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Introduction to linguistics study guide

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Honors Project Cover Page

Introductory Linguistics Study Guide

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Abstract: A step-by-step guide to the major areas of introductory-level theoretical linguistics (phonetics, phonology, morphology, syntax, semantics, and pragmatics) with a focus on practical problem-solving. Designed to assist students in low-level linguistics classes and tutors of same by providing additional explanations, examples and exercises.

Introduction to Linguistics Study Guide

Anna Gartsman & Laura Hughes
Northeastern University Senior Honors Project 2006-2007

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Phonetics

Phonetics is the study of speech sounds.

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The International Phonetic Alphabet (IPA)

Objective: Transcribe English speech sounds in the international phonetic alphabet.

What is the international phonetic alphabet (IPA), and why do we need one?

The International Phonetic Alphabet is a way of transcribing speech as it's pronounced, which means it can be used to transcribe any language (so long as there are symbols for the sounds spoken in that language). Because there is a one-to-one correspondence between symbols and sounds in IPA, there are no problems with weird, ambiguous spelling, silent letters, etc. such as we often find in written English.

In phonetics and phonology, we use IPA to represent data sets of sounds from different languages. Using words written in IPA, we can focus on the sounds of a language without having to learn the writing systems of different languages—many of which don't have any writing system at all, or have one that isn't based on sounds (such as Chinese).

You can use your textbook or handouts or the charts provided here to learn the IPA symbols used for English consonants and vowels. Since many languages have sounds we don't use in English, you may be introduced to more symbols in later problem sets; but these symbols are all you need to start transcribing English speech.

Transcription Tips:

- **Sounds Not Spelling** When transcribing words into the IPA, focus on the sounds, not the way that they're spelled. Say the word aloud.
- **Normal (Fast) Speech** Be careful not to say the word too slowly and carefully, because that may change some of the sounds. The idea is to transcribe the way you usually pronounce the word in normal speech.
- **IPA Symbols Are Not the Same As Letters** An IPA symbol may look like an English letter, but represent a different sound than that letter normally does. This is especially true of vowels. Note, for example, that [e] is the vowel sound in "say" or "weigh", *not* in "bed" (that would be [ɛ]).
- **Ignore Silent Letters** Many English words have silent letters, the "e" at the end of "cape," for example. Remember, the difference between "cap" and "cape" doesn't have to do with the "e"—it's a different vowel between [k] and [p] (that is, [kæp] vs. [kep]).
- **Your Pronunciation May Vary** Even within English, people with different dialects may pronounce words differently. (Again, this is especially true of vowels!) There may be more than one way to transcribe a word, but there is only one way to transcribe the word the way *you* say it.
- **Use Your Friends** If you're worried that your accent or dialect is too non-standard, or if you can't tell what sound you're saying, ask someone else to say the word. If you're worried about "priming" them to pronounce the word the way you do, write down the word and have them read it to you.

The charts on the following pages give examples of the English consonants and vowels. We transcribed the words into IPA using our own dialect of Standard American English; your mileage may vary. (The symbols in parentheses show alternative symbols for the same sound.)

Phonetic Alphabet Chart: Consonants of English

IPA Symbol	Example (Standard Orthography)	Example (IPA)
p	**p**owers, su**p**erhero, ca**p**e	**p**awərz, su**p**ərhiro, ke**p**
b	**B**atman, Ro**b**in, la**b**	**b**æʔmæn, ra**b**ən, læ**b**
t	**t**oxic, Green Lan**t**ern, invisible je**t**	**t**aksək, grin læn**t**ərn, ɪnvɪzəbəl dʒɛ**t**
d	**D**octor **D**oom, incre**d**ible, Alfre**d**	**d**aktər **d**um, ɪnkrɛ**d**əbəl, ælfrə**d**
k	**c**ostume, Do**c**tor O**c**topus, Hul**k**	**k**astjum, da**k**tər a**k**təpʊs, hʌl**k**
g	**G**otham, Ma**g**neto, Ro**g**ue	**g**aθəm, mæ**g**niɾo, ro**g**
f	**f**ortress, Al**ph**a **F**light, tou**gh**	**f**ortʃrəs, ælfə **f**lajt, tʌ**f**
v	**v**illain, Professor Xa**v**ier, Batca**v**e	**v**ɪlən, prʌfɛsər əgze**v**iər, bæʔke**v**
θ	**th**reat, Lex Lu**th**or, steal**th**	**θ**rɛt, lɛks lu**θ**ər, stɛl**θ**
ð	**Th**e Hulk, wea**th**er, scy**th**e	**ð**ə hʌlk, wɛ**ð**ər, saj**ð**
s	**S**uperman, la**ss**o, **s**pande**x**	**s**upərmæn, læ**s**o, **s**pændɛk**s**
z	**z**onk, la**s**er, disgui**s**e	**z**aŋk, le**z**ər, dəskaj**z**
ʃ (š)	**Sh**adowcat, radia**ti**on, Fla**sh**	**ʃ**ædokæt, redie**ʃ**ən, flæ**ʃ**
ʒ (ž)	trea**s**ure, Mira**g**e	trɛ**ʒ**ər, məra**ʒ**
h	**H**ulk, super**h**ero	**h**ʌlk, supər**h**iro
tʃ (č)	**ch**ampion, Wat**ch**men, laun**ch**	**tʃ**æmpiyən, wa**tʃ**mən, lən**tʃ**
dʒ (ǰ)	**j**ustice, ori**g**in, **j**ud**g**e	**dʒ**ʌstəs, ɔrɪ**dʒ**ən, **dʒ**ʌ**dʒ**
m	**M**agneto, Aqua**m**an, cri**m**e	mægniɾo, akwə**m**æn, kraj**m**
n	**N**ightcrawler, spa**n**dex, Robi**n**	**n**ajʔkralər, spæ**n**dɛks, rabə**n**
ŋ	super stre**ng**th, Batara**ng**	supər strɛ**ŋ**kθ, bæɾəræ**ŋ**
l	**L**ois **L**ane, Al**l**fred, Sma**ll**vi**ll**e	**l**owəs **l**en, æ**l**frəd, sma**l**vɪ**l**
r	**R**ogue, Alf**r**ed, Night**c**ra**w**le**r**	**r**og, ælf**r**əd, najʔk**r**alə**r**
w	**W**onder **W**oman, Night**w**ing	**w**ʌndər **w**ʊmən, najt**w**ɪŋ
j (y)	**u**nited, sla**y**er	**j**unajɾəd, sle**j**ər
ʔ	u**h**-oh, Ba**t**man	ʌ**ʔ**o, bæ**ʔ**mæn
ɾ	Magne**t**o	mægni**ɾ**o

Weird Consonants to Notice

ʔ *Glottal Stop:* Voiceless stop that's rare in English. It may almost seem like a short pause instead of a sound. "uh-oh" is the best example, but it can also replace "t" in certain words (like "mitten") in some dialects.

ɾ *Lateral Flap:* A quick flap of the tongue. Comes out sort of like a cross between a "t" and "d" sound, as in "butter".

j *Palatal Glide:* Be careful with word-medial [j]. Compare "layer" [lejər] with "lair" [ler].

Phonetic Alphabet Chart: Vowels of English

IPA Symbol	Example (Standard Orthography)	Example (IPA)
i	superh**e**ro	supərh**i**ro
ɪ	**i**nv**i**sib**i**lity	**ɪ**nv**ɪ**zəb**ɪ**ləɾi
e	c**a**pe	k**e**p
ɛ	incr**e**dible	ɪnkr**ɛ**dəbəl
æ	B**a**tm**a**n	b**æ**ʔm**æ**n
ʌ	B**u**ffy	b**ʌ**fi
ə	**a**bil**i**ty	**ə**bɪlə**ɾ**i
a	R**o**bin	r**a**bən
u	S**u**perman	s**u**pərmæn
ʊ	Doctor Octop**u**s	daktər aktəp**ʊ**s
o	R**o**gue	r**o**g
ɔ	l**aw**	l**ɔ**
aj (aɪ)	kryptoni**t**e	krɪptən**aj**t
aw (aʊ)	p**ow**ers	p**aw**ərz
ɔj (ɔɪ)	Superb**oy**	supərb**ɔj**

Weird Vowels to Notice

aj, aw, ɔj *Diphthongs:* Although written with two symbols, these count as one sound.

ə *Schwa:* Always unstressed. Usually comes out sounding like [ʌ] as in "cut". Found in longer words when another vowel is stressed.

ɔ *Low Back Round Vowel:* Not everyone has this sound in their dialect. Do you have a difference between "caught" and "cot"? If so, then "caught" would be [kɔt]. If not, they are both [kat].

IPA Transcription Exercises

I. Consonants

1. Write the IPA symbol for the *first* sound in these words:

sniffles	___	bronchitis	___
cold	___	pneumonia	___
flu	___	death	___

2. Write the IPA symbol for the *last* sound in these words:

rash	___	concussion	___
lacerations	___	hemorrhage	___
fracture	___	death	___

3. Write the IPA symbol for the *highlighted* sound in these words:

alco**h**olism	___	hemo**ph**ilia	___
dia**b**etes	___	can**c**er	___
hypo**th**yroidism	___	**ch**ronic death... syndrome	___

II. Vowels

1. Write the IPA symbol for the *first* sound in these words (just the first sound of the first word is fine if it's a phrase):

obesity	___	amnesia	___
epilepsy	___	aphasia	___
autism	___	attention deficit disorder	___

2. Write the IPA symbol for the *last* sound in these words (just the last sound of the last word is fine if it's a phrase):

dystrophy	___	sciatica	___
polio	___	punched in the jaw	___

3. Write the IPA symbol for the *highlighted* sound in these words:

borderl**i**ne	___	sch**i**zoid	___
bip**o**lar	___	paran**oi**d	___
obs**e**ssive compulsive	___	antisoci**a**l	___

III. From Orthography to IPA

1. Write the following words in IPA:

chlamydia	_____	gonorrhea	_____
hepatitis	_____	syphilis	_____

1a. Alternate exercises for people who find STDs discomforting:

fluffy bunnies	_____	sunshiney rainbows	_____
pretty unicorns	_____	grim death and despair	_____

2. Transcribe the following into IPA:

Do no harm.

Off with your shirt, let's have a look.

A few days with a cooperative test subject could be worth months of theoretical research.

IV. From IPA to Orthography

1. Write each word in standard English orthography.

pɪl _____ tot _____

pil _____ tɔt _____

pul _____ tat _____

pʊl _____ tut _____

pel _____

2. Write each sentence in standard English orthography.

aj kænt bəliv ju ʃat mi

---

dʌz ðæt hæv ɛni lɛmənz ɪn ɪt? aj hæv ʌ sɪtrəs ælərdʒi

---

maj hajpoglajsimiə ɪz nat əmædʒənd. aj wʌz dəstɪŋktli tɔld ðæt aj hæd ʌ blʌd ʃʊgər prabləm

---

V. Going Beyond

1. If you know another language, what (if any) sounds in that language cannot be represented using the symbols you now know?
2. Here's a passage from another dialect of English. Try transcribing into standard orthography. Can you guess what kind of dialect this is? (ɜ is a new vowel sound. To tell what it sounds like, try saying the word "nurse" without the "r".)

> fɜst rul əv dʒənɛtɪks: sprɛd ðə dʒinz əpaʔ, jʊ no! bət ðə rojəlz a əbsɛst wəθ,
> "a ju ə rojl fæmli? a ju ə rojl mɛmbə? wɛl ðɛn ju kən mæri mi kəz jɔ sem dʒin pul,
> ənd a aj kjuz wɪl go dawn ðə tojlət." fæntæstɪk! ðəts waj ðeə a no krezi rojəlz,
> ðeə dʒəst kajnd əv, "hɛlo! hɛlo, wət də ju du? o, jɔ ə plʌmə! wət an ɜθ əz ðæt?"[i]

Natural Classes

Objective: Define a natural class. Given a natural class, identify the sounds that belong to it. Given a set of consonants or vowels, identify what class, if any, they belong to.

What is a natural class?

A natural class is a way of describing a set of speech sounds that have something in common. In order for a set of sounds to belong to a natural class, there must be some way of describing them that:

- includes *all* the sounds in the set
- does not include any other sounds

Examples

- The set of sounds {p, t, k} is in a natural class of "voiceless stops".
- The set of sounds {n, ŋ, g} *do not* comprise a natural class because there is no natural class that will include all these sounds and only these sounds. One could say that they are voiced stops, and this would be correct, except that would also include /d/, /b/, and /m/, which are not part of the set.
- The set of sounds {p, b, m, n} do not comprise a natural class because while /p/, /b/, and /m/ are all bilabial stops, /n/ is not, and the natural class needs to include all the sounds in the given set.

Tips:

- **Look at the charts (next page).** When analyzing whether a set of consonants comprises a natural class, a good place to start is to look at the IPA chart and see if the sounds all fit into a particular row (manner of articulation) or column (place of articulation). For example, {m, n, ŋ} are all nasals, and {k, g, ŋ} are all velar sounds.
- **Don't forget about voicing.** Voiceless sounds are shaded in the consonant chart provided. All vowels are voiced.
- **Look at combinations.** If there is no clear natural class in the manner or place of articulation, try looking at a combination of the two. For example, {f,v} are labiodental fricatives – "labiodental" has to be mentioned in order to exclude other fricatives, such as /θ/ and /ð/.
- **Each sound is a natural class.** For example, {p} is the only member of the natural class voiceless bilabial stops.
- **Vowels have a different set of descriptors than consonants.** Vowels are distinguished from each other by frontness (front, central, or back), height (high, mid, or low), tenseness (tense or lax), and roundness (round or non-round). Check the chart for details. All vowels are voiced.

IPA English Consonant Chart: Manner of Articulation, Place of Articulation, Voicing*

		Place of Articulation						
		Bilabial	**Labio-dental**	**Inter-dental**	**Alveolar**	**Palatal**	**Velar**	**Glottal**
Manner of Articulation	**Stop**	p			t		k	ʔ
		b			d		g	
	Nasal	m			n		ŋ	
	Fricative		f	θ	s	ʃ		h
			v	ð	z	ʒ		
	Affricate					tʃ		
						dʒ		
	Approximant	w			r	j		
	Lateral Approximant				l			

** Shaded sounds are voiceless*

IPA English Vowel Chart: Height, Frontness, Tense/Lax*, Roundness**

		Frontness		
		Front	**Central**	**Back**
Height	**High**	i		**u**
		ɪ		**ʊ**
	Mid	e		**o**
		ɛ	ʌ, ə	
	Low			**ɔ**
		æ		a

** Shaded sounds are tense*
***Bold sounds are round*

Natural Class Exercises

I. List all the sounds in each class.

a. Voiceless
b. Fricative
c. Velar
d. Alveolar stop
e. Velar nasal
f. Mid
g. Round
h. Low back non-round
i. High tense

II. Determine whether the following sets of sounds are in a natural class. If so, what is the class?

a. {f, θ, s, ʃ, h}
b. {z, tʃ, dʒ}
c. {p, b, m, w}
d. {b, d, g, ʔ}
e. {u, ʊ, o}
f. {æ, a, ɔ}
g. {i, ɪ, ʊ}
h. {ʌ, ə, ɛ}

Features

Objective: Describe speech sounds in terms of their features.

Contents:

Overview
Consonant Feature Chart
Vowel Feature Chart
Example Problems
Exercises

What are features?

From the description of natural classes, it is clear that sounds have specific features (for example, [t] is alveolar, as is [n], but [k] is not). It is possible to think of every sound as a collection of features which distinguish it from every other sound. Each sound has a unique combination of features that can be used to identify or describe it, and these features are binary – either the sound has it, or it does not. This is indicated with a "+ 'feature'" or "- 'feature'" notation. For example, the sound [t] can be described as {+alveolar, -voice, -continuant}. This set of features describes only the sound [t] and no other sounds.

Distinctive features are features which differentiate sounds from each other. Whether or not a feature is distinctive depends on the set of sounds that one is describing. For example, if one wants to differentiate [t] from [d], there is only one distinctive feature: [t] is {–voice}, and [d] is {+voice}. These two sounds have all other features in common, so they are not distinctive features in this case.

Another aspect of distinctive features is redundancy – there are instances where one feature is a subset of another feature (for example, all {+nasal} sounds are also {+consonantal}). The idea is to use the narrowest feature possible: use {+nasal} instead of {+consonantal} to describe [n], because the feature {+nasal} is narrower in that it describes fewer sounds, and is therefore more descriptive. Once {+nasal} is used, there is no need to indicate that the sound is also {+consonantal} – that would be redundant, since all {+nasal} sounds are also {+consonantal}.

Describing sounds in features is similar to describing sounds in the terms of a natural class, but it is not identical. It is helpful to use the natural classes as a guide, but not all natural classes correspond to features (for example, "voiceless" is a natural class, but not a feature: that would be indicated by {-voice}).

List of Distinctive Features (Consonants)

Feature	- Feature	Included Sounds	Definition
consonantal	nonconsonantal	Consonants (not vowels, also not /w/ or /j/).	Consonants.
sonorant	obstruent	Nasals, approximants.	Equal air pressure inside & outside the vocal tract.
syllabic	nonsyllabic	Vowels and sometimes approximants	Can be the nucleus of a syllable.
voice	voiceless	Vowels, voiced consonants	Vocal chord vibration
continuant	stop	Fricatives, approximants. (Not nasals!)	Continuous passage of air through the mouth.
nasal	oral	{m, n, ŋ}	Air passes through the nose.
sibilant	nonsibilant	{s, z, ʃ, ʒ, tʃ, dʒ}	Jet of air through narrow passage toward obstacle (teeth)
lateral	rhotic	{l} but not {r}	Air flows along sides of the tongue
labial	non-labial	{p, b, m, f, v, w}	Use of lips
alveolar	non-alveolar	{t, d, n, s, z, l, r}	Use of alveolar ridge
palatal	non-palatal	{ʃ, ʒ, tʃ, dʒ, j}	Use of hard palate
velar	non-velar	{k, g, ŋ}	Use of velum
anterior	posterior	Labials, dentals, alveolars	Produced forward of the alveolar ridge.
coronal	noncoronal	Dentals, alveolars, palatals.	Use of tip and/or blade of the tongue.

List of Distinctive Features (Vowels)

Feature	- Feature	Included Sounds	Definition
high	low	i, ɪ, u, ʊ	Has to do with height of production in mouth.
low	high	æ, a	Has to do with height of production in mouth.
back	front	ʌ, ə, u, ʊ, o, ɔ, a	Has to do with location of production in mouth.
rounded	non-round	u, ʊ, o, ɔ	Lips are rounded.
tense	lax	i, e, u, o	Involve more constriction of tongue than lax vowels.

Distinctive Feature Chart (Consonants)

Feature	p	b	t	d	k	g	ʔ	m	n	ŋ	f	v	θ	ð	s	z	ʃ	ʒ	h	tʃ	dʒ	r	l	w	j
consonantal	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-
sonorant	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+
syllabic	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+/-	+/-	+/-	+/-
voice	-	+	-	+	-	+	-	+	+	+	-	+	-	+	-	+	-	+	-	-	+	+	+	+	+
continuant	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	-	-	+	+	+	+
nasal	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
sibilant	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	-	+	+	-	-	-	-
lateral	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-
labial	+	+	-	-	-	-	-	+	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	+	-
alveolar	-	-	+	+	-	-	-	-	+	-	-	-	-	-	+	+	-	-	-	-	-	+	+	-	-
palatal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	+	+	-	-	-	+
velar	-	-	-	-	+	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
anterior	+	+	+	+	-	-	-	+	+	-	+	+	+	+	+	+	-	-	-	-	-	+	+	+	-
coronal	-	-	+	+	-	-	-	-	+	-	-	-	+	+	+	+	+	+	-	+	+	+	+	-	-

Distinctive Feature Chart (Consonants)

Feature	i	ɪ	e	ɛ	æ	ʌ, ə	u	ʊ	o	ɔ	a
high	+	+	-	-	-	-	+	+	-	-	-
low	-	-	-	-	+	-	-	-	-	-	+
back	-	-	-	-	-	+	+	+	+	+	+
rounded	-	-	-	-	-	-	+	+	+	+	-
tense	+	-	+	-	-	-	+	-	+	-	-

Example Problems:

1. What sound(s) is/are described by this list of features?
   a. {+labial, +nasal}

      To find this sound, locate all the sounds that are {+labial}. Then, find out which {+labial} sounds are also {+nasal}. There is only sound that is both {+labial} and {+nasal}: [m].

   b. {+palatal, +continuant}

      As above, locate all sounds that are {+palatal}. This list includes: {ʃ, ʒ, tʃ, dʒ, j}. Of these, which sounds are {+continuant}? There are several: {ʃ, ʒ, j}. { tʃ, dʒ} are excluded because they are not continuant. So, the set of sounds described by the features {+palatal, +continuant} is {ʃ, ʒ, j}.

   c. {+palatal, +continuant, -consonantal}

      As in (b), locate the {+palatal, +continuant} sounds: {ʃ, ʒ, j}. Of these sounds, which are {-consonantal}? {ʃ, ʒ} are {+consonantal}; only [j] is {-consonantal}. So, the {+palatal, +continuant, -consonantal} sound is [j].

   d. {+low, -back}

      There are only two low vowels, {æ, a}. Only one, [a], is {–back}.

2. What list of features describe(s) this/these sound(s)? Make sure there are no redundant features, and the sound is described uniquely (no other sound is described by this list of features).
   a. [f]

      The place feature is a good place to start; [f] is {+labial}. We need to distinguish it from the other {+labial} sounds [p], [b], [m], [v], and [w]. Adding {+continuant} gets rid of the stops [p], [b], and [m], so we only need to deal with [v] and [w]. Both are {+voice} while [f] is {-voice}, so there's our third feature. Our complete list is {+labial, +continuant, -voice}.

   b. [r]

      [r] is {+alveolar}. We need to distinguish it from the other alveolar sounds, [t], [d], [n], [s], [z] and [l]. A nice way to get rid of everything except [l] is to add {+sonorant}. Now we just have to distinguish between [r] and [l]. The only difference is that [l] is {+lateral}, so we add that [r] is {-lateral}. The complete list is {+alveolar, +sonorant, -lateral}.

      Another way we could have gone instead of using {+sonorant} is to get of [t], [d] and [n] by adding {+continuant} to our list of features. Now we need to deal with [s], [z], and [l]. [s] and [z] are {+sibilant}, so we add {-sibilant} to our list. Now we still need to distinguish between [r] and [l], so we add{-lateral}. Our complete list is {+alveolar, +continuant, -sibilant, -lateral}. This is also correct, but less efficient, because it requires four features instead of three.

c. {k, g}

[k] and [g] are both {+velar}; the only other {+velar} sound is [ŋ]. To get rid of [ŋ] we just have to say {-nasal}. Hooray, the features are {+velar, -nasal}.

d. {u, ʊ}

You can start by saying that they are {+high}. Now you only need to differential them from {i, I}. Either {+back} or {+rounded} will do this. Since there are no high, back, non-round vowels and no high, rounded, non-back vowels, either way will work equally well. So there are two correct answers: {+high, +back} or {+high, +round}.

3. What are the distinctive features that differentiate these two sounds?

a. {θ, ð}

This is one of those many pairs where the only difference is that [ð] is {+voice}, and [θ] is {-voice}. So the feature involved here is {+/- voice}.

b. {s, ʃ}

The difference between these is place; [s] is alveolar and [ʃ] is palatal. There are features for both, so you can either say that the difference is {+/- alveolar} or {+/- palatal}.

c. {ʌ, ɔ}

If you look at the feature chart, you can see that the only difference between these two is that [ɔ] is {+round}. So {+/- round} is the relevant feature.

4. What are the distinctive features that differentiate these two *sets* of sounds?

a. {t, d} & {s, z}

To show the difference between these two sets, we need to describe each set individually. {t, d} are {-continuant, +alveolar, -nasal}. {s, z} are {+continuant, +alveolar, -sonorant}. The distinctive feature is {+/- continuant}: both sets are +alveolar, and even though it is unnecessary to state this for {t, d}, both sets are also {-sonorant}.

` b. {i, ɪ} & {u, ʊ}

{i, ɪ} are {-back, +high}. {u, ʊ} are {+back, +high}. The distinctive feature is {+/- back}, since both sets of vowels are {+high}.

Exercises

1. What sound(s) is/are described by this list of features?
   a. {-voice, +velar}
   b. {+rounded, -low, -high}
   c. {+voice}
   d. {+high, +tense}
   e. {+sonorant, +alveolar, -nasal}
2. What list of features describe(s) this/these sound(s)? Make sure there are no redundant features, and the sound is described uniquely (no other sound is described by this list of features).
   a. b
   b. dʒ
   c. w, j
   d. e
   e. æ, a
3. What are the distinctive features that differentiate these two sounds?
   a. {g, ŋ}
   b. {r, l}
   c. {i, u}
4. What are the distinctive features that differentiate these two *sets* of sounds?
   a. {p, b} & {k, g}
   b. {æ, a} & {ɔ, ʊ}

Phonology

A *phoneme* is a distinct speech sound in a language.

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Minimal Pairs

Objective: To identify minimal pairs.

Minimal pairs are pairs of words with different meanings and exactly one sound difference. For example, "cat" and "bat" are minimal pairs because only the first sound is different ([k] vs [b]). However, "cat" and "flat" are not minimal pairs, because there are two sound differences: ([k] vs [f] and [l].)

The reason we look for minimal pairs is to identify a *contrast* between two sounds. If two different sounds, placed in the same exact environment, produce different words with different meanings, then those sounds really are different *phonemes*. See the "Phonemes vs. Allophones" lesson in this section for more information.

Remember, the restrictions on minimal pairs are:

- The two words have different meanings
- Only one sound is different
- The words have the same number of sounds
- The sound that is different is in the same place in both words

Tips

- If the words are in English, they will probably be given to you in standard orthography. Remember, DO NOT RELY ON SPELLING! Write the words in IPA. Then you just have to compare the symbols. For example, in standard orthography it looks like "rewind" and "resigned" must have more than one sound change, but if you write them in IPA (rəwajnd, rəzajnd) you will see that they are actually minimal pairs (Again, your dialect may vary.)
- If the words are in another language, you will be given the transcription and a gloss (what the word means). So, you don't have to worry about trying to do a transcription into IPA.

Example Problems

1. Are the following pairs of English words minimal pairs?

a. raven, craven

IPA transcriptions: revən, krevən

These are not minimal pairs—they don't have the same number of sounds. The idea is to compare one sound with another, but there is no sound to compare [k] to, because it corresponds to no sound in the word "raven."

b. cab, cash

IPA transcriptions: kæb, kæʃ

These are minimal pairs. You're comparing [b] and [ʃ].

2. Consider this data set from another language, and determine whether the given pairs are minimal pairs or not.

a. Tagalog: kahon "box"

kaʔon "to fetch"

These two words have different meanings and one sound change (between "h" and "ʔ"). They are a minimal pair.

b. Inuktitut: iɡlu (snow)house

iɡlʊ (snow)house

These two words have the same meaning, so even though there is a sound change, they do not constitute a minimal pair.

Exercises

1. Are the following pairs of English words minimal pairs?
   a. law, jaw
   b. crime, time
   c. prison, prism

2. Consider this data set from Thai, and determine whether the given pairs are minimal pairs or not.
   a. baɪ ("sheet"), paɪ ("to go")
   b. bryy ("extremely fast"), myy ("hand")
   c. paɪ ("to go"), p^haɪ ("danger")

Phonemes vs. Allophones

Objective: To distinguish phonemes from allophones.

Definitions

So far, we've been describing speech sounds. Now we're going to distinguish between two types of speech sounds: *phonemes* and *allophones*.

> **Phoneme:** A speech sound that is distinct from other sounds in the language. Changing a phoneme changes the meaning of a word.
>
> **Allophone:** A speech sound that is a variation of some phoneme in a language. An allophone of a phoneme is a version of that phoneme which is always found in some particular environment.

Explanation

There is a lot of variation in the way that sounds are produced. For example, someone with a very high voice saying [k] creates quite a different sound wave than someone with a very low voice saying [k]. Yet we still recognize the two different sounds as being the same; they're the same phoneme. There's any number of individual or random variations that affect the quality of the sound, but which don't affect us as listeners and perceivers of language. We're wired to process phonemes, and string them into meaningful words in our minds, without noticing unimportant differences in how they sound from one speaker or moment to the next. What differences count as unimportant? Well, it depends on the language.

[s] and [ʃ]: Phonemes in English, allophones in Korean

Consider the difference between [s] and [ʃ]. (Quick, look at your IPA consonant or feature charts. What *is* the difference?) In English, we consider the distinction to be an important one: [s] and [ʃ] are different phonemes. One way to tell is that minimal pairs like "soot" and "shoot" have different meanings. Take a word, change the [s] sound to a [ʃ] sound, and you've got either a different word ("sop" becomes "shop") or meaningless nonsense ("soap" becomes "shoap").

So, [s] and [ʃ] are definitely different phonemes in English, but that isn't so in all languages. For example, in Korean, [s] and [ʃ] are allophones of the same phoneme. Changing [s] to [ʃ] does not change the meaning of the word; it just sounds a little strange.

[p] and [p^h]: Allophones in English, phonemes in Thai

The different symbols in the IPA chart you have represent sounds that are different phonemes in English. Now we'll describe a new set of sounds which are not in your IPA chart, but which you already know how to make if you are a native speaker of English—in fact, you use them all the time. These are the aspirated stops.

Consider the difference between words like "pot" and "spot". Say them, and really pay attention to how they sound, and how they feel. Can you tell the difference between the [p] is "pot" and in "spot"? Try really overemphasizing them. If you're still not sure, try holding a piece of paper in front of your mouth, or speaking at a lit candle. The paper, or the flame, should move when you say a word-initial [p] ("pa, pa, pa, pa") and stay still when you say [p] after [s] ("spa,

spa, spa, spa"). (If it doesn't, you may not have this difference with your particular dialect or accent. Don't worry—someone in your class will have it, and you don't need to *have* the difference to understand what it is.) The two kinds of [p] are really different sounds: one has an additional puff of air, which is called *aspiration*. Aspirated [p] like you find at the beginning of a word is written as [p^h], whereas the unaspirated [p] like you find in "spot" is written just as regular old [p]. You can find aspiration with every voiceless stop in English (so, [t] and [k] also). The candle trick also works with "stop" and "top," or "cab" and "scab," for example.)

Now, in English, these are not different phonemes. If you really try, you can get aspiration on a voiceless stop after [s] (try saying [st^hap]) or produce an unaspirated word-initial voiceless stop (try saying [tap])—it sounds weird to native speakers, but it doesn't change the meaning of the word.

There are some languages in which aspiration *is* a phonemic difference, though. For example, in the minimal pair exercise above, the Thai words paɪ ("to go") and $p^haɪ$ ("danger") constitute a minimal pair which contrasts aspirated and unaspirated [p]. Since the meaning of the word changes depending on which [p] is used, aspiration is a phonemic difference in Thai.

Psycholinguistic Research

How can phonemic distinction different cross-linguistically? Aren't sounds like [p] and [b] fundamentally different? In some ways, the distinctions we draw between different sounds are arbitrary. Take a pair like [r] and [l]. By slowing moving your tongue forward and back, you can switch continuously between the two sounds. They can be thought of not so much as two separate, concrete entities, but as ends of a continuum. Voiced/voiceless pairs are also like that. Suppose someone is making a bilabial stop followed by [a] (so, "pa" or "ba"). Because of the vowel, the speaker will have to start voicing at some point. Whether the listener hears a [p] or a [b] depends on the voice onset time. If voicing starts early, the listener will hear "ba"; if voicing starts late, they will hear "pa". But if the voicing starts at some in-between time, they have to make a judgment call.

The extent to which various sounds seem distinct varies from language to language. It may sound like [r] and [l] are very different because we are used to them being different; however, people who speak languages that don't treat [r] and [l] as different phonemes find that they sound very similar. In contrast, it may seem to native English speakers that [p] and [p^h] sound very similar, but to speakers of Thai, they sound entirely different.

Summary

- Even though there may be systematically different ways of pronouncing some sound (that is, different allophones of some phoneme), speakers of a language recognize the difference between different phonemes and usually fail to notice the difference between different allophones.
- Whether a pair of sounds represents two different phonemes or allophone variants of the same phoneme depends on the language.

Complementary and Contrastive Distribution

Objective: Distinguish between contrastive and complementary distribution. Know which one indicates phonemes, and which indicates allophones.

Definitions

> **Environment:** For these simple examples, the environment is simply the sounds before and after the ones we are looking at.
>
> **Contrastive Distribution:** Sounds that are in contrastive distribution can be found in the same environment. The sounds *constrast* and therefore they are different phonemes.
>
> **Complementary Distribution:** Sounds that are in complementary distribution are always found in different environments. The two sounds *complement* each other—that is, between them, they cover all possible environments. They are allophones of the same phoneme.

Explanation

We know that different phonemes can appear in the same surrounding word and create different meanings (minimal pairs). We also know that when there are different allophone variants of a phoneme, the environment determines which one appears (for example, in standard English, [pH] is always pronounced at the beginning of a word, never [p]). We can use this knowledge to determine whether the difference between a pair of sounds is phonemic or allophonic in a given language. If the two sounds can appear in the same environment (that is, with the same surrounding sounds), then they are in *constrastive distribution* and they are different phonemes. On the other hand, if the two sounds *always* appear in different environments—if there's a systematic way to tell when to use one sound and when to use the other—then they're in *complementary distribution* and they're allophones of the same phoneme.

Summary

- Phonemes are found in *contrastive distribution* (same environment)
- Allophones are found in *complementary distribution* (different environments)

Environments

Objective: Make charts showing the environments to compare two sounds, and make a decision about complementary vs. contrastive distribution. If complementary, decide which is the underlying phoneme.

Overview

In order to determine if a pair of sounds represents different phonemes or different allophones, we need to know whether they are in contrastive or complementary distribution. And in order to determine that distribution, we need to carefully look at the environments in which the sounds are found. If the sounds can be found in the same environment—if both sounds could come before and after the same surrounding sounds—then they're in contrastive distribution and they're phonemes. But if we can find some systematic difference in the environments, then we're looking at complementary distribution (allophones).

If there are minimal pairs that contrast the sounds you're looking at, you know right away that the sounds are different phonemes. If there aren't, though, you need to carefully look at the sounds before and after. One way to clarify the problem is to draw charts of the immediate environments of each sound.

Representing Environment

The environment of a sound means the sounds that come immediately before and after it. By convention, we write this as [preceding sound]_[following sound]. For example, the environment of [k] in the word [bækət] would be written s_ə.

Environment-Writing Tips:

- Word boundaries—the beginning or end of a word—are represented by the symbol #. The environment of the [k] in [luk] (the name "Luke") would be written u_#.
- A diphthong counts as one sound, so the environment for [k] in [skaj] is s_aj.
- Notice that a single word can have the letter of interest multiple times. For example, [luk skajwɔkər] has three separate environments for [k]:

  u_# s_aj ɔ_ə

Environment Charts: Step-by-Step

1. *Make a list of the environments for each sound of interest.*
   You will typically be comparing two sounds found in a data set. For each sound, go through the data set, writing down every environment where that sound is found. Keep the lists separate.

2. *Compare each side of one list to the corresponding side of the other list, looking for overlap.*
   Overlap means the same sounds appear in the same position (before or after the sound of interest) on both lists.

   If there is overlap on *both sides,* we can conclude the sounds are in contrastive distribution because they could, theoretically, appear in the exact same environment. There's no difference between the environments in which one sound occurs vs. the other sound, so the sounds themselves contrast. In other words, they're two different phonemes.

If there is *no overlap* on *one or both of the sides* (i.e. there is no over lap on either side OR either the right side or left side has no overlap, although the other may certainly have overlap), we can conclude the sounds are in complementary distribution, because they occur in systematically different environments. In other words, they are two allophone versions of the same underlying phoneme. Later sections will show how to tell which is the underlying phoneme and what rule governs the use of the allophone.

Example Problems

1. Consider this data from Tongan, a Polynesian language. Are [s] and [t] different phonemes, or allophones of the same phoneme?

tauhi	"to take care"	sino	"body"
sisi	"garland"	totonu	"correct"
motu	"island"	pasi	"to clap"
mosimosi	"to drizzle"	fata	"shelf"
motomoto	"unripe"	movete	"to come apart"
fesi	"to break"	misi	"to dream"[ii]

First off, we can check for minimal pairs, since that's the easiest way to tell that the two sounds are phonemes. There are none, so we can't conclude anything yet. We need to figure out if the sounds are in complementary or contrastive distribution.

Step 1. Make a list of environments for each sound of interest.
Our chart looks like this:

s	t
#_i	#_a
i_i	o_u
o_i	o_o
o_i	o_o
e_i	#_o
#_i	o_o
a_i	a_a
i_i	e_e

Note that since we care about variability, there's really no point in listing all the repeated environments in each list. So we could write the list like this:

s	t
#_i	#_a
i_i	o_u
o_i	o_o
e_i	#_o
a_i	a_a
	e_e

In the rest of the examples we present, we won't write repeat environments. For the purposes of comparing the lists, it doesn't matter whether you do or not. Just make sure, if you get rid of them, that you do it separately for each list—so if the same environment is in both lists, you definitely want to leave that.

Step 2. Compare each side of one list to that side of the other list, looking for overlap.

Let's look at the lists we made in the previous step. First, we will compare the left-hand side of each environment. (We re-wrote the lists one side at a time for this purpose, but you can do this visually in a number of ways--covering up the side you're not looking at, circling the side you are looking at, etc.)

