

Today's topics:

- **Morphology — Word structure**
- **Syntax — Sentence structure**

Background:

- Swahili translation puzzle
- Ingrid and the Martian video

0. Key points today

- Review / check-in: Language, sounds, and spelling
- Morphology and its relevance to reading
 - Morphological awareness
- Syntax and its relevance to reading
 - “Garden-path” sentences
 - Structural ambiguity as evidence for hierarchical (constituent) structure

1. Language, sounds, and spelling

Review and summary of key ideas so far

- Humans are “hard-wired” for **spoken** language
 - Young children naturally **acquire** a systematic and unconscious **mental grammar** from exposure to the language of their community
 - Every language variety has a systematic mental grammar, although some may differ from the “standard” / “mainstream” / “classroom” variety
- **Reading** and **writing** are cultural innovations, and must be explicitly **learned**
 - Written language is not the “core” of language

1. Language, sounds, and spelling

Review and summary of key ideas so far

- We can analyze the sounds of (American) English, as a precursor to looking at how they matter in reading
 - **Phonetics:** How each individual consonant or vowel sound is articulated (and perceived)
 - **Phonology:** How the mental grammar represents, organizes, and manipulates sounds
 - **Phoneme** = distinct mental sound category
 - **Syllable** = mental-grammar unit that groups sounds together

1. Language, sounds, and spelling

- In the video called “[Phonemic Awareness Routine](#)”, what **pre-reading skills** were being coached?

- Which of these skills were **phonics** skills? Why?

1. Language, sounds, and spelling

- In the video called “[Phonemic Awareness Routine](#)”, what **pre-reading skills** were being coached?
 - rhyming
 - counting syllables
 - blending words
 - segmenting words
- Which of these skills were **phonics** skills? Why?
 - None! Phonics skills involve the **relationship** between sounds and letters.
- Why is “Phonemic Awareness Routine” actually not the best name for this video? What might be a better choice?

1. Language, sounds, and spelling

- A real-life curriculum example:
What **phonics** skills can we find among the learning objectives in the [Wilson Fundamentals reading curriculum, Level 1](#) brochure? (1st grade, Carrboro)
- Beginning readers can be taught to “sound out” words. Which **phonological awareness** and/or **phonics** skills can we identify in this process?

1. Language, sounds, and spelling

Discussion

One argument that has been made against phonics-based reading instruction: *Skilled readers don't use phonics when they read, so we shouldn't teach reading by using phonics.*

- Would you say that skilled readers of English use any **phonics knowledge** when reading?

What is one piece of **evidence** you can you give to support your answer? (Try to draw on concepts from our course where you can.)

1. Language, sounds, and spelling

- Any questions about topics we have covered so far?

2. Structure of words and phrases/sentences

- In this first part of the course, we are looking at aspects of (spoken) language structure, and beginning to consider their relevance to reading
- So far, we have looked at
 - **Phonetics** — **physical sounds** of speech
 - **Phonology** — **mental** organization of speech **sounds**
- Today, we will look at
 - **Morphology** — **words** and their meaningful **parts**
 - **Syntax** — the structure of **phrases** and **sentences**

3. Morphology

Discussion

- [Swahili verbs](#) translation puzzle
 - What are the answers to the translation puzzles?
 - **How** did you figure out the translations?

3. Morphology

- [Swahili verbs](#) translation puzzle
- **How** did you figure out the translations?
 - Each piece of **meaning corresponds** to a piece of the word's **sound shape**
 - **Compare** all the words that **share** a piece of meaning and figure out what is the same in their sound shape
 - **Compare** words that are **minimally different** in meaning and figure out what distinguishes their sound shape

3. Morphology

- These word pieces are **morphemes**
- **Morpheme** = minimal unit of sound-meaning correspondence
 - Cannot be divided without losing meaning
- How many morphemes are in these English words?
 - *cat* | 1
 - *cat+s* | 2
 - *category* | 1
 - *cat+like+ness* | 3

Hint: Look for sound-meaning correspondences

- A morpheme should **recur** in other words (and contribute the same meaning)

3. Morphology

How many of these terms do you already know?

