## TOOTH AND THROAT SINGING:

## MONDEGREENS AND THE DECODING OF SOUND STRUCTURE

Andrew Nevins University College London



Connect With Us on Twitter Follow @nytimesarts for arts and entertainment

news.



Arts Twitter List: Critics, Reporters and Editors

#### Arts & Entertainment Guide

A sortable calendar of noteworthy cultural events in the New York region, selected by Times critics. • Go to Event Listings » "Just last week," she said, "someone was like, 'I didn't know you write music.' "

It seems safe to say that few people will make that mistake again. On Monday she was walking in Hudson River Park when she began getting e-mails and calls from friends telling her that she had gotten a Pulitzer. "I briefly thought that I was having a psychotic break," she said. She finally called her father, who went on the Internet and told her that she had actually won.

The award citation praised "Partita" as "a highly polished and inventive a cappella work uniquely embracing speech, whispers, sighs, murmurs, wordless melodies and novel vocal effects."

Jeremy Geffen, the director of artistic planning at Carnegie Hall and the chairman of this year's Pulitzer jury, recalled: "We kept listening because we were required to. But also because none of us could see what was around the next corner.

"She changes gears so quickly and so easily, and every turn is so unexpected and so full of joy. And it's in such a convincing and cohesive manner that you could never doubt the sense of architecture and the sense of premeditation."

Ms. Shaw wrote the work over three successive summers, starting in 2009, during which Roomful of Teeth was in residence at the Massachusetts Museum of Contemporary Art. The new ensemble wanted to explore nontraditional vocal techniques and was focusing on Tuvan throat singing, yodeling and belting, all of which found their way into "Partita."

The group's foundar, Brad Walls a member of the voice feaulty at Williams College

Connect With Us on Twitter Follow @nytimesarts for arts and entertainment

news.



Arts Twitter List: Critics, Reporters and Editors

#### Arts & Entertainment Guide

A sortable calendar of noteworthy cultural events in the New York region, selected by Times critics. • Go to Event Listings » "Just last week," she said, "someone was like, 'I didn't know you write music.' "

It seems safe to say that few people will make that mistake again. On Monday she was walking in Hudson River Park when she began getting e-mails and calls from friends telling her that she had gotten a Pulitzer. "I briefly thought that I was having a psychotic break," she said. She finally called her father, who went on the Internet and told her that she had actually won.

The award citation praised "Partita" as "a highly polished and inventive a cappella work uniquely embracing speech, whispers, sighs, murmurs, wordless melodies and novel vocal effects."

Jeremy Geffen, the director of artistic planning at Carnegie Hall and the chairman of this year's Pulitzer jury, recalled: "We kept listening because we were required to. But also because none of us could see what was around the next corner.

"She changes gears so quickly and so easily, and every turn is so unexpected and so full of joy. And it's in such a convincing and cohesive manner that you could never doubt the sense of architecture and the sense of premeditation."

Ms. Shaw wrote the work over three successive summers, starting in 2009, during which Roomful of Teeth was in residence at the Massachusetts Museum of Contemporary Art. The new ensemble wanted to explore nontraditional vocal techniques and was focusing on Tuvan throat singing, yodeling and belting, all of which found their way into "Partita."

The group's founder\_Brad Walls a member of the voice feaulty at Williams College



Connect With Us on Twitter Follow @nytimesarts for arts and entertainment

news



Arts Twitter List: Critics, Reporters and Editors

#### Arts & Entertainment Guide

A sortable calendar of noteworthy cultural events in the New York region, selected by Times critics. • Go to Event Listings » "Just last week," she said, "someone was like, 'I didn't know you write music.' "

It seems safe to say that few people will make that mistake again. On Monday she was walking in Hudson River Park when she began getting e-mails and calls from friends telling her that she had gotten a Pulitzer. "I briefly thought that I was having a psychotic break," she said. She finally called her father, who went on the Internet and told her that she had actually won.

The award citation praised "Partita" as "a highly polished and inventive a cappella work uniquely embracing speech, whispers, sighs, murmurs, wordless melodies and novel vocal effects."

Jeremy Geffen, the director of artistic planning at Carnegie Hall and the chairman of this year's Pulitzer jury, recalled: "We kept listening because we were required to. But also because none of us could see what was around the next corner.

"She changes gears so quickly and so easily, and every turn is so unexpected and so full of joy. And it's in such a convincing and cohesive manner that you could never doubt the sense of architecture and the sense of premeditation."

Ms. Shaw wrote the work over three successive summers, starting in 2009, during which Roomful of Teeth was in residence at the Massachusetts Museum of Contemporary Art. The new ensemble wanted to explore nontraditional vocal techniques and was focusing on Tuvan throat singing, yodeling and belting, all of which found their way into "Partita."