Left-hand side comparison

s	t
#	#
i	o
o	o
e	#
a	a
	e

There's definitely overlap between these two lists: we see [o], [e], [a] and word boundaries (#) on both lists.

What does this mean? Well, if we find overlap on the right-hand side as well, then the sounds are in contrastive distribution (and are phonemes). However, if there is no overlap on the right-hand side, then we can conclude that they are in complementary distribution, and it's the sound on the right-hand side that causes the change from one allophone to the other. So let's check out the right-hand side.

Right-hand side comparison

s	t
i	a
i	u
i	o
i	o
i	a
	e

Absolutely no overlap. The list for [s] consists only of [i], and there are no [i]s on the list for [t].

Since we found no overlap on one side, we can conclude that the two sounds are in complementary distribution. They're allophones of the same phoneme.

2. Using the same data set from the previous problem (reprinted below), are [m] and [t] different phonemes, or allophones of the same phoneme?

tauhi	"to take care"	sino	"body"
sisi	"garland"	totonu	"correct"
motu	"island"	pasi	"to clap"
mosimosi	"to drizzle"	fata	"shelf"
motomoto	"unripe"	movete	"to come apart"
fesi	"to break"	misi	"to dream"[iii]

First, we check for minimal pairs, since that's the easiest way to tell that the two sounds are phonemes. There are none, so we can't conclude anything yet. We need to figure out if the sounds are in complementary or contrastive distribution.

Step 1. Make a list of environments for each sound of interest.
Our chart looks like this:

t	m
#_a	#_o
o_u	i_o
o_o	o_o
#_o	#_i
a_a	
e_e	

Step 2. Compare each side of one list to that side of the other list, looking for overlap.

First, we will compare the left-hand side of each environment.

Left-hand side comparison

t	m
#	#
o	i
o	o
#	#
a	
e	

There's overlap: [o] and word boundaries (#) occur on both lists.

What does this mean? Well, if we find overlap on the right-hand side as well, then the sounds are in contrastive distribution (and are phonemes). However, if there is no overlap on the right-hand side, then we can conclude that they are in complementary distribution, and it's the sound on the right-hand side that causes the change from one allophone to the other. So let's check out the right-hand side.

Right-hand side comparison

t	m
a	o
u	o
o	o
o	i
a	
e	

There's overlap on this side, too—[o] occurs on both lists. Since we see overlap on both sides, the sounds are in contrastive distribution, and we can conclude that [t] and [m] are different phonemes in this language.

Exercises

1. Consider the following data from English (use the IPA transcriptions, not the standard orthography glosses.) According to this data, are [θ] and [ð] allophones of the same phoneme, or different phonemes?

boθ	"both"	θɪŋk	"think"
ðoz	"those"	ðej	"they"
ræðər	"rather"	loð	"loathe"
θɪn	"thin"	ðɪs	"this"
faðərz	"fathers"	mæθ	"math"

2. Consider the following data from English. According to this data, are [n] and [ŋ] allophones of the same phoneme, or different phonemes?

mɛntəl	"mental"	æŋgwəʃ	"anguish"
ɪnstətuʃən	"institution"	tʃræŋk	"tranq"
lɪŋgər	"linger"	jɔn	"yawn"
hændəl	"handle"		

3. Consider the following data from Ganda. According to this data, are [l] and [r] allophones of the same phoneme, or different phonemes?[iv]

kola	'do'	omugole	'bride'
lwana	'fight'	lumonde	'sweet potato'
buulira	'tell'	eddwaliro	'hospital'
lya	'eat'	oluganda	'Ganda language'
luula	'sit'	olulimi	'tongue'

wulira	‘hear’	effirimbi	‘whistle’
beera	‘help’	emmeeri	‘ship’
jjukira	‘remember’	eraddu	‘lightning’
eryato	‘canoe’	wawaabira	‘accuse’
omuliro	‘fire’	lagira	‘command’

Going Beyond

In English, are [n] and [ŋ] allophones of the same phoneme, or different phonemes? Give data to support your answer. Does your answer support or conflict with your answer to exercise #2? If there is a conflict, how might you explain it?

Determining the Underlying Phoneme

Objective: Given two sounds in complementary distribution and their environments, determine which sound is the underlying phoneme.

Overview

The previous section, "Environments," described how to decide if two sounds are in contrastive (phonemic) or complementary (allophonic) distribution. If we find that two sounds are different phonemes, then that's about all we can say about them, but if they are two allophones of the same phoneme, there are still some questions to resolve. One important question is: which is the underlying phoneme? The basic answer to that question is *the sound that is in wider distribution*. Wider distribution means the sound could occur in more different environments.

To determine distribution, we look at the environment lists—specifically, the side with no overlap. Which list is more variable?

Example Problems

1. This is the right-hand (no-overlap) side of the environments in example #1 (Tongan data) of the previous section ("Environments"). Which sound is in wider distribution?

s_	t
i	a
i	u
i	o
i	o
i	a
	e

This is a very clear-cut case. [t] can occur before all sorts of vowels, and [s] can only occur before [i]. Therefore, [t] is in wider distribution and is the underlying phoneme.

2. Compare the following environments. Which sound is in wider distribution, [s] or [z]?

s_	z
#_	g_
f_	a_
t_	ŋ_
h_	i_
p_	o_
	m_

In this case, even though [z] looks like it appears with more sounds, all of these sounds can be combined in one category, namely "voiced" sounds (remember that all vowels are voiced). There is no way to group the environment of the [s] sound (because there is no way to group the word

edge with a sound), so [s] is the underlying phoneme, and [z] is the allophone of [s] that occurs in voiced environments.

The key points to remember in identifying the underlying phoneme are:

- **Wider distribution does not mean *the list with the most sounds***
- **Wider distribution means *the most variable list***
- **Only the side with no overlap has the relevant environment**

Exercises

For exercises 2 and 3 of the previous section ("Environments"), state which sound is the underlying phoneme. They are reproduced below for convenience:

1. Consider the following data from English. According to this data, which sound of [n] and [ŋ] is the underlying phoneme?

mɛntəl	"mental"	æŋgwəʃ	"anguish"
ɪnstətuʃən	"institution"	tʃræŋk	"tranq"
lɪŋgər	"linger"	jɔn	"yawn"
hændəl	"handle"		

2. Consider the following data from Ganda. According to this data, which sound of [l] and [r] is the underlying phoneme?

kola	'do'	wulira	'hear'
lwana	'fight'	beera	'help'
buulira	'tell'	jjukira	'remember'
lya	'eat'	eryato	'canoe'
luula	'sit'	omuliro	'fire'
omugole	'bride'	effirimbi	'whistle'
lumonde	'sweet potato'	emmeeri	'ship'
eddwaliro	'hospital'	eraddu	'lightning'
oluganda	'Ganda language'	wawaabira	'accuse'
olulimi	'tongue'	lagira	'command'

Going Beyond

1. Explain why we didn't ask for the underlying phoneme of the first exercise from that section.
2. Consider the Going Beyond question of the previous section ("Environments"): "In English, are [n] and [ŋ] allophones of the same phoneme, or different phonemes? Give data to support your answer. Does your answer support or conflict with your answer to exercise #2? If there is a conflict, how might you explain it?" Does considering the answer to the question provide you with more data which supports or contradicts the decision to label either [n] or [ŋ] as the underlying phoneme?

Rules

Overview

When we find that a pair of sounds constitutes allophones of the same phoneme, the next question is "When do we use which sound?" The general rule is that you start with the basic phoneme, and it turns into a specific allophone version of that phoneme in certain situations. For example, you might say, "/p/ becomes [p^h] at the beginning of a word," or more generally, "voiceless stops become aspirated at the beginning of a word." Formally, these rules would be written as follows:

Symbol Notation:

/p/ → [p^h] / #_

/p/ becomes [p^h] when it follows a word boundary (i.e. at the beginning of a word)

Feature Notation:

[-voice, -continuant] → [+aspirated] / #_

Voiceless stops become aspirated when they follows a word boundary
(i.e. at the beginning of a word)

You can see from the examples that the rules take this form:

/phoneme/ → [allophone] / environment,

where the arrow (→) means "becomes" and the slash (/) means "where/when". So some underlying phoneme becomes some specific allophone when some environment occurs. Your job when writing a rule is to figure out:

- What's the underlying phoneme and what's the allophone, and
- What environment triggers the use of the allophone

Feature Notation

Often, it makes more sense to use feature notation than symbol notation for rules. This allows you to see precisely what is changing. For example, if /k/ is showing up as [g] in a certain environment, you know right away that the change is in voicing, since [g] is simply the voiced version of [k].

Example Problems

1. In the "Environments" section, example problem #1, we looked at data from Tongan, and decided that [s] and [t] were in complementary distribution. Here are the environments:

s	t
#_i	#_a
i_i	o_u
o_i	o_o
e_i	#_o
a_i	a_a
	e_e

Write a rule in symbol notation which describes when each allophone occurs.

Remember that in "Determining the Underlying Phoneme," example problem #1, we decided that [t] was the underlying phoneme since it occurs in more variable environments (before [a], [u], [o], or [e], while [s] only occurs before [i]). Since [t] is the underlying phoneme, the rule will look like this:

/t/ → [s] / some environment

What environment do we want to put there? Well, we want to say when [s] occurs. Looking at the data, it's pretty clear that [s] only occurs before [i]. So that's what we write.

/t/ → [s] / _i

How would we write the rule for this example in feature notation? We'll have to consult our old phonetics charts to figure out the relevant features of [t], [s], and [i].

/t/ : {+alveolar, -voice, -continuant}
/s/ : {+alveolar, -voice, -continuant}
/i/ : {+high, -back, +tense}

Note that when we write the rule, we only have to include those features of allophone [s] that are *different* from the features of the underlying phoneme /t/.

{+alveolar, -voice, -continuant}→{-continuant} / _{+high, -back, +tense}

2. The English plural "-s" can be pronounced as either [s] or [z] depending on the context. Here's some data:

hobbits	habɪts	trolls	tʃrolz
elves	ɛlvz	wraiths	reθs
orcs	ɔrks	ponies	poniz
humans	hjumənz		

Write the rule (in feature notation) for when [s] appears and when [z] appears.

First, we write the environments as per the previous section.

s	z
t_#	v_#
k_#	n_#
θ_#	l_#
	i_#

We're concerned with the sound on the left (obviously, since the right side of both lists is composed entirely of word boundaries.) Because [z] occurs with both vowels and consonants and [s] occurs only with consonants, [z] appears to be in wider distribution. Therefore we could write the rule in symbol notation as follows:

/z/ → [s] / {t, k, θ}_

Now it's just a matter of converting the rule to feature notation. First of all, what feature, if any, is common to {t, k, θ} but not {v, n, l, i}? Consulting our chart, we see that {t, k, θ} are all unvoiced. Interestingly enough, voicing also accounts for the difference between [z] and [s].

{+alveolar, +voice, +continuant}→{-voice} / {-voice}_

Exercises
Consider the exercises in the previous section ("Determining the Underlying Phoneme"). Can you write the rule for these exercises? Remember to write in both symbol and feature notation.

1. Consider the following data from English. According to this data, what is the rule that predicts the occurrence of the [n] vs. the [ŋ] sound?

mɛntəl	"mental"	æŋgwəʃ	"anguish"
ɪnstətuʃən	"institution"	tʃræŋk	"tranq"
lɪŋgər	"linger"	jɔn	"yawn"
hændəl	"handle"		

2. Consider the following data from Ganda. According to this data, what is the rule that predicts the occurrence of the [r] vs. the [l] sound?

kola	'do'	wulira	'hear'
lwana	'fight'	beera	'help'
buulira	'tell'	jjukira	'remember'
lya	'eat'	eryato	'canoe'
luula	'sit'	omuliro	'fire'
omugole	'bride'	effirimbi	'whistle'
lumonde	'sweet potato'	emmeeri	'ship'
eddwaliro	'hospital'	eraddu	'lightning'
oluganda	'Ganda language'	wawaabira	'accuse'
olulimi	'tongue'	lagira	'command'

Going Beyond

1. In example problem 2, when we developed a rule for plural pronunciation, we decided [z] was the basic underlying phoneme. Given what the rule turned out to be, what's an alternate explanation for why [z] is in wider distribution than [s]? Could [z] and [s] actually be equally ranked (neither one more "underlying" than the other, or you can't tell)?

Rule-writing Conventions

<u>Symbols To Know</u>
/X/ X is a phoneme (underlying sound)
[Y] Y is an allophone (actual pronunciation in this environment)
-> "becomes"; "shows up as"
/ "when"; "where"; "in the environment of"
_ placeholder for the allophone, showing its location in the environment
C consonants
V vowels
Ø null/nothing
# word boundary (can be used for the beginning or end of a word)
$ syllable boundary

<u>Basic Rule Format</u>
/phoneme x/ -> [allophone y] / _ [trigger environment z]
/phoneme x/ becomes [allophone y] when it comes before [trigger environment z]

/phoneme x/ -> [allophone y] / [trigger environment z] _
/phoneme x/ becomes [allophone y] when it comes after [trigger environment z]

/phoneme x/ -> [allophone y] / [trigger environment z] _ [trigger environment α]
/phoneme x/ becomes [allophone y] when it comes between [trigger environment z] and [trigger environment α]

Analyzing Data Sets for Phonemic and Allophonic Distinctions

Objective: Given a data set, identify whether a pair of sounds represent different phonemes or allophones of the same phoneme in that language. If different allophones, write the rule.

Step-by-Step Guide

Each one of these steps is described in detail a previous section.

Question:

Consider the following data from Daga. Are [s] and [t] allophones of the same phoneme or of separate phonemes?

jamosivin	'I'm licking'	simura	'whisper'
jamotain	'they will lick'	otu	'little'
asi	'grunt'	topen	'hit'
anet	'we should go'	use	'there'
senao	'shout'	tave	'old'
urase	'hole'	siuran	'salt'
sinao	'drum'	tuian	'I kill'
wagat	'holiday'[v]		

Step 1: Write the environments

Make one list for each sound of interest. List every individual environment (preceding and following sound, separated by a place-holding underscore) in which that sound is found. Use a pound sign (#) to represent word boundaries (the beginning or end of a word.)

s	t
o_i	o_a
a_i	e_#
#_e	a_#
a_e	o_u
#_i	#_o
u_e	#_a
	#_u

Step 2: Compare the environments for overlap (one side at a time)

- Is there overlap on the left? Yes, because both the list for [s] and the list for [t] have [o], [a], # on the left side of the underscore.
- Is there overlap on the right? No, because the list for [s] has [i] and [e] on the right side of the underscore, while the list for [t] has [a], #, [u], [o]

Step 3: Make the call: phonemes or allophones

- Overlap on both sides means the sounds are in contrastive distribution and are phonemes.
- No overlap on either side means the sounds are in complementary distribution and are allophones of the same phoneme.

In this case, we have one side with no overlap, so the sounds are in complementary distribution and we can conclude they are allophones.

ALLOPHONES ONLY: Step 4: Write the rule
We need to fill in a rule of the form
/underlying phoneme/ → [allophone version] / environment

Step 4a. Decide which allophone is the underlying phoneme.
The allophone that is in wider distribution is the underlying phoneme. To determine distribution, we look at the side of the environments where we found no overlap.

Sounds following [s]	Sounds following [t]
[i]	[a] [o]
[e]	[u]#

Right away, we can see that [t] is in wider distribution because while [s] only comes before certain vowels, [t] comes before certain vowels *and word boundaries*.

Step 4b. Write the rule.
We already have all the information we need to write the rule in symbol notation.

Symbol Notation

/t/ → [s] / _ [i, e]
"/t/ becomes [s] before [i] or [e]"

For many rules, especially those with multiple sounds, it will make more sense to write at least part of the rule in feature notation. What's another way we can say "[i] or [e]"? Consult your vowel chart. What do they have in common (that [a], [o], and [u] do not have in common)?

Partial feature notation

/t/ → [s] / _ [-back, -low]
"/t/ becomes [s] before non-back, non-low vowels"

We can also put the whole rule into feature notation by describing [t] and [s] in terms of their features. First we must uniquely describe [t], then we can describe [s] in terms only of the feature(s) that make it distinct from [t].

(Note that because we are working with another language, there may be additional sounds/features to take into account. These will usually be provided for you if they are relevant. For the purposes of this problem, we will assume the features we developed for English are sufficient.)

Full Feature Notation

/+alveolar –voice –continuant/ → [+continuant] / _ [-back, -low]
"voiceless alveolar stops become continuant before non-back, non-low vowels"

Another Example Question
Consider the following data set from Tongan. Are [m] and [t] different phonemes, or allophones of the same phoneme (if they are allophones, provide the rule)?

tauhi	"to take care"	sino	"body"
sisi	"garland"	totonu	"correct"
motu	"island"	pasi	"to clap"
mosimosi	"to drizzle"	fata	"shelf"
motomoto	"unripe"	movete	"to come apart"
fesi	"to break"	misi	"to dream"[vi]

Following the step-by-step guide:
Step 1: Write the environments.

t	e_e
#_a	m
o_u	#_o
o_o	i_o
#_o	o_o
a_a	#_i

Step 2: Compare environments for overlap.
When we look at the left side of each sound, we notice that there is overlap – they share [#, o]. When we compare the right side of each sound, we notice that there is overlap there too – they share [o].

Step 3: Decide on phonemes or allophones.
Since there is overlap on both sides (contrasting distribution), this part is easy – these two sounds are distinct phonemes in this language.

Exercises
1. Consider the following data from English. According to this data, are [n] and [ŋ] phonemes or allophones (if allophones, provide the rule in symbol and feature notations):

mɛntəl	"mental"	æŋgwəʃ	"anguish"
ɪnstətuʃən	"institution"	tʃræŋk	"tranq"
lɪŋgər	"linger"	jɔn	"yawn"
hændəl	"handle"		

2. Consider the following data from English (use the IPA transcriptions, not the standard orthography glosses.) According to this data, are [θ] and [ð] allophones of the same phoneme, or different phonemes (if allophones, provide the rule in symbol and feature notations)?

boθ	"both"	ðej	"they"
ðoz	"those"	loð	"loathe"
ræðər	"rather"	ðɪs	"this"
θɪn	"thin"	mæθ	"math"
faðərz	"fathers"		
θɪŋk	"think"		

3. Consider the following data from Ganda. According to this data, are [r] and [l] phonemes or allophones (if allophones, provide the rule in symbol and feature notations):

kola	'do'	beera	'help'
lwana	'fight'	jjukira	'remember'
buulira	'tell'	eryato	'canoe'
lya	'eat'	omuliro	'fire'
luula	'sit'	effirimbi	'whistle'
omugole	'bride'	emmeeri	'ship'
lumonde	'sweet potato'	eraddu	'lightning'
eddwaliro	'hospital'	wawaabira	'accuse'
oluganda	'Ganda language'	lagira	'command'
olulimi	'tongue'		
wulira	'hear'		

4. Consider this data from Tongan, a Polynesian language. Are [s] and [t] different phonemes or allophones of the same phoneme (if allophones, provide the rule in symbol and feature notations)?

tauhi	"to take care"
sisi	"garland"
motu	"island"
mosimosi	"to drizzle"
motomoto	"unripe"
fesi	"to break"
sino	"body"
totonu	"correct"
pasi	"to clap"
fata	"shelf"
movete	"to come apart"
misi	"to dream"[vii]

Going Beyond

You may run into a problem at a certain point in this data set.

Consider this data from Tojolabal. Are [t] and [t^h] separate phonemes or allophones of the same phoneme? If allophones, what rule specifies their distribution?

tʃitam 'pig'	tʃatat^h 'kind of plant'
makton 'a patch'	mut^h 'chicken'
potot' 'kind of plant'	nahat^h 'long'
tinan 'upside down'	ʔinat^h 'seed'

Note: The ejective /t'/ is a separate phoneme and therefore will be considered as just another sound, not relevant to solving this problem.[viii] (Also, remember that /tʃ/ is one sound!)

Phonological Processes

Objective: Given a rule, determine what, if any, phonological process is at work.

Overview & Examples

Some phonological rules are examples of specific *phonological processes*.

Assimilation and Dissimilation

Assimilation is when a sound changes to be *more like* its environment; dissimilation is when a sound changes to be *less like* its environment.

Recall that rules are of the format:

/underlying sound/ → [surface sound] / environment

Therefore, in an assimilation rule, the surface sound (allophone) and environment will have some feature in common which the underlying sound lacks.

Example of an assimilation rule:

{+alveolar +continuant –voiced} → {+voiced} / {+voiced}_

In a dissimilation rule, the underlying phoneme and the environment will share some feature which the surface sound lacks.

Example of a dissimilation rule:

{+alveolar +continuant –voiced} → {+voiced} / {-voiced}_

Epenthesis and Deletion

So far we have looked at rules where a particular environment triggers speakers to use a particular allophone version of an underlying phoneme. Certain trigger environments can also lead to *epenthesis* (insertion of an additional phoneme) and *deletion* (dropping a phoneme in some environment).

<u>Rules With Ø (Deletion & Epenthesis)</u>

[X] -> Ø / Y _ Z

"X is deleted between Y and Z"

Ø -> X / Y _ Z

"X is inserted between Y and Z"

Examples

1. Consider the following words in English (pronounce them together as you would in normal speech):

"fast task"
"camp fire"
"first grade"
"second semester"

You may notice that some consonants are dropped (some may not be, depending on dialect). So, a lot of people pronounce these words in the following manner:

	underlying representation	surface pronunciation
"fast task"	[fæst tæsk]	[fæstæsk]
"camp fire"	[kæmp fajr]	[kæmfajr]
"first grade"	[fərst gred]	[fərsgred]
"second semester"	[sɛkənd sɛmɛstər]	[sɛkənsɛmɛstər]

What happens here is that the medial consonant in a cluster ([t] or [d] in this case) gets deleted in surface pronunciation. This is the process of *deletion.* The rule for this would be:

/t, d/ → Ø / C _ C

2. Consider the following words in Spanish:
escuela "school"
esperar "to wait"
esfera "sphere"
estructura "structure"

And the following loanwords from English:
estandar "standard"
esmoquin "smoking jacket"

What happens to the English words when they are borrowed into Spanish? It looks as if they are made to comply with the Spanish standard rules of pronunciation (which require an initial "e" [ɛ] before a sC cluster). So, an "e" is inserted to comply with Spanish pronunciation. This is the process of *epenthesis*. The rule for this would be:

Ø → [ɛ]/ #_sC

3. Consider the following words from English (pay attention to the vowels):

jab	jam
sag	sang
dad	Dan

You may notice that the vowel [æ] in the first column of words is slightly different from the same vowel [æ] in the second column. The [æ] in the second column is nasalized. The reason for the nasalization becomes clear when we look at the environments. The environment on the left side is the same, so the difference must be on the right. In the first column, the sounds on the right are all voiced oral stops; in the second column, the sounds are all nasal stops. So, the vowel *assimilates* to its environment (becomes nasalized when it's next to a nasal sound):

/æ/ → [+ nasal] / _ [+nasal] C

4. Consider the following data from Kitharaka[ix] (ɤ is a voiced velar fricative):

/ka + pandi/ → [ɤapandi] a small grasshopper
/ke + tuɤe/ → [ɤetuɤe] a pole
/ka + cuma/ → [ɤacuma] a small piece of iron
/ke + kundi/→ [ɤekundi] a group

What happens when a [ke] or [ka] prefix is added to a word that starts with a voiceless sound? The [k] in the prefix becomes voiced, so that it is different from its environment. Notice here that the vowel between the two consonants does not seem to play a role. This is sometimes the case with phonological data sets – sometimes, the environment that triggers a change is not the immediate environment. So, in this case of *dissimilation*, the rule is:

/k/ → [+ voice] / _ V [-voice]C

Here, it is the voicing that is important, so we ignore, in partial feature notation, the change from –continuant to +continuant that also occurs.

Exercises

1. Consider the following data from a dialect of English sometimes spoken in Eastern Massachusetts (":" next to a vowel indicates a long vowel); what phonological process could account for the transformation from underlying to surface form? Provide the rule:

underlying form	*surface form*	*orthography*
[sɔ:ɪŋ]	[sɔ:rɪŋ]	sawing
[aɪdɪə]	[aɪdɪəɹ]	idea
[wɑʃɪŋtən]	[wɑɹʃɪŋtən]	Washington
[klɑθ]	[klɑɹθ]	cloth

2. Consider the following data from English; what differences in pronunciation do you find among the basic word and the word with an attached suffix? Pay specific attention to the last sound in the root word. What phonological process could account for the transformation? Provide the rule:

Root	*Root + morphology*
hand	handed
long	longer
limb	limber

3. Consider the following data from English; keep in mind that all of these words have the same underlying prefix: “con-”. What phonological process could account for the transformation from underlying to surface form of the prefix “con-”? Provide the rule:

conjoin	commerce
contraction	compose
contemplate	comply
conspire	combine
configure	
conclude	

4. Consider the following data from English; keep in mind that all of these words have the same underlying suffix: “-al”. What phonological process could account for the transformation from underlying to surface form of the suffix “-al”? Provide the rule:

Noun	*Adjective*	*Noun*	*Adjective*
person	personal	pole	polar
region	regional	circle	circular
autumn	autumnal	single	singular
cause	causal	uvula	uvular

Morphology

A *morpheme* is the smallest unit of meaning.

Lessons

Basic Lexical Categories (Noun, Verb, Adjective, Adverb)
Morphology Terms & Definitions
- Terms & Definitions

Subcategorization Frames
- Overview
- Step-by-Step
- Tips
- Example Problems
- Exercises

Morphology Trees
- Overview
- Step-by-Step
- How do I tell…?
- Example Problems
- Exercises

Zero-Derivation
- Overview
- Example Problems
- Tips
- Exercises

Morphology in Other Languages
- Terms & Definitions
- Agglutinating Language Puzzles

Word Formation Processes
- Chart: Word Formation Processes

Basic Lexical Categories (Noun, Verb, Adjective, Adverb)

For morphology and syntax, it is vital to be familiar with these lexical categories. (In syntax, we also discuss prepositions, determiners, qualifiers, quantifiers, auxiliaries, and complementizers—for that discussion, see "Lexical Categories" in the Syntax section.)

Nouns Typically defined as "person, place, or thing." Feelings and ideas are also nouns.
Examples: John, genius, Atlantis, space ship, computer, regret, sadness, loyalty, milk, noun

You Know It's A Noun If...

It's someone's name (like "Meredith" or "Dr. Zelenka"),
OR it's a pronoun
- Pronouns are stand-ins for nouns—"he", "him", "she", "her", "it", "they", "them"

OR you can precede it with a determiner
- That is, the word can go after a word like "a", "the", "this", "that", "those", "these"

OR you can add noun-specific inflectional morphology
- That is, you can make it plural (usually by adding "-s" or "-es")

Verbs Typically defined as "action words."
Examples: run, jump, play, be, have, exist, sleep, consider, like, dislike, zip, unzip

You Know It's A Verb If...

You can precede it with an auxiliary or modal
- That is, you can put the word after a helping verb like "have/has", "will", "can", "would", "should", "could"

OR you can add verb-specific inflectional morphology
- That is, you can make it past tense (usually by adding "-ed") or make it present tense continuing (by adding "-ing")

Adjectives Typically defined as "describing words." Describe nouns.
Examples: green, happy, worldly, disgusting, ugly, beautiful, unrealistic, useless, impenetrable

You Know It's An Adjective If...

It can describe a noun
AND you can make it comparative or superlative by preceding it with "more" or "most," or by adding adjective-specific inflectional morphology
- That is, you can make it comparative (like when you change "big" to "bigger", or "beautiful" to "more beautiful") or superlative (like when you change "big" to "biggest," or "beautiful" to "most beautiful")

Adverbs Describe qualities of verbs.
Examples: quickly, soundly, temporarily, often, sometimes

You Know It's An Adverb If...

It can describe a verb
Note: Most adverbs end in –ly. (This is not a hard and fast rule, however.)

Morphology Terms and Definitions

Objectives: To separate English words into the morphemes that compose them. To identify the root and the affixes. To identify whether an English morpheme is free or bound, and if bound, whether inflectional or derivational.

Morpheme

A morpheme is the smallest unit in language which holds meaning.

- A basic word like "cat" is a morpheme – the individual parts of the word (the sounds /k/, /æ/, /t/) don't have any meaning of their own.
- A word like "unsinkable" can be broken down into three morphemes: "un-" which means "not"; "sink" which means, well, "sink"; and "-able" which means "able to be..."

Types of Morphemes (Free and Bound)

Free morphemes can stand alone as their own word.
English Examples: cat, apple, sing, wonder, green, happy, of, above

Bound morphemes cannot stand alone as their own word but, instead, join to other words.
English Examples: un-, -ing, -able, re-, de-, -ist, -er, -s (plural)

Types of Bound Morphemes in English (Inflectional and Derivational)

Inflectional morphemes denote number, gender, tense, or case. (They don't really change the meaning of the root word, except to make it plural, past tense, etc.)

English Inflectional Morphemes (complete set)

That attach to... **nouns**	**verbs**	**adjectives**
plural **–s** (or **–es**) (dogs, churches)	present tense continuous **–ing** (running, jumping) past tense **–ed** (walked, slept) past participle **–en** (eaten, taken)	comparative **–er** (happier) superlative **–est** (happiest)

Derivational morphemes change the meaning of the root word. For example, adding the derivational morpheme "un-" to the root word "happy" turns it into "unhappy," a different word with a different meaning.

Some, but not all, derivational morphemes change the lexical class of the word; for example, "-ize" turns a noun into a verb. (Example: "energy", a noun, plus "-ize" results in "energize," a verb.)

It is possible to create novel words using derivational morphemes. (Somebody had to be the first to use the word "prioritize," for example.) Derivational morphemes that can and are frequently used to form new words are considered *productive.*

There are too many derivational morphemes list them all. For some common ones, see "Common Derivational Morphemes Chart"; but try to do the exercises in this chapter before you study the chart.

Roots
Every word has a single root—a free morpheme onto which other, bound morphemes may be attached.

- *Exception:* Compound words (like "pancake" or "blackboard") have two roots (free morphemes).
- *Bound Roots:* There are certain words which clearly have morphology, but which don't have a free root. (For example, "antagonist" and "antagonize" have the "-ize" and "-ist" suffixes as we know them, and they are certainly related in meaning, so it seems senseless to consider them separate, monomorphemic words; but the problem with separating them into "antagon" and "-ist" or "antagon" and "-ize" is that "antagon" cannot stand alone.) In our example problems, every word should have a free root, but if your teacher gives problems like this, and you need to find out how they are to be handled in your class.

Affixes
An affix is any morpheme that is added onto a root—in other words, any bound morpheme is an affix. In English, we have two kinds of affixes:

Prefixes: Attach to the beginning of a word, like "un-" or "dis-" or "re-".

Suffixes: Attach to the end of a word, like "-tion" or "-ing" or "-ist."

Other languages might have additional types of affixes, such as:

Infixes: Inserted in the middle of the root. In English we actually do have one infix, but only one: forms of the word "fucking," as in "abso-fucking-lutely!"

- *Note:* Don't make the mistake of identifying an affix as an infix just because it is neither at the beginning nor the end of the word. In "activation" (act+ive+ate+tion), "-ate" is NOT an infix—it's just the first suffix. Remember, infixes *only* occur when the root is actually broken into two pieces to surround the morpheme.

Circumfixes: Single morphemes that are broken into two parts and placed on either side of a root. There is no example of this in English.

- *Note:* Don't make the mistake of identifying a pair of different morphemes as a circumfix. A word like "unreliable" (un+rely+able) may have a root surrounded by morphemes on either side, but "un...able" is *not* a circumfix—they're two different morphemes which can be separated, mixed, and matched.

Subcategorization Frames

Objective: Write subcategorization frames for various derivational morphemes.

Overview

A subcategorization frame tells you what lexical category a morpheme takes, and what lexical category it produces.

For example, Take the suffix "-ize," found in words like "prioritize," "energize," and "ionize." All of these are verbs, so we know that the suffix "-ize" takes words and turns them into verbs. What kind of words does it take? Well, look at the roots this suffix is acting on:

priority + ize energy + ize ion + ize

"Priority," "energy," and "ion" are all nouns. From this evidence, we see that "-ize" takes nouns and turns them into verbs. So the subcategorization frame looks like this:

-ize: N -> V

Step-by-Step

Suppose we're trying to find the subcategorization frame for the suffix **–tion.**

1. Brainstorm some words that use this morpheme. I came up with "creation," "action", "retention," and "station."

2. Break down these examples, removing the morpheme. Here, we realize we need to throw out "station" since it seems to be a free morpheme on its own, not "sta + tion". (What's a sta?) The rest look like this:

create+tion act + tion retain + tion

3. Identify the lexical categories of the words, with and without the morpheme, and compare. "Create," "act" and "retain" are all verbs; "creation", "action" and "retention" are all nouns. So –tion takes a verb, and turns it into a noun. The subcategorization frame looks like this:

-tion: V -> N (evidence: "activation," "action," "retention")

Tips

- **Some morphemes have more than one meaning (and therefore, more than one subcategorization frame).** Much like words like "bat" have multiple meanings, many morphemes look and sound the same, but are really different, and may have different subcategorization frames. There are, for example, two kinds of "un-" and two kinds of "-er" (see example problems).
- **Roots might change spelling (or even pronunciation) when a morpheme is added.** You might have to do a little thinking to realize that, for example, the root of "detention" is "detain."
- **Be aware of the meaning of your morpheme (and choose evidence accordingly).** For example, "underwear" can't be used as evidence for the subcategorization frame of "un-"

as that is not the same "un-" that mans "not": "underwear" doesn't mean "not derwear." Similarly, although there is a word "bell," "rebel" isn't good evidence for "re-" since "re-" means "again" and "rebel" doesn't mean "bell again."

Example Problems

3. Give subcategorization frames for the following English morphemes. Support your answer with evidence (words using that morpheme). *Note: Some of these are intentionally tricky.*

a. un-

Think of words that start with "un-". First off, you have adjectives like "unhappy" or "unambitious." Then you have verbs like "undo" or "unwrap." Notice that the adjectives are all of the form un+adjective, and the verbs are all of the form un+verb.

Like many morphemes, "un-" actually has two subcategorization frames.

un-: Adj -> Adj (Evidence: "unhappy," "unambitious")
un-: V -> V (Evidence: "undo," "unwrap")

(There are some words, like "under," which do start with "un," but if you think about it, that's not the *morpheme* "un-". You can't split up "under" into "un" and "der" – "der" doesn't mean anything on its own. "Under" is a single, free morpheme.)

b. re-

What words start with "re"? I can think of verbs like "reheat" and "remodel."

I can also think of a handful of other verbs, like "revere," "rescue," and "repair," but I won't use these because I don't think they are using the *morpheme* "re." You can tell "revere" and "rescue" are monomorphemic (they have one morpheme) because they can't be broken down: there's no word "vere" or "scue."

There is a word "pair," but think about it: "re" means "again." "Repair" doesn't mean "pair again." Actually, the word "pair" and the word "repair" have nothing to do with each other; it's just a coincidental similarity. "Repair" is monomorphemic too!

So, we'll just go with those "do again" verbs: "reheat" meaning "heat again," and "remodel" meaning "model again". We know our subcategorization frame looks like this so far: "re: ?? -> V."

What are those words that "re" is attaching to? "Heat" and "model" could be nouns *or* verbs. Hmm. More evidence might clarify this. What are some other "re-" verbs? "Redesign" (also could be noun or verb); "recreate" (ooh, that's a verb); "relocate" (another verb!) Looks like "re-" attaches to verbs.

re: V -> V (evidence: "reheat," "recreate," "relocate")

c. –er

"-er" can either go at the end of adjectives, like in "happier" or "smarter"—this is the inflectional comparative. It can also be used to make words like "painter" or "writer", to turn a verb X into a noun meaning "person who does X".

There is no subcategorization frame for inflectional morphemes, since they don't change the meaning or lexical category of the root. So the only subcategorization frame we need to worry about is the one for the derivational, "person-who-does" "-er".

-er: V -> N (evidence: "painter", "writer")

Subcategorization Frame Exercises

1. Give subcategorization frames for the following English morphemes, giving your evidence. (If you cheat and use a chart of common morphemes, the angels will weep for you.)

a. –s
b. –ify
c. -ly

Common Derivational Morphemes Chart

Morpheme	Subcategorization Frame	Meaning	Examples
-able	V -> Adj	able to be Xed	washable
-al	N -> Adj		professional
anti-	N -> N	against X	antiwar
-ate	Adj -> V	make be X	activate
de-	V -> V	do reserve of X	deactivate
dis-	V -> V	do reverse of X	disestablish
-er	V -> N	one who Xs	baker, swimmer, singer
-ful	N -> Adj	full of X	beautiful, bountiful
-ify	N -> V	make be X	clarify, beautify
in-	Adj -> Adj	not X	indecent, inorganic
-ity	Adj -> N	the state of being X	normality, curiosity
-ish	Adj -> Adj	sort of X	greenish, prettyish
-ism	N, Adj -> N	belief in or support of X	egoism, creationism, universalism
-ist	N, Adj -> N	one who does, believes in or supports X	artist, egoist, creationist, universalist
-ive	V -> Adj		active
-ize	N -> V		terrorize, prioritize, energize
-less	N -> Adj	without X	clueless, penniless, careless
-ly	Adj -> Adv	in an X manner	hurriedly, happily
-ment	V, Adj -> N		establishment, merriment
mis-	V -> V	not X, not X correctly	misanalyze, misunderstand
-ness	Adj -> N		prettiness, niceness
-ous	N -> Adj		dangerous
re-	V -> V	X again	reheat, recreate
-tion/-ation/-ion	V -> N		creation, action, decision
un- (1)	V -> V	do reverse of X	untie, unlock, undo
un- (2)	Adj -> Adj	not X	unhappy, undecided
-y	N -> Adj		lucky, sexy

Morphology Trees

Overview: Draw morphology trees.