- **root**
- **affix**
 - **inflectional** affix
 - **derivational** affix
- What can we find in: *cat* *cat+s* *cat+like+ness*

3. Morphology

- **root** — the core meaning of a word
 - Every word has at least one root
 - More than one root → compound word
- **affix** — prefix, suffix, etc., added to a **base** (a root, or a prior combination of morphemes)
 - **inflectional** affix — adds grammatical information (number, gender, person, tense, ...)
 - **derivational** affix — derives a new word with a different meaning
- What can we find in: *cat* *cat+s* *cat+like+ness*

3. Morphology

Discussion

- Which of these pairs of words share a **morpheme**?
(Hint: What does the morpheme mean?)
 - *higher, silver*
 - *rewrite, remake*
 - *smaller, singer*
 - *unhappy, untie*

3. Morphology

Discussion

- Which of these pairs of words share a morpheme?
(Hint: What does the morpheme mean?)
 - *higher, silver* | no
 - *rewrite, remake* | yes! — meaning?
 - *smaller, singer* | no...but check *higher/smaller*
 - *unhappy, untie* | no
- Note that the **category** (noun, verb, etc.) an affix **attaches** to, and the category it **creates**, can also be used to distinguish morphemes

3. Morphology

Discussion

- How many morphemes are in these English words?

refer

remit

receive

confer

commit

conceive

permit

perceive

transfer

transmit

Hint: Look for sound-meaning correspondences

- A morpheme should **recur** in other words (and contribute the same meaning)

3. Morphology

- The analysis of cases like these is complicated!

refer

remit

receive

confer

commit

conceive

permit

perceive

transfer

transmit

- Words borrowed from other languages (especially Latin, Greek) may have pieces that recur (=morphemes in the original language)
- But they don't always play a role as **meaningful** pieces of words (morphemes) ***in English***
- **Etymology** is not the same as **morphology**

4. Morphology and reading

Discussion

- Remember *knotting* and *nodding*?
 - They both have [r] (“flap”) in the middle
 - **Why** are they spelled differently?
- Another example: Is the regular plural morpheme always pronounced the same way in English? Does the spelling match the pronunciation? **Why**?
 - *cats, parks, cliffs*
 - *dogs, birds, loves*

4. Morphology and reading

- Remember *knotting* and *nodding*?
 - They both have [r] (“flap”) in the middle
 - **Why** are they spelled differently?
- Another example: Is the regular plural morpheme always pronounced the same way in English? Does the spelling match the pronunciation? **Why?**
 - *cats, parks, cliffs* [s]
 - *dogs, birds, loves* [z]
- **Some** cases of sound/spelling mismatch are due to **spelling a morpheme** consistently

4. Morphology and reading

- Reminder: We discussed **phonological awareness** earlier in the course
 - Conscious awareness, and ability to manipulate, phonological units like phonemes and syllables

Discussion

- Based on the above, what do you think **morphological awareness** would be?
- How do you think morphological awareness might be relevant in **reading** or **reading education**?

5. Reading a sentence in real time

- A text will appear little by little below.
 - Raise your hand if it stops feeling like a real sentence of English.
 - Put your hand back down if it gets better again.

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The horse

5. Reading a sentence in real time

- A text will appear little by little below.
 - Raise your hand if it stops feeling like a real sentence of English.
 - Put your hand back down if it gets better again.

The horse raced

5. Reading a sentence in real time

- A text will appear little by little below.
 - Raise your hand if it stops feeling like a real sentence of English.
 - Put your hand back down if it gets better again.

The horse raced past

5. Reading a sentence in real time

- A text will appear little by little below.
 - Raise your hand if it stops feeling like a real sentence of English.
 - Put your hand back down if it gets better again.

The horse raced past the barn

5. Reading a sentence in real time

- A text will appear little by little below.
 - Raise your hand if it stops feeling like a real sentence of English.
 - Put your hand back down if it gets better again.

The horse raced past the barn fell

5. Reading a sentence in real time

- A text will appear little by little below.
 - Raise your hand if it stops feeling like a real sentence of English.
 - Put your hand back down if it gets better again.

**The horse raced past the barn fell,
but the horse ridden in the meadow didn't.**

5. Reading a sentence in real time

- What happened?

the horse **raced** **past the barn** **fell**

- main verb?
- part of relative clause?
- Two possible interpretations of *raced*
- **Your real-time syntax parser typically chooses the wrong one** (due to frequency?)

the horse **ridden** **in the meadow** **didn't**

- ~~main verb?~~
- part of relative clause?
- Only one interpretation of *ridden* — helps with *raced*

5. Reading a sentence in real time

- What happened?

the horse raced past the barn fell

- Examples like this are called “**garden-path sentences**” because your real-time syntax parser gets “led down the garden path” and has to recover
 - This causes **processing difficulty**, which can be **measured** experimentally
 - What kind of mistake is the parser making here?
 - Wrong **constituent structure** is initially assigned to the sentence

6. Structural ambiguity: Evidence for syntax

- Does a sentence consist of words lined up like beads on a string?

6. Structural ambiguity: Evidence for syntax

- Does a sentence consist of words lined up like beads on a string?
 - No: There is evidence that the mental grammar organizes words into smaller phrases, which are then organized into larger phrases and sentences
 - One source of evidence: **Structural ambiguity**

6. Structural ambiguity: Evidence for syntax

- What example of structural ambiguity did we see in the video about Ingrid and the Martian?
- See (optional) section 8 at the end of these slides for more detailed discussion of the Ingrid example

6. Structural ambiguity: Evidence for syntax

- Quick context check-in:
 - What are the Falkland Islands?
 - Why were they in the news in the 1980s?