The group's founder Bred Walls a member of the voice feaulty at Williams College

1 2 NEXT PAGE »

This article has been revised to reflect the following correction:

#### Correction: April 19, 2013

An article on Thursday about Caroline Shaw, who won the Pulitzer Prize for music this week, referred incorrectly to a vocal technique explored by a group she has sung with, Roomful of Teeth. It is Tuvan throat singing — a tradition of the Tuvan people of Siberia — not "tooth and throat" singing.







• These sounds are acoustically very similar

- These sounds are acoustically very similar
- Perceptual similarity plays a guiding role in lexical change and language change

- These sounds are acoustically very similar
- Perceptual similarity plays a guiding role in lexical change and language change
- Dialects of East London English say two plus one is free, I fink

- These sounds are acoustically very similar
- Perceptual similarity plays a guiding role in lexical change and language change
- Dialects of East London English say two plus one is free, I fink
- Latin American Spanish has also lost

- These sounds are acoustically very similar
- Perceptual similarity plays a guiding role in lexical change and language change
- Dialects of East London English say two plus one is free, I fink
- Latin American Spanish has also lost
- But the New York Times?

- These sounds are acoustically very similar
- Perceptual similarity plays a guiding role in lexical change and language change
- Dialects of East London English say two plus one is free, I fink
- Latin American Spanish has also lost
- But the New York Times?
- Naturalistic mishearings allow us to see language change 'at the moment of mutation'



 Naturalistic studies of perceptual mishearings are a valid way to study perceptual similarity, even with the interference of top-down factors, and the overall patterns are highly similar to those of artificial 'confusion matrix' studies

- Naturalistic studies of perceptual mishearings are a valid way to study perceptual similarity, even with the interference of top-down factors, and the overall patterns are highly similar to those of artificial 'confusion matrix' studies
- When a mishearing occurs, the misheard word is not generally more frequent than the intended word, and in fact, there is an intriguing effect whereby the two words are of the same frequency class, suggesting listeners estimate the probability of the word they missed out on

- Naturalistic studies of perceptual mishearings are a valid way to study perceptual similarity, even with the interference of top-down factors, and the overall patterns are highly similar to those of artificial 'confusion matrix' studies
- When a mishearing occurs, the misheard word is not generally more frequent than the intended word, and in fact, there is an intriguing effect whereby the two words are of the same frequency class, suggesting listeners estimate the probability of the word they missed out on
- Speakers' insistence on imposing a structure on an ambiguous percept are arguably a holdover from language acquisition, and suggest that learning *does* take place in the face of ambiguous input



## LET'S ROLL UP OUR SLEEVES...



 "Confusion matrix" studies in the laboratory: people listen to nonsense syllables such as efe, ethe and write down or choose what they hear.

- "Confusion matrix" studies in the laboratory: people listen to nonsense syllables such as efe, ethe and write down or choose what they hear.
- Sometimes the effects of various kinds of noise (white noise, pink noise, cafeteria noise) are used to investigate the direction of errors

- "Confusion matrix" studies in the laboratory: people listen to nonsense syllables such as efe, ethe and write down or choose what they hear.
- Sometimes the effects of various kinds of noise (white noise, pink noise, cafeteria noise) are used to investigate the direction of errors
- But naturalistic 'slips' of the ear -- surely those must be messier than controlled laboratory studies?



• Surely tooth and throat singing arises because people don't know what *Tuvan* means, right? Or it's less familiar?

- Surely tooth and throat singing arises because people don't know what *Tuvan* means, right? Or it's less familiar?
- In natural conversation, there is a dialogue and a communicative goal, and surely that 'interferes' with examining pure perceptual similarity?

- Surely tooth and throat singing arises because people don't know what *Tuvan* means, right? Or it's less familiar?
- In natural conversation, there is a dialogue and a communicative goal, and surely that 'interferes' with examining pure perceptual similarity?
- One of my research goals: face the messiness. When language change happens, it happens amidst communicative intent, with real lexical items, and with listeners trying to be cooperative



 In 2009, on a train, I asked 's Leiden next? A Dutch passenger quizzically retorted Is the light what?

- In 2009, on a train, I asked 's Leiden next? A Dutch passenger quizzically retorted Is the light what?
- Clearly this is related to the flapping rule that makes t and d the same in American English (e.g. *atom* and *adam*)

- In 2009, on a train, I asked 's Leiden next? A Dutch passenger quizzically retorted Is the light what?
- Clearly this is related to the flapping rule that makes t and d the same in American English (e.g. *atom* and *adam*)
- In the same year, I announced the most dramatic results possible. My interlocutor asked the most Germanic results?