Overview

Morphology trees are diagrams used to illustrate:

(1) what are the individual morphemes in a given word,
(2) what order the affixes were added to the root,
(3) what each affix is *doing* to the word—that is, the subcategorization frame of the morpheme, and the lexical category of each word along the way.

Step-by-Step

Suppose we're trying to do a morphology tree for the word "activation."

1. *Divide the word into all its component morphemes.* For "activation", that's:

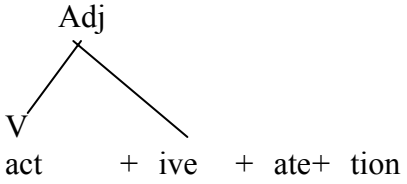
act + ive + ate + tion

2. *Give the lexical category of the root, and the subcategorization frames of the morphemes.* (If you can't do them all now… you may be able to fill them in later.) The root is "act," which is a verb. So we'll label "act" with its lexical category, and write the subcategorization frames off to the side.

V
act + ive + ate + tion

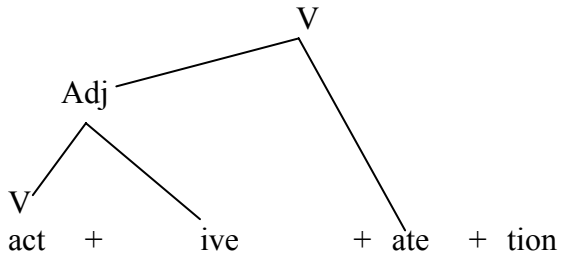
ive: V-> Adj (evidence: creative, explosive)
ate: Hmm. I can't think of many words that end in "ate." I'll leave this one for now.
tion: V->N (creation, action)

3. *Connect the root with first morpheme that's attached, and label with the lexical category of the new word.* We only have one option for which morpheme is attached first, because there is only one morpheme next to the root! (For more complicated cases, see "How do I tell…?") The new word, "active," is an adjective.

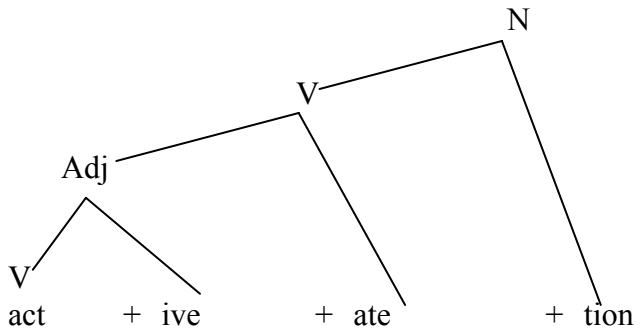


4. *Keep going until you have reached the top!*

"Activate" is a verb:



Finally, “activation” is a noun. Here is the final tree:



Subcategorization frames:
-ive: V->Adj
-ate: Adj->V
-tion: V->N

How do I tell what order the morphemes go on in?

Generally, the morphemes have to connect in order: in the above example, “activation” is not formed by combining “act” and “-ate” first, for instance. However, what happens when there are two possible morphemes that can connect next?

Let’s take, for example, the word “unbelievable”. This word is composed of three morphemes: un + believe + able. We know that believe is a verb, so we can start making the tree:

un: V→ V
un: Adj → Adj
able: V → Adj (“doable”, “imaginable”)

V
un + believe + able

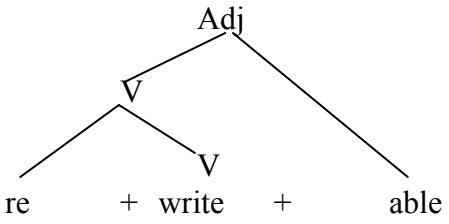
However, here we run into a problem. Does “un-” connect first, or does “-able”? There is a shortcut that can be used here because one of these morphemes connects to the root to make a word, and one of them does not. That is, “believable” is a word, but “unbelieve” is not. Therefore, we know that “-able” connects first.

However, it sometimes happens that both options create valid words. In that case, we need to look at the subcategorization frames. Let's take the word "rewriteable" as an example. It has the following structure:

re: V → V ("redo", "remove")
able: V → Adj

V
re + write + able

We know that "write" is a verb, but "rewrite" and "writeable" are both words, so the shortcut from above doesn't work here. We need to look at the subcategorization frames: "re-" takes a verb and produces a verb; "-able" takes a verb and makes an adjective. We know that "rewritable" is an adjective, so the end result has to be an adjective. The only frame that produces an adjective is "-able", so we know that "-able" has to connect last. Alternately, we can try to connect "-able" first, and see that "writeable" is an adjective, but "re-" can't attach to adjectives, so we are unable to attach the "re-" morpheme. So, the tree for "rewritable" looks like this:



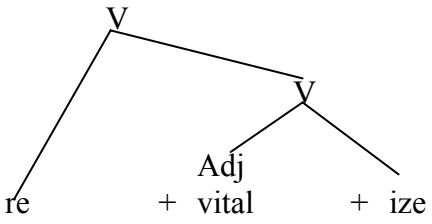
Example Problems

1. Make morphology trees for the following words:

a. revitalize

First, we break the word into its component morphemes: re + vital + ize. (Although –al is sometimes a separate morpheme, "vital" cannot be broken down further: "vit" alone is meaningless.) Vital is an adjective, so we can go ahead and label that.

Now we need to decide what morpheme is added first: "re-" or "–ize". I'm not sure if I've ever heard the word "vitalize," but "revital" is definitely not a word. It wouldn't even work with the subcategorization frames: "re-" takes verbs, and "vital" is an adjective. On the other hand, "-ize" takes adjectives, and makes them into verbs. So we know "-ize" needs to be added first, forming a verb ("vitalize") and then "re-" gets added onto that. The whole word remains a verb. The tree looks like this:

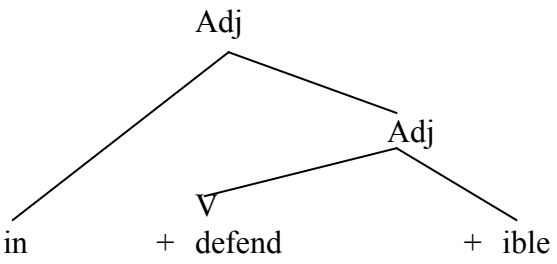


re-: V -> V
-ize: Adj -> V

b. indefensible

First, break the word into its component morphemes: in + defend + ible. ("-ible" is a variant of "-able".) The tricky thing is that this breakdown relies on the intuition that the root is "defend" and not "defense". Either one is possible given the spelling (the changing of /d/ to [s] could be one of those phonological changes that sometimes occur as a result of adding morphology). I chose the verb "defend" rather than the noun "defense" because the meaning of the word is "not able to be defended".

Now, choose which morpheme to add first. "Indefend" (or "indefense") is not a word, but "defensible" is. Furthermore, "-able" or "-ible" take a verb and turn it into an adjective, and "in-" must be added to an adjective. So we know "-ible" gets added first, then "in-" is added to the adjective "defensible."



in-: Adj -> Adj
-ible: V -> Adj

c. furtive

Although this word looks like it has morphology (the "-ive"), it really can't be broken down any more than it already is—"furt" cannot stand on its own. Since it is monomorphemic, there's really no tree—all you can do is label the word with its lexical category and call it a day.

Adj
furtive

d. misunderstandings

The morpheme breakdown:

mis + understand + ing + s

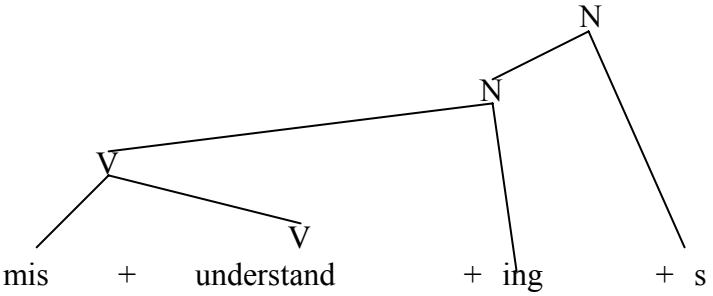
"Understand" looks like two free morphemes (a compound, perhaps) but since the meaning of "understand" doesn't have anything do with the meanings of "under" or "stand", we'll treat it like a single, non-compound, free root. Furthermore, we know that "understand" is a verb, so we can go ahead and label that right away.

Now, what order do we add the morphemes in? Recall that "-s" is inflectional (the plural morpheme for nouns) and that inflectional morphemes always get added last. So we know that much.

Next question: Is this "-ing" the inflectional "-ing" or the derivational "-ing"? If it's inflectional, then the whole word "misunderstanding" will be a verb (since inflectional "-ing" always works on verbs). If it's derivational, then the whole word will be a noun (since derivational "-ing" turns verbs into nouns). Actually, the word "misunderstanding" could go either way (a noun in sentences like "It was all a big misunderstanding" and a verb in sentences like "She was misunderstanding everything I said.") But the word "misunderstandings" must be a noun, since only nouns can be plural (in other words, "-s" is N -> N). So in this case, "misunderstanding" is a noun and "-ing" is derivational.

So we know that "misunderstandings" is going to be a noun, and "misunderstanding" is also going to be a noun. Now we just need to decide what to add to the root first: the "-ing" (V->N) or the "mis-" (V->V). Both take verbs, so either one could work on "understand". But if we add "-ing" first, we'll get a noun, and "mis-" can't work on a noun. On the other hand, if we add "mis-" first, we'll still have a verb, and "-ing" can work on it. So the only thing we can do is add "mis-" first and then add "-ing."

To sum up: we start with "understand", a verb; add "mis-" and we have "misunderstand", still a verb; add "-ing" and we have "misunderstanding", a noun; and finally, add the inflectional plural "-s" and we have "misunderstandings", a noun.



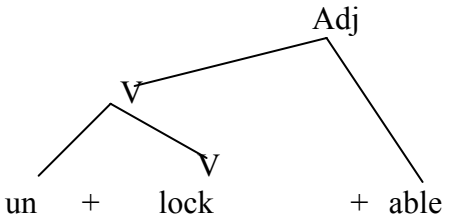
e. unlockable

The morpheme breakdown:

un + lock + able

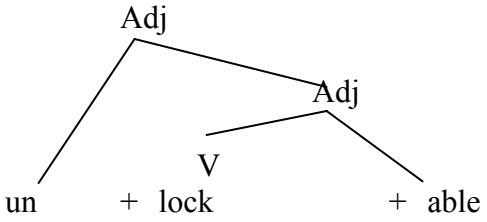
Here, it is crucial to realize that "unlockable" has two meanings. One meaning is "not able to be locked", as in "The lock is broken, so this door is unlockable". The other meaning is "able to be unlocked" as in "That door has a flimsy lock, it's unlockable with a credit card". Each meaning has a different tree structure, but both trees have a lot in common: both versions of the word are adjectives, both have "lock" as the root (and we know "lock" has to be a verb and not a noun because "-able" does not attach to nouns, and neither does "un-"). The difference is in the attachment of the morphemes. One of the meanings corresponds to "un-" attaching first, the other meaning corresponds to "-able" attaching first.

Let's draw the tree with "un-" attaching first:



Which meaning does this correspond to? We make the word "unlock" first, and then attach "-able". "-able" attaches to verb X, and makes an adjective that means "able to be Xed", so this structure means "able to be unlocked", which is the second meaning discussed above.

The other option is to attach "-able" first:



In this structure, we make "lockable" first, and then attach "un-" which, when attached to an adjective X, means "not X". So, this structure makes "not lockable", which is the first meaning discussed above.

Exercises

Make morphology trees for the following words:

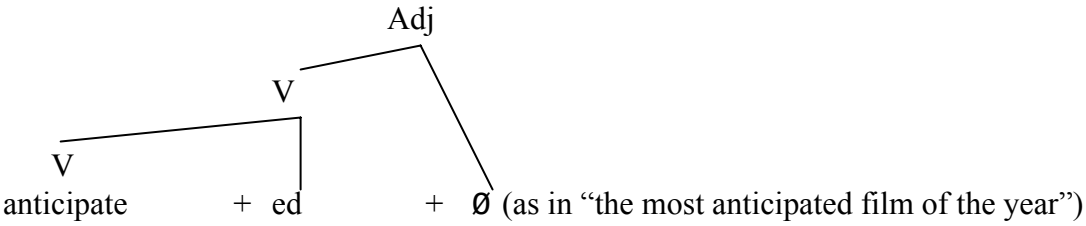
a. unmentionable
b. revelations
c. undeniably
d. untieable
e. deactivating

Zero Derivation

Overview

You know that "-ed" and "-ing" are inflectional morphemes which assign tense to verbs, as in "I waited for you all day, but you never arrived!" But what about, "This is the most anticipated film of the year"? What lexical category do you assign to "anticipated" in this context? How can you explain this?

One way to explain the adjectival "anticipated" in "the most anticipated film of the year" is to suggest that this is a new, derivational "-ed" which transforms verbs into adjectives. But there is an alternative explanation, which is that a new, non-pronounced (or null, written as Ø) morpheme is being added to the word. Ø can take any subcategorization frame you please.



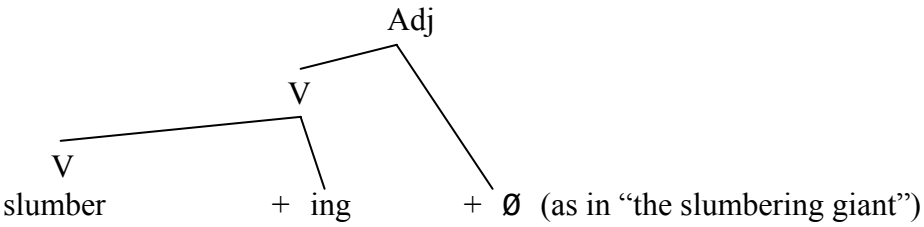
-ed: inflectional verb tense marker
Ø: V → Adj

Adding a null morpheme, or zero derivation, is the favored explanation because the practice of using a word in a different part of speech than usual is so widespread in English. Consider the following three sentences, where the word "baby" changes its lexical category without any attachment of morphology:

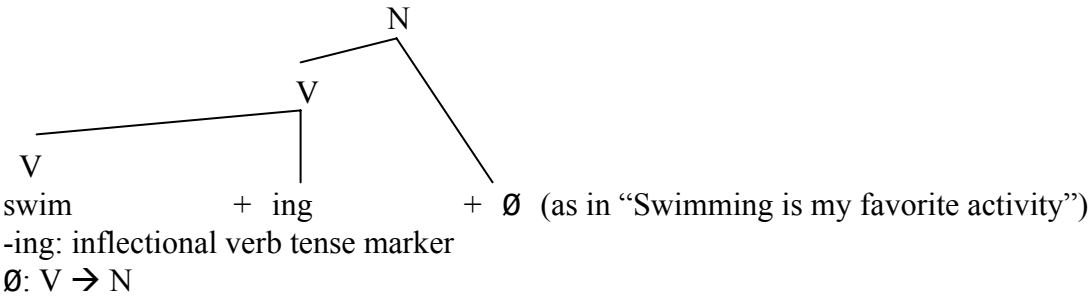
- He held the baby awkwardly. (noun)
- The baby mice were adorable. (adj)
- Her mother likes to baby her. (verb)

Example Problems

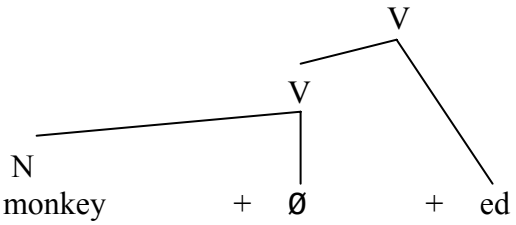
1. Show how to derive the adjective and noun versions of "-ing" words, as in "the slumbering giant" or "Swimming is my favorite activity."



-ing: inflectional verb tense marker
Ø: V → Adj



2. Show how to derive the past tense verb “monkeyed” as in “The children monkeyed around” from the noun “monkey.”



Ø: N → V
-ed: inflectional verb tense marker

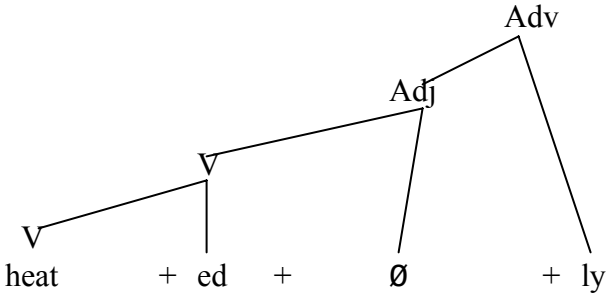
Notice that, unlike in the previous examples, we added the Ø morpheme before the other morphology. How do you tell what order to add the morphemes? Use the same skills you know from previous morphology problems: pay attention to the subcategorization frames and the meanings of the words.

Ø can take and produce any lexical category, but the other morphemes still have their usual constraints. As an inflectional morpheme, “-ed” takes and produces verbs. So it would be impossible to add “-ed” to a noun like “monkey” without first turning “monkey” into a verb using Ø.

This makes intuitive sense if you think about the meaning of the words. “Monkeyed” is the past tense of the verb “to monkey”, derived from the noun “monkey.” (Interesting, synonymous phrases with “to monkey around”—like “to fool around” and “to horse around”—also depend on zero derivation from nouns!)

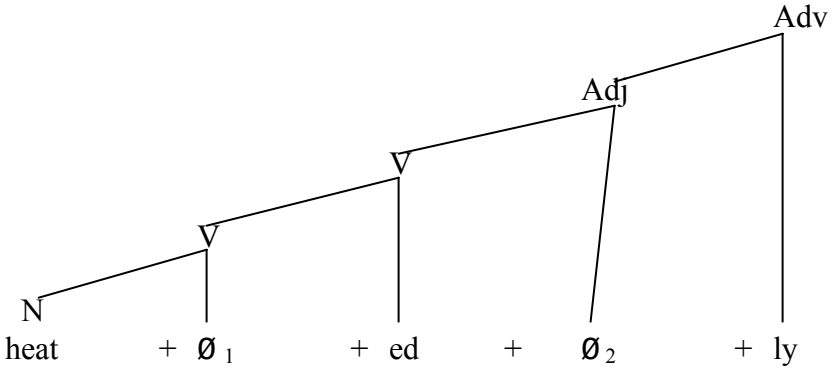
3. Show the derivation of the word "heatedly".

If you assume that "heat" is a verb, you can add "-ed" to make it past tense, and then zero-derive it into an adjective in order to add "-ly", which turns adjectives into adverbs.



-ed: inflectional verb tense marker
Ø: V → Adj
ly: Adj → Adv

You could also start out by assuming "heat" is a noun, in which case this word would have two instances of zero derivation.



-ed: inflectional verb tense marker
$Ø_1$: N→ V
$Ø_2$: V → Adj
ly: Adj → Adv

Is "heat" actually a noun or a verb? It's unclear which originated first, so you could go either way.

Tips

- **The null morpheme Ø can take and produce any lexical category.** Assign it whatever subcategorization frame you need to get through the problem.
- **Ø can be added after inflectional morphology.** Normally, inflectional morphology is added last (after all derivational morphology), but Ø may be added after inflectional morphology (and then more morphology may be added after that).

- **The original or underlying lexical category of a given word isn't always clear.** Remember the word "heat" from the examples--it might originally be a noun or a verb. If you can manage to consult one, an etymology dictionary may resolve the question. When in doubt, you may zero-derive or just assume that the word originally has the lexical category that would make life easiest for you; as always, your mileage (and your professor's) may vary.

Exercises

1. Business jargon provides a rich source of zero derived words. Provide tree structures for the following words:
    a. "actioning" as in, "I'll talk to Todd in accounting and see about actioning that for you."
    b. "table" as in "I think we should table this discussion for now."
2. Provide tree structures for the first two words in the sentence "Verbing weirds language."

Morphology in Other Languages

We can divide languages into the following groups according to how they handle morphology:

Isolating (or analytic): Almost every word is a free morpheme.
Example: Vietnamese[x]

khi tôi dên nhà ban tôi, chúng tôi bát dâu làm bài.

when I come house friend I Plural I begin do lesson

When I came to my friend's house, we began to do lessons.

Synthetic: Words consist of many morphemes. Types of synthetic languages:

Agglutinative: A sequence of morphemes are added in a specific order, and each morpheme represents one unit of meaning. Agglutinating languages tend to be very regular (with some exceptions, e.g. Georgian).
Example: Turkish[xi]

Turkish adds morphemes (mainly suffixes) to words, in a specific order, to indicate person, number, aspect, and other features of language:

ev house
evin your house
evinde at your house
Evindeyim I am at your house

Fusional: A single morpheme encodes several units of meaning.
Example: Latin

The Latin word "bonus", meaning "good man" has the suffix "-us" which indicates masculine gender, nominative case, and singular number. Changing any of these features requires a completely new suffix. For instance, to say "good men", thereby changing only the number (from singular to plural) requires the use of the suffix "-i": "boni". In an agglutinating language, only the appropriate affix indicating number would be changed.

Agglutinating language puzzles

Agglutinating languages puzzles consist of examining a set of data from an agglutinating language, and determining which affixes indicate which feature, and what order these affixes attach to the root word. Given a set of phrases and their glosses, we can try to figure out the morphological structure of a language.

For example, let's say that we have the following information:

MFL 1[xii]

English Gloss	*MFL phrase*
I see her	kurakax
He saw her	kuratix
I ate	tixoki
You (sg) wrote (to) her	elalix
She will eat it	elagoɤ
They (masc) see her	kurafax
I ate them (fem)	tixokir
You (sg) didn't eat them (inanimate)	tixolɲæ
We see them (masc)	kuramaz
They (fem) wrote	elani
He will write it	elatoɤ
She eats	tixoga
We write	elama
They (masc) will see them (inanimate)	kurafoɲ

What appear to be the distinctions that are identified in the English glosses? First, there are three different roots ("see", "eat", "write"). There are several tenses (present, past, future), and pronouns that sometimes differentiate between genders ("I", "He", "You", "She", "We", "They (fem)", "They (masc)"). There are also direct objects ("her", "them (fem, masc, inanimate)", "it"). So, let's find all the corresponding morphemes.

To do this, we need to analyze the MFL phrases that differ in only one element (do you recall "minimal pairs" from phonetics/phonology? The principle is the same). So, for example, the only difference between "I ate" and "I ate them (fem)" is the presence of the direct object "them (fem)". So, we can compare the MFL phrases "tixoki" and "tixokir". The only difference between them is the final "r", so we can assume that the direct object "them (fem) is indicated by the morpheme "r".

Now, we can try to find the root word for "eat". Look at "I ate" and then "She eats". There are two differences between these phrases: one difference is the pronoun, and the other is the tense of the verb. So, when we compare the two phrases, the root is what they have in common: "tixoki" ad "tixoga" have "tixo" in common, so that is probably the root.

Next, let's look at the first two examples. There, the root is probably "kura" (for "see") because that is what those two phrases have in common. Further, we can compare "he saw her" with "I ate", since we know both of the roots. "kuratix" and "tixoki" have one thing in common (if the roots are disregarded), namely the "i". Since both of these phrases are in the past tense, and there is no other similarity, we can conclude that "i" indicates past tense.

We can continue in this way until all the distinctions are identified, and we can also judge what order they are added to the words:

I	k
You (sg)	l
He	t
She	g
We	m
They (masc)	f
They (fem)	n

Present tense	a
Past tense	i
Future tense	o

Her	x
It	ɤ
Them (masc)	z
Them (fem)	r
Them (inan.)	ɲ

Negation	æ

See	kura
Write	ela
Eat	tixo

The order of the suffixes (all the affixes attach after the root) is as follows:

root + subject + tense + object + negation (mood)

Tips

- **You can start at any point.** You can start examining these puzzles from comparing almost any two phrases. If the first two you choose don't seem to give you any information, pick another two.
- **Don't judge by English.** Just because English has or does not have a particular feature, does not tell you anything about the language that you are analyzing. For example, as above, English does not differentiate between masculine and feminine "they" (e.g. a group of men vs. a group of women) but this language does.
- **Sometimes similarities are misleading.** In these puzzles, it is often possible to make a false assumption. The key is to keep track of all assumptions you make about a specific morpheme, and to be able to go back and modify the assignments if you run into a problem upon further analysis.
- **Sometimes, a particular feature is not indicated by a morpheme.** If you cannot find a morpheme that corresponds to a specific feature, that feature is probably indicated by the *lack* of a morpheme, or the null (ø) morpheme.

Exercise:
MFL 2
Find the following morphemes in the data set below:

Subjects	*Objects*	*Tense*	*Aspect*	*Roots*
I		present	progressive (-ing)	like
we	us	past	perfect (have done)	draw
you (sg)		future		wear
you (pl)	you (pl)			
he	him			
she	her			
they	them			
	it			

Also, find the order in which the morphemes attach.

English Gloss	*MFL phrase*
I am liking it	furynibusatinex
You will draw him	resœgenuvul
We like us	taloʃibusa
They had drawn you all	sutedvenuʔawɛt
I drew them	furɔmenuʔa
You (pl) will draw us	sisoʃenuvul
She is drawing him	ʃaðœgenutinex
We will have liked it	talynibusavulwɛt
You (sg) have worn her	resoforgotiwɛt
He drew	lytenuti
I had liked her	furofibusaʔawɛt
She draws them	ʃaðɔmenuti
You (pl) are wearing it	sisynorgotinex
He liked them	lytɔmibusaʔa
They have drawn her	sutofenutiwɛt

How would this language construct the following sentences?
a. I am wearing it.
b. You (pl) will like us.
c. He had drawn them.
d. She likes you (pl).
e. They will wear it.
f. I had liked you (pl).

Word Formation Processes

New words are created all the time. Here are some of the processes that account for the coining of new words. The "<" symbol means "comes from".

Process	Examples
adding morphology A new word is created by adding morphology to an existing word.	undead < un- + dead slayage < slay + -age embiggen < en- + big + -en
backformation A new word is created when people take a word that appears to have been created by adding morphology, and try to get at the root by removing the morphology. Happens due to a misanalysis of the origin of the original word.	pea < pease – -s resurrect < resurrection – -tion
compounding Two words are combined, retaining the entirety of both words.	weblog < web + log
blending Two words are combined, and some intermediate portions of both words are dropped.	smog < smoke + fog Bennifer < Ben + Jennifer
clipping A word is shortened.	lab < laboratory blog < weblog
initialism (or alphabetism) A sequence of initials used as a word (the individual letters are pronounced).	ATM < automatic teller machine ID < identification
acronym A sequence of initials used as a word (sounded out phonetically rather than saying individual letters).	NASA < National Aeronautics and Space Administrations laser < Light Amplification by Stimulated Emission of Radiation
generification People come to use a brand name to describe any similar product.	Kleenex (meaning any tissue) < Kleenex (meaning Kleenex brand tissue)
lexical shift (or zero derivation) Words that used to be one lexical cateogory are used in another, without adding morphology. The phrase "zero derivation" refers to the idea that a null (unpronounced) derivational morpheme is being added to the root to change its lexical category.	to Xerox (V) < (a) Xerox (N) to blog/blogging (V) < (a) blog (N)

If you like this, you'll love "Processes of Semantic Change" in the section on Semantics.

Syntax

Syntax is the study of sentence structure.

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Constituency

Objective: Decide whether an indicated group of words forms a constituent using the tests of substitution, question/answer, cleft, and pseudocleft.

Overview

A constituent is a word or group of words in a sentence that functions as a unit. That is, it can be taken out of the sentence, or moved, or replaced with other words, and these actions do not change the grammaticality of the sentence. These constituents are also called "phrases" (See: Syntax: Phrases).

Constituency tests are operations that can be performed on a group of words to see if it is a constituent. There are many of these tests; we will cover four of them. Generally, if two of the tests are passed, the group of words is a constituent. If three of the tests fail, then it is not a constituent.

Constituency Tests

1. Replacement/Substitution: replace the group of words with another word or phrase. For example:
    a. The pretty girl put the bowl on the counter.
    The pretty girl can be replaced with "she": She put the bowl on the counter. The pretty girl passes this constituency test. Pronoun-substitution is generally used for a noun and any adjectives that describe it (noun phrases).
    b. The pretty girl put the bowl on the counter.
    On the counter can be replaced with "there": She put the bowl there. On the counter passes this constituency test. "There" is generally used to substitute for a location (prepositional phrases).
    c. The pretty girl put the bowl on the counter.
    Put the bowl on the counter can be replaced with "did so": The pretty girl put the bowl on the counter. The ugly girl did so too. Put the bowl on the counter passes this constituency test. "Did so" is generally used to substitute for actions (verb phrases).
2. Question/Answer: form a question from the given sentence such that the group of words being tested is the answer. For example:
    a. The pretty girl put the bowl on the counter.
    The pretty girl should be the answer. The question would be: Who put the bowl on the counter? The pretty girl.
    b. The pretty girl put the bowl on the counter.
    On the counter should be the answer. The question can be: Where did the pretty girl put the bowl? On the counter.
    c. The pretty girl put the bowl on the counter.
    Put the bowl on the counter should be the answer. The question can be: What did the pretty girl do? Put the bowl on the counter.
3. Cleft: the cleft construction moves the words being tested into a different location. This construction follows the structure: "It is (/was/will be) possible constituent that (/who) rest of sentence." For example:

a. The pretty girl put the bowl on the counter.
It was the pretty girl who put the bowl on the counter.
b. The pretty girl put the bowl on the counter.
It was on the counter that the pretty girl put the bowl.
c. The pretty girl put the bowl on the counter.
It was put the bowl on the counter that the pretty girl did. (Note that this sentence is not acceptable to everyone; constituency tests are somewhat subjective. If you are unsure about a particular test with a particular example, use the other tests to provide further evidence.)

4. Pseudocleft: the pseudocleft construction is similar to the cleft in that it splits up the words being tested from the rest of the sentence. However, where the cleft construction moves the possible constituent to the front of the sentence, the pseudocleft moves it to the back of the sentence: "The thing that (/The person who/The place where/The reason why/What) rest of sentence is (/was/will be) possible constituent.
   a. The pretty girl put the bowl on the counter.
   The person who put the bowl on the counter was the pretty girl.
   b. The pretty girl put the bowl on the counter.
   The place where the pretty girl put the bowl was on the counter.
   c. The pretty girl put the bowl on the counter.
   What the pretty girl did was put the bowl on the counter. (Note that this is more acceptable than the same example with clefts – some movements seem more natural than others. This is why it is important to do several tests for each example).

Example Problems

1. Decide if the underlined portion of the following sentence is a constituent:
   John solved many mathematical equations for Meredith.
   If John is a constituent, then at least two of the constituency tests need to produce grammatical results:
   Substitution: He solved many mathematical equations for Meredith.
   Q/A: Who solved many mathematical equations for Meredith? John.
   Cleft: It was John who solved many mathematical equations for Meredith.
   Pseudocleft: The person who solved many mathematical equations for Meredith was John.
   Since John passes all of the constituency tests, it is a constituent.

2. Decide if the underlined portion of the following sentence is a constituent:
   John solved many mathematical equations for Meredith.
   If many mathematical equations is a constituent, at least two of the tests need to produce a grammatical result:
   Substitution: John solved them for Meredith.
   Q/A: What did John solve for Meredith? Many mathematical equations.
   Cleft: It was many mathematical equations that John solved for Meredith.
   Pseudocleft: The things that John solved for Meredith were many mathematical equations.
   The first three tests create valid sentences; the pseudocleft creates a more awkward sentence that may or may not sound grammatical to a specific individual. However, since at least two

of the tests produce a grammatical result, we can say that many mathematical equations is a constituent in this sentence.

3. Decide if the underlined portion of the following sentence is a constituent:
   John solved many mathematical equations for Meredith.
   As above, if John solved many is a constituent, then at least two of the tests need to produce a grammatical result:
   Substitution: (*) He mathematical equations for Meredith.
   Q/A: (*)What mathematical equations for Meredith? John solved many.
   Cleft: (*) It was John solved many that mathematical equations for Meredith.
   Pseudocleft: (*) The things that many mathematical equations for Meredith were John solved many.
   All four tests produce ungrammatical results; therefore, John solved many is not a constituent.

4. Decide if the underlined portion of the following sentence is a constituent:
   John solved many mathematical equations for Meredith.
   Once again, we perform the constituency tests to decide if for Meredith is a constituent, but these require some thinking:
   Substitution: John solved many mathematical equations there. (While "there" seems like an odd substitution for "for Meredith", there is no other word that will fit better. Whether or not this is a valid substitution is up to the individual.)
   Q/A: Why did John solve many mathematical equations? For Meredith. (While one may be tempted to ask "for whom" in this question, "for" is already used in the answer and cannot be repeated in the question. Whether or not "for Meredith" is a valid answer to "why" is up to the individual.)
   Cleft: It was for Meredith that John solved many mathematical equations.
   Pseudocleft: The reason John solved many mathematical equations was for Meredith. (This one is also unclear: is "for Meredith" really a valid "reason"?)
   Because some of these tests show unclear results, for Meredith may appear as a constituent to some people and not to others, depending on the grammaticality of the above statements.

Exercises

Decide if the underlined portion of the following sentences is a constituent (show the constituency tests used):

1. Meredith mocked John's solutions in the science lab.
2. Meredith mocked John's solutions in the science lab.
3. Meredith mocked John's solutions in the science lab.
4. Meredith mocked John's solutions in the science lab.
5. Meredith mocked John's solutions in the science lab.
6. Meredith mocked John's solutions in the science lab.
7. Meredith mocked John's solutions in the science lab.

Lexical Categories

Objective: Given a sentence, identify any given word's lexical category.

Overview

Lexical categories are often referred to as "parts of speech". Lexical categories are divided into two main groups: function words and content words.

Content Words: Generally, content words nouns, adjectives, and verbs – they are words that contain meaning in and of themselves.

Function Words: Function words, which include prepositions, determiners, and conjunctions, are used for grammatical structure and do not have inherent meaning. For example, "dancing" is a content word, whereas "with" is a function word.

Words can be different parts of speech in different sentences, depending on context. For example, both of the sentences below include the word "dancing". However, in one sentence, "dancing" is a verb, and in the other, it's a noun:

a) John is dancing with Meredith. (verb)
b) John likes dancing. (noun)

Similarly, "her" has different lexical categories in the following sentences:

a) He likes her. (noun)
b) Her books are on the table. (determiner)

Generally speaking, one can use the following rules to identify lexical categories. The rules for content words (nouns, verbs, adjectives, and adverbs) are described in the Morphology: Basic Lexical Categories section. These are not hard and fast rules; there are always exceptions. A non-exhaustive list of function words and their categories is in the Lexical Categories Quick Reference (later this section), but it is important to understand that some words can be in any of several lexical categories depending on the sentence; it's better to look at the role the word is playing in the sentence than what word it specifically is.

Nouns/Pronouns, Verbs, Adjectives, Adverbs: See Morphology Section

Determiners: The most common determiners are "the", "a", and "an"; however, there are others including possessive pronouns (his, her, their) and identifiers like this, that, and those. One simple test: a word is acting as a determiner if it can be replaced by "the" or "a"/"an".

Some examples:

- *A book is on the table*: Both "a" and "the" are determiners.
- *Her book is on that table*: Both "her" and "that" are determiners.
- *Our book is on his table*: Both "our" and "his" are determiners.
- *He gave his book to her*: Only "his" is a determiner in this case because it's the only word that can be replaced by "the" or "a"/"an". That is, "He gave the book to her" is an acceptable sentence, but "He gave his book to the" is not, even though "her" was an acceptable determiner a previous example.

Modals/Auxiliary Verbs: Auxiliary verbs are also called "helping verbs". In sentences where there are two verbs immediately next to each other, one of the verbs is a main verb and the other is an auxiliary. For example, "I am eating now" contains two verbs: "am" and "eating". "Eating" is the main verb; "am" is an auxiliary that helps determine the tense of the sentence. Auxiliary verbs can sometimes be main verbs. For example, in "I am here," "am" is the main verb. Likewise, in "I have seen a cat," "have" is an auxiliary, whereas in "I have a cat," "have" is the main verb.

Modal verbs are verbs that can never function as the main verb. There are nine of them in English: can/could, may/might, shall/should, will/would, and must. For example, in the sentence, "I could use a drink," "could" is the modal verb, and "use" is the main verb.

Conjunctions: Conjunctions connect two words or phrases of the same lexical category. For the purposes of this guide, the only conjunctions are "and", "but", and "or". For instance, "and" connects two nouns in the first sentence, two verbs in the second, and two whole sentences in the third:

- John **and** Meredith like to explore. (John and Meredith are connected by the conjunction)
- John flies planes **and** hates bugs. ("flies planes" and "hates bugs" are verb phrases connected by the conjunction)
- John sets them up **and** Meredith knocks them down (each side of the conjunction comprises an entire sentence)

Complementizers: Complementizers are words that introduce an embedded sentence. Some examples: that, because, if, whether, which. For example, the following sentence contains an embedded sentence that is introduced by the complementizer "that":

John is convinced **that** Meredith is stalking him.

"Meredith is stalking him" is a complete, embedded sentence. Note that this use of "that" is different from the previously discussed uses of "that" as a noun or a determiner. In this sentence, it is not possible to substitute another noun in place of "that", so it does not function as a noun. It is not possible to substitute "the" in place of "that," so it is not acting as a determiner.

It is conceivable to imagine a reading of the sentence where "that" is a determiner, but only if there is more than one Meredith, and the point of the sentences is that "*that* Meredith" is stalking John, and not "*this other* Meredith". However, this reading of the sentence is not the one that first comes to mind, so it is probable that "that" is a complementizer in this sentence.