6. Structural ambiguity: Evidence for syntax

- Why are the following newspaper headlines funny?

Squad Helps Dog Bite Victim

British Left Waffles on Falklands

McDonald's Fries the Holy Grail for Potato Farmers

<https://www.nytimes.com/2010/01/31/magazine/31FOB-onlanguage-t.html>

6. Structural ambiguity: Evidence for syntax

- Each headline has a second, unintended meaning

Squad Helps Dog Bite Victim

British Left Waffles on Falklands

McDonald's Fries the Holy Grail for Potato Farmers

<https://www.nytimes.com/2010/01/31/magazine/31FOB-onlanguage-t.html>

Group discussion

- Is it possible to read these out loud in a way that distinguishes between the two meanings?

6. Structural ambiguity: Evidence for syntax

- **Why** are there **two meanings** for this sentence?

British Left Waffles on Falklands

6. Structural ambiguity: Evidence for syntax

- **Why** are there **two meanings** for this sentence?

British	Left	Waffles	on Falklands
noun?	verb?	noun?	= breakfast
adj?	noun?	verb?	= is undecided

6. Structural ambiguity: Evidence for syntax

- Which version goes with which meaning?

British Left Waffles on Falklands

British Left Waffles on Falklands

- Is there a **relationship** between pronunciation and meaning with these?

6. Structural ambiguity: Evidence for syntax

- Which version goes with which meaning?

British Left **Waffles** on Falklands = is undecided

British Left **Waffles** on Falklands = breakfast

- There tends to be a **large prosodic break** after the **subject** of a sentence in English (and most languages)

A **large prosodic break** may be signaled by some or all of:

- A pause
- Phrase-final intonation (tone pattern)
- Creaky voice (vocal fry)

6. Structural ambiguity: Evidence for syntax

- When we examine the mental grammar of native speakers (of any language), we find that **within a sentence, words form subgroups**
 - These subgroups are called **constituents**
- Evidence: Constituents can be **replaced** or **moved**

The cute fluffy kittens shredded the magazine.

They shredded the magazine.

*The cute fluffy kittens shredded **it.***

*The cute fluffy kittens **did.***

6. Structural ambiguity: Evidence for syntax

- Back to this difference...

British Left **Waffles** on Falklands = is undecided

British Left **Waffles** on Falklands = breakfast

- We said...

There tends to be a **large prosodic break** after the subject of a sentence in English (and most languages)

- Now we can understand this as an effect of syntactic **constituency** on **prosodic structure** (including the location of prosodic breaks)

6. Structural ambiguity: Evidence for syntax

- Note that not all ambiguity is structural

*I don't like to use my computer because of the **mouse**.*

Can pronunciation disambiguate this one?

6. Structural ambiguity: Evidence for syntax

- Note that not all ambiguity is structural

*I don't like to use my computer because of the **mouse**.*

Can pronunciation disambiguate this one? | **No!**

- Some sentences are ambiguous purely because **a word has two different meanings**, and not because the string of words has two different structures

7. Reading and syntax

Key points from the syntax discussion so far:

- Our **mental grammar** produces and comprehends **sentences** using a **hierarchical structure**
- Some sentences have more than one **meaning** because they have more than one **structure**
- Sometimes the different structures are assigned different **pronunciations** (such as prosodic breaks)

7. Reading and syntax

When we read a written text in real time...

- Sometimes we (temporarily) **choose** the “wrong” structure in our mental parser
 - This can impede understanding
- A **text** doesn't provide access to the **prosodic** information that might disambiguate two structures
 - There are exceptions: How can (some) prosodic information be represented in text?
 - There's a trade-off between phonological detail and ease/speed of reading

8. A deeper look at structural ambiguity

Note: Section 8 of the lecture outline is optional material

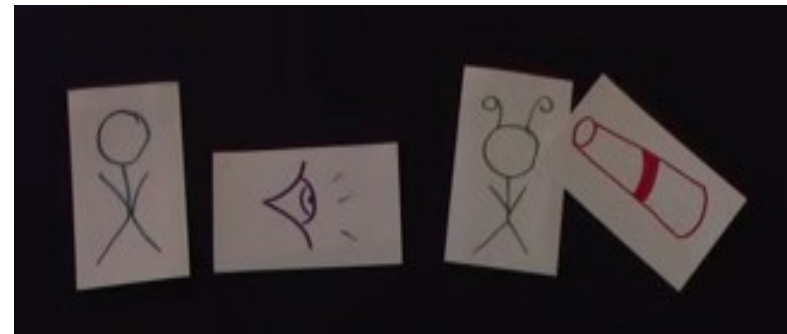
- To be covered in class if time permits
- For your information if you are interested in learning more about syntax
- Two structures and **two possible meanings**
Ingrid saw the Martian with a telescope
 - What are the two possible **meanings**?
 - What is the **evidence** that they correspond to two different **structures**?