- In 2009, on a train, I asked 's Leiden next? A Dutch passenger quizzically retorted Is the light what?
- Clearly this is related to the flapping rule that makes t and d the same in American English (e.g. *atom* and *adam*)
- In the same year, I announced the most dramatic results possible. My interlocutor asked the most Germanic results?
- This in turn results from the <j>-like pronunciation of *dr* in English (young children often spell *drum* as *jrum* and tree and chree), and from the similarity of **ə**r and r**ə** (e.g. 'preturb')


• Meringer (1908) collected 47 slips

Meringer (1908) collected 47 slips

• Z.S. Bond (1999) collected 900 slips

- Meringer (1908) collected 47 slips
- Z.S. Bond (1999) collected 900 slips
- Labov (2010) collected 900 slips

- Meringer (1908) collected 47 slips
- Z.S. Bond (1999) collected 900 slips
- Labov (2010) collected 900 slips
- Nevins (2009-2010) collected 2857 slips

- Meringer (1908) collected 47 slips
- Z.S. Bond (1999) collected 900 slips
- Labov (2010) collected 900 slips
- Nevins (2009-2010) collected 2857 slips
- Kevin Tang (UCL PhD student) and I have combined these all into a searchable corpus (Tang & Nevins 2013, Tang 2015) with aligned pairs of consonants (intended and perceived)

- Meringer (1908) collected 47 slips
- Z.S. Bond (1999) collected 900 slips
- Labov (2010) collected 900 slips
- Nevins (2009-2010) collected 2857 slips
- Kevin Tang (UCL PhD student) and I have combined these all into a searchable corpus (Tang & Nevins 2013, Tang 2015) with aligned pairs of consonants (intended and perceived)
- I'll report on those results today, as well as our recent harvesting of a self-reported mondegreen corpus



## CORPUS COLLECTION AND STRUCTURE

# CORPUS COLLECTION AND STRUCTURE

<u>Intended</u>	<u>Perceived</u>	IPA Intended	IPA Perceived	<u>Utterer</u>	<u>Perceiver</u>	<u>Where</u>	<u>Collected By</u>	Notes
Fill it	Willis	'ffl It	'w11.1s	Male, 19, MD	Female, 18, NY	Annenberg	Kristen	Lots of background
Think about it	Think about shit	'Ө1ŋk ә.'baʊt It	'θıŋk ə.'baʊt '∫īt	Female, 18, NY	Male, 18, TX	Annenberg	Kristen	Lots of background noise
Fire her	Fire	'fa1.ə1 ə1	'faı.əı	Female, 18, NY	Female, 18, CT	Annenberg	Kristen	Lots of background noise
Smart	Start	'sma:t	'sta:.1t	Female, 18, NY	Male, 19, MD	Lamont	Kristen	Whispering
It was hot as balls.	I was sucking balls.	It wəz 'hə:t æz 'ba:lz	aI wəz 'sʌk.Iŋ 'bɑ:lz	Male, 18, LA	Male, 18, CO	Annenberg	Preston	Background noise
I need to have fun tonight because I got a job.	I need to have fun tonight because I got into Harvard.	a1 'ni:d tə 'hæv 'fAn tə.'naIt b1.'kə:z a1 'ga:t ə 'd3a:b	aI 'ni:d tə 'hæv 'fAn tə.'naIt bI.'kə:z aI 'gɑ:t 'In.tu 'hɑ:ɪv.əɪd	Male, 18, CO	Male, 18, Alberta, Canada	Annenberg	Preston	Background noise
Is Turkish monosyllabic?	Is Turkish Balto- Slavic?	Iz 't3:.Ik.IJ .ma:n.ə.sI. 'læb.Ik	Iz 't3:.1k.1∫ ,ba:lt.ə.'slæv.1k 	Male, 18, IL	Male, 18, CO	Memorial Church	Preston	Reverberation
I want to take	I want to take a	aI 'wa:nt tə 'teIk ə 'vi:.i:.'ɛs	aI 'wa:nt tə 'teIk ə ˌbi:.'ɛs	Female,	Male, 18,	Baskin	Denter	Background



#### EARS PLAYING TRICKS

#### EARS PLAYING TRICKS

 If you have a piece of paper in front of you, write down what you hear during the following 'Praat parlour trick'...









kiss th' sky > kiss th's guy



kiss th' sky > kiss th's guy





Sylvia Wright coined this term, based on her mishearing of They have slain the Earl of Moray, and <u>laid him on the green</u>



Sylvia Wright coined this term, based on her mishearing of They have slain the Earl of Moray, and laid him on the green



 Ambiguous phonetic stream is interpreted by the listener in a way that he or she 'wants' > Lady Mondegreen

Sylvia Wright coined this term, based on her mishearing of They have slain the Earl of Moray, and laid him on the green



 Ambiguous phonetic stream is interpreted by the listener in a way that he or she 'wants' > Lady Mondegreen

 "Freudian" *lapsus* of the ear are the result of a complex computation involving interaction of all these levels: phonology, syntax, plausibility, and <u>expectations</u>

#### PAREIDOLIA

#### PAREIDOLIA









What kind of 'grouping' do we impose on this image?