Qualifiers: Qualifiers modify adjectives and adverbs. Common examples include rather, very, and quite. For example, in the following statement, "rather" modifies the adjective "incinerating" and "very" modifies the adverb "quickly":

Meredith's rather incinerating glare made John catch on very quickly.

Quantifiers: Quantifiers are "number" words such as: one, two, fifteen, 300, etc. They are also expressions that refer to number, such as: many, few, some, much, etc.

Prepositions: Common prepositions include: to, from, with, of, by, for, in, into, on, under, about, near, around, etc. Prepositions are notoriously difficult to define, but, in general, they are relational indicators: words which show the relationship between things (in space or in some other way, e.g. "with", "of"). Often, if the word doesn't fit into any of the other categories, it is probably a preposition.

Note that prepositions belong to a wider class, called adpositions. We call them "prepositions," with the suffix "pre-" meaning "before" because, in English, these words occur before the noun that they modify. In other languages, such as Japanese, they can occur after (e.g. "on the desk" in English vs. "the desk on" in Japanese). In Japanese the word corresponding to "on" would be called a postposition.

Lexical Categories Quick Reference:

Category	Examples
Determiner	the, a, an, her, his, our, that (also possessives, like "John's" in "John's hat")
Modal Verb	could, should, might, must, will, would, can, may, shall
Auxiliary Verb	any form of "be" or "have" when used with another verb
Preposition	in, on, around, above, with, about, near, within, from, by
Qualifier	rather, very, too, quite
Quantifier	one, three, 300, some, several, many, much
Complementizer	that, whether, because, if, which
Conjunction	and, but, or

Example Problems

Label all the words in the following sentences with the appropriate lexical category labels.

1. John likes Meredith.
   This is a simple example: "John" and "Meredith" are both nouns, and "likes" is a verb. So:

N	V	N
John	likes	Meredith.

2. John likes the scientist.
   In this example, "John" and "scientist" are nouns, "likes" is a verb, and "the" is a determiner:

N	V	D	N
John	likes	the	scientist.

3. John likes the pretty scientist from Canada.
   In this example, the new words are "pretty", which is a descriptor (adjective); "from", which is a preposition, and "Canada", which is a noun.

N	V	D	Adj	N	P	N
John	likes	the	pretty	scientist	from	Canada.

4. The scientists in the lab like that John thinks highly of them.
   Here, there are a few new categories. “That”, in this case, is a complementizer, because it introduces a new sentence (“John thinks highly of them”). Any sentence that has two different verbs (as opposed to a set of auxiliary + main verb) must contain a complementizer. “Highly” is an adverb. Like many adverbs, it ends in “-ly” and describes a verb (“thinks”). So:

D	N	P	D	N	V	C	N	V	Adv	P	N
The	scientists	in	the	lab	like	that	John	thinks	highly	of	them.

5. That scientist believes that he is smarter.
   Here, the two “that” words have different roles. The first one, as in “that scientist” functions as a determiner (you can replace it with “the” or “a”). The second one is a complementizer. “is” here is the main verb of the embedded sentence.

D	N	V	C	N	V	Adj
That	scientist	believes	that	he	is	smarter.

6. Everyone will see that John likes Meredith eventually.
   In this example, “will” is a modal/auxiliary verb. It is labeled as “mod”.

N	Mod	V	C	N	V	N	Adv
Everyone	will	see	that	John	likes	Meredith	eventually.

Exercises:

Label the words in the following sentences with appropriate lexical category labels.

1. Meredith loves chocolate.
2. Meredith loves chocolate truffles.
3. Meredith loves chocolate truffles with real milk chocolate.
4. Meredith loves chocolate truffles that John brought to the city.
5. All scientists adore John and his shiny brain.
6. Scientists from Canada detest the Antarctic winter with a fiery passion.

English Phrase Structure & Syntax Trees

Objective: Use phrase structure rules to draw syntax trees. Know the parts of a syntax tree and be able to describe and understand them.

Overview

There are language-specific rules of syntax that govern sentence structure. This section examines one way of looking at English syntax, with an internally consistent set of rules that is not complete (or entirely correct) but that shows, conceptually, how the sentence structure rules are used to create syntactic trees. Keep in mind that these rules are provided as an example of simple rules we might use to describe English; the ones used in your class might vary in terms of sophistication and/or labeling conventions.

Recall that in the section on constituency tests, we described units of the sentence which naturally go together, or "constituents." Now, we'll call constituents "phrases." We'll have a special kind of phrase for every kind of content word: nouns phrases, verb phrases, adjective phrases, and adverb phrases, as well as prepositional phrases.

English Phrase Structure Rules

CP → C IP
IP → NP I VP
NP → (Det) (Quant) (AdjP) N {PP, CP}
VP → V {PP, NP, CP, AdvP}
AdjP → (Qual) Adj
AdvP → (Qual) Adv
PP → P NP

The way to read these rules is as follows:

P In general, "P" means "phrase" (except in the case of Prepositional Phrases, in which case the first P means, funnily enough, "Prepositional.") The other letters correspond to lexical categories (the same abbreviations we used in the previous section, "Lexical Categories.")

I means "inflectional"; a sentence is known as an *inflectional phrase.* Auxiliaries and modals are considered inflectionals, as well as any tense information (more on this later).

Arrows → The phrase at the left of the arrow is the one "on top", which contains the elements to the right of the arrow.

Parentheses ( ) Optional elements are in ( ), required elements are not.

Brackets { } The elements included in { } can occur in any order and are also optional.

WARNING: These rules apply to English syntax only. Other languages have their own rules for word and phrase order.

Phrase Structure Rules, Abstracted
As you may notice from above, there are some regularities in the way phrase structure rules are formed. For one thing, every phrase has at least one non-optional element, which the phrase is named after: a noun phrase always has a noun, a verb phrase always has a verb, etc. That non-optional namesake element is called the *head.* Like every person, phrase has one head.

Beyond that, all the phrase structure rules are basically structured as follows:

Some Kind of Phrase (XP) → (Some Optional Stuff) X (Some more optional stuff)

where X is the head of the X-phrase (whatever X is). We call the stuff before the head the *specifier*, and the stuff after the head the *complement.* Thus the general phrase structure rule is

XP → Spec X Comp

Remember that even this seemingly basic rule *only applies to English*—Japanese, for example, puts the specifier after the head.

Key Points about Phrase Structure Rules

- The order of phrases is important, and is language specific. In English, a sentence must be composed of a noun phrase, an I (inflectional), and a verb phrase, *in that order*.
- Some elements could occur in many different phrases (an NP could be in an IP, a VP, or a PP, for example), while others can only occur with certain phrases. For instance, determiners can only occur in noun phrases, and adverb phrases can only occur in verb phrases (which makes sense, since adverbs modify verbs).
- *Recursion:* Any rule/structure which could, theoretically, go on forever is *recursive*. For instance, a NP can take PP (optionally) and the PP requires a NP. The NP within the PP can then take another PP, and so on. This creates a structure such as: "the box with the ribbon with the gold trim with the white lacing…" etc indefinitely.
- *Conjuctions:* There are additional rules for combining elements using conjunctions. So, there are additional rules for NP, VP, PP, and AdjP/AdvP as follows:
  NP → NP conj NP "John and Meredith"
  VP → VP conj VP "loved pie and hated citrus"
  PP → PP conj PP "with milk and with sugar"
  AdjP → AdjP conj AdjP "pretty and nice"
  AdvP → AdvP conj AdvP "quickly and efficiently"

As noted above, the specific rules from your class may differ; the important thing is that you follow the rules that you develop (whatever those rules are) so that your structures are consistent.

Tree Drawing Overview
We will use the phrase structure rules above to draw tree diagrams which show the structure of sentences in a pretty visual diagram. Some vocabulary for tree drawing:

Node: Any place on the tree which is labeled (e.g. N, NP, AdjP). The point of tree-drawing is to show how the nodes attach to each other.

Branch: A line on the tree showing relationships/attachments between nodes.

Mother: The node directly above/on top of another node (only when directly connected with a branch) is its parent.

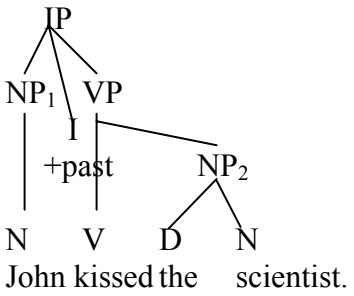
Daughter: The node directly below/under another node (only when directly connected with a branch) is its daughter.

Sister: Nodes which have the same mother are sisters.

Immediately dominates: A node *immediately dominates* any node which it contains/is on top of, as long as it is connected by one branch.

Dominates: A node *dominates* any node which it contains/is on top of, as long as it is connected by some series of branches (it need not be a direct, one-branch connection, but you may not include branches which lead to a higher level).

Examples
Here's a sample tree which demonstrates the vocabulary we've talked about so far. "Example Problems" (next page) gives more detail on how to draw these trees for yourself.



You can see how the phrase structure rules relate to the tree:

IP → NP I VP	The IP contains an NP, I, and VP
NP → (Det) (Quant) (AdjP) N {PP, CP}	NP_1 contains its only mandatory member, N. NP_2 also contains an optional determiner.
VP → V {PP, NP, CP, AdvP}	The VP contains a V and an NP, acceptable in the rule

- All of the labeled areas where branches can connect (IP, NP_1, I, VP, N, V, NP_2, D, N) are *nodes*.
- IP is the *mother* of NP_1, I, and VP. IP is not considered the mother of N (either one), V, D, or NP_2 because there is no direct connection between them.
- V and NP_2 are *daughters* of VP. Can you find some more mother-daughter relationships?
- NP_1, I, and VP are sisters. Can you find some more sister relationships?
- VP immediately dominates V and NP_2. IP dominates both VP and V (actually, IP dominates everything), but only immediately dominates VP.
- NP_1 is on a higher level than, say, D, it does not dominate D. There is no way to trace down branches from NP_1 to D without going up a level first.

Note that non-optional elements must be included in a tree regardless of whether a corresponding word is actually present in the sentence. Notably, "I" must always be included regardless of whether there is an auxiliary or modal verb that actually holds that position. The "I" is considered the head of the IP, and indicates the tense of the sentence. If there s no auxiliary or modal, the "I" is labeled with the tense of the sentence (e.g. +present, +past, +future).

In other cases where a position is indicated with no word holding that position, the general rule of thumb is to assume that the position is there in the mind, but the corresponding word is dropped in speech. In your tree, you will include the position but write a null symbol (Ø) where the corresponding word should be. This happens most commonly with CPs (complementizer phrases; see "Complex Sentences"). Sometimes, an embedded sentence is introduced with no complementizer, such as in the sentence "I heard John likes Meredith" (instead of "I heard *that* John likes Meredith").

Example Problems

Using the structure rules above, draw the following trees:

1. John likes Meredith

The first step is to label all the words with the appropriate lexical category:

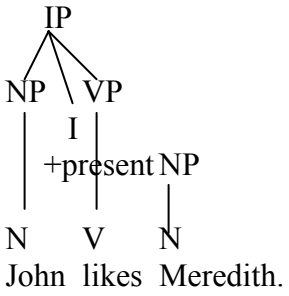
```
N     V     N
John likes  Meredith.
```

Now, we have to extend all the elements that are heads to their appropriate phrases (so N goes to NP, V goes to VP). It's a good strategy to find the subject N (in this case, John) and the main V and extend them higher than the rest of the sentence, since they will eventually connect to the main, top-level phrase, that is, the IP:

```
NP    VP
 |     |
 |     |     NP
 |     |      |
N     V     N
John  likes  Meredith.
```

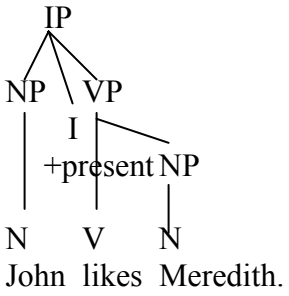
There are two steps left, which could be done in either order.

- By the rule, IP → NP I VP, we see that our top-level phrase, the IP, needs an NP and a VP. Handily, we have one. Connect the subject NP and the VP to the IP. Make sure to place the I under the IP, between the NP and VP, as it is required. Since no word corresponds to it, simply note the tense information (the sentence is in present tense.)



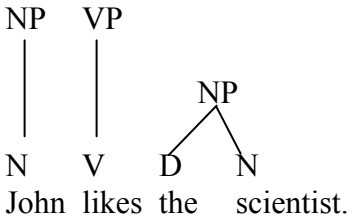
- Connect the object NP (Meredith) to the VP (likes). Generally, the object always connects to the VP (since it describes/belongs with/has to do with the verb), but in case there were any doubts, you can see that there's no other place for it to go. Crossing lines of the tree is not allowed, so only two nodes are open: the VP and the IP. Both are allowed to have an NP inside them (see the rules: VP → V {PP, **NP**, CP, AdvP} and IP → **NP** I VP), but our IP already has its NP, and the rule does not allow for an additional NP after the VP. So, the VP is the only place our NP can actually go.

Our final tree:

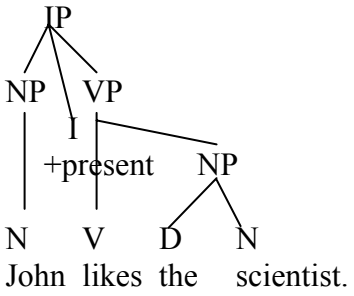


2. John likes the scientist

The procedure is similar here to the example above. The only special circumstance to note is that, by our current rules, determiners do not get their own phrase – they attach directly to the noun phrase of the noun they modify. In this case "the" attaches to the "scientist" NP:



Once this is complete, the tree is the same as above:

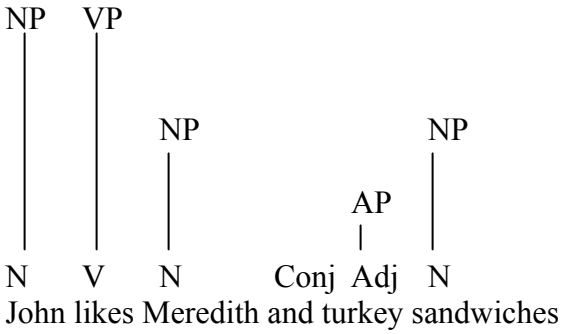


3. John likes Meredith and turkey sandwiches

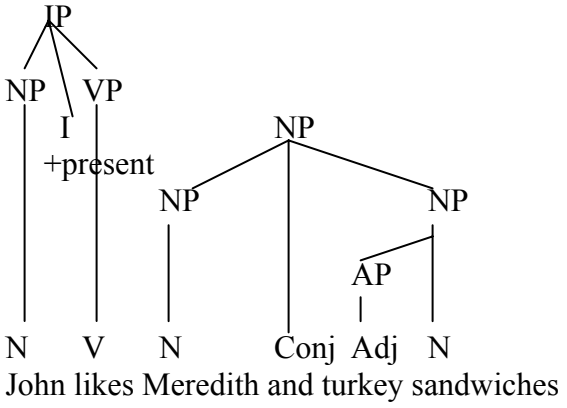
This is a little more complicated, as it contains a conjunction. First, we label the words:

N V N Conj Adj N
John likes Meredith and turkey sandwiches

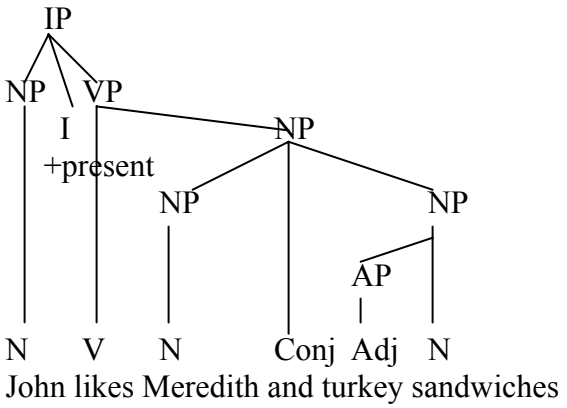
Note that "turkey" in this case is an Adjective because it describes the kind of sandwich that John likes. As before, we now find the subject N (John) and the V (likes) and draw them higher than the other phrases:



Notice that the adjective phrase modifies the noun that follows it (what kind of sandwiches? turkey sandwiches!). So, the AdjP connects to the NP "sandwiches". Also, now we can see that the conjunction combines two noun phrases ("Meredith" and "turkey sandwiches") so we can combine them into a new NP. As before, the subject NP and the VP go to IP:



Note that in the case of conjunctions is the *only* case, according to our rules, that a XP phrase can dominate itself (i.e. normally, NP is not allowed to contain an NP). Now, for the final tree, we connect the object NP to the VP and we are done:

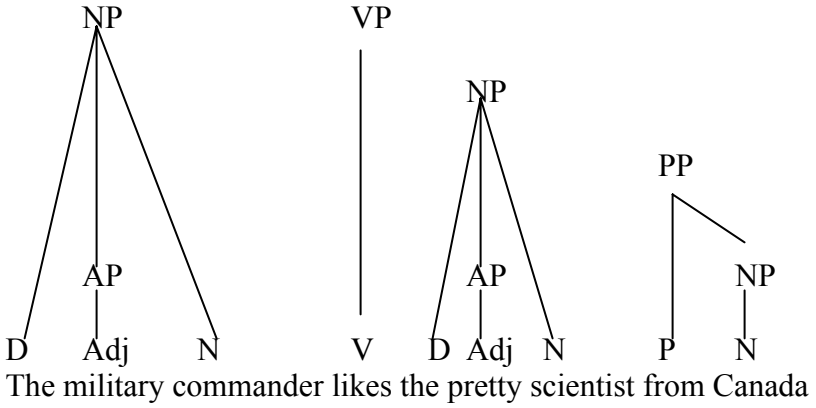


4. The military commander likes the pretty scientist from Canada

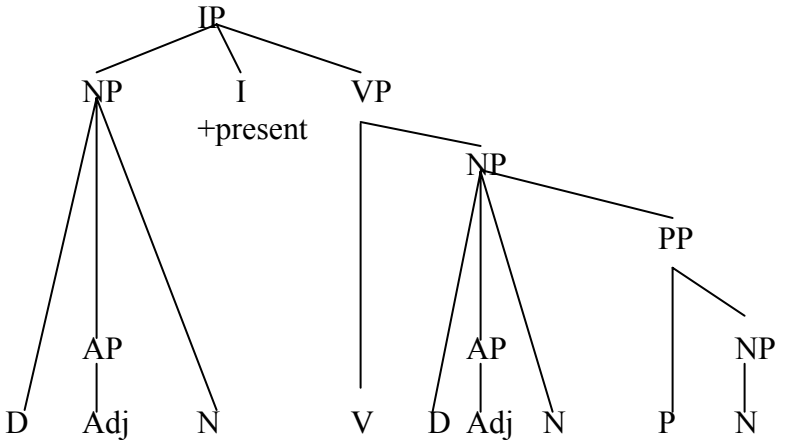
As before, we label the categories:

D Adj N V D Adj N P N
The military commander likes the pretty scientist from Canada

The new element here is the prepositional phrase; the key with these is to remember that a prepositional phrase always takes the noun phrase immediately to the right of the preposition. We find the subject N (commander) and the V (likes), and draw the extensions as before:



We know that the main NP and the VP will go to IP; we know that "the pretty scientist" is an object of the verb "likes", so will attach to the VP. However, the PP has two places it could go – either to the NP next to it, or to the VP a little further away. The question is, what does "from Canada" modify – the scientist, or the liking? It's pretty clear from this example, that "from Canada" is talking about the scientist, so it will connect to the NP:



The military commander likes the pretty scientist from Canada

Tips

- Find the subject N and the main V, and immediately place them as the head of their respective NP and VP. These will go directly to IP. You can draw them higher than the other elements.
- Generally, Adjectives will modify something, so the associated AP needs to be drawn lower than the phrase containing whatever it is they modify (usually an NP).
- Follow the rules – the rules are very limiting, and can help you if you're not sure which words to put into the same phrase (e.g. in "the pretty scientist", "the" is part of the NP the head of which is "scientist" – if you're not sure about this, the rules will tell you because they don't allow determiners in adjective phrases).
- The entire tree has to be connected; the only node that doesn't have a mother is the main IP.
- Everything else has one (and only one) mother. A node can have (but doesn't have to have) many daughters, but can only have one mother.

Exercises

Using the structure rules, draw the following trees:

1. Meredith loves chocolate.
2. Meredith loves chocolate truffles.
3. Meredith loves chocolate truffles with real milk chocolate.
4. Meredith loves cookies and milk.

Ambiguous Sentences

Objective: Distinguish multiple readings of ambiguous sentences, and draw the distinct tree that corresponds with each reading.

Overview

This section deals with sentences that are ambiguous: that is, they could have more than one meaning. For example, the sentence "Meredith hit the scientist with the brick" has two meanings: the first meaning is that Meredith hit the scientist using the brick to do the hitting; the second meaning is that Meredith hit the scientist who had the brick (as opposed to the scientist who had the hammer).

The difference can be expressed using syntactic trees by attachment of the phrase that is responsible for the ambiguity. In this case, it is the phrase "with the brick", which is either referring to the scientist or to the act of hitting, will attach to either "the scientist" noun phrase or to the "hit" verb phrase.

(Note: There are other kinds of ambiguities which we won't talk about here; the most common are semantic ambiguities, which are caused by the multiple meanings of a single word. For example, "John went to the bank" could mean "John went to the financial institution" or "John went to the riverside." There is no way to show this disambiguation using syntax trees, so before you try, make sure it's the structure, and not a word, that's responsible for the ambiguity!)

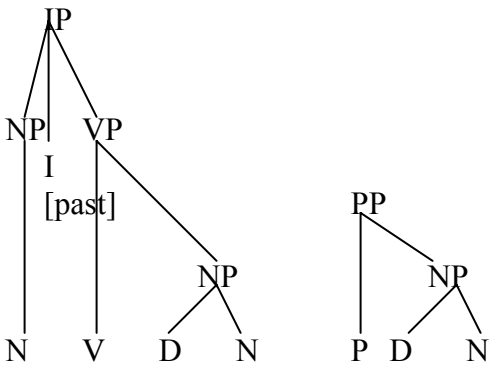
Example Problems

Determine the two meanings in these ambiguous sentences and provide the meanings with corresponding trees.

1. John teased the scientist with the device.

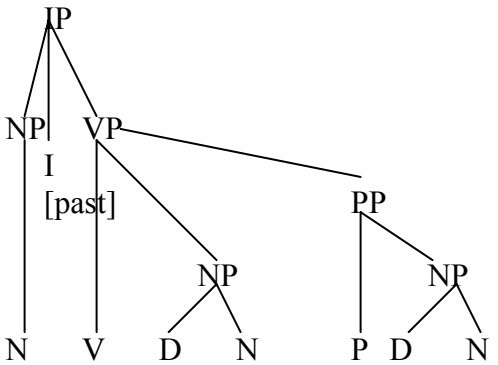
Here, the two meanings are concerned with the phrase "with the device". One meaning is that John teased the scientist using the device to do the deasing; the other meaning is that John teased the scientist who had the device. The procedure is as follows:

Write down one meaning: "John teased the scientist, using the device to do so." (Make sure your paraphrase doesn't reproduce the ambiguity. Even the paraphrase "John teased the scientist using the device", which seems to capture the meaning you want here, might also mean "John teased the scientist *who was* using the device.") Next, draw the tree, paying particular attention to the attachment of the phrase that is responsible for the ambiguity. The tree is normal up to the attachment of the prepositional phrase:



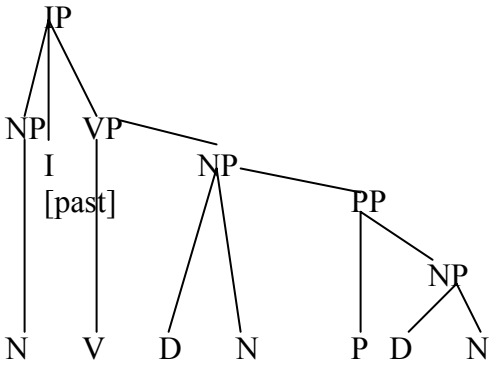
John teased the scientist with the device.

The attachment of the PP is based on meaning. Since our meaning is that John is using the device as a tool to tease the scientist, then the device is an instrument (See Semantics: Theta Roles) of the teasing. That means it attaches to the verb phrase:



John teased the scientist with the device.

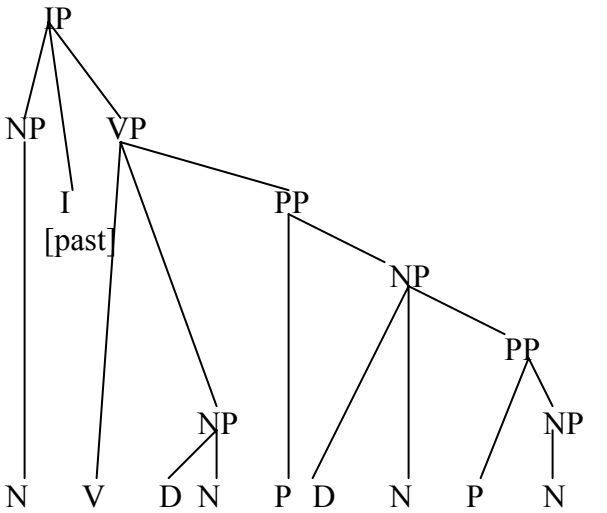
The second meaning, that John teased the scientist who had the device, has an almost identical tree. The only difference is the attachment of the PP, which now explains which scientist John teased as opposed to explaining how John accomplished the teasing:



John teased the scientist with the device

2. John sold the device to the scientist in Canada.
In this example, the source of ambiguity is in the phrase “in Canada” which can refer to either scientist or to the selling; as in the previous example, the difference in the tree will be in whether the PP (in Canada) attaches to the NP (the scientist) or to the VP (sold):

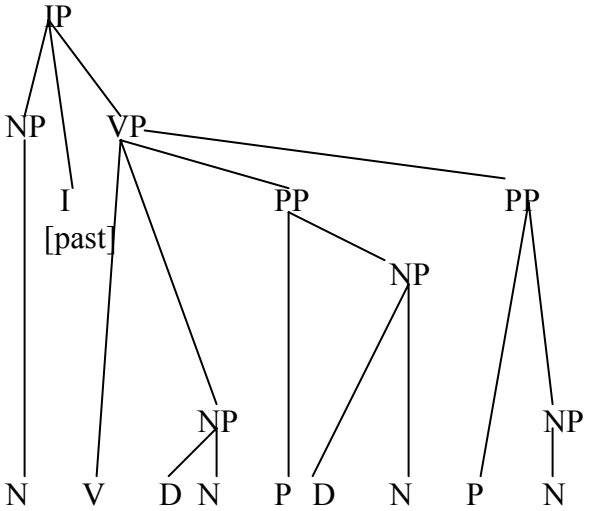
Meaning 1: John sold the device to the scientist who is currently in Canada:



John sold the device to the scientist in Canada.

Note that “to the scientist” attaches directly to the verb phrase; it is not part of the other noun phrase “the device”. This is because “to the scientist” refers to the selling; it doesn’t say anything about the device. In another sentence, as in: “John sold the device with the shiny light in Canada”, “with the shiny light” would be describing the device and would therefore attach to “the device” NP.

Meaning 2: John sold the device to the scientist, and the sale took place in Canada:

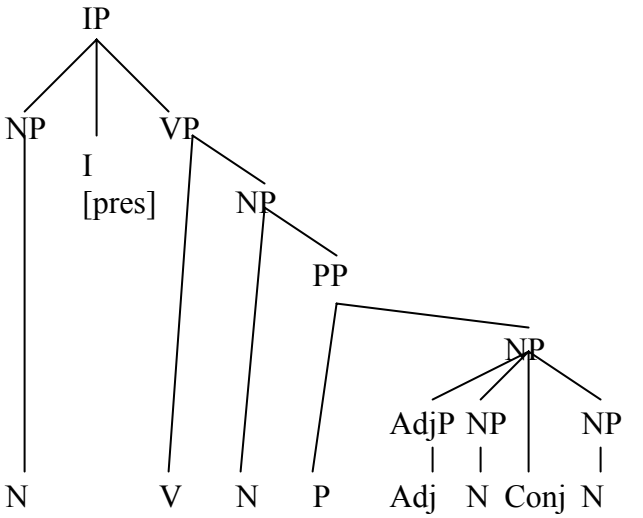


John sold the device to the scientist in Canada.

Note that the PP in question (in Canada) attaches directly to the VP.

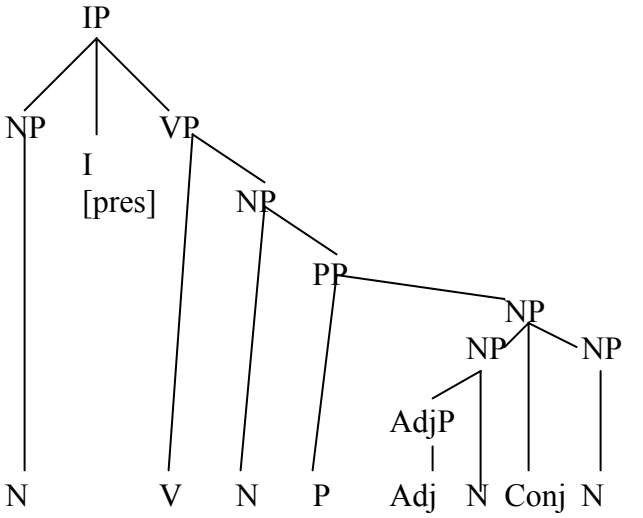
3. Meredith drinks coffee with extra milk and sugar.
Here, the ambiguity is of a slightly different sort: the question is whether Meredith drinks coffee with extra "milk and sugar" (that is, if there's extra milk AND extra sugar) or if Meredith drinks coffee with "extra milk" and sugar. So, the question is in whether or not the conjunction dominates the word "extra".

Meaning 1: Meredith drinks coffee with extra milk and extra sugar.



Meredith drinks coffee with extra milk and sugar.

Note that with this reading, the adjective "extra" is modifying both milk and sugar, since it attaches at the level of the conjunction.
Meaning 2: Meredith drinks coffee with extra milk and a normal amount of sugar.



Meredith drinks coffee with extra milk and sugar.

Note that here, the adjective phrase "extra" only modifies "milk", because it attaches to "milk" before the conjunction unites the milk NP and the sugar NP.

Exercises

Determine the meanings in these ambiguous sentences and provide the meanings with corresponding trees.

1. John shot the marine with the gun.
2. Meredith likes chocolate truffles and cake.
3. John burned the picture of Elizabeth with her ex-boyfriend. (three possible meanings here, one requires treating "with" as a conjunction)

Complex Sentences

Objective: Draw trees with embedded sentences/complementizer phrases (CPs).

Overview

Some sentences contain embedded sentences (e.g. "John believes that Meredith likes him."). In these sentences, there is the main sentence ("John believes ___") and the embedded sentence ("Meredith likes him") which are joined by the complementizer (in this case, "that").

The way to handle these complex sentences is to determine which is the upper-level sentences and which is the embedded sentence. Then, draw the tree for the embedded sentence first. It will be a complete tree (with an IP). Then you can work on the rest of tree, and figure out where the embedded sentence attaches in the main sentence.

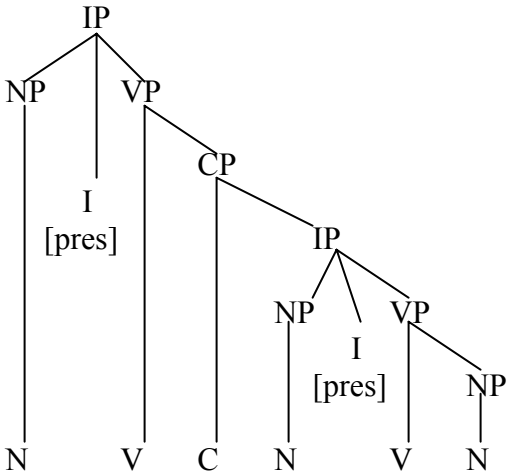
One hint that you have an embedded sentence: if you have a sentence with more than one verb (excluding aux and modal verbs) and the verbs are not connected with a conjunction, then there's going to be embedded sentence(s). There will be only one VP, and therefore only one main verb, per IP.

Example Problems

Construct the trees for the following complex sentences:

1. John believes that Meredith likes him.

"that" is the complementizer that introduces the embedded sentence "Meredith likes him".



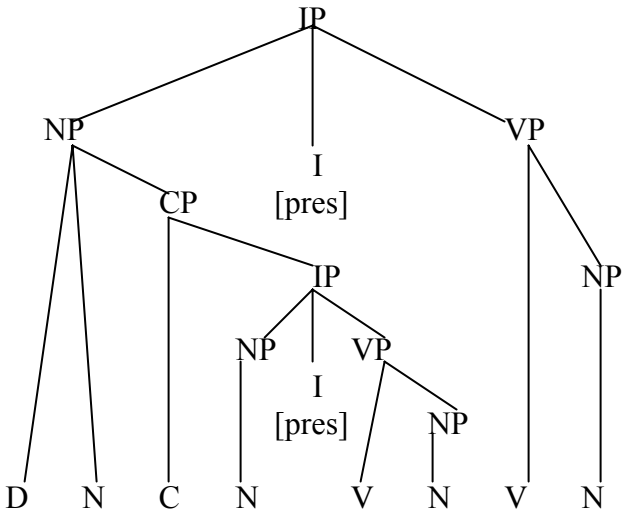
John believes that Meredith likes him.

Use the same logic to figure out where CP attaches as you would use for any other phrase.

- Look at the phrase structure rules. From our rules from "English Phrase Structure Rules & Syntax Trees", we see a CP could go in either a noun phrase or a verb phrase:
  NP → (Det) (Quant) (AdjP) N {PP, CP}
  VP → V {PP, NP, CP, AdvP}
- Use the meaning of the sentence to help determine the place of attachment. In this case, "that Meredith likes him" is talking about what John believes, so it attaches to the "believe" VP.

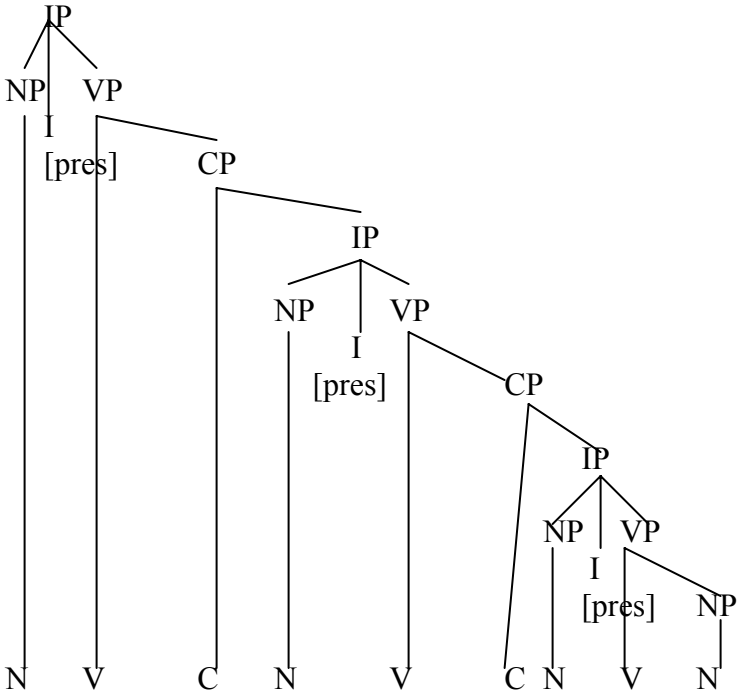
Remember that even the embedded IP must have an I.

2. The rumor that Meredith likes John annoys Elizabeth.
This one is a little tricky because it's harder to find the main sentence. The subject of the main sentence is "rumor", and what does the rumor do? It annoys Elizabeth. So, the main sentence is "the rumor annoys Elizabeth". The embedded sentence is "Meredith likes John." The CP "that Meredith likes John" is talking about the rumor, so will end up attached to the "rumor" NP.



The rumor that Meredith likes John annoys Elizabeth

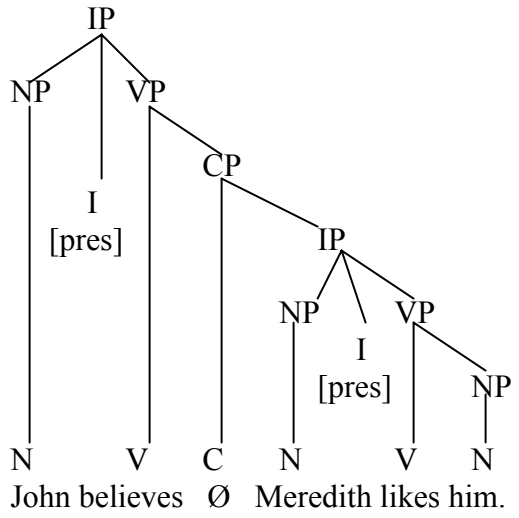
3. John believes that Meredith believes that John loves Elizabeth.
This sentence has two embedded sentences, so it will have two CPs. The smallest sentence is "John loves Elizabeth"; it is embedded within the sentence "Meredith believes that John loves Elizabeth", which is itself embedded in the main sentence.



John believes that Meredith believes that John loves Elizabeth

The English language allows for an infinite construction of this type (another example of recursion!) It's always possible to embed the sentence in another sentence. It's important to think of every CP as just another constituent in order to not become confused about the attachments of the various phrases.

