simple codas okay

Divide into syllables (1)

H. Bagwa (Attack of the Clones)

Logray (Ewok medicine man)

Senator Ferra Baab

Divide into syllables (2)

- Kitik Keed'kak

- K'Kruhk

- Doda Bodaonawieedo

Next time.....

- Morphology