8. A deeper look at structural ambiguity

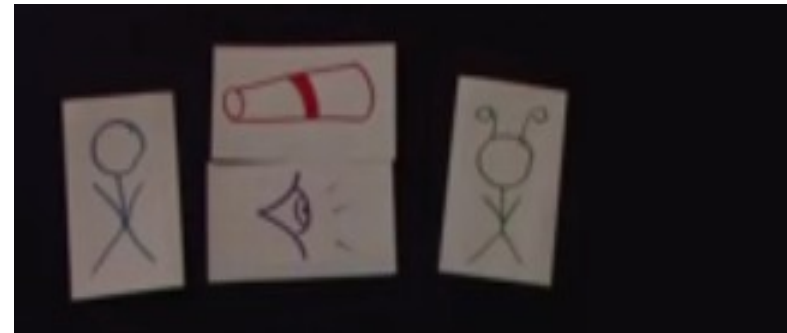
- What are the **two possible meanings?**

*Ingrid **saw** the **Martian** **with a telescope***

#1: **the Martian has**
a telescope



#2: **the seeing happened**
by means of
a telescope



- How do we know that they correspond to two different **sentence structures?**

8. A deeper look at structural ambiguity

- When we examine the mental grammar of native speakers (of any language), we find that **within a sentence, words form subgroups**
 - These subgroups are called **constituents**
- Evidence: Constituents can be **replaced** or **moved**

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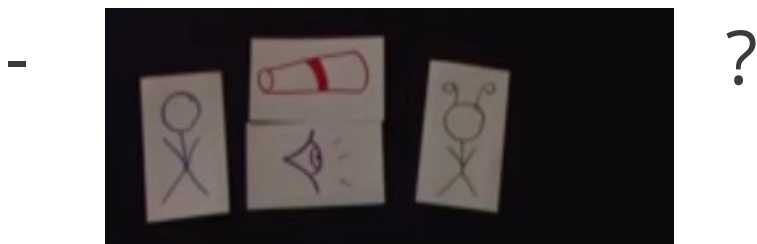
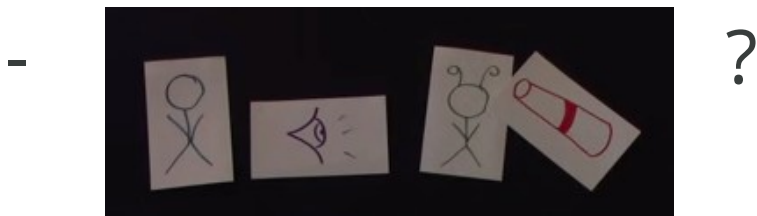
- Which **meaning** goes with which **structure**?

Ingrid saw the Martian with a telescope.

Ingrid saw** **it.

Ingrid saw the Martian with a telescope.

Ingrid saw** **it** **with a telescope.



8. A deeper look at structural ambiguity

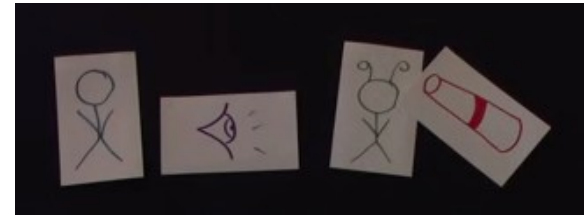
- Which **meaning** goes with which **structure**?

#1: **the Martian has** a telescope

Ingrid saw **[the Martian with a telescope]**.

✓ Ingrid saw **it**.

✗ Ingrid saw it with a telescope.

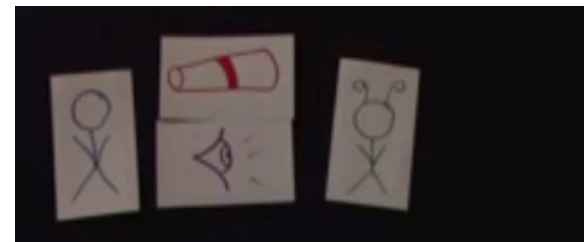


#2: **the seeing happened by means of** a telescope

Ingrid saw **[the Martian]** with a telescope.

✗ Ingrid saw it.

✓ Ingrid saw **it** with a telescope.



9. For next time

- We will look at some basics of visual processing of written text
- Use the discussion prep slides to help you work through the reading!