4. John believes Meredith likes him.
Sometimes you'll have an embedded sentence which is seemingly introduced by no complementizer. No, the complementizer is not optional—it is the head of the CP which contains the embedded sentence, after all. In this case, we assume the C position is still there in our mental model of the sentence, but the corresponding word (e.g. "that") is dropped in fast speech. We insert a null symbol (Ø) to show that something belongs there, but that it is not pronounced. Otherwise, this is identical to sentence #1.



Exercises:
Construct the trees for the following complex sentences:

1. John insists that Meredith brought the cake without citrus to the party.
2. The announcement that Meredith went to the party raised some eyebrows.
3. John played the game because Meredith insisted on his participation.
4. John thinks Meredith sang the song about love for him.
5. John heard that Meredith ate the cake yesterday. (This sentence is ambiguous; give both meanings/trees)

Transformations

Objective: Draw trees for yes/no and wh-word questions.

Overview

Think about how we phrase questions in English (e.g. "What has John done?"). The question form is related to the declarative statement form, and you can form a declarative version of any sentence ("John has done what"). We assume that the declarative version is the basic version you start with in your brain (the deep or underlying structure), and the version you actually say—the question form—is the result of a transformation, moving words around in a specific, rule-based way. This section covers the transformations that occur in English sentences to turn them from declarative statements to question statements.

Now that we're talking about questions, we'll start drawing the main IP of all our sentences as embedded within an overarching CP. The transformations rely upon having those extra nodes to work with. (The examples will explain further.) We'll also start including a non-specific Specifier (Spec) position in a CP. Recall that "specifier" just means "stuff before the head" (for English, at least).

The two transformations we cover are Inversion (movement of the I to the C position of the main CP, as in yes/no questions such as, "Can John love Meredith?" from "John can love Meredith") and Wh- Movement (movement of a wh-word, such as who, what, where, when, to the Specifier position of the main CP, as in "What has John done?" from "John has done what").

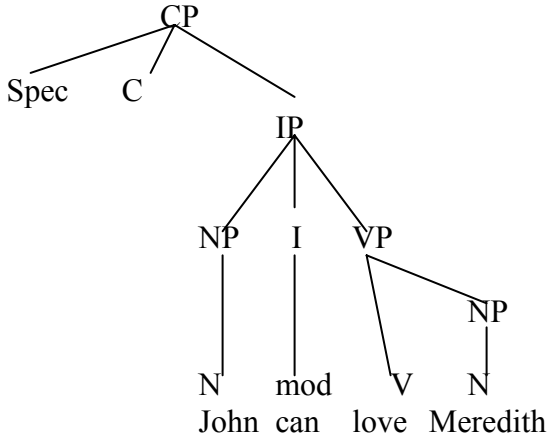
Example Problems

Draw the underlying and surface structure of the following sentences:

1. Can John love Meredith?

First, we find the underlying sentence (also known as "deep structure"). You could think about this as the sentence that provides an answer to the question. In this case, it is "John can love Meredith." We draw the tree for this sentence as usual. The only difference is that we have to put in the empty CP at the top to indicate where the moved elements will end up.

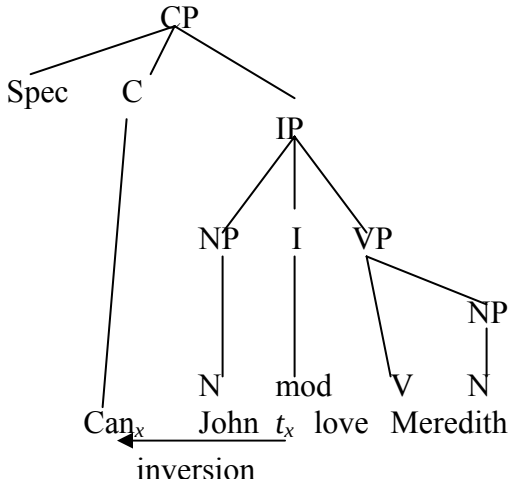
Underlying structure:



The surface structure (or the version of the question that you actually pronounce) is very, very similar, so the easiest thing to do is to re-draw the entire tree from above and then make the changes with a little erasing. The changes are as follows:
- Figure out what word moves, and where it moves to. The only term that moves here is "can," and it moves to the beginning of the sentence. We put in the C position in the main CP. So, write "Can" under C, and erase it from where it used to be (under mod).
- Replace the moved term with a trace (*t*). In this case, write *t* where "can" used to be, under mod.
- Attach the trace to the word's new location with an arrow, and label the arrow to describe the kind of movement. Here, draw an arrow from the *t* to "Can." Since we're doing an inversion, we write "inversion."

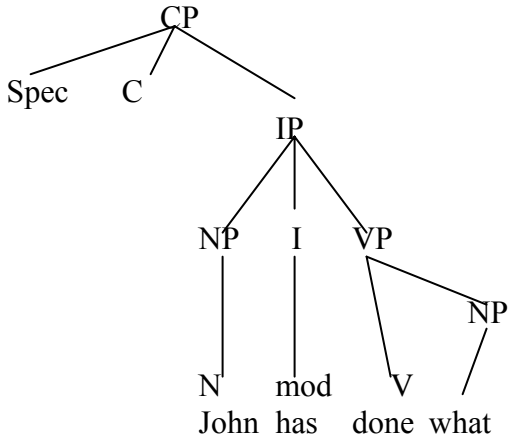
The resulting tree looks like this:

Surface structure:



2. What has John done?

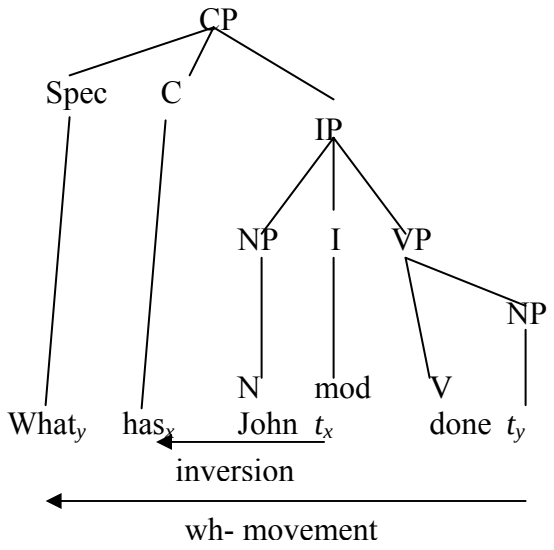
Underlying structure: John has done what. "What" is generally a NP.



In the surface structure, we have to show both movements (of "has" and of "what"). The "has" movement is just an inversion, like we did before. "What" moves to the Specifier position of the CP, and this is called "wh-movement" because we are moving a wh-question word.

Because there are two traces, we label each trace with a little letter, called a *coindex* (typically x, y, z) to distinguish between them. We then label the corresponding word with the same coindex, so it's clear which trace goes with which word.

Surface structure:



Tips

- Underlying structure: make sure you draw the empty CP
- Underlying structure: label the wh- word, if it exists, with the correct category (what = NP, when = AdvP; where = PP, why = CP, who = NP).
- Surface structure: draw arrows to label movement
- Surface structure: make sure to co-index the traces and the words that moved
- Surface structure: label the arrows with appropriate transformation types (i.e. inversion or wh-movement)
- Surface structure: the movement from the I position always goes to C; the movement of the wh- word always goes to Spec.

Exercises

Draw the underlying and surface structure of the following sentences:

1. Does Meredith love chocolate truffles?
2. Who did John sell the device to?
3. Where did John sell the device?
4. When will Meredith yell at the scientists?

Semantics

Semantics is the study of meaning.

Lessons

Connotation & Denotation
- Overview
- Definitions & Examples

Processes of Semantic Change

Theta roles
- Overview
- Definitions & Examples
- Exercises

Tautologies, Contradictions, and Contingencies
- Overview
  - Definitions & Examples

Sense & Reference
- Overview
- Definitions & Examples
- Exercises

Presupposition & Entailment
- Definitions
- Tests for Presupposition & Entailment
- Example Problems
- Exercises

Connotation & Denotation

Overview
When talking about the meanings of words, it is important to distinguish between the basic, literal definition, such as one might find in the dictionary (*denotation*), and the feelings or associations evoked by a particular word choice (*connotation*).

(WARNING: "Connotation" and "denotation" have two meanings in linguistics. The other meaning has to do with the meaning of the words used to describe an object (*connotation*) vs. the actual object referred to (*denotation*); we will use "sense" and "reference", respectively, to describe this distinction, in the section entitled "Sense & Reference." Be aware of which kind of connotation/denotation your professor is using, and adjust your use of the words accordingly.)

Definitions & Examples
Denotation: the "dictionary" or literal definition of a word or phrase.
Connotation: an emotional or metaphorical meaning associated with a word or phrase.

For example, "woman," "lady", "dame", "broad", and "chick" all mean (denote) "adult female," but they have different connotations: "woman" is fairly neutral; "lady" might be associated with politeness and gentility, or with advanced age; "dame" and "broad" are both fairly outdated slang, and nowadays probably have strongest associations with the time period they come from; "chick" would probably be considered derogatory or at least highly informal.

We can talk about connotations as being *positive, negative,* or *neutral* depending on the kind of feelings they evoke. Depending on how you feel about them, you might describe the same animal as "vermin" (negative), "rats" (neutral/possibly negative), or "fuzzy-wuzzy little creatures" (positive).

Processes of Semantic Change

Here are some of the processes by which word meanings can change.

broadening A word's meaning becomes more general.

- "salary" used to mean a soldier's ration of salt; now it means wages earned

narrowing A word's meaning becomes more specific.

- "meat" used to mean any kind of food, not just "animal flesh"
- "starve" used to mean "die", not just "die of hunger"

extension (or metaphorical extension) A word gains an additional meaning when it is used in a new context.

- the use of "mouse" to mean the computer pointing device in addition to the rodent
- the word "illuminate", or, similarly, the phrase "to shed light on" originally meant "to light up", but has been extended in metaphor to "to clarify" in terms of understanding, not just physical environment

euphemism An "innocent" word is used as a stand-in for a taboo word.

- "croak" for "die"
- "nuts" for "insane"
- "gay" for "homosexual"

amelioration A word gains positive connotations.

- "gay" and "queer" used to be used as insulting words for "homosexual", now have neutral/positive connotations

pejoration A word gains negative connotations.

- "mistress" used to be the female version of "master," but gained the meaning and negative connotations of "extramarital lover."
- "lover" used to mean "someone who loves" but now carries an almost exclusively sexual meaning and often implies "extramarital lover."

metonymy A concrete symbol or part is used to represent a larger or more abstract whole.

- "crown" for "king" or "monarchy" ("I am loyal to the crown of England!")
- "wheels" for "car"
- "the steak," used by a waiter to describe a patron who ordered a steak

See also "Word Coining Processes" in the Morphology section.

Theta roles

Objective: To identify the roles that noun phrases serve in a given sentence.

Overview

A theta-role of a noun phrase is its semantic role in a sentence. The semantic role is important; it is not the same as the syntactic roles of subject/object/etc positions. For instance, in the example, "John loves Meredith," "John" is the subject of the sentence (in the syntactic sense), and is also the Agent/Experiencer (in the semantic sense) as he is the one who is doing the action. However, in the passive version of that sentence, "Meredith is loved by John," "Meredith" becomes the subject but "John" is still the Agent/Experiencer.

Keep in mind that you may only use a subset of the given roles, or there may be extra ones that are not covered here. For example, one can consider Theme/Patient to be one theta role (any recipient of the action) because Patient can be seen as a subset of Theme.

Definitions & Examples

*Agent***:** Someone (usually human/conscious/animate) that performs an action. For example, "**John** broke Meredith's favorite computer game."

*Experiencer***:** Someone that experiences some input (usually sensory). For example, "**John** heard Meredith through the radio".

*Cause***:** Something that performs the action but is not sentient/aware. For example, "**The earthquake** opened up a passageway to the underground tunnels."

*Theme/Patient***:** The recipient of an action (generally, the recipient is termed "theme" if it did not undergo a change as a result of the action, and as "patient" if it did). So, in "John broke Meredith's favorite computer game," "Meredith's favorite computer game" is the patient because it was broken. In contrast, in "John gave Meredith a new computer game," "Meredith" is the theme.

*Instrument***:** Something used to carry out the action. For example, "John broke Meredith's favorite computer game with **a hammer**."

*Goal***:** The direction of the action. For example, "John ran **toward Meredith**."

*Location***:** The location where the action occurs. For example, "John and Meredith explored the city **in the Pegasus galaxy**."

*Source***:** The location where the action originated. For example, "Meredith activated the weapon **from a safe distance**."

Examples: Label all the underlined phrases in the following sentences with the appropriate theta roles.

1. <u>Meredith</u> held <u>a giant bug</u>.
   Meredith is the Agent, because "holding" is a deliberate action.
   A giant bug is the theme, because it is the recipient of the holding action but is not changed by it.
2. <u>John</u> saw Meredith hold a giant bug <u>from behind the pillar</u>.
   John is the experiencer, because "seeing" is not a deliberate action.
   From behind the pillar is the source from which John performed his action.

3. Carson stabbed the giant bug with sharp scissors to get at its insides.
   Carson is the agent, because "stabbing" is a deliberate action.
   The giant bug is the patient because it is the recipient of the action, and was changed by that action.
   Sharp scissors is the instrument that is used in the stabbing action.
   To get at its insides is the goal of the action.

Exercises: Label all the underlined phrases in the following sentences with the appropriate theta roles.

1. The explosion took out most of the western pier in the city.
2. Meredith activated the weapon from a distance using a special device.
3. John picked up the shiny device from the closet in the office with the tongs

Tautologies, Contradictions, and Contingencies

Objective: To identify statements as tautologies, contradictions, or contingencies.

Overview

In semantics we care not only about the meanings of individual words, but the meanings of *propositions*. Without knowing any facts about the world we live in beyond the meanings of the words used, we can automatically identify certain propositions as true (tautologies) and certain propositions as false (contradictions).

Definitions & Examples

Proposition: A statement. Propositions are either true or false (though you may not know which).

Tautology: A statement that must, necessarily, be true, regardless of the actual conditions of the world. Examples:

- My brother is male
- A dog is a dog

Here are some examples of true statements which are ***not* tautologies**:

- Buckingham Palace has guards
- Some people buy Ivory soap

Contradiction: A statement that must, necessarily, be false, regardless of the actual conditions of the world. Examples:

- My brother is female
- A dog is not a dog

Here are some examples of false statements which are ***not* contradictions**:

- All humans hate ice cream
- The Canadian flag depicts a man holding an orange and weeping uncontrollably

Contingency: A statement which might be true or false, depending on the reality of the world. All of the examples above of statements that are *not* tautologies or contradictions are contingencies. In fact, most statements you hear every day are contingencies, since these are the only kind of statements which provide useful information. It's generally a waste of time to state a tautology (since obviously they are true) or a contradiction (since obviously they are false).

Exercises

Decide if the following statements are tautologies, contradictions, or contingencies:

1. All bachelors are not married.
2. The red cake is green.
3. The cakes are red.
4. Every man loves a woman.
5. John loves Meredith.
6. Meredith is a woman.

Sense & Reference

Objective: Distinguish between the sense and reference of a word or phrase.

Overview

Different noun phrases may refer to the same actual object. For example, at the time of this writing, the president of the United States is George W. Bush. So, the phrase "the president of the United States" refers to the same individual as does "George W. Bush." If we're talking about John, who is a pilot with dark hair and who is dating Meredith, the phrases "John" and "Meredith's boyfriend" and "the dark-haired pilot" refer to the same person.

But with a little thought we can see that these different ways of describing the same person (or object, or entity) are not identical. One way to tell is that the sentence "John is John" is clearly a tautology, but the sentences "John is Meredith's boyfriend" or "the dark-haired pilot is John" are contingencies, even though they are also of the form "{phrase referring to John} is {phrase referring to John}." So, there must be more to the meaning of a descriptive noun phrase than the actual object that it refers to. Thus the distinction between *sense* and *reference.*

Definitions & Examples

Referent: The actual individual, object, or entity in the world referred to by some description.

- The individual John is the referent for phrases like "John," "Meredith's boyfriend," and "the dark-haired pilot."
- Abraham Lincoln is the referent for "the sixteenth president of the United States" or "the man who gave the Emancipation Proclamation" or "the man John Wilkes Booth shot."

Sense: The meaning of a description, inherent in the wording.

- The sense of "the president of the United States" is the actual office of the presidency, rather than the individual holding it.
- The sense of "Meredith's boyfriend" might be something like "some male who routinely kisses Meredith, plans dates, cooks dinner, etc." rather than an any specific individual currently performing that role (e.g. John).

Note that the referent of some sense can change over time. For example, "the president of the United States" refers to George W. Bush in 2007, but Franklin Delano Roosevelt in 1934. The phrase "Meredith's boyfriend" might refer to John now, but it could be different tomorrow when John finds out that Meredith has been secretly writing love notes to Sam. And so on.

Exercises

1. Identify the sense and reference of the following phrases.
    a. Prime Minister of Canada
    b. the last team to win the World Series
    c. my (the exercise-doer's) favorite fruit

2. Consider the statements "<u>Meredith's boyfriend</u> is not <u>Meredith's boyfriend</u>" and "<u>John</u> is not <u>Meredith's boyfriend</u>."
    a. What is the referent of each of the underlined phrases?
    b. What kind of statements are these (tautology, contradiction, or contingency)? If they are different, why?

Presupposition & Entailment

Objective: To use the appropriate test (negation or contradiction) on a pair of sentences, A and B, to determine whether A presupposes B, A entails B, or both (mutual entailment).

Definitions

Presupposition: Information that is presupposed is considered to be in the common ground—that is, it's assumed to be true by the speaker. For example, if you say "Carson lost his baby turtles," you're presupposing "Carson used to have baby turtles."

- *Presupposition is constant under negation*. That is, whether you say "Carson lost his baby turtles" or "Carson didn't lose his baby turtles," you are still creating the impression in the mind of the listener that Carson had baby turtles to begin with.

Entailment: If statement A entails statement B, then whenever A is true, B is also true. "John shot the monster" entails "The monster was shot."

- If A entails B, then "A and not B" is a contradiction.
- *Mutual Entailment:* If A and B entail each other, then B true whenever A is true, AND A is true whenever B is true. This generally happens with statements that mean the same thing.
- Note: Statement A can strongly *imply* statement B without *requiring* that B be true. Such a statement is not an entailment; it is an *implicature*. For example, "John shot Meredith" can imply "Meredith is dead" but does not require it – John could have shot Meredith with a BB gun, for example. Alternately, "John killed Meredith" requires "Meredith is dead". Implicatures are discussed further in the Pragmatics section.

Tests for Presupposition and Entailment

Negation Test for Presupposition: Since presupposition is constant under negation, you can test whether A presupposes B by negating A (saying "It's not true that A" or a statement which means the same thing).

- If B is still true when "not A" is true, then A presupposes B.
- If B is untrue when "not A" is true or you can't tell whether B is true or not anymore, then A does not presuppose B.

Contradiction Test for Entailment: We know that if A entails B, then "A and not B" is a contradiction. Therefore, to test for entailment, we can negate sentence B ("It's not true that B") and put the two sentences together.

- If "A and not B" must be false, then A entails B.
- If "A and not B" could be true (it's definitely true or you don't know whether it's true or not), then A does not entail B.
- If A entails B (that is, "A and not B" is a contradiction), then you can test for mutual entailment. Flip the order of the sentences (mark A as B and B as A) and do the test again.

Example Problems

Presupposition/Entailment. In the following sets of statements, does A entail or presuppose B? When testing for presupposition, we have to use the negation test. So, for all of these examples, we will negate A to see if B is still true. If B is true, then A presupposes B. If the truth of B is unknown when A is negated, then A entails B.

1A. John was glad Meredith came to his party.
1B. Meredith came to John's party.

We negate 1A to get: *John was not glad that Meredith came to his party.*
1B is still true: Meredith came to John's party, whether or not John was glad of it. Therefore, 1A presupposes 1B.

2A. John and Meredith went to Carson's party.
2B. Meredith went to Carson's party.

We negate 2A to get: *It is not the case that John and Meredith went to Carson's party.* Note here that the negation "John and Meredith did not go to Carson's party" is incorrect, because does not allow for the possibility that John went to Carson's party and Meredith did not, which is still a possible negation of 2A.
So, given that "It is not the case that John and Meredith went to Carson's party," the truth of 2B is unknown: It's possible that Meredith went and John did not, or it's possible that John went and Meredith did not, or maybe both of them didn't go. Because we don't have the information to decide whether Meredith went to Carson's party, 2A entails (and does not presuppose) 2B.

3A. Everyone finds John attractive.
3B. Meredith finds John attractive.

We negate 3A to get: *Not everyone finds John attractive*. Note here that the negation of "everyone" is "not everyone"; "no one" is the negation of "someone".
Given the negation of 3A, the truth of 3B is unknown. It's possible that Meredith finds John attractive, or it's possible that Meredith is one of the people who does not find John attractive. Since the truth of 3B is unknown, 3A entails 3B.

4A. John stopped beating his wife.
4B. John used to beat his wife.

We negate 4A to get: *John did not stop beating his wife.*
4B is still true: Whether or not John stopped beating her, he has to have beaten her at some point. Therefore, 4A presupposes 4B.

5A. Carson understands John's feelings for Meredith.
5B. Someone understands John's feelings for Meredith.

We negate 5A to get: *Carson does not understand John's feeling for Meredith.*

5B is now not necessarily true; it's possible that someone else understands John's feelings for Meredith, but it's also possible that Carson was the only person who understood John's feelings for Meredith. So, the truth of 5B is now unknown, so 5A entails 5B.

Mutual Entailment. In the following sets of statements, does A entail B, does B entail A, does both A entail B and B entail A (mutual entailment), or does neither entail the other?
When testing for entailment, we have to use the contradiction test where we combine sentence A with the negation of sentence B. If the combined sentence is a contradiction, then A entails B. We then repeat the test for B entailing A.

1A. John is taller than Meredith.
1B. Meredith is shorter than John.

We negate 1B to get: *Meredith is not shorter than John;* then we combine A and B to get: *John is taller than Meredith* AND *Meredith is not shorter than John*, which is a contradiction, so A entails B.
Now, we switch the sentences and negate 1A: *John is not taller than Meredith*; then we combine A and B to get: *Meredith is shorter than John* AND *John is not taller than Meredith*, which is also a contradiction, so B entails A.
Since A entails B and B entails A, this is a case of mutual entailment.

2A. John is taller than Meredith.
2B. Meredith is the same height as John.

We negate 2B to get: *Meredith is not the same height as John;* then we combine A and B to get: *John is taller than Meredith* AND *Meredith is not the same height as John*, which is not a contradiction, so A does not entail B.
Now, we switch the sentences and negate 2A: *John is not taller than Meredith*; then we combine A and B to get: *Meredith is the same height as John* AND *John is not taller than Meredith*, which is also not a contradiction, so B does not entail A.
Since A does not entail B and B does not entail A, there is no entailment in any direction.

3A. Everyone finds John attractive.
3B. Meredith finds John attractive.

We negate 3B to get: *Meredith does not find John attractive;* then we combine A and B to get: *Everyone finds John attractive* AND *Meredith does not find John attractive*, which is a contradiction, so A entails B.
Now, we switch the sentences and negate 3A: *Not everyone finds John attractive*; then we combine A and B to get: *Meredith finds John attractive* AND *Not everyone finds John attractive*, which is not a contradiction, so B does not entail A.
Since A entails B and B does not entail A, this is a case of one-way entailment (A → B only).

4A. Not everyone loves Meredith like John loves Meredith.
4B. Someone loves Meredith like John loves Meredith.

We negate 4B to get: *No one loves Meredith like John loves Meredith;* then we combine A and B to get: *Not everyone loves Meredith like John loves Meredith* AND *No one loves Meredith like John loves Meredith*, which is not a contradiction, so A does not entail B.
Now, we switch the sentences and negate 4A: *Everyone loves Meredith like John loves Meredith*; then we combine A and B to get: *Someone loves Meredith like John loves Meredith* AND *Everyone loves Meredith like John loves Meredith*, which is not a contradiction, so B does not entail A.
Since A does not entail B and B does not entail A, there is no entailment in any direction.

5A. Carson understands John's feelings for Meredith.
5B. Someone understands John's feelings for Meredith.

We negate 5B to get: *No one understands John's feelings for Meredith;* then we combine A and B to get: *Carson understands John's feelings for Meredith* AND *No one understands John's feelings for Meredith*, which is a contradiction, so A entails B.
Now, we switch the sentences and negate 5A: *Carson does not understand John's feelings for Meredith*; then we combine A and B to get: *Someone understands John's feelings for Meredith* AND *Carson does not understand John's feelings for Meredith*, which is not a contradiction, so B does not entail A.
Since A entails B and B does not entail A, this is a case of one-way entailment (A → B only).

Exercises

Presupposition/Entailment: In the following sets of statements, does A entail or presuppose B?

1A. John did not realize that Meredith was working in Antarctica.
1B. Meredith was in Antarctica.

2A. John's charming personality makes everyone like him.
2B. Meredith likes John.

3A. Everyone believes everything they hear.
3B. Someone does believe everything they hear.

4A. The rumor that John loves Meredith is true.
4B. John loves Meredith.

5A. The rumor that John loves Meredith is true.
5B. It is rumored that John loves Meredith.

Mutual Entailment: In the following sets of statements, does A entail B, does B entail A, does both A entail B and B entail A (mutual entailment), or does neither entail the other?

1A. John loves Meredith more than Meredith loves John.
1B. Meredith loves John less than John loves Meredith.

2A. John's charming personality makes everyone like him.
2B. Meredith likes John.

3A. Everyone believes everything they hear.
3B. Someone does believe everything they hear.

4A. The rumor that John loves Meredith is true.
4B. John loves Meredith.

5A. John loves Meredith.
5B. Meredith loves John.

Pragmatics

Pragmatics is the study of language at the discourse level; or, how language is *used*.

Lessons

Grice's Cooperative Principle, Maxims of Conversation & Conversational Implicature
- The Cooperative Principle
- The Maxims of Conversation
- Maxim Violations
- Natural Language vs. Logical Language
- More on Conversational Implicature
- Criticisms of the Maxims
- Exercises

Speech Acts
- Definitions
- Searle's Classification of Illocutionary Acts
- Felicity Conditions
- Exercises

Brown & Levinson's Politeness Theory
- About Face
- Politeness Strategies
- Example Problems
- Exercises

Grice's Cooperative Principle, Maxims of Conversation & Conversational Implicature

Objective: Given a short dialogue which makes use of the maxims, identify the maxim in play, and explain your answer. If applicable, explain the implication created.

The Cooperative Principle

A basic underlying assumption we make when we speak to one another is that we are trying to cooperate with one another to construct meaningful conversations. This assumption is known as the Cooperative Principle. As stated in H. P. Grice's "Logic and Conversation" (1975):

> Make your conversational contribution such as is required, at the stage at which it occurs, by the accepted purpose or direction of the talk exchange in which you are engaged. [xiii]

In other words, we as speakers try to contribute meaningful, productive utterances to further the conversation. It then follows that, as listeners, we assume that our conversational partners are doing the same.

You can think of reasons why someone might be uncooperative in conversation (maybe they're being interrogated for information they don't want to give up; maybe they hate the person they're talking to; maybe they're just crazy) but in the vast majority of conversations, it's safe to assume that both participants are trying to be cooperative.

This assumption (that the cooperative principle holds, and the people we're speaking to are trying to cooperate) explains two things:

(i) why speech errors are often ignored (or even go unnoticed) in conversation. As long as the meaning the speaker is *trying* to get across is clear, the listener usually gives them the benefit of the doubt and focuses on the meaning.

(ii) why we can find meaning in statements which, on the surface, seem ridiculous, untrue or unrelated (i.e. metaphors, sarcasm, overstatement, understatement, etc.) Rather than assuming that our conversational partner is lying, crazy, or speaking at random, we assume they're trying to get across some meaning, and we can figure out what that meaning is.

The Maxims of Conversation

Grice came up with the following maxims of conversation. (A "maxim" is kind of like a rule of thumb. But these rules aren't nearly as hard and fast as the Cooperative Principle, as we'll see.)

Quantity

- Make your contribution as informative as required. (Don't say too much or too little.)
- Make the strongest statement you can.

Quality

- Do not say what you believe to be false.
- Do not say that for which you lack adequate evidence.

Relation

- Be relevant. (Stay on topic.)

Manner

- Avoid obscurity of expression.
- Avoid ambiguity.

- Be brief (avoid unnecessary prolixity).
- Be orderly.[xiv]

The simplest way to think of Grice's maxims is general rules we follow in conversation. However, that's not entirely accurate. The interesting thing about these "rules" is that often, we *don't* follow them.

Maxim Violations
There are several ways/reasons a speaker might break one of the rules:

1. **Violating the Cooperative Principle.** (See "Grice's Cooperative Principle.") One instance in which a speaker might break the maxim of quality is if they are really trying to deceive the listener; but this would also be a violation of the cooperative principle. For the really interesting violations, let's assume the Cooperative Principle holds.

2. **Signaling a violation (minor violation).** A person might essentially come out and tell you they are violating a maxim and why.

Examples.

"I don't know if this is relevant, but..." (relation)
"I'm not sure how to say this, but..." (manner)
"I can't tell you; I'm sworn to secrecy." (quantity)
"This is just the word on the street; I can't vouch for this information." (quality)

3. **Maxim clash.** A speaker might violate one maxim in order to preserve another.

Example.

Carson is driving John to Meredith's house.
CARSON: Where does Meredith live?
JOHN: Nevada.
Maxim Violated: Quantity.
Why: There is clash between quantity and quality. Carson is looking for a street address, but John gives a weaker, less informative statement (hence the quantity violation). If John really doesn't know anything more specific, however, he cannot give a more informative statement without violating quality.

4. **"Flouting" a maxim (major violation) to create a conversational implicature.** By clearly and obviously violating a maxim, you can imply something beyond what you say.

Examples.

JOHN: Where's Meredith?
ELIZABETH: The control room or the science lab.

Maxim Violated: Quantity; Elizabeth didn't give as much information as John wanted (Meredith's exact location), but instead gave a weaker statement (giving two possible options).
Implication: Elizabeth doesn't know which of the two places Meredith is.

SIMON: When are you coming home?
ELIZABETH: I will codify that question to my superiors and respond at such a time as an adequate answer is preparable.
Maxim Violated: Manner; Elizabeth is using unnecessarily complicated and confusing words and construction.
Implication: Elizabeth does not know or does not wish to give an answer to the question.

MEREDITH: You really love me?
JOHN: I like Ferris wheels, and college football, and things that go real fast.
Maxim Violated: Relation; John is changing the topic.
Implication: Either John doesn't want to respond to Meredith (perhaps he has problems discussing his feelings) or the answer is "no."

ELIZABETH: A lot of people are depending on you.
MEREDITH: Thanks, that really takes the pressure off.
Maxim Violated: Quality; knowing that "a lot of people are depending on you" does not, in fact, take the pressure off. Meredith is saying something obviously untrue.
Implication: By saying something clearly untrue, Meredith is implying that the *opposite* is true (sarcasm). The true meaning being expressed here is probably more like "That really puts a lot of pressure on me" and perhaps, by extension, "Stop pressuring me."

More on Conversational Implicature
As you can see from the above examples, flouting maxims to create implications can be a powerful and creative way to get across a point.

Why imply instead of just saying what we mean? Well, implication can get across a great deal of meaning with relatively little actual speech. Thinking of what you want to get across, and interpreting what other people have said, seems to take much quicker than the relatively slow process of actually verbalizing all the necessary sounds. So saying a little, while implying a lot, is a way to avoid this "phonological bottleneck" and communicate more efficiently.[xv]

Of course, we're not always saving time. Sometimes, maxim violations are creative. After all, without this capacity to draw inferences and understand implications—to assume that speakers *are* being cooperative even when they are saying things which are on the surface untrue, irrelevant, ambiguous or unclear—we couldn't have neat stuff like sarcasm, metaphor, hyperbole, irony, etc.

Natural Language vs. Logical Language
Here's another way to understand the maxims. In Grice's original paper presenting the maxims, he explained them as systematic ways that natural language differs from logical language. If you've had any exposure to symbolic logic, you know that there's a difference between, for example, the logical statement

Meredith is in the control room $\vee$ (OR) Meredith is in the science lab

and the natural language statement

Meredith is in the control room or the science lab.

All we know about the logical statements is that at least one of the propositions is true. But we know more than that about the natural language statement: we know (or, we have a good reason to assume) that the speaker *doesn't know* which of the two places Meredith is, or they would say so. According to the maxim of quantity, a person shouldn't give a weaker statement when a stronger one is available. But logical language has no such rules about cooperation. If we used strictly logical language, the weaker statement would be equally acceptable, as long as it was true. (This natural/logical language distinction also explains why we get so mad when people do smartass things like say "Yes" to the question "Can you pass the salt?" We then fix them with a withering glare and say "You *know* what I *mean*.")

Some people have argued that natural language is inferior to logical language because it is less precise and more ambiguous, but using the maxims and the idea of implicature, Grice argued that natural language, while different, is just as good. Indeed, more often than not, listeners *do* know what the speaker means, even if it's not explicitly stated.

Criticisms of the Maxims

- It's not clear whether the maxims work in other languages and cultures.
- Some key concepts are undefined. A lot of intuition must be used to figure out, for example, when a speaker is being irrelevant.
- They're not a complete listing of the rules we follow in conversation; for example, there are also rules about, say, politeness, which are not addressed.
- There is some overlap, so it's not always clear-cut which maxim is being violated. For example, take a dialogue like this:

  JOHN: Are you done yet?
  MEREDITH: Well, let's see, I've had to deal with seven near-catastrophic systems failures in the last four hours, Elizabeth dragged me to four different useless meetings, and *someone* replaced my regular coffee with decaf, so I'm only just getting caffeine in my system and I still have to track down whoever did it and slowly eviscerate them, which is a little higher on my to-do list at the moment than fixing your stupid computer, so no, no, I'm not done yet, actually.
  JOHN: Jeez, a simple "no" would have sufficed.

  It looks like this is a quantity violation (too much information), but it could also be argued that it is a violation of relation (since the extra information Meredith volunteers is largely irrelevant to the question John asked). It could further be argued that this lengthy tirade violates manner, since it's unnecessarily prolix (wordy). It's also probable that Meredith is exaggerating about the level of seriousness of the systems failures and about killing that guy, so a quality violation is also likely.

Exercises
Each problem presents a short dialogue. You must identify which a maxim is being *used* or *violated*. You may be asked to figure out the implication, or it may be given to you.

1. LAURA: Come on, I'm taking you to the gym.
MEREDITH: Yeah, and pigs can fly.
What is Meredith implying?
What maxim creates that implication, and why?

2. CARSON: What happened?
MEREDITH: He got attacked by a giant bug, and he passed out.
Implication: He passed out because he was first attacked (in other words, the order in which the events occurred is: (1) he got attacked; (2) he passed out.)
What maxim creates that implication, and why?

3. JOHN: We just have to fly real close to the corona of the sun!
MEREDITH: You're lucky you're pretty.
What is Meredith implying?
What maxim creates that implication, and why?

4. LAURA: Do you have any pets?
CARSON: I have two wee baby turtles.
Implication: Carson doesn't have any other pets besides the two turtles.
What maxim creates that implication, and why?

5. MEREDITH: Tell them what happened!
JOHN: Meredith saw an object or entity strongly resembling a giant bug.
What is John implying?
What maxim creates that implication, and why?

Speech Acts

Objective: Given a speech act, give the type of illocutionary force (according to Searle's classification). Tell whether the speech act is explicit or nonexplicit. Given a failed speech act, identify the felicity condition(s) not met.

Definitions

John Austin (1955) introduced the idea of *speech acts*, utterances which have some effect beyond simply stating information. For example, if you say "I'm sorry for accidentally killing your cat," you're not just saying something—you're apologizing. If you say "I dub thee Sir Mopes-a-lot," you may (under the right circumstances) be giving someone a new name.

Speech act: A speech event or utterance. Each speech act is comprised of:

- **Locutionary act**: The act of saying something.
- **Illocutionary act** (or illocutionary force): What the speech act *does* (See "Searle's Classification of Illocutionary Acts.")

There are two types of speech acts:

- **Explicit** Speaker uses a verb which states the illocutionary force of their speech act.
  Examples: "I *promise* to be there by nine." "I *forbid* you to go."
- **Nonexplicit** Speaker does not explicitly state the illocutionary force.
  Examples: "I'll be there by nine." "Don't go."

An easy way to tell the difference: explicit speech acts can have the word "hereby" inserted before the essential verb. So "I (hereby) call dibs" is an explicit speech act, whereas "I'll call you" isn't (*"I'll hereby call you" doesn't work.)

Note that statements which, on their own, are not speech acts, can become (nonexplicit) speech acts in the right context. For example, the word "Me!" is a speech act when it comes after the question "Who will help me bake the bread?" (since it commits the speaker to help bake the bread).

Searle's Classification of Illocutionary Acts

John Searle (1976) [xvi] proposed the following classification of different types of illocutionary acts.

- **Representative.** Speaker describes a state of affairs.
  Examples: "I am a woolly lamb." "It was I who murdered Mr. Body." "These are not the droids you're looking for."
- **Directive.** Speaker tries to get the hearer to do something.
  Examples: "Could you please do the dishes?" "You should apply to CalTech." "Never go into the west wing." "Get your hands off me, you dirty ape!"
    - **Question.** Speaker tries to get the hearer to provide some information.
      Examples: "Where's Meredith?" "What's the score?"
- **Commissive.** Speaker commits to doing something.
  Examples: "I'll meet you back here in an hour." "I'll feed the cat while you're gone." "Yes, I'll marry you."

- **Expressive.** Speaker expresses an emotional state.
  Examples: "I'm sorry I forgot to feed your cat." "I'm so disappointed in you." "I'm sorry for your loss." "Congratulations on your engagement!" "Welcome to the neighborhood!"
- **Declaration.** Speaker changes something's status.
  Examples: "I now pronounce you man and wife." "I absolve you of your sins." "We surrender!" "You are sentenced to five years hard labor."

Felicity Conditions
Speech acts require certain conditions to be met in order for the illocutionary force to take effect.

- **Preparatory conditions:** The speaker must have the necessary ability, authority, and beliefs.
  Failure example: At a baseball game, I scream, "You're out!" But since I'm not the umpire, nothing happens.
- **Sincerity conditions:** The speaker must mean it.
  Failure example: My roommate asks me to do the dishes and I say "Yes," but I have no intention of actually doing it.
- **Essential conditions:** The hearer recognizes the intention of the speech act.
  Failure example: Intending to propose marriage, I tell my girlfriend, "Let me share your burden." She thinks for a minute, and then hands me her books.
- **Propositional content conditions:** The propositions contained in the wording of the speech act must be true.
  Failure example: I say "I'm sorry I broke the lamp" when I have not, in fact, broken a lamp.

Exercises
Consider each situation, and answer the questions.

1. JOHN: Are you busy?
   MEREDITH: Could you not hover while I'm trying to work?

   a. What is the illocutionary force of John's speech act?
   b. What is the illocutionary force of Meredith's speech act?

2. ELIZABETH: Gentlemen, stand down.
   JOHN: Um... you've been relieved of duty.

   a. What is the illocutionary force of Elizabeth's speech act?
   b. Is Elizabeth's speech act explicit or nonexplicit?
   c. Are the felicity conditions met? If not, why not?

3. ELIZABETH: You endangered the lives of everyone on this ship!
   MEREDITH: Whoops.
   ELIZABETH: Is that supposed to be an apology?
   MEREDITH: Wasn't that clear?

a. What is the illocutionary force of Meredith's (first) speech act?
b. Is Meredith's speech act explicit or nonexplicit?
c. Are the felicity conditions met? If not, why not?

4. MEREDITH: Thanks for the present.
   JOHN: I didn't give you any present.

   a. What is the illocutionary force of Meredith's speech act?
   b. Is Meredith's speech act explicit or nonexplicit?
   c. Are the felicity conditions met? If not, why not?

5. JOHN: Meet me in the jumper bay in ten minutes.
   MEREDITH: Okay.
   -20 Minutes Later-
   JOHN: Where were you?
   MEREDITH: Sorry, I lost track of time!

   a. What is the illocutionary force of John's speech act?
   b. What is the illocutionary force of Meredith's speech act?
   c. What is the illocutionary force of John's *second* speech act?
   d. What is the illocutionary force of Meredith's *second* speech act?
   e. Are the felicity conditions met for Meredith's first speech act? If not, why not?

6. JOHN: That's your baby whale friend?
   MEREDITH: I'm going to call him "Sam."

   a. What is the illocutionary force of Meredith's speech act?
   b. Is Meredith's speech act explicit or nonexplicit?
   c. Are the felicity conditions met? If not, why not?

7. MEREDITH: I was very heroic.
   JOHN: I call bullshit!

   a. What is the illocutionary force of Meredith's speech act?
   b. What is the illocutionary force of John's speech act?
   c. Is Meredith's speech act explicit or nonexplicit?
   d. Is John's speech act explicit or nonexplicit?
   e. In light of John's statement, are the felicity conditions met for Meredith's speech act? If not, why not?

Going Beyond

Consider the speech act of calling shotgun (claiming for oneself the right to sit in the passenger seat on car trip.) The website http://www.shotgunrules.com/ gives a number of rules limited the power of the speech act, including, but not limited to:

- "You must say the word 'Shotgun' .... clearly and loud enough so that at least one other to-be occupant of the vehicle can hear you."
- "You must be outside to call Shotgun."
- The deed (whatever you came in the car to do) must be done. "There is no crime greater than calling Shotgun on Monday in reference to the ride to the concert on Friday. Some people choose to play this way, and they are fools."[xvii]

1. What kind of speech act is calling shotgun? That is to say, what illocutionary force classification would you give it?
2. What is the distinction between saying "Shotgun!" and "I call shotgun!"?
3. Suppose my friends and I go to the mall and in the middle of the food court I try to call shotgun for the way back. What felicity condition has been broken? What if I mutter "shotgun" so quietly that nobody hears me?
4. In what circumstances would the utterance "Shotgun!" *not* be the kind of speech act described here?

Brown & Levinson's Politeness Theory

About Face

According to Penelope Brown & Stephen Levinson (1987)[xviii], politeness is a linguistic and behavior tool we use to help each other save *face*. Face refers to a person's self-esteem or self-respect. There are two types of face:

- *Positive face* is the desire to be appreciated by others. A person's positive face depends on their ability to show themselves and others that they are well-liked.
- *Negative face* is the desire to maintain autonomy. A person's negative face depends on their ability to show themselves and others that they do what they do because they choose to; they're independent, and not subordinate to anybody.

We use politeness to avoid or minimize *face-threatening acts*, or any act which infringes on the listener's ability to maintain face. For example, trying to get someone to do something for you can be a face-threatening act (primarily, threatening their autonomy.)

Politeness Strategies

Four strategies, in ascending order of politeness:

- *Bald on-record* No attempt to minimize threat to listener's face.
  Example: "Close the window."

- *Positive politeness* Attempts to minimize threat to listener's face by offering compliments, framing a request as a question, or otherwise emphasizing that the speaker likes, appreciates, and/or respects them.
  Example: "Could you please close the window?"

- *Negative politeness* Attempts to minimize threat to listener's face by emphasizing their autonomy. Speaker assumes they are imposing on the listener in some way.
  Example: "I'm sorry to bother you, but could you please close the window?"

- *Indirect/Off-record* Attempts to minimize threat to listener's face by speaking indirectly or generally. Since the speaker is not making a direct request to the listener at all, the listener's response feels like a completely autonomous choice.
  Example: "Boy, it's cold in here."

Example Problems

1. Name the politeness strategy being used in each of the following utterances.
   a. "You look ravishing today."
      Positive politeness. The speaker is complimenting the listener, building up their positive face.
   b. "I'm so busy, I don't know how I'll find time to get the dishes done."
      Indirect. Rather than telling or asking the listener to do the dishes, the speaker is mentioning conversationally that it would be nice if they got done, hoping the listener will take the hint and volunteer to do them.

c. “I apologize for taking up so much of your time.”
   Negative politeness. The speaker is assuming that they have infringed on the listener, showing respect for the listener’s time and independence.
d. “You’ll eat your peas and you’ll like it, mister.”
   Bald on-record. This is a direct order, and no attempt to protect the listener’s face is made. This is fairly obviously a request made by someone in a position of power to a subordinate (e.g., parent to child).

Exercises

1. Name the politeness strategy being used in each of the following utterances.
   a. “Well, I know you have a lot going on, so I’ll let you go.”
   b. “You need to go pick up the dry-cleaning.”
   c. “You’re such a sweetheart, I know I can count on you.”
   d. “Mmm, those cookies smell good.”
2. Suppose you want someone to loan you five dollars. Give an example of four ways you could request the money, one from each politeness strategy.

Answers to Exercises

Phonetics
IPA Transcription

Phonology
Natural Classes
Features
Minimal Pairs
Environments
Determining the Underlying Phoneme
Analyzing Data Sets
Phonological Processes

Morphology
Subcategorization Frames
Trees
Zero Derivation
Agglutinating Language Puzzle

Syntax
Constituency Tests

Semantics
Theta Roles
Tautologies, Contradictions, and Contingencies
Sense & Reference
Presupposition & Entailment

Pragmatics
Maxims, Maxim Violations & Implications
Speech Acts
Brown & Levinson's Politeness Theory

IPA Transcription

I. Consonants

1. Write the IPA symbol for the *first* sound in these words:

sniffles	s	bronchitis	b
cold	k	pneumonia	n
flu	f	death	d

2. Write the IPA symbol for the *last* sound in these words:

rash	ʃ	concussion	n
lacerations	z	hemorrhage	dʒ
fracture	r	death	θ

3. Write the IPA symbol for the *highlighted* sound in these words:

alco**h**olism	h	hemo**ph**ilia	f
dia**b**etes	b	can**c**er	s
hypo**th**yroidism	θ	**ch**ronic death... syndrome	k

II. Vowels

1. Write the IPA symbol for the *first* sound in these words (just the first sound of the first word is fine if it's a phrase):

obesity	o or ə	amnesia	æ or ə
epilepsy	ɛ	aphasia	ə
autism	ɔ	attention deficit disorder	ə

2. Write the IPA symbol for the *last* sound in these words (just the last sound of the last word is fine if it's a phrase):

dystrophy	i	sciatica	ə
polio	o	punched in the jaw	ɔ

3. Write the IPA symbol for the *highlighted* sound in these words:

borderl**i**ne	aj	sch**i**zoid	ɪ
bip**o**lar	o	paran**oi**d	oj
obs**e**ssive compulsive	ɛ	antisoci**a**l	ə

III. From Orthography to IPA

1. Write the following words in IPA:

chlamydia	kləmɪdiə	gonorrhea	ɡanəriə
hepatitis	hɛpətajtəs	syphilis	sɪfələs

1a. Alternate exercises for people who find STDs discomforting:

fluffy bunnies flʌfi bʌniz

pretty unicorns prɪɾi junəkorn

sunshiney rainbows sʌnʃajni renboz

grim death and despair grɪm dɛθ ænd dəsper

Transcribe the following into IPA:

Do no harm.

du no harm

Off with your shirt, let's have a look.

ɔf wɪθ jɔr ʃərt, lɛts hæv ə lʊk

A few days with a cooperative test subject could be worth months of theoretical research.

IV. From IPA to Orthography

1. Write each word in standard English orthography.

pɪl __pill____

pil __peel____

pul __pool____

pʊl __pull____

pel __pale/pail

tot __tote____

tɔt __taught_____

tat __tot___

tut __toot____

2. Write each sentence in standard English orthography.

aj kænt bəliv ju ʃat mi

I can't believe you shot me.

dʌz ðæt hæv ɛni lɛmənz ɪn ɪt? aj hæv ʌ sɪtrəs ælərdʒi

Does that have any lemons in it? I have a citrus allergy.

---

maj hajpoglajsimiə ɪz nat əmædʒənd. aj wʌz dəstɪŋktli tɔld ðæt aj hæd ʌ blʌd ʃʊgər prabləm

My hypoglycemia is not imagined. I was distinctly told that I had a blood sugar problem.

V. Going Beyond

1. If you know another language, what (if any) sounds in that language cannot be represented using the symbols you now know?
2. Here's a passage from another dialect of English. Try transcribing into standard orthography. Can you guess what kind of dialect this is? (ɜ is a new vowel sound. To tell what it sounds like, try saying the word "nurse" without the "r".)

fɜst rul əv dʒənɛtɪks: sprɛd ðə dʒinz əpaʔ, jʊ no! bət ðə rojəlz a əbsɛst wəθ, "a ju ə rojl fæmli? a ju ə rojl mɛmbə? wɛl ðɛn ju kən mæri mi kəz jɔ sem dʒin pul, ənd a aj kjuz wɪl go dawn ðə tojlət." fæntæstɪk! ðəts waj ðeə a no krezi rojəlz, ðeə dʒəst kajnd əv, "hɛlo! hɛlo, wət də ju du? o, jɔ ə plʌmə! wət an ɜθ əz ðæt?"[xix]

First rule of genetics: spread the genes apart, you know! But the royals are obsessed with, "Are you a royal family? Are you a royal member? Well then you can marry me cause you're same gene pool, and our IQs will go down the toilet." Fantastic! That's why there are no crazy royals, they're just kind of, "Hello! Hello, what do you do? Oh, you're a plumber! What on Earth is that?"

Natural Classes

I. List all the sounds in each class.

a. Voiceless – p, t, k, f, θ, s, ʃ, tʃ, h
b. Fricative – f, v, θ, ð, s, z, h
c. Velar – k, g, ŋ
d. Alveolar stop -- t, d, n
e. Velar nasal -- ŋ
f. Mid – e, o, ɛ, ʌ, ə
g. Round – u, ʊ, o, ɔ
h. Low back non-round – a
i. High tense – i, u

II. Determine whether the following sets of sounds are in a natural class. If so, what is the class?

a. {f, θ, s, ʃ, h} – yes, voiceless fricatives
b. {z, tʃ, dʒ} – no
c. {p, b, m, w} – yes, bilabial consonants
d. {b, d, g, ʔ} – no
e. {u, ʊ, o} – no
f. {æ, a, ɔ} – yes, low vowels
g. {i, ɪ, ʊ} – no
h. {ʌ, ə, ɛ} – mid lax vowels

Features

1. What sound(s) is/are described by this list of features?
   a. {-voice, +velar} – k
   b. {+rounded, -low, -high} – o
   c. {+voice} – b, d, g, m, n, ŋ, v, ð, z, ʒ, r, l, w, dʒ, j, and all vowels
   d. {+high, +tense} – i, u
   e. {+sonorant, +alveolar, -nasal} – r, l
2. What list of features describe(s) this/these sound(s)? Make sure there are no redundant features, and the sound is described uniquely (no other sound is described by this list of features).
   a. b -- {+voice, +labial, -continuant}
   b. dʒ -- {+voice, +palatal, -continuant}
   c. w, j -- {-consonantal}
   d. e -- {+tense, -back, -high, -low}
   e. æ, a -- {+low, -tense}
3. What are the distinctive features that differentiate these two sounds?
   a. {g, ŋ} -- +/- nasal
   b. {r, l} -- +/- lateral
   c. {i, u} -- +/- back, or +/- rounded
4. What are the distinctive features that differentiate these two *sets* of sounds?
   a. {p, b} & {k, g} – {p, b} is +labial, {k, g} is +velar
   b. {æ, a} & {ɔ, ʊ} -- {æ, a} is -rounded, {ɔ, ʊ} is +rounded

Minimal Pairs

1. Are the following pairs of English words minimal pairs?
   a. law, jaw lɔ, dʒɔ minimal pair (sound change between l & dʒ)
   b. crime, time krajm, taim not a minimal pair (two sound differences)
   c. prison, prism prɪsn, prɪsm minimal pair (sound change between n & m)
2. Consider this data set from Thai, and determine whether the given pairs are minimal pairs or not.
   a. baɪ ("sheet"), paɪ ("to go") minimal pair (sound change between b & p)
   b. bryy ("very fast"), myy ("hand") not a minimal pair (r is contrasted with ø)
   c. paɪ ("to go"), p^haɪ ("danger") minimal pair (change between p and p^h)

Environments

1. Consider the following data from English (use the IPA transcriptions, not the standard orthography glosses.) According to this data, are [θ] and [ð] allophones of the same phoneme, or different phonemes?

boθ	"both"	θɪŋk	"think"
ðoz	"those"	ðej	"they"
ræðər	"rather"	loð	"loathe"
θɪn	"thin"	ðɪs	"this"
faðərz	"fathers"	mæθ	"math"

Environments:

<u>θ</u>	<u>ð</u>
o_#	#_o
#_ɪ	æ_ə
æ_#	#_e
	o_#
	#_ɪ

There is overlap on both sides (on the left, [o], [æ] and # occur on both lists; on the right, [ɪ] and # occur on both lists). This is contrastive distribution. Therefore, [θ] and [ð] are different phonemes.

2. Consider the following data from English. According to this data, are [n] and [ŋ] allophones of the same phoneme, or different phonemes?

mɛntəl	"mental"	æŋgwəʃ	"anguish"
ɪnstətuʃən	"institution"	tʃræŋk	"tranq"
lɪŋgər	"linger"	jɔn	"yawn"
hændəl	"handle"		

Environments:

<u>n</u>	<u>ŋ</u>
ɛ_t	ɪ_g
ɪ_s	æ_g
ə_#	æ_k
æ_d	
ɔ_#	

There is overlap on the left, since [ɪ] and [æ] occur on both lists. However, there is no overlap on the right. This is complementary distribution. According to this data, [n] and [ŋ] are allophones.

3. Consider the following data from Ganda. According to this data, are [l] and [r] allophones of the same phoneme, or different phonemes?

kola	'do'	wulira	'hear'
lwana	'fight'	beera	'help'
buulira	'tell'	jjukira	'remember'
lya	'eat'	eryato	'canoe'
luula	'sit'	omuliro	'fire'
omugole	'bride'	effirimbi	'whistle'
lumonde	'sweet potato'	emmeeri	'ship'
eddwaliro	'hospital'	eraddu	'lightning'
oluganda	'Ganda language'	wawaabira	'accuse'
olulimi	'tongue'	lagira	'command'

Environments:

l	r
o_a	i_a
#_w	i_o
u_i	e_a
#_y	e_y
#_u	i_i
u_a	e_i
o_e	
a_i	
o_u	
#_a	

There is overlap on the right, since [a], [o], [i], and [y] occur on both lists. However, there is no overlap on the left. This is complementary distribution. According to this data, [l] and [r] are allophones in Ganda.

Going Beyond: In English, are [n] and [ŋ] allophones of the same phoneme, or different phonemes? Give data to support your answer. Does your answer support or conflict with your answer to exercise #2? If there is a conflict, how might you explain it?

They are different phonemes. You can tell from minimal pairs like

sʌn "sun" sʌŋ "sung"
wɪn "win" wɪŋ "wing"

where switching between /n/ and /ŋ/ results in different words, with different meanings.

There are a few explanations for the results in question 2. One simple one is that, by manipulation of the data chosen, a phoneme pair can be made to look like an allophone pair (although not vice versa. Can you explain why?) You just have to choose words where the phonemes are shown in different contexts.

In actuality, this *is* a stable, rule-based difference in English. Although /n/ and /ŋ/ are different phonemes in English, /n/ shows up as [ŋ] in certain situations. In the "Rules" section, you are asked to write the rule which governs this.

Determining the Underlying Phoneme

1. Consider the following data from English. According to this data, which sound of [n] and [ŋ] is the underlying phoneme?

mɛntəl	"mental"	æŋgwəʃ	"anguish"
ɪnstətuʃən	"institution"	tʃræŋk	"tranq"
lɪŋgər	"linger"	jɔn	"yawn"
hændəl	"handle"		

Given the answer to this question in the previous section, we know that only the right side of the environments is relevant for deciding which is the underlying phoneme. These environments are:

n	ŋ
ɛ_t	ɪ_g
ɪ_s	æ_g
ə_#	æ_k
æ_d	
ɔ_#	

The right-side environment of [ŋ] consists of [g, k], which are both velar consonants. The right-side environment of [n] can't be grouped into one category, so [n] is the underlying phoneme.

2. Consider the following data from Ganda. According to this data, which sound of [l] and [r] is the underlying phoneme?

kola	'do'	wulira	'hear'
lwana	'fight'	beera	'help'
buulira	'tell'	jjukira	'remember'
lya	'eat'	eryato	'canoe'
luula	'sit'	omuliro	'fire'
omugole	'bride'	effirimbi	'whistle'
lumonde	'sweet potato'	emmeeri	'ship'
eddwaliro	'hospital'	eraddu	'lightning'
oluganda	'Ganda language'	wawaabira	'accuse'
olulimi	'tongue'	lagira	'command'

Given the environments from the answer in the previous section, we know that the relevant side is the left one (there is overlap on the right):

l	r
o_a	i_a
#_w	i_o
u_i	e_a
#_y	e_y
#_u	i_i
u_a	e_i
o_e	
a_i	
o_u	
#_a	

The left-side environment of [r] consists of [i, e], which are both front vowels. The left-side environment of [l] can't be grouped into one category, so [l] is the underlying phoneme.

Going Beyond

1. Explain why we didn't ask for the underlying phoneme of the first exercise from that section.

We didn't ask for the underlying phoneme of the first exercise because in that exercise, there is overlap on both sides of the sound, which means that the sounds both occur in all environments, which makes them phonemes. There can be no underlying phoneme if there is no systematic difference in the environment using which one can predict the appearance of one sound instead of another.

2. Consider the Going Beyond question of the previous section ("Environments"): "In English, are [n] and [ŋ] allophones of the same phoneme, or different phonemes? Give data to support your answer. Does your answer support or conflict with your answer to exercise #2? If there is a conflict, how might you explain it?" Does your answer to this question provide you with more data which supports or contradicts the decision to label either [n] or [ŋ] as the underlying phoneme?

Upon further thought, it is easy to see that actually, [n] are [ŋ] different phonemes in English (see the above answer for proof). However, if one considers the circumstances in which [n] and [ŋ] are actually in allophonic distribution, it is evident that [n] is the underlying phoneme if one considers how often the sound [n] is encountered versus the sound [ŋ]. So, it is possible to argue both ways: one, that the data is not complete, and that both [n] and [ŋ] are phonemes, or two, that the data show one of the relationships that exist in English between [n] and [ŋ] and that this relationship is correctly portrayed by the underlying phoneme [n] becoming the allophone [ŋ] in certain environments.

Rules

1. Consider the following data from English. According to this data, what is the rule that predicts the occurrence of the [n] vs. the [ŋ] sound?

mɛntəl	"mental"	æŋgwəʃ	"anguish"
ɪnstətuʃən	"institution"	tʃræŋk	"tranq"
lɪŋgər	"linger"	jɔn	"yawn"
hændəl	"handle"		

Since we decided (see the answers to the last two sections) that [n] is the underlying phoneme, we just need to describe the environment in which the allophone [ŋ] occurs. So:

In symbols: /n/ → [ŋ] / _{g, k}

In features: {+nasal, +alveolar} → {+velar} / {+velar}_

2. Consider the following data from Ganda. According to this data, what is the rule that predicts the occurrence of the [r] vs. the [l] sound?

kola	'do'	eddwaliro	'hospital'
lwana	'fight'	oluganda	'Ganda language'
buulira	'tell'	olulimi	'tongue'
lya	'eat'	wulira	'hear'
luula	'sit'	beera	'help'
omugole	'bride'	jjukira	'remember'
lumonde	'sweet potato'	eryato	'canoe'

omuliro 'fire'	eraddu 'lightning'
effirimbi 'whistle'	wawaabira 'accuse'
emmeeri 'ship'	lagira 'command'

Since we decided (see the answers to the last two sections) that [l] is the underlying phoneme, we just need to describe the environment in which the allophone [r] occurs. So:

In symbols: /l/ → [r] / {i, e}_

In features: {+lateral}→{-lateral} / {+front, +tense}_

Going Beyond

1. In example problem 2, when we developed a rule for plural pronunciation, we decided [z] was the basic underlying phoneme. Given what the rule turned out to be, what's an alternate explanation for why [z] is in wider distribution than [s]? Could [z] and [s] actually be equally ranked (neither one more "underlying" than the other, or you can't tell)?

One could argue that [z] is in wider distribution than [s] because there are more voiced sounds in English than there are voiceless sounds (consider that most consonants and all vowels are +voice). However, because all the voiced sounds can be put in a class (namely, +voice) and all the voiceless sounds can be put in another class (-voice), [z] is not actually in a wider distribution than [s]. If viewed in this manner, [z] and [s] are equally ranked.

Analyzing Data Sets

1. Consider the following data from English. According to this data, are [n] and [ŋ] phonemes or allophones (if allophones, provide the rule in symbol and feature notations):

mɛntəl "mental"	æŋgwəʃ "anguish"
ɪnstətuʃən "institution"	tʃræŋk "tranq"
lɪŋgər "linger"	jɔn "yawn"
hændəl "handle"	

Step 1: Write the environments

n	ŋ
ɛ_t	ɪ_g
ɪ_s	æ_g
ə_#	æ_k
æ_d	
ɔ_#	

Step 2: Compare the environments for overlap (one side at a time)

There is overlap on the left, since [ɪ] and [æ] occur on both lists. However, there is no overlap on the right.

Step 3: Make the decision: phonemes or allophones?
Since there is no overlap on at least one side, this is complementary distribution. According to this data, [n] and [ŋ] are allophones.

Step 4: Write the rule (symbol and feature notation)

4a. Determine the underlying phoneme.

The right-side environment of [ŋ] consists of [g, k], which are both velar consonants. The right-side environment of [n] can't be grouped into one category, so [n] is the underlying phoneme.

4b. Write the rule:

In symbols: /n/ → [ŋ] / _{g, k}
In features: {+nasal, +alveolar}→{+velar} / {+velar}_

2. Consider the following data from English (use the IPA transcriptions, not the standard orthography glosses.) According to this data, are [θ] and [ð] allophones of the same phoneme, or different phonemes (if allophones, provide the rule in symbol and feature notations)?

boθ	"both"	θɪŋk	"think"
ðoz	"those"	ðej	"they"
ræðər	"rather"	loð	"loathe"
θɪn	"thin"	ðɪs	"this"
faðərz	"fathers"	mæθ	"math"

Step 1: Write the environments

<u>θ</u>	<u>ð</u>
o_#	#_o
#_ɪ	æ_ə
æ_#	#_e
	o_#
	#_ɪ

Step 2: Compare the environments for overlap (one side at a time)
There is overlap on both sides (on the left, [o], [æ] and # occur on both lists; on the right, [ɪ] and # occur on both lists).

Step 3: Make the decision: phonemes or allophones?
Since there is overlap on both sides, this is contrastive distribution. Therefore, [θ] and [ð] are different phonemes.

Step 4: Write the rule (symbol and feature notation)
This step cannot be completed because it only applies to allophones.

3. Consider the following data from Ganda. According to this data, are [r] and [l] phonemes or allophones (if allophones, provide the rule in symbol and feature notations):

kola	'do'	wulira	'hear'
lwana	'fight'	beera	'help'
buulira	'tell'	jjukira	'remember'
lya	'eat'	eryato	'canoe'
luula	'sit'	omuliro	'fire'
omugole	'bride'	effirimbi	'whistle'
lumonde	'sweet potato'	emmeeri	'ship'
eddwaliro	'hospital'	eraddu	'lightning'
oluganda	'Ganda language'	wawaabira	'accuse'
olulimi	'tongue'	lagira	'command'

Step 1: Write the environments

l	r
o_a	i_a
#_w	i_o
u_i	e_a
#_y	e_y
#_u	i_i
u_a	e_i
o_e	
a_i	
o_u	
#_a	

Step 2: Compare the environments for overlap (one side at a time)
There is overlap on the right, since [a], [o], [i], and [y] occur on both lists. However, there is no overlap on the left.
Step 3: Make the decision: phonemes or allophones?
Since there is no overlap on at least one side, this is complementary distribution. According to this data, [l] and [r] are allophones in Ganda.
Step 4: Write the rule (symbol and feature notation)

4a. Determine the underlying phoneme.

The left-side environment of [r] consists of [i, e], which are both front vowels.

The left-side environment of [l] can't be grouped into one category, so [l] is the underlying phoneme.

4b. Write the rule:

In symbols: /l/ → [r] / {i, e}_

In features: {+lateral}→{-lateral} / {+front, +tense}_

4. Consider this data from Tongan, a Polynesian language. Are [s] and [t] different phonemes or allophones of the same phoneme (if allophones, provide the rule in symbol and feature notations)?

tauhi	"to take care"	sino	"body"
sisi	"garland"	totonu	"correct"
motu	"island"	pasi	"to clap"
mosimosi	"to drizzle"	fata	"shelf"
motomoto	"unripe"	movete	"to come apart"
fesi	"to break"	misi	"to dream"

Step 1: Write the environments

s	t
#_i	#_a
i_i	o_u
o_i	o_o
e_i	#_o
a_i	a_a
	e_e

Step 2: Compare the environments for overlap (one side at a time)
There's definitely overlap on the left: we see [o], [e], [a] and word boundaries (#) on both lists. However, there is no overlap on the right: the list for [s] consists only of [i], and there are no [i]s on the list for [t].

Step 3: Make the decision: phonemes or allophones?
Since we found no overlap on one side, we can conclude that the two sounds are in complementary distribution. They're allophones of the same phoneme.

Step 4: Write the rule (symbol and feature notation)

4a. Determine the underlying phoneme.

The right side environment of [s] consists only of [i] (a high front vowel), whereas the right side environment of [t] consists of many different vowels. Since [t] has a wider distribution, [t] is the underlying phoneme.

4b. Write the rule:

In symbols: /s/ → [t] / _i

{+alveolar, -voice, -continuant}→{-continuant} / _{+high, -back, +tense}

Going Beyond: Consider this data from Tojolabal. Are [t] and [t^h] separate phonemes or allophones of the same phoneme? If allophones, what rule specifies their distribution?

tʃitam 'pig'	tʃatat^h 'kind of plant'
makton 'a patch'	mut^h 'chicken'
potot' 'kind of plant'	nahat^h 'long'
tinan 'upside down'	ʔinat^h 'seed'[xx]

Environments:

<u>t</u>	<u>t^h</u>
i_a	a_#
k_o	u_#
o_o	
#_i	

This is clearly complementary distribution, but there's no overlap on *both* sides! How do you formulate a rule here? You have a couple of options.

(1) Include both sides in your rule.

/t/ → [t^h] / [a, u]_#

"/t/ becomes [t^h] between [a] or [u] and a word boundary"

The problem with this rule is that it is extremely specific. If we had more data, we would probably see that only one of the sides was really important. Additionally, there's the problem that [a] and [u] don't really go together very well, which we'll see if we:

(2) Decide that the left side is more important here and write the rule as follows:

/t/ →[t^h] / [a, u]_

"/t/ becomes [t^h] after [a] or [u]"

If you can find some similarity between [a] and [u] which is not shared by the sounds that precede /t/ ([i], [k], [o]) and write the rule in features, that might lend some support.

/t/ → [+aspirated] / [-consonantal, ????] _

If you check out the feature chart, you'll see that there's no similarity shared by [a] and [u] and excluding [o] ([u] is the high version of [o], and [a] is low). This rule doesn't look promising. There's no reason for [a] and [u] alone to be trigger environments when [o] is not. Let's see if we have better luck when we:

(3) Decide that the right side is more important here and write the rule as follows:

/t/ → [t^h] / _#

"/t/ becomes [t^h] before a word boundary"

To me, this seems like the best rule. It's simple and explainable. However, we'd need more data to know for sure.

Phonological Processes

1. Consider the following data from a dialect of English sometimes spoken in Eastern Massachusetts (":" next to a vowel indicates a long vowel); what phonological process could account for the transformation from underlying to surface form? Provide the rule:

underlying form	*surface form*	*orthography*
[sɔ:ɪŋ]	[sɔ:rɪŋ]	sawing
[aɪdɪə]	[aɪdɪəɹ]	idea
[wɑʃɪŋtən]	[wɑɹʃɪŋtən]	Washington
[klɑθ]	[klɑɹθ]	cloth

The change from the underlying form to the surface form is in the addition, in all these words, of the sound [ɹ]. Since a sound is added, we know that this is epenthesis. Now, to come up with the rule; let's see what the immediate environment of the added sound is like:

ɔ:_ɪ
ə_#
ɑ_ʃ
ɑ_θ

We can't classify the right side – all sorts of things appear there, including vowels, consonants, and a word edge. However, the left side only has vowels; not only that, all the vowels are non-high vowels. So, we can formulate a rule that states that [ɹ] is inserted after a non-high vowel:

Ø → [ɹ] / [-high]V_

2. Consider the following data from English; what differences in pronunciation do you find among the underlying word and the word with an attached suffix? Pay specific attention to the last sound in the root word. What phonological process could account for the transformation? Provide the rule:

Root	*Root + morphology*
hand	handed
long	longer
limb	limber

When we look at the pronunciation of the two columns, we notice that in the first column, we do not pronounce the last sound (d, g, b), but in the second column we do. Why is this? The answer

is a little tricky because it relies on the information provided in the second column; namely, that these last sounds do in fact exist underlyingly (otherwise, why would they appear in the second column?). So, we have: (d, g, b) are pronounced in the middle of the word, but not at the end.

We could formulate the rule that these sounds are deleted at the end of the word, and this would be acceptable given the data set. However, if we think a little bit, we can come up with words that end in (d, g, b) and would therefore negate our rule: for example, tab, beg, shod. So, it must be more precise than that. The only thing left to do is look at the other side of the environment: the preceding sounds are all nasals. So, our more precise rule would state that (d, g, b), or voiced stops, are *deleted* at the end of a word if they follow a nasal:

/d, g, b/ → Ø / [+nasal]C_#

3. Consider the following data from English; keep in mind that all of these words have the same underlying prefix: "con-". What phonological process could account for the transformation from underlying to surface form of the prefix "con-"? Provide the rule:

conjoin	commerce
contraction	compose
contemplate	comply
conspire	combine
configure	
conclude	

Since we know that "con-" is the underlying form, we must explain why in the second column, it becomes "com-". We can examine the environments immediately near the changed sound, "n/m" to see if it provides a clue:

<u>n</u>	<u>m</u>
ə_dʒ	ə_m
ə_t	ə_p
ə_s	ə_b
ə_f	
ə_k	

Since the environments on the left are the same, we focus on the environment on the right. The environment of [n] consists of all kinds of consonants, whereas the environment of [m] is very narrow: it only contains labial consonants. We can notice, then, that [n] is an alveolar sound, and [m] is a labial sound. So, the alveolar [n] becomes the labial [m] when it precedes labial sounds. This is *assimilation* because the sound becomes more like its environment.

/n/ → [m] / _ [+labial]C

4. Consider the following data from English; keep in mind that all of these words have the same underlying suffix: "-al". What phonological process could account for the transformation from underlying to surface form of the suffix "-al"? Provide the rule:

Noun	*Adjective*	*Noun*	*Adjective*
person	personal	pole	polar
region	regional	circle	circular
autumn	autumnal	single	singular
cause	causal	molecule	molecular

Since we are given that the underlying suffix is "-al", we must explain why in the second column, the suffix changes to "-ar". When we examine the environments, we have to look at the last sound of the noun, since that is what the suffix attaches to:

-al	-ar
n_	l_
m_	
z_	

Now, it is clear that "-ar" occurs after [l]. Why would "-al" change to "-ar" after [l]? Try pronouncing "-al" after the nouns in the second column. Is it easy?
The difference between "-al" and "-ar" is in the final sound; one is +lateral, the other is –lateral. The final sounds in the "-al" column are –lateral. The final sounds in the "-ar" column are +lateral. So, the +lateral suffix changes to –lateral when the final sound in the word is +lateral. This is *dissimilation*, because the sound change makes the sound more different from its environment.

/al/ → [ar] / [+lateral]C _

Subcategorization Frames

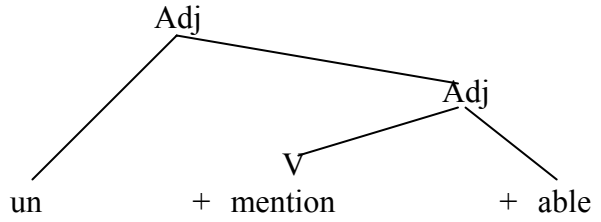
1. Give subcategorization frames for the following English morphemes, giving your evidence. *(Evidence will vary.)*

a. –s: N → N (cats, trucks)
b. –ify: Adj → V or N → V (clarify (clear + ify), beautify (beauty + ify))
c. –ly: Adj → Adv (happily, suddenly)

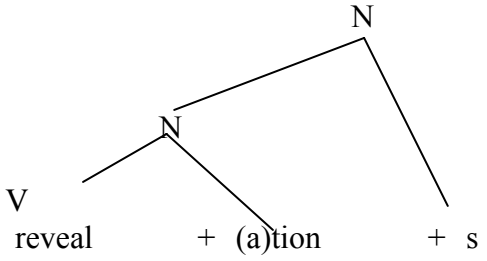
Trees

Make morphology trees for the following words:

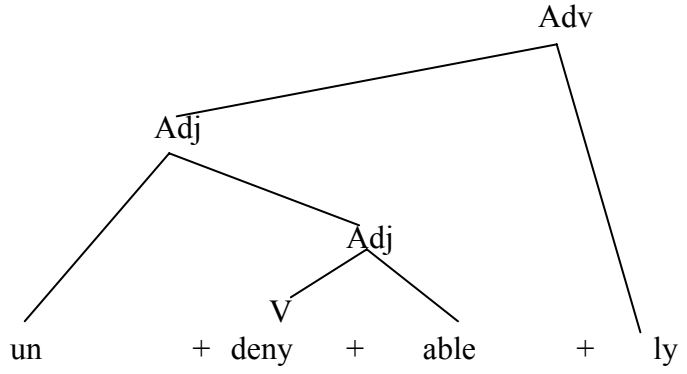
a. unmentionable



b. revelations

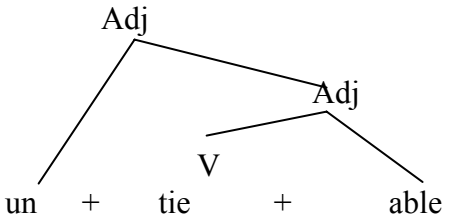


c. undeniably

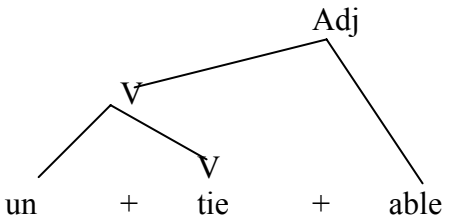


d. untieable

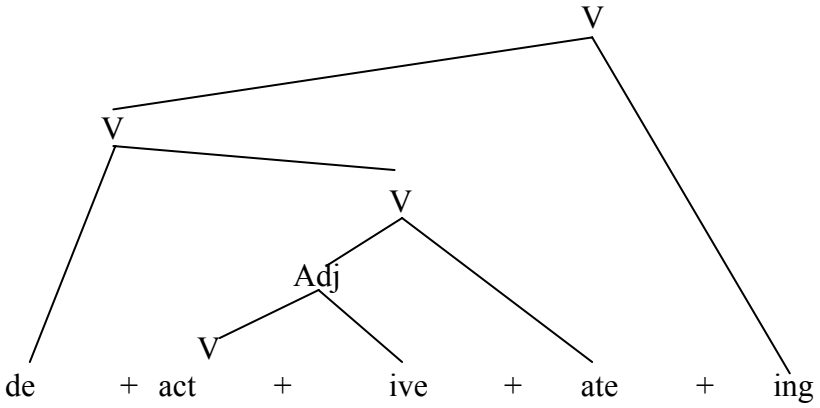
not able to be tied:



able to be untied:

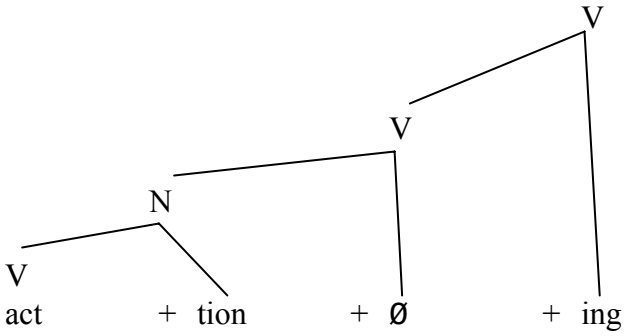


e. deactivating



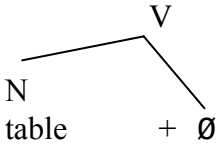
Zero Derivation

1. Provide tree structures for the following words:
    a. "actioning" as in, "I'll talk to Todd in accounting and see about actioning that for you."



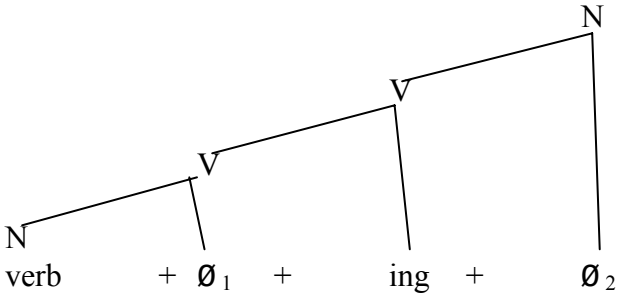
-tion: V → N
Ø: N → V
-ing: inflectional verb tense marker

    b. "table" as in "I think we should table this discussion for now."

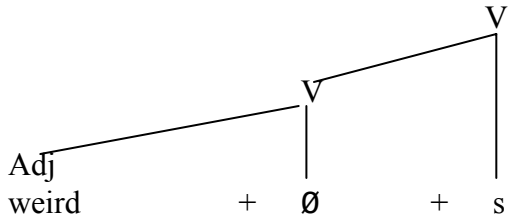


Ø: N → V

2. Provide tree structures for the first two words in the sentence "Verbing weirds language."



$Ø_1$: N → V
-ing: inflectional verb tense marker
$Ø_2$: V → N



Ø: Adj → V
-s: inflectional verb tense marker

Agglutinating Language Puzzle

Subjects		*Objects*		*Tense*		*Aspect*		*Roots*	
I	fur			present	ti	progressive (-ing)	nex	like	ibusa
we	tal	us	oʃ	past	ʔa	perfect (have done)	wɛt	draw	enu
you (sg)	res			future	vul			wear	orgo
you (pl)	sis	you (pl)	edv						
he	lyt	him	œg						
she	ʃað	her	of						
they	sut	them	ɔm						
		it	yn						

Order of attachment:
subject + object + root + tense + aspect

a. I am wearing it. furynorgotinex
b. You (pl) will like us. sisoʃibusavul
c. He had drawn them. lytɔmenuʔawɛt
d. She likes you (pl). ʃaðedvibusati
e. They will wear it. sutoforgovul
f. I had liked you (pl). furedvibusaʔawɛt

Constituency Tests

Decide if the underlined portion of the following sentences is a constituent (show the constituency tests used):

1. Meredith mocked John's solutions in the science lab. **YES**
   Substitution: Meredith mocked his solutions in the science lab.
   Q/A: Whose solutions did Meredith mock in the science lab? John's.
   Cleft: (*) It was John's that Meredith mocked solutions in the science lab.
   Pseudocleft: (?) The solutions that Meredith mocked in the science lab were John's.
2. Meredith mocked John's solutions in the science lab. **NO**
   Substitution: (*)__?__ his solutions in the science lab.
   Q/A: (*) What happened to John's solutions in the science lab? Meredith mocked.
   Cleft: (*) It was Meredith mocked that John's solutions in the science lab.
   Pseudocleft: (*) The thing that happened to John's solutions in the science lab was Meredith mocked.
3. Meredith mocked John's solutions in the science lab. **YES**
   Substitution: Meredith mocked John's solutions there.
   Q/A: Where did Meredith mock John's solutions? In the science lab.
   Cleft: It was in the science lab that Meredith mocked John's solutions.
   Pseudocleft: The place where Meredith mocked John's solutions was in the science lab.
4. Meredith mocked John's solutions in the science lab. **NO**
   Substitution: (*) Meredith mocked John's them in the science lab.
   Q/A: (*) What of John's did Meredith mock in the science lab? Solutions.
   Cleft: (*) It was solutions that Meredith mocked John's in the science lab.
   Pseudocleft: (*) The thing of John's that Meredith mocked in the science lab was solutions.
5. Meredith mocked John's solutions in the science lab. **YES**
   Substitution: Meredith mocked John's solutions in the science lab. Jeannie did so as well.
   Q/A: (?) What did Meredith do? Mocked John's solutions in the science lab.
   Cleft: It was mock John's solutions in the science lab that Meredith did.
   Pseudocleft: What Meredith did was mock John's solutions in the science lab.
6. Meredith mocked John's solutions in the science lab. **YES/NO** (depending if "in the science lab" refers to solutions or to mocking).
   Substitution: (?) Meredith mocked them.
   Q/A: (?) What did Meredith mock? John's solutions in the science lab.
   Cleft: (?) It was John's solutions in the science lab that Meredith mocked.
   Pseudocleft: (?) What Meredith mocked were John's solutions in the science lab.
7. Meredith mocked John's solutions in the science lab. **YES/NO** (depending if "in the science lab" refers to solutions or to mocking).
   Substitution: (?) Meredith mocked them in the science lab.
   Q/A: (?) Whose did Meredith mock in the science lab? John's solutions.
   Cleft: (?) It was John's solutions that Meredith mocked in the science lab.
   Pseudocleft: (?)What Meredith mocked in the science lab were John's solutions.

Lexical Categories

Exercises: Label the words in the following sentences with appropriate labels.

1. N V N
   Meredith loves chocolate.

2. N V Adj N
   Meredith loves chocolate truffles.

3. N V Adj N P Adj Adj N
   Meredith loves chocolate truffles with real milk chocolate.

4. N V Adj N C N V P D N
   Meredith loves chocolate truffles that John brought to the city.

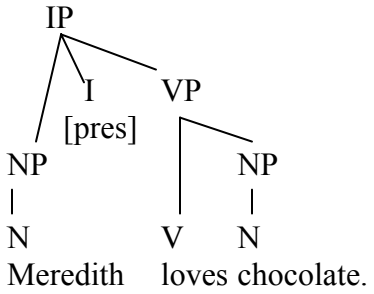
5. Quant N V N Conj Det Adj N
   All scientists adore John and his shiny brain.

6. N P N V D Adj N P D Adj N
   Scientists from Canada detest the Antarctic winter with a fiery passion.

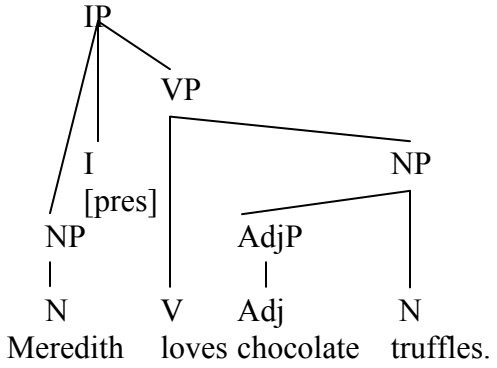
Phrase Structure/Trees

Using the structure rules above, draw the following trees:

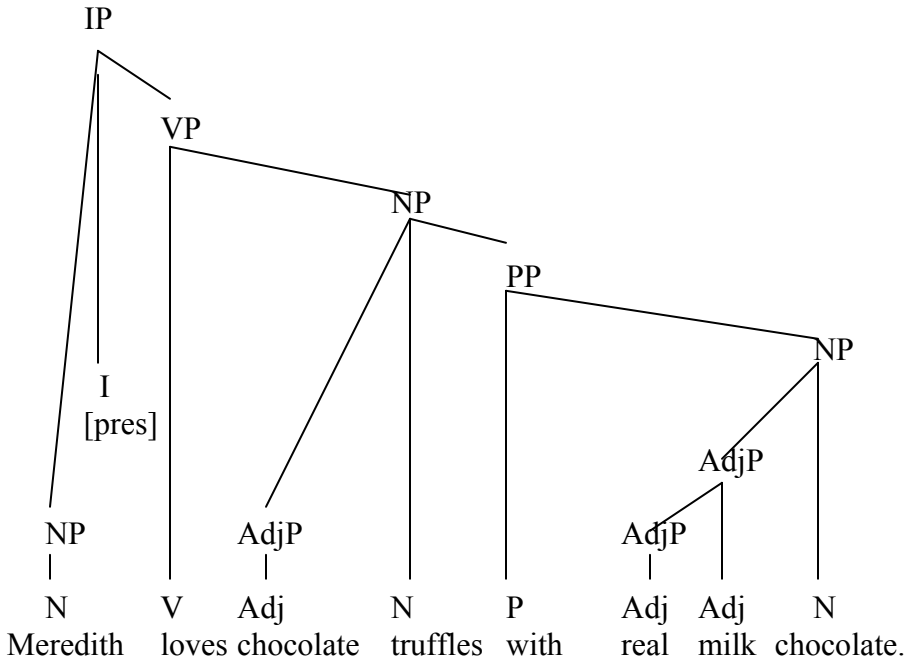
1.



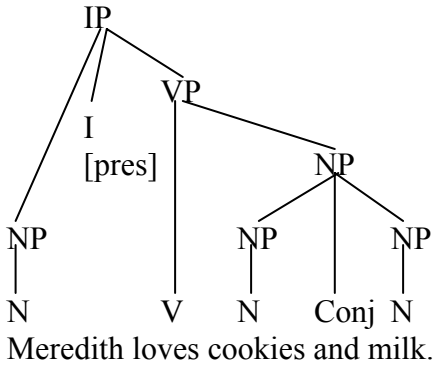
2.



3.



4.



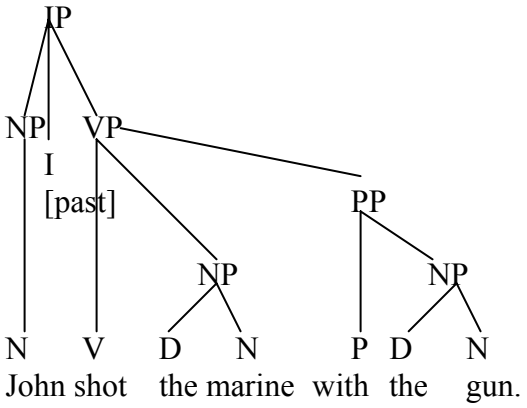
Ambiguous Tree Structures

Determine the meanings in these ambiguous sentences and provide the meanings with corresponding trees.

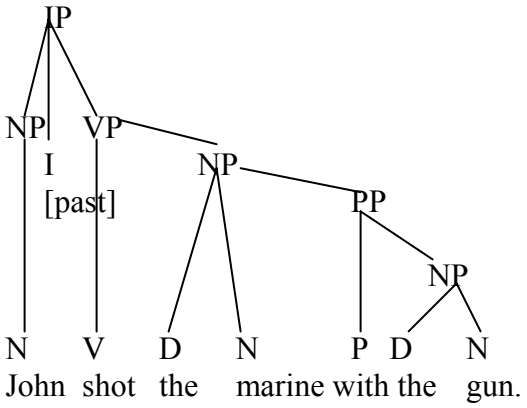
1. John shot the marine with the gun.

Meaning 1: John shot the marine using the gun.
Meaning 2: John shot the marine who had the gun.

Tree for Meaning 1:

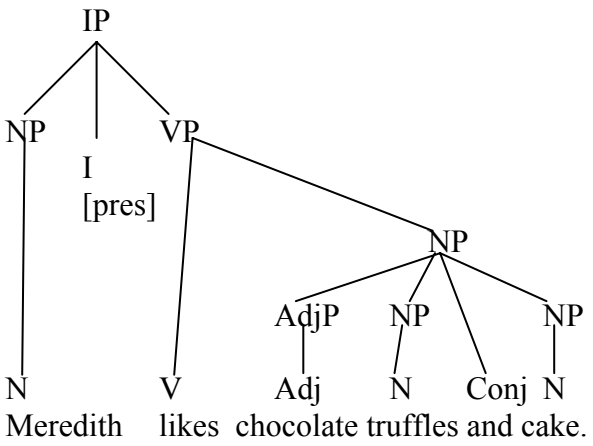


Tree for Meaning 2:

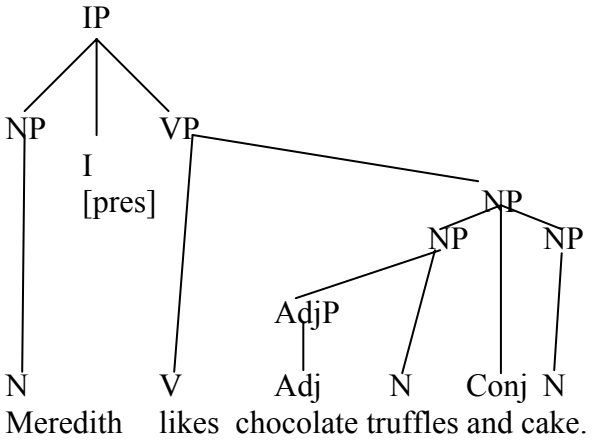


2. Meredith likes chocolate truffles and cake.
Meaning 1: Meredith likes chocolate truffles and chocolate cake.
Meaning 2: Meredith likes chocolate truffles and any kind of cake at all.

Tree for Meaning 1:

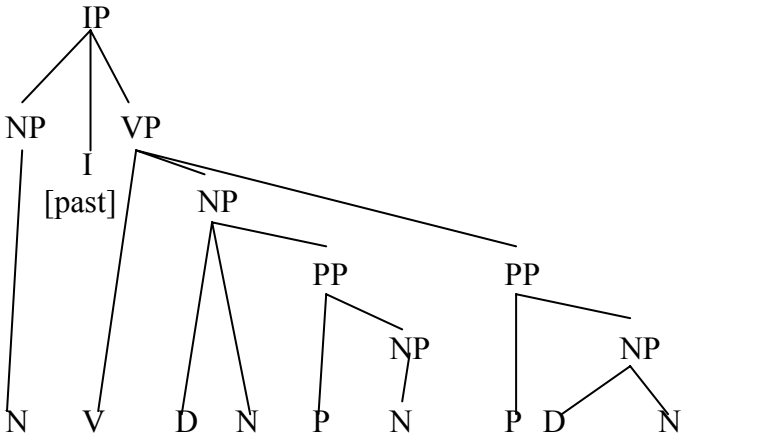


Tree for Meaning 2:



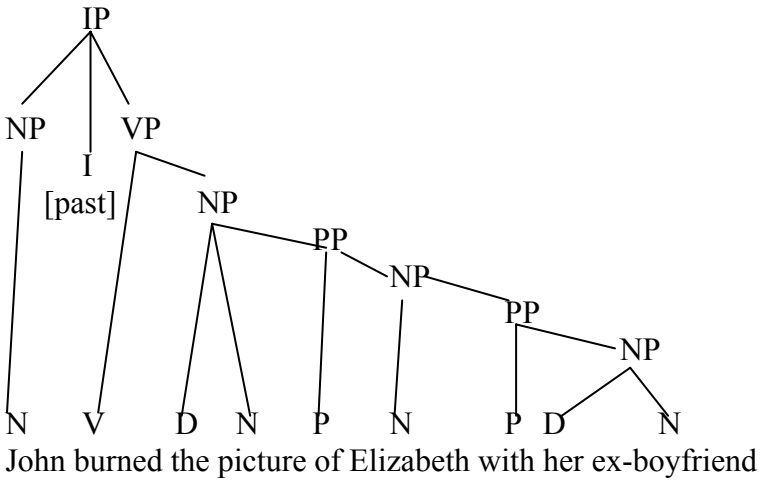
3. John burned the picture of Elizabeth with her ex-boyfriend. (three possible meanings here, one requires treating "with" as a conjunction)
Meaning 1: John and Elizabeth's ex-boyfriend burned her picture together ("with her ex-boyfriend" attaches to the "burned" VP).
Meaning 2: John burned the picture that showed Elizabeth and her ex-boyfriend ("with her ex-boyfriend" attaches to the "Elizabeth" NP).
Meaning 3: John burned the picture of Elizabeth at the same time as he burned Elizabeth's ex-boyfriend (here, "with" function as "and"). This third meaning is actually a different kind of ambiguity (it's lexical ambiguity about the word "with", not necessarily a structural ambiguity). Nonetheless, it is included here, because it is a common reading of this sentence which does actually have two addition syntactic ambiguities (Meaning 1 and 2).

Tree for Meaning 1:

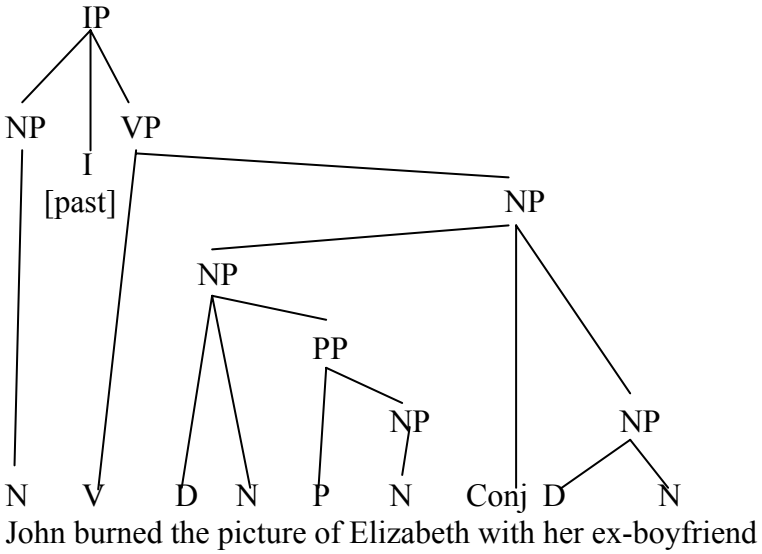


John burned the picture of Elizabeth with her ex-boyfriend

Tree for Meaning 2:



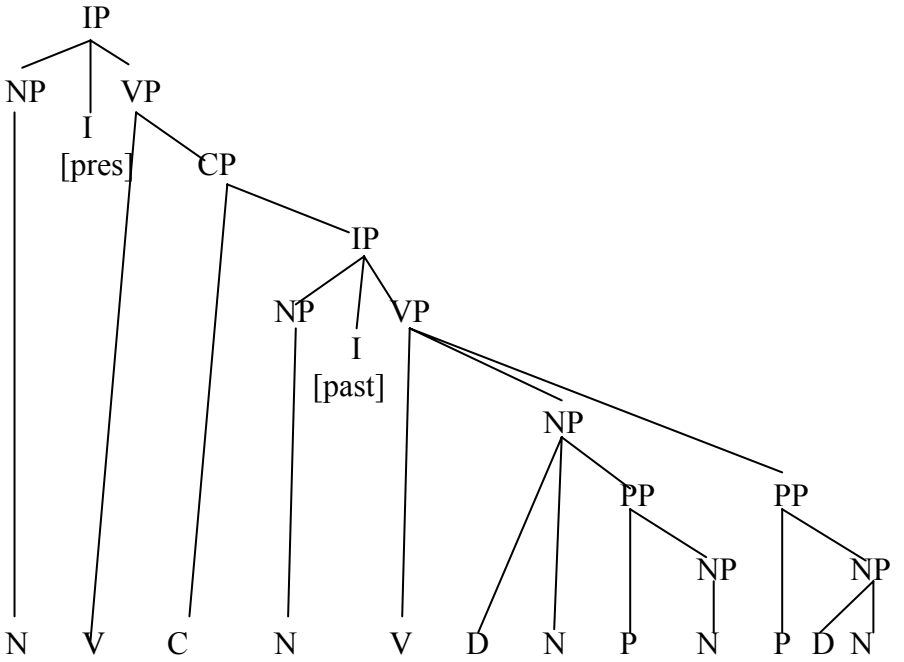
Tree for Meaning 3:



Complex Sentences

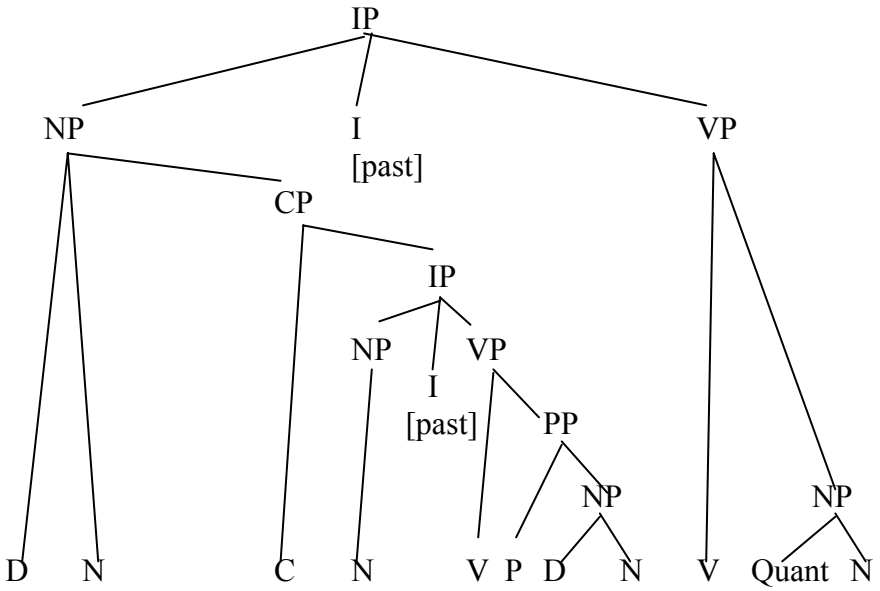
Construct the trees for the following complex sentences:

1.



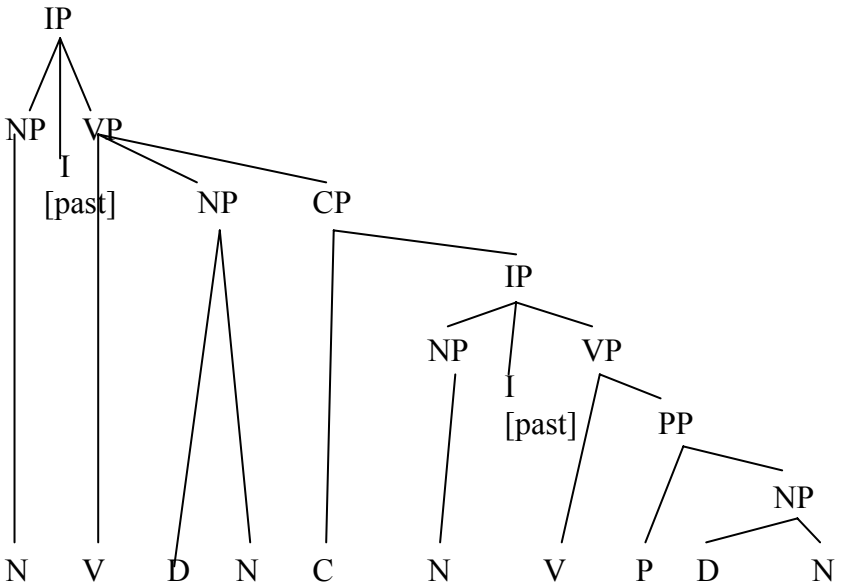
John insists that Meredith brought the cake without citrus to the party.

2.



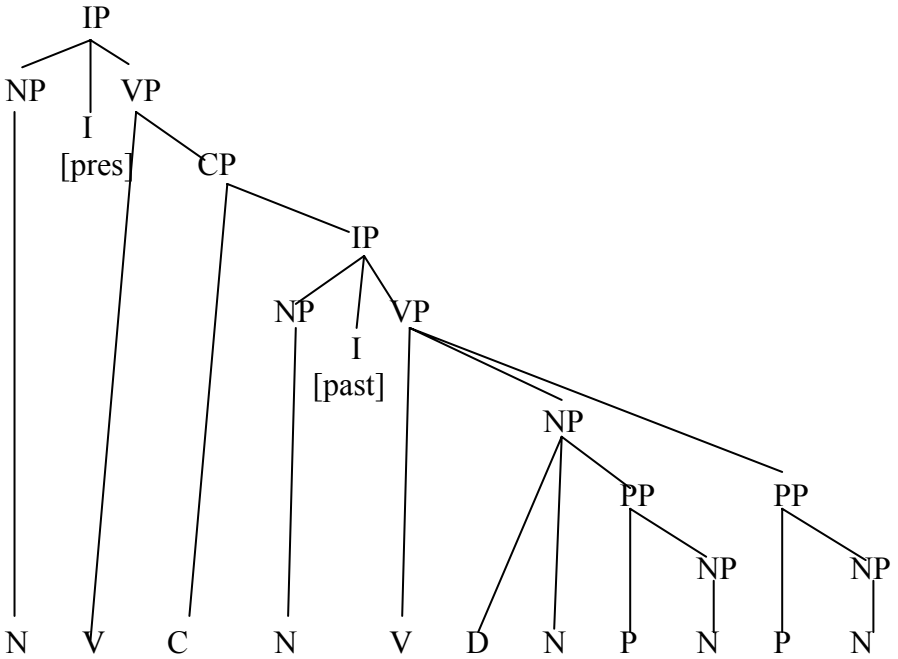
The announcement that Meredith went to the party raised some eyebrows.

3.



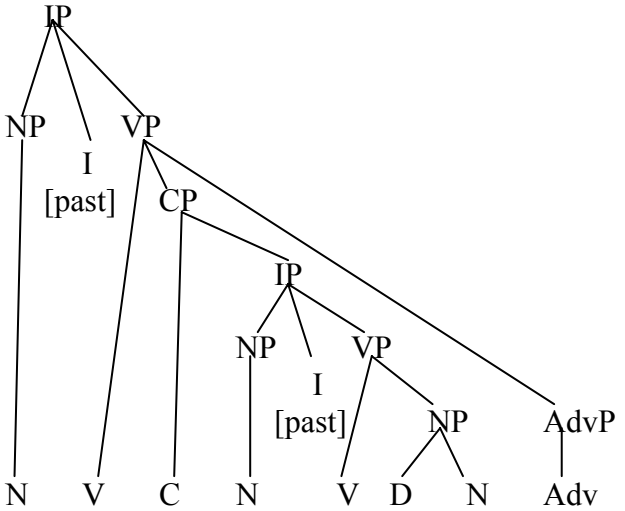
John played the game because Meredith insisted on his participation.

4.



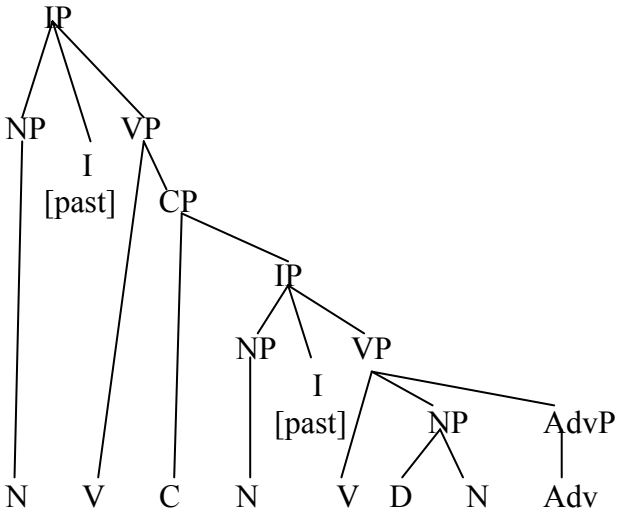
John thinks Ø Meredith sang the song about love for him

5a. Meaning: John heard yesterday that Meredith ate the cake.



John heard that Meredith ate the cake yesterday.

5b. John heard that yesterday, Meredith ate the cake.



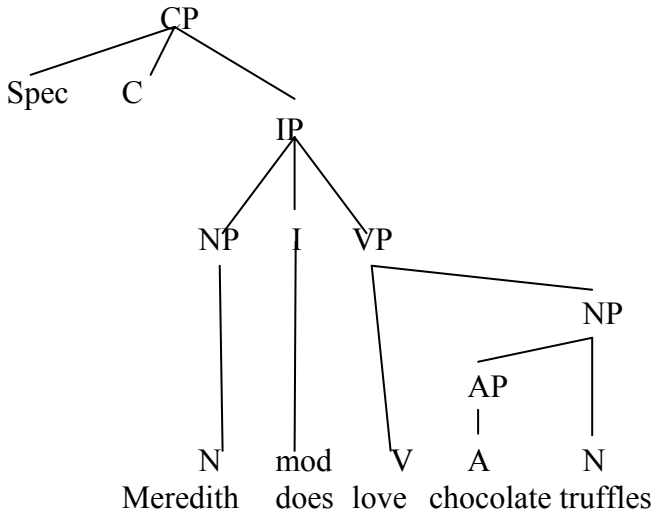
John heard that Meredith ate the cake yesterday.

Transformations

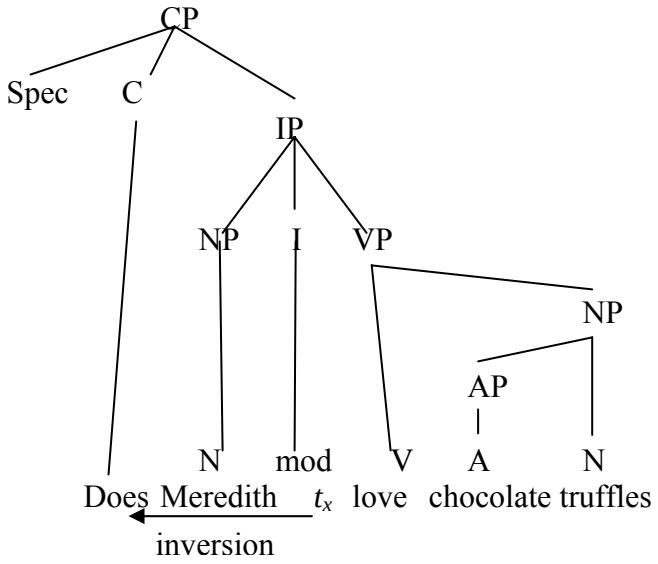
Draw the underlying and surface structure of the following sentences:

1. Does Meredith love chocolate truffles?

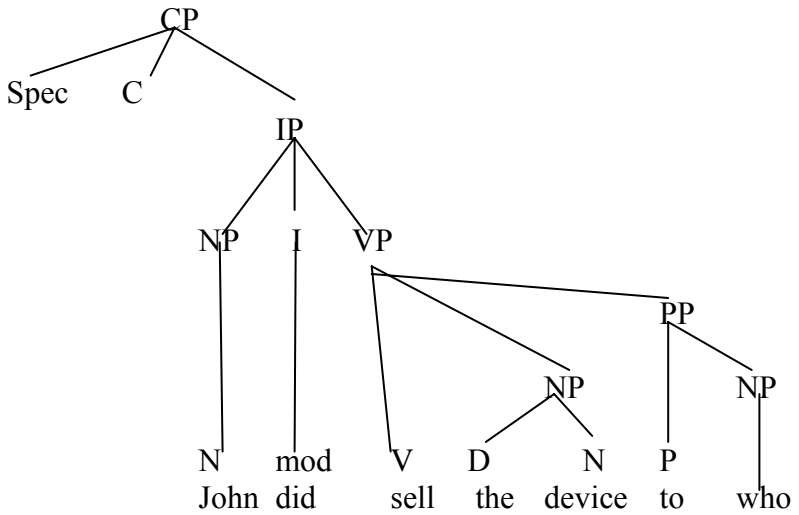
Underlying structure: Meredith does love chocolate truffles.



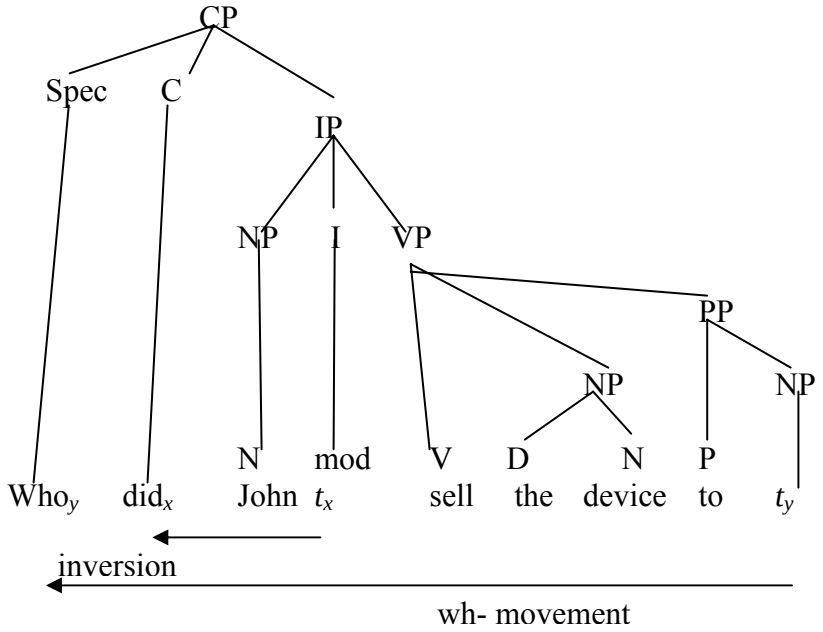
Surface structure:



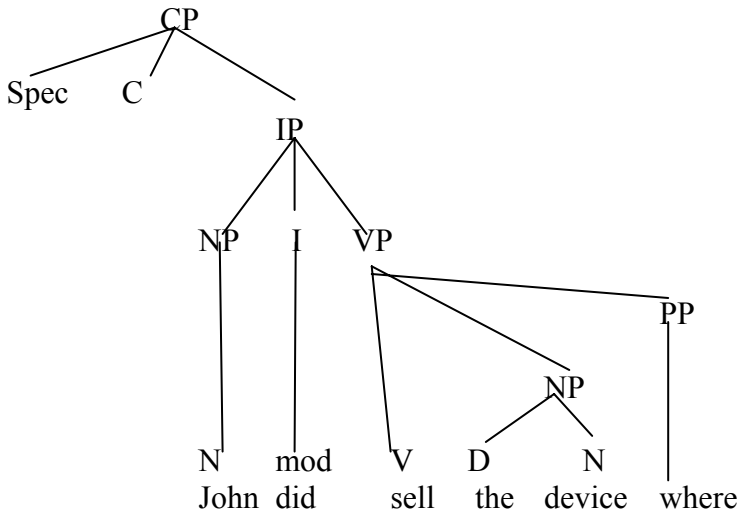
2. Who did John sell the device to?
Underlying structure: John did sell the device to who(m).



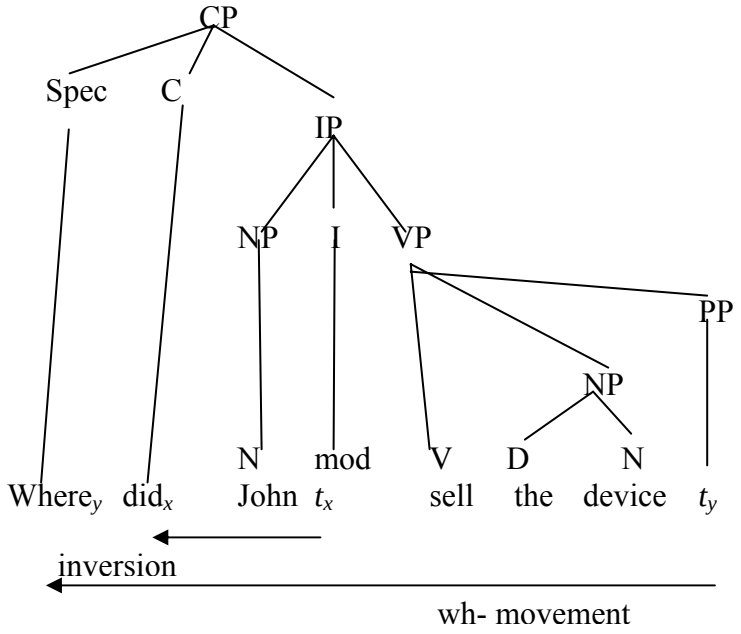
Surface structure:



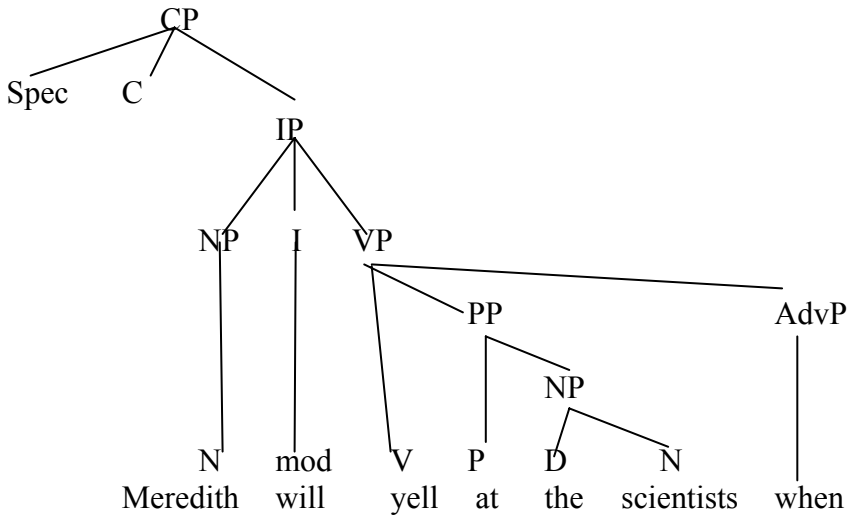
3. Where did John sell the device?
Underlying structure: John did sell the device where.



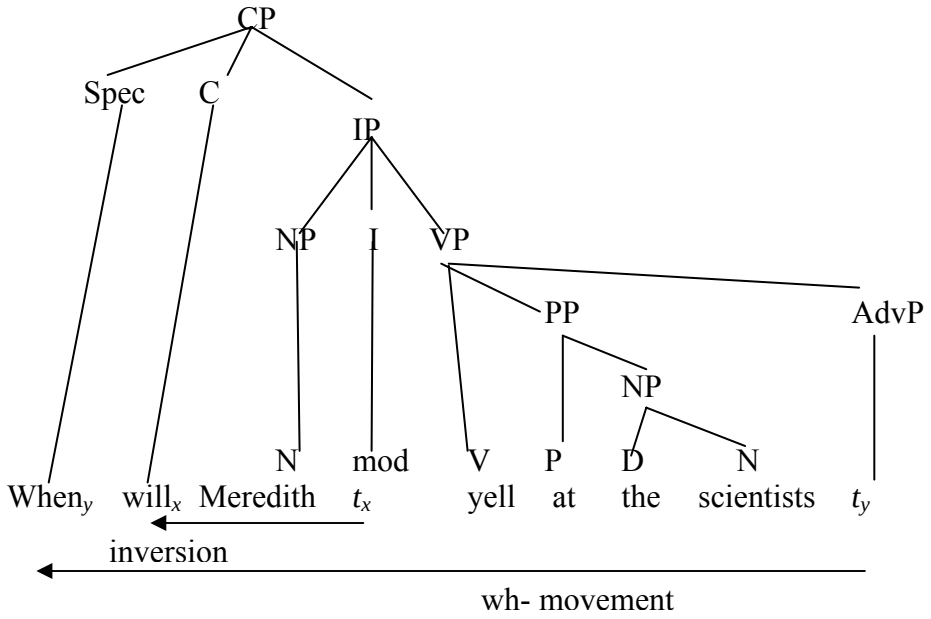
Surface structure:



4. When will Meredith yell at the scientists?
Underlying structure: Meredith will yell at the scientists when



Surface structure:



Theta Roles

Label all the underlined phrases in the following sentences with the appropriate theta roles.

1. The explosion took out most of the western pier in the city.
   The explosion is the cause (it's not an agent or an experiencer, but it still performs the action of "taking out"/destroying).
   Most of the western pier is the patient (not theme, because presumably most of the western pier is destroyed as a result of the explosion).
   In the city is the location of the explosion.
2. Meredith activated the weapon from a distance using a special device.
   Meredith is the agent (activation requires deliberate action on the part of the agent).
   The weapon is the theme (the recipient of the activating action).
   From a distance is the source because it indicates where the action came from.
   Special device is the instrument with which the action was performed.
3. John carried the shiny toy from the closet to the office with the tongs.
   John is an agent (carrying requires deliberate action).
   The shiny toy is the theme (not patient, because presumably the act of carrying does not change the properties of the toy).
   From the closet is the source of the action.
   To the office is the goal of the action.
   With the tongs is the instrument of the action.

Tautologies, Contradictions, and Contingencies

Decide if the following statements are tautologies, contradictions, or contingencies:

1. All bachelors are not married.
   Tautology (Since the definition of "bachelor" is "unmarried man", all bachelors are not married.)
2. The red cake is green.
   Contradiction (If the cake is red, it cannot be green.)
3. The cakes are red.
   Contingency (Depends on which cakes are being referred to.)
4. Every man loves a woman.
   Contingency (It's certainly not a tautology – there are many men who do not love a woman. It's also not a contradiction – there are *some* men who do love a woman. Therefore, it's a contingency.)
5. John loves Meredith.
   Contingency (The truth of this statement is unknown.)
6. Meredith is a woman.
   Contingency ("Meredith" could be a woman, a man, or a millipede for all we know.)

Sense & Reference

1. Identify the sense and reference of the following phrases.
    c. **Prime Minister of Canada:** The sense is the actual office of the leader of the Canadian government. As of this writing, the referent is Stephen Harper.
    d. **the last team to win the World Series:** The sense is whatever baseball team most recently won the World Series, which varies from year to year. As of this writing, the referent is the St. Louis Cardinals.
    e. **my (the exercise-doer's) favorite fruit:** The sense is whatever fruit the exercise doer prefers. The referent varies from person to person, time to time. For me, the referent is a peach.

2. Consider the statements "Meredith's boyfriend is not Meredith's boyfriend" and "John is not Meredith's boyfriend."
    f. **What is the referent of each of the underlined phrases?** The referent for each phrase is John.
    g. **What kind of statements are these (tautology, contradiction, or contingency)? If they are different, why?** The first phrase is a contradiction; the second is a contingency. Although John is currently the referent for the phrase "Meredith's boyfriend", the sense is simply whoever is currently fulfilling the role, which need not be John (Meredith's boyfriend might imaginably be somebody else). So, the sentence "John is Meredith's boyfriend" is contingency, because it need not be true; stating it is informative. On the other hand, whoever is currently fulfilling the role of Meredith's boyfriend, that person is never anybody other than himself. It is unnecessary to know the referent of "Meredith's boyfriend" to determine that "Meredith's boyfriend is not Meredith's boyfriend" is a contradiction.

Presupposition & Entailment

Presupposition/Entailment: In the following sets of statements, does A entail or presuppose B?

1A. John did not realize that Meredith was working in Antarctica.
1B. Meredith was in Antarctica.
Presupposition.

2A. John's charming personality makes everyone like him.
2B. Meredith likes John
Entailment.

3A. Everyone believes everything they hear.
3B. Someone does believe everything they hear.
Entailment.
.
4A. The rumor that John loves Meredith is true.
4B. John loves Meredith.
Entailment.

5A. The rumor that John loves Meredith is true.
5B. It is rumored that John loves Meredith.
Presupposition.

Mutual Entailment: In the following sets of statements, does A entail B, does B entail A, does both A entail B and B entail A (mutual entailment), or does neither entail the other?

1A. John loves Meredith more than Meredith loves John.
1B. Meredith loves John less than John loves Meredith.
Mutual entailment.

2A. John's charming personality makes everyone like him.
2B. Meredith likes John.
One way entailment (A → B).

3A. Everyone believes everything they hear.
3B. Someone does believe everything they hear.
One way entailment (A → B).

4A. The rumor that John loves Meredith is true.
4B. John loves Meredith.
Mutual entailment.

5A. John loves Meredith.
5B. Meredith loves John.
No entailment.

Maxims, Maxim Violations & Implications

1. LAURA: Come on, I'm taking you to the gym.
MEREDITH: Yeah, and pigs can fly.
What is Meredith implying?
Meredith refuses to go to the gym with Laura.
What maxim creates that implication, and why?
Quality. Meredith is saying something which is clearly untrue. By combining the "yes" response with a clearly untrue statement, Meredith is implying that the actual response is "no."

2. CARSON: What happened?
MEREDITH: He got attacked by a giant bug, and he passed out.
Implication: He passed out because he was first attacked (in other words, the order in which the events occurred is: (1) he got attacked; (2) he passed out.)
What maxim creates that implication, and why?
Manner. According to the maxim of manner, you are supposed to say things in an orderly way, so you should say events in the actual order in which they occurred. When a person says "This happened and that happened," you assume they mean "this happened, and then that happened."

3. JOHN: We just have to fly real close to the corona of the sun!
MEREDITH: You're lucky you're pretty.
What is Meredith implying?
John's idea is stupid.
What maxim creates that implication, and why?
Relation. Meredith is going off topic, talking about John's looks rather than his idea.

4. LAURA: Do you have any pets?
CARSON: I have two wee baby turtles.
Implication: Carson doesn't have any other pets besides the two turtles.
What maxim creates that implication, and why?
Quantity. According to maxim of quantity, you are supposed to say the strongest statement you possible can. So we have to assume that's what Carson is doing. If he actually had, say, two turtles and a dog, he should have made the stronger statement "I have two turtles and a dog" instead of the weaker (but still true) statement "I have two turtles."

5. MEREDITH: Tell them what happened!
JOHN: Meredith saw an object or entity strongly resembling a giant bug.
What is John implying?
Whatever Meredith saw, it wasn't a giant bug.
What maxim creates that implication, and why?
Manner. John is using unusually vague and ambiguous language. By describing what Meredith saw in an unusual way, he's signaling that there's something unusual about it—it isn't what it seemed to be.
Alternate explanation. John is signaling a minor violation of quality. He can't just say "Meredith saw a giant bug" since he isn't sure if it's true, so he avoids violating quality by using words especially chosen to signal his uncertainty.

Speech Acts

1. JOHN: Are you busy?
   MEREDITH: Could you not hover while I'm trying to work?
   a. What is the illocutionary force of John's speech act?
   Question (subcategory of Directive). John is asking for information.
   b. What is the illocutionary force of Meredith's speech act?
   Directive. Meredith is trying to get John to quit hovering.

2. ELIZABETH: Gentlemen, stand down.
   JOHN: Um... you've been relieved of duty.
   a. What is the illocutionary force of Elizabeth's speech act?
   Directive. She is commanding some forces to stand down.
   b. Is Elizabeth's speech act explicit or nonexplicit?
   Nonexplicit. An explicit version would be saying, "I (hereby) order you to stand down."
   c. Are the felicity conditions met? If not, why not?
   No, the preparatory conditions are not met. If Elizabeth has been relieved of duty, she does not have the authority to order the forces to stand down.

3. ELIZABETH: You endangered the lives of everyone on this ship!
   MEREDITH: Whoops.
   ELIZABETH: Is that supposed to be an apology?
   MEREDITH: That wasn't clear?
   a. What is the illocutionary force of Meredith's (first) speech act?
   Expressive. From context, it appears Meredith was attempting an apology.
   b. Is Meredith's speech act explicit or nonexplicit?
   Nonexplicit. An explicit version would be saying, "I (hereby) apologize."
   c. Are the felicity conditions met? If not, why not?
   No (not at first, anyway). The essential conditions are not met. Elizabeth isn't sure that it's supposed to be an apology.

4. MEREDITH: Thanks for the present.
   JOHN: I didn't give you any present.
   a. What is the illocutionary force of Meredith's speech act?
   Expressive. Meredith is expressing gratitude.
   b. Is Meredith's speech act explicit or nonexplicit?
   Nonexplict. An explicit version would have to use "thank" or similar as a verb ("I (hereby) thank you".)
   c. Are the felicity conditions met? If not, why not?
   No. If John didn't actually give Meredith a present, then the propositional conditions are not met.

5. JOHN: Meet me in the jumper bay in ten minutes.
   MEREDITH: Okay.
   -20 Minutes Later-
   JOHN: Where were you?
   MEREDITH: Sorry, I lost track of time!

   a. What is the illocutionary force of John's *first* speech act?
   Directive. John is trying to get Meredith to do something.
   b. What is the illocutionary force of Meredith's *first* speech act?
   Commissive. Meredith is promising to be at a certain place at a certain time.
   c. What is the illocutionary force of John's *second* speech act?
   Directive (question). John is asking for information. It could also be read that John's primary intent is to shame Meredith for not showing up, in which case this could be considered an expressive (i.e. a paraphrase of "I'm hurt that you didn't show up")
   d. What is the illocutionary force of Meredith's *second* speech act?
   Expressive. It's an apology.
   e. Are the felicity conditions met for Meredith's first speech act? If not, why not?
   Yes, as long as the apology is genuine—that is, as long as Meredith actually did lose track of time (instead of planning all along not to go).

6. JOHN: That's your baby whale friend?
   MEREDITH: I'm going to call him "Sam."

a. What is the illocutionary force of Meredith's speech act?
This could be a read few different ways. To me, the most natural is that this is Meredith's way of naming the whale, in which case it's a declarative. However, it could also be considered a statement of fact (representative): perhaps Meredith has already officially named the whale and is just informing John about it. It could even be read as a commissive: Meredith is promising to name the whale "Sam" at some later date.
b. Is Meredith's speech act explicit or nonexplicit?
If you read this as a declarative, then the phrase "going to call" is basically synonymous with "name"/"baptize"/"declare" and the speech act is explicit. In the other cases, it looks more like a nonexplicit speech act. The explicit version of the representative reading would be something like "I declare that I am going to call him 'Sam'." The explicit version of the comissive reading is "I swear to name him 'Sam'."
c. Are the felicity conditions met? If not, why not?
As far as we know, they are met, so long as Meredith actually does call the whale "Sam" from then on. Whether Meredith possesses the authority to name a whale is debatable (probably not from the whale's point of view.)

7. MEREDITH: I was very heroic.
JOHN: I call bullshit!
a. What is the illocutionary force of Meredith's speech act?
Representative. Meredith is describing a belief.
b. What is the illocutionary force of John's speech act?
"Calling bullshit" is an interesting speech act; I'm inclined to call it a declarative (declaring Meredith's statement as false), but it could be considered an expressive (i.e. "I disagree!"—showing how John feels about Meredith's statement).
c. Is Meredith's speech act explicit or nonexplicit?
Nonexplicit. The explicit version would be something like "I proclaim that I was very heroic."
d. Is John's speech act explicit or nonexplicit?
Explicit, so long as you agree that it would be possible to say "I hereby call bullshit!"
e. In light of John's statement, are the felicity conditions met for Meredith's speech act? If not, why not?
No. If John is right and Meredith is full of it, then the statement "I was very heroic" is false and the propositional content conditions are not met.

Going Beyond

1. **What kind of speech act is calling shotgun? That is to say, what illocutionary force classification would you give it?** I would be most likely to call it a declarative—staking a claim on shotgun could be seen as changing your own status (non-shotgun-haver to shotgun-haver) or the status of shotgun (not-yours to yours). I'm open to other convincing explanations, however.
2. **What is the distinction between saying "Shotgun!" and "I call shotgun!"?**
"Shotgun!" is nonexplicit; "I call shotgun!" is explicit.
3. **Suppose my friends and I go to the mall and in the middle of the food court I try to call shotgun for the way back. What felicity condition has been broken? What if I mutter "shotgun" so quietly that nobody hears me?** In the first case, I am violating the

preparatory conditions, since, according to the shotgun rules, I don't have the authority to call shotgun indoors, with the deed (going to the mall) not yet done. In the second case, I am violating both the preparatory conditions (by violating the rules) and the essential conditions (by making it impossible for the hearer(s) to recognize my intention). Indeed, the explicit Shotgun rule that somebody must hear you say "shotgun" has some overlap with the idea of essential conditions.

4. **In what circumstances would the utterance "Shotgun!" *not* be the kind of speech act described here?** If it were the answer to the question "What kind of gun is that in your pocket?" or even "What's that word that people use to call the front seat of the car?"—or any circumstance in which uttering the word is *not* understood to be actually calling dibs on anyone's front seat.

Brown & Levinson's Politeness Theory

1. Name the politeness strategy being used in each of the following utterances.
    a. "Well, I know you have a lot going on, so I'll let you go."
    Negative politeness
    b. "You need to go pick up the dry-cleaning."
    Bald on-record
    c. "You're such a sweetheart, I know I can count on you."
    Positive politeness
    d. "Mmm, those cookies smell good."
    Indirect
2. Suppose you want someone to loan you five dollars. Give an example of four ways you could request the money, one from each politeness strategy. **Answers will vary.**
    Example responses:
    Bald on-record: "Give me five dollars!"
    Negative politeness: "I know I'm asking a lot, but can you loan me five dollars?"
    Positive politeness: "Could you please loan me five dollars?"
    Indirect: "Oh man, I'm five dollars short..."

Tables & Charts

Reprinted from their original contexts

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Phonetic Alphabet Chart: Consonants of English

IPA Symbol	Example (Standard Orthography)	Example (IPA)
p	**p**owers, su**p**erhero, ca**p**e	**p**awərz, su**p**ərhiro, ke**p**
b	**B**atman, Ro**b**in, la**b**	**b**æʔmæn, ra**b**ən, læ**b**
t	**t**oxic, Green Lan**t**ern, invisible je**t**	**t**aksək, grin læn**t**ərn, ɪnvɪzəbəl dʒɛ**t**
d	**D**octor **D**oom, incre**d**ible, Alfre**d**	**d**aktər **d**um, ɪnkrɛ**d**əbəl, ælfrə**d**
k	**c**ostume, Do**c**tor O**c**topus, Hul**k**	**k**astjum, da**k**tər a**k**təpʊs, hʌl**k**
g	**G**otham, Ma**g**neto, Ro**g**ue	**g**aθəm, mæ**g**niɾo, ro**g**
f	**f**ortress, Al**ph**a **F**light, tou**gh**	**f**ortʃrəs, ælfə **f**lajt, tʌ**f**
v	**v**illain, Professor Xa**v**ier, Batca**v**e	**v**ɪlən, prʌfɛsər əgze**v**iər, bæʔke**v**
θ	**th**reat, Lex Lu**th**or, steal**th**	**θ**rɛt, lɛks lu**θ**ər, stɛl**θ**
ð	**Th**e Hulk, wea**th**er, scy**th**e	**ð**ə hʌlk, wɛ**ð**ər, saj**ð**
s	**S**uperman, la**ss**o, **s**pande**x**	**s**upərmæn, læ**s**o, **s**pændɛk**s**
z	**z**onk, la**s**er, disgui**s**e	**z**aŋk, le**z**ər, dəskaj**z**
ʃ (š)	**Sh**adowcat, radia**ti**on, Fla**sh**	**ʃ**ædokæt, redie**ʃ**ən, flæ**ʃ**
ʒ (ž)	trea**s**ure, Mira**g**e	trɛ**ʒ**ər, mərə**ʒ**
h	**H**ulk, super**h**ero	**h**ʌlk, supər**h**iro
tʃ (č)	**ch**ampion, Wat**ch**men, laun**ch**	**tʃ**æmpiyən, wa**tʃ**mən, lən**tʃ**
dʒ (ǰ)	**j**ustice, ori**g**in, **j**udge	**dʒ**ʌstəs, ɔrɪ**dʒ**ən, **dʒ**ʌ**dʒ**
m	**M**agneto, Aqua**m**an, cri**m**e	mægniɾo, akwə**m**æn, kraj**m**
n	**N**ightcrawler, spa**n**dex, Robi**n**	**n**ajʔkralər, spæ**n**dɛks, rabə**n**
ŋ	super stre**ng**th, Batara**ng**	supər strɛ**ŋ**kθ, bæɾəræ**ŋ**
l	**L**ois **L**ane, Al**l**fred, Sma**ll**vi**ll**e	**l**owəs **l**en, æ**l**frəd, sma**l**vɪ**l**
r	**R**ogue, Alf**r**ed, Night**c**ra**w**le**r**	**r**og, ælf**r**əd, najʔk**r**alə**r**
w	**W**onder **W**oman, Night**w**ing	**w**ʌndər **w**ʊmən, najt**w**ɪŋ
j (y)	**u**nited, sla**y**er	**j**unajɾəd, sle**j**ər
ʔ	u**h-**oh, Ba**t**man	ʌ**ʔ**o, bæ**ʔ**mæn
ɾ	Magne**t**o	mægni**ɾ**o

Weird Consonants to Notice

ʔ *Glottal Stop:* Voiceless stop that's rare in English. It may almost seem like a short pause instead of a sound. "uh-oh" is the best example, but it can also replace "t" in certain words (like "mitten") in some dialects.

ɾ *Lateral Flap:* A quick flap of the tongue. Comes out sort of like a cross between a "t" and "d" sound, as in "butter".

j *Palatal Glide:* Be careful with word-medial [j]. Compare "layer" [lejər] with "lair" [ler].

Phonetic Alphabet Chart: Vowels of English

IPA Symbol	Example (Standard Orthography)	Example (IPA)
i	superh**e**ro	supərh**i**ro
ɪ	**i**nv**i**sib**i**lity	**ɪ**nv**ɪ**zəb**ɪ**ləɾi
e	c**a**pe	k**e**p
ɛ	incr**e**dible	ɪnkr**ɛ**dəbəl
æ	B**a**tm**a**n	b**æ**ʔm**æ**n
ʌ	B**u**ffy	b**ʌ**fi
ə	**a**bil**i**ty	**ə**bɪlə**ɾ**i
a	R**o**bin	r**a**bən
u	S**u**perman	s**u**pərmæn
ʊ	Doctor Octop**u**s	daktər aktəp**ʊ**s
o	R**o**gue	r**o**g
ɔ	l**aw**	l**ɔ**
aj (aɪ)	kryptoni**t**e	krɪptən**aj**t
aw (aʊ)	p**ow**ers	p**aw**ərz
ɔj (ɔɪ)	Superb**oy**	supərb**ɔj**

Weird Vowels to Notice

aj, aw, ɔj *Diphthongs:* Although written with two symbols, these count as one sound.

ə *Schwa:* Always unstressed. Usually comes out sounding like [ʌ] as in "cut". Found in longer words when another vowel is stressed.

ɔ *Low Back Round Vowel:* Not everyone has this sound in their dialect. Do you have a difference between "caught" and "cot"? If so, then "caught" would be [kɔt]. If not, they are both [kat].

IPA English Consonant Chart: Manner of Articulation, Place of Articulation, Voicing*

		Place of Articulation						
		Bilabial	**Labio-dental**	**Inter-dental**	**Alveolar**	**Palatal**	**Velar**	**Glottal**
Manner of Articulation	**Stop**	p			t		k	ʔ
		b			d		g	
	Nasal	m			n		ŋ	
	Fricative		f	θ	s	ʃ		h
			v	ð	z	ʒ		
	Affricate					tʃ		
						dʒ		
	Approximant	w			r	j		
	Lateral Approximant				l			

** Shaded sounds are voiceless*

IPA English Vowel Chart: Height, Frontness, Tense/Lax*, Roundness**

		Frontness		
		Front	**Central**	**Back**
Height	**High**	i		**u**
		ɪ		**ʊ**
	Mid	e		**o**
		ɛ	ʌ, ə	
	Low			**ɔ**
		æ		a

** Shaded sounds are tense*
***Bold sounds are round*

List of Distinctive Features (Consonants)

Feature	- Feature	Included Sounds	Definition
consonantal	nonconsonantal	Consonants (not vowels, also not /w/ or /j/).	Consonants.
sonorant	obstruent	Nasals, approximants.	Equal air pressure inside & outside the vocal tract.
syllabic	nonsyllabic	Vowels and sometimes approximants	Can be the nucleus of a syllable.
voice	voiceless	Vowels, voiced consonants	Vocal chord vibration
continuant	stop	Fricatives, approximants. (Not nasals!)	Continuous passage of air through the mouth.
nasal	oral	{m, n, ŋ}	Air passes through the nose.
sibilant	nonsibilant	{s, z, ʃ, ʒ, tʃ, dʒ}	Jet of air through narrow passage toward obstacle (teeth)
lateral	rhotic	{l} but not {r}	Air flows along sides of the tongue
labial	non-labial	{p, b, m, f, v, w}	Use of lips
alveolar	non-alveolar	{t, d, n, s, z, l, r}	Use of alveolar ridge
palatal	non-palatal	{ʃ, ʒ, tʃ, dʒ, j}	Use of hard palate
velar	non-velar	{k, g, ŋ}	Use of velum
anterior	posterior	Labials, dentals, alveolars	Produced forward of the alveolar ridge.
coronal	noncoronal	Dentals, alveolars, palatals.	Use of tip and/or blade of the tongue.

List of Distinctive Features (Vowels)

Feature	- Feature	Included Sounds	Definition
high	low	i, ɪ, u, ʊ	Has to do with height of production in mouth.
low	high	æ, a	Has to do with height of production in mouth.
back	front	ʌ, ə, u, ʊ, o, ɔ, a	Has to do with location of production in mouth.
rounded	non-round	u, ʊ, o, ɔ	Lips are rounded.
tense	lax	i, e, u, o	Involve more constriction of tongue than lax vowels.

Distinctive Feature Chart (Consonants)

Feature	p	b	t	d	k	g	ʔ	m	n	ŋ	f	v	θ	ð	s	z	ʃ	ʒ	h	tʃ	dʒ	r	l	w	j
consonantal	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-
sonorant	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+
syllabic	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+/-	+/-	+/-	+/-
voice	-	+	-	+	-	+	-	+	+	+	-	+	-	+	-	+	-	+	-	-	+	+	+	+	+
continuant	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	-	-	+	+	+	+
nasal	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
sibilant	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	-	+	+	-	-	-	-
lateral	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-
labial	+	+	-	-	-	-	-	+	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	+	-
alveolar	-	-	+	+	-	-	-	-	+	-	-	-	-	-	+	+	-	-	-	-	-	+	+	-	-
palatal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	+	+	-	-	-	+
velar	-	-	-	-	+	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
anterior	+	+	+	+	-	-	-	+	+	-	+	+	+	+	+	+	-	-	-	-	-	+	+	+	-
coronal	-	-	+	+	-	-	-	-	+	-	-	-	+	+	+	+	+	+	-	+	+	+	+	-	-

Distinctive Feature Chart (Consonants)

Feature	i	ɪ	e	ɛ	æ	ʌ, ə	u	ʊ	o	ɔ	a
high	+	+	-	-	-	-	+	+	-	-	-
low	-	-	-	-	+	-	-	-	-	-	+
back	-	-	-	-	-	+	+	+	+	+	+
rounded	-	-	-	-	-	-	+	+	+	+	-
tense	+	-	+	-	-	-	+	-	+	-	-

Rule-writing Conventions

Symbols To Know

/X/ X is a phoneme (underlying sound)
[Y] Y is an allophone (actual pronunciation in this environment)
-> "becomes"; "shows up as"
/ "when"; "where"; "in the environment of"
_ placeholder for the allophone, showing its location in the environment
C consonants
V vowels
Ø null/nothing
# word boundary (can be used for the beginning or end of a word)
$ syllable boundary

Basic Rule Format

/phoneme x/ -> [allophone y] / _ [trigger environment z]
/phoneme x/ becomes [allophone y] when it comes before [trigger environment z]

/phoneme x/ -> [allophone y] / [trigger environment z] _
/phoneme x/ becomes [allophone y] when it comes after [trigger environment z]

/phoneme x/ -> [allophone y] / [trigger environment z] _ [trigger environment α]
/phoneme x/ becomes [allophone y] when it comes between [trigger environment z] and [trigger environment α]

Rules With Ø (Deletion & Epenthesis)

[X] -> Ø / Y _ Z
"X is deleted between Y and Z"

Ø -> X / Y _ Z
"X is inserted between Y and Z"

Basic Lexical Categories (Noun, Verb, Adjective, Adverb)

Nouns Typically defined as "person, place, or thing." Feelings and ideas are also nouns.
Examples: John, genius, Atlantis, space ship, computer, regret, sadness, loyalty, milk, noun

You Know It's A Noun If...

It's someone's name (like "Meredith" or "Dr. Zelenka"),
OR it's a pronoun
- Pronouns are stand-ins for nouns—"he", "him", "she", "her", "it", "they", "them"

OR you can precede it with a determiner
- That is, the word can go after a word like "a", "the", "this", "that", "those", "these"

OR you can add noun-specific inflectional morphology
- That is, you can make it plural (usually by adding "-s" or "-es")

Verbs Typically defined as "action words."
Examples: run, jump, play, be, have, exist, sleep, consider, like, dislike, zip, unzip

You Know It's A Verb If...

You can precede it with an auxiliary or modal
- That is, you can put the word after a helping verb like "have/has", "will", "can", "would", "should", "could"

OR you can add verb-specific inflectional morphology
- That is, you can make it past tense (usually by adding "-ed") or make it present tense continuing (by adding "-ing")

Adjectives Typically defined as "describing words." Describe nouns.
Examples: green, happy, worldly, disgusting, ugly, beautiful, unrealistic, useless, impenetrable

You Know It's An Adjective If...

It can describe a noun
AND you can make it comparative or superlative by preceding it with "more" or "most," or by adding adjective-specific inflectional morphology
- That is, you can make it comparative (like when you change "big" to "bigger", or "beautiful" to "more beautiful") or superlative (like when you change "big" to "biggest," or "beautiful" to "most beautiful")

Adverbs Describe qualities of verbs.
Examples: quickly, soundly, temporarily, often, sometimes

You Know It's An Adverb If...

It can describe a verb
Note: Most adverbs end in –ly. (This is not a hard and fast rule, however.)

English Inflectional Morphemes (complete set)

That attach to... nouns	**verbs**	**adjectives**
plural **–s** (or **–es**)	present tense continuous **–ing**	comparative **–er**

(dogs, churches)	(running, jumping) past tense **–ed** (walked, slept) past participle **–en** (eaten, taken)	(happier) superlative **–est** (happiest)

Common Derivational Morphemes

Morpheme	**Subcategorization Frame**	**Meaning**	**Examples**
-able	V -> Adj	able to be Xed	washable
-al	N -> Adj		professional
anti-	N -> N	against X	antiwar
-ate	Adj -> V	make be X	activate
de-	V -> V	do reserve of X	deactivate
dis-	V -> V	do reverse of X	disestablish
-er	V -> N	one who Xs	baker, swimmer, singer
-ful	N -> Adj	full of X	beautiful, bountiful
-ify	N -> V	make be X	clarify, beautify
in-	Adj -> Adj	not X	indecent, inorganic
-ity	Adj -> N	the state of being X	normality, curiosity
-ish	Adj -> Adj	sort of X	greenish, prettyish
-ism	N, Adj -> N	belief in or support of X	egoism, creationism, universalism
-ist	N, Adj -> N	one who does, believes in or supports X	artist, egoist, creationist, universalist
-ive	V -> Adj		active
-ize	N -> V		terrorize, prioritize, energize
-less	N -> Adj	without X	clueless, penniless, careless
-ly	Adj -> Adv	in an X manner	hurriedly, happily
-ment	V, Adj -> N		establishment, merriment
mis-	V -> V	not X, not X correctly	misanalyze, misunderstand
-ness	Adj -> N		prettiness, niceness
-ous	N -> Adj		dangerous
re-	V -> V	X again	reheat, recreate
-tion/-ation/-ion	V -> N		creation, action, decision
un- (1)	V -> V	do reverse of X	untie, unlock, undo
un- (2)	Adj -> Adj	not X	unhappy, undecided
-y	N -> Adj		lucky, sexy

Word-Coining Processes

Process	Examples
adding morphology A new word is created by adding morphology to an existing word.	direction < direct + tion embiggen < en- + big + -en
backformation A new word is created when people take a word that appears to have been created by adding morphology, and try to get at the root by removing the morphology. Happens due to a misanalysis of the origin of the original word.	pea < pease – -s administrate < administration – -ation
compounding Two words are combined, retaining the entirety of both words.	weblog < web + log
blending Two words are combined, and some intermediate portions of both words are dropped.	smog < smoke + fog Bennifer < Ben + Jennifer
clipping A word is shortened.	lab < laboratory blog < weblog
initialism (or alphabetism) A sequence of initials used as a word (the individual letters are pronounced).	ID < identification SGA < Stargate: Atlantis
acronym A sequence of initials used as a word (sounded out phonetically rather than saying individual letters).	NASA < National Aeronautics and Space Administrations laser < Light Amplification by Stimulated Emission of Radiation
eponym A proper name is used to describe something associated with that person.	sandwich < the 4th Earl of Sandwich
generification A brand name is used to describe any similar product.	Kleenex (meaning any tissue) < Kleenex (meaning Kleenex brand tissue)
lexical shift (or **zero derivation**; see "Zero Derivation") Words that used to be one lexical cateogory are used in another, without adding morphology. The phrase "zero derivation" refers to the idea that a null (unpronounced) derivational morpheme is being added to the root to change its lexical category.	to Xerox (V) < (a) Xerox (N) to blog/blogging (V) < (a) blog (N)

Lexical Categories Quick Reference:

Category	Examples
Determiner	the, a, an, her, his, our, that (also possessives, like "John's" in "John's hat")
Modal Verb	could, should, might, must, will, would, can, may, shall
Auxiliary Verb	any form of "be" or "have" when used with another verb
Preposition	in, on, around, above, with, about, near, within, from, by
Qualifier	rather, very, too, quite
Quantifier	one, three, 300, some, several, many, much
Complementizer	that, whether, because, if, which
Conjunction	and, but, or

Phrase Structure Rules

CP → C IP
IP → NP I VP
NP → (Det) (Quant) (AdjP) N {PP, CP}
VP → V {PP, NP, CP, AdvP}
AdjP → (Qual) Adj
AdvP → (Qual) Adv
PP → P NP

Abstract Rule

XP → Spec X Comp

Abstract Conjunction Rule

XP → XP Conj XP

Grice's Cooperative Principle

Make your conversational contribution such as is required, at the stage at which it occurs, by the accepted purpose or direction of the talk exchange in which you are engaged.

Grice's Maxims of Conversation

Quantity

- Make your contribution as informative as required. (Don't say too much or too little.)
- Make the strongest statement you can.

Quality

- Do not say what you believe to be false.
- Do not say that for which you lack adequate evidence.

Relation

- Be relevant. (Stay on topic.)

Manner

- Avoid obscurity of expression.
- Avoid ambiguity.
- Be brief (avoid unnecessary prolixity).
- Be orderly.

Searle's Classification of Illocutionary Acts

- **Representative.** Speaker describes a state of affairs.
  Examples: "I am a woolly lamb." "It was I who murdered Mr. Body." "These are not the droids you're looking for."
- **Directive.** Speaker tries to get the hearer to do something.
  Examples: "Could you please do the dishes?" "You should apply to CalTech." "Never go into the west wing." "Get your hands off me, you dirty ape!"
    - **Question.** Speaker tries to get the hearer to provide some information.
      Examples: "Where's Meredith?" "What's the score?"
- **Commissive.** Speaker commits to doing something.
  Examples: "I'll meet you back here in an hour." "I'll feed the cat while you're gone." "Yes, I'll marry you."
- **Expressive.** Speaker expresses an emotional state.
  Examples: "I'm sorry I forgot to feed your cat." "I'm so disappointed in you." "I'm sorry for your loss." "Congratulations on your engagement!" "Welcome to the neighborhood!"
- **Declaration.** Speaker changes something's status.
  Examples: "I now pronounce you man and wife." "I absolve you of your sins." "We surrender!" "You are sentenced to five years hard labor."

Felicity Conditions

- **Preparatory conditions:** The speaker must have the necessary ability, authority, and beliefs.
  Failure example: At a baseball game, I scream, "You're out!" But since I'm not the umpire, nothing happens.
- **Sincerity conditions:** The speaker must mean it.
  Failure example: My roommate asks me to do the dishes and I say "Yes," but I have no intention of actually doing it.
- **Essential conditions:** The hearer recognizes the intention of the speech act.
  Failure example: Intending to propose marriage, I tell my girlfriend, "Let me share your burden." She thinks for a minute, and then hands me her books.
- **Propositional content conditions:** The propositions contained in the wording of the speech act must be true.
  Failure example: I say "I'm sorry I broke the lamp" when I have not, in fact, broken a lamp.

Brown & Levinson's Politeness Strategies

- *Bald on-record* No attempt to minimize threat to listener's face.
  Example: "Close the window."

- *Positive politeness* Attempts to minimize threat to listener's face by offering compliments, framing a request as a question, or otherwise emphasizing that the speaker likes, appreciates, and/or respects them.
  Example: "Could you please close the window?"

- *Negative politeness* Attempts to minimize threat to listener's face by emphasizing their autonomy. Speaker assumes they are imposing on the listener in some way.
  Example: "I'm sorry to bother you, but could you please close the window?"

- *Indirect/Off-record* Attempts to minimize threat to listener's face by speaking indirectly or generally. Since the speaker is not making a direct request to the listener at all, the listener's response feels like a completely autonomous choice.
  Example: "Boy, it's cold in here."

References

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[ix] Data set from wa Mberia, K., "Nasal Consonant Processes in Kitharaka." Nordic Journal of African Studies, *11*(2), 2002
[x] Examples taken from Eugene Loos, "Glossary of Linguistic Terms." http://www.sil.org/linguistics/glossaryOfLinguisticTerms/Index.htm
[xi] Examples taken from Wikipedia, "Turkish Language." http://en.wikipedia.org/wiki/Turkish_language
[xii] MFL = Matthew's Fake Language. These data are not from an actual language, but were invented by our friend for this study guide.
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[xix] From Eddie Izzard, "Dress to Kill."
[xx] Data set from Michael Noonan, University of Wisconsin-Milwaukee, Introduction to English Linguistics Handout in Phonology. http://www.uwm.edu/~noonan/Summer400Handouts/Phonology.Combined.pdf