What kind of 'grouping' do we impose on this image?

<u>Perception of structure</u> is an active process in 'parsing' and 'decoding', and depends on the deductions and decisions we make in <u>grouping</u> a set of items



What kind of 'grouping' do we impose on this image?

<u>Perception of structure</u> is an active process in 'parsing' and 'decoding', and depends on the deductions and decisions we make in <u>grouping</u> a set of items

...whether they be ink-blobs, phrases, or syllables



### PAREIDOLIA WITH OBSCENE MINIONESE?



### PAREIDOLIA WITH OBSCENE MINIONESE?




# THE I4K-EXAMPLE KISSTHISGUY.COM CORPUS

# THE I4K-EXAMPLE KISSTHISGUY.COM CORPUS

2	Traditional	God Save The Queen	God save the Queen	God shave the Queen	My teacher asked me in 5th grade about the lyrics of the British Hymn. Then the whole class <u>startet</u> to laugh. real embarrassing.	04/23/
3	Diana Ross and the Supremes	You Can't Hurry Love	You can't hurry love	You kangaroo love	My daughter, now 19 and a college student, delighted at age 3, in playing our old 45's on her new record player. We heard her play over and over this song, and wondered what attraction it had for a 3 year old. She told us what she was hearing and we still get laughs out of this memory - which she hates hearing about again and again!	02/28/
4	Bon Jovi	Bed Of Roses	I want to be as close as the holy ghost is	I want to be as close as your roller coasters.	Just nowlisten to the songmaybe she's in a roller coaster!	
5	Tears for Fears	Break It Down Again	"Head strong like a horse" and later "Hot tips for the boys"	"I'm hung like a horse" and later "I touch little boys"	Singing along in the car with my parents	02/28/
6	Jewel	You Were Meant for Me	"I kinda like it in my brand new place."	"I found a maggot in my bran-oat flakes."	I was watching the video with my <u>mom</u> who let out the misheard lyric to extreme laughter from me. I tried to clue her in to the right words but she still sings it her way. Sounds cool to me.	02/15/
7	Wallflowers	One Headlight	"It smells like cheap wine and cigarettes"	"It smells like cheap Hawaiian cigarettes"	A friend of mine was sitting in my car with me screaming the incorrect lyrics. I still laugh at her whenever we hear that song!"	03/14/
8	Pearl Jam	Glorified G	Glorified version of a pellet gun	29 virgins on a pelican	It's not a line you want to belt at the top of your lungs at a party.	
9	<u>Aaliyah</u>	More Than A Woman	More than a lover	More than a llama	l was singing it in the car and my 10-year-old cousin corrected me	
	1		See the woman	See the Moniton	1	1



 We investigated two well-known perceptual similarity effects that recur throughout the history of English (in time and space): θ > f and ŋ > n. The latter is implicated in a number of processes, including most famously, writin' instead of writing

- We investigated two well-known perceptual similarity effects that recur throughout the history of English (in time and space): θ > f and ŋ > n. The latter is implicated in a number of processes, including most famously, writin' instead of writing
- One of the most surprising and revealing results of perceptual similarity studies is that they are *asymmetric in direction*: θ seems more similar to f than vice-versa.

- We investigated two well-known perceptual similarity effects that recur throughout the history of English (in time and space): θ > f and ŋ > n. The latter is implicated in a number of processes, including most famously, writin' instead of writing
- One of the most surprising and revealing results of perceptual similarity studies is that they are *asymmetric in direction*: θ seems more similar to f than vice-versa.
- In all of these self-reported (and often humorous) mix-ups, are such trends preserved?



# CONFUSION AND CHANGE BETWEEN <TH> AND <F>

# CONFUSION AND CHANGE BETWEEN <TH> AND <F>





#### DESIGN FEATURES OF HUMAN LANGUAGE

#### DESIGN FEATURES OF HUMAN LANGUAGE





Roman Jakobson



#### Morris Halle



Roman Jakobson

#### PHONOLOGY



Morris Halle



PHONOLOGY



Roman Jakobson

Morris Halle

 Syntax: a combinatorial system in which meaningful elements (words) are put together to create larger meaningful elements (phrases)



PHONOLOGY



Roman Jakobson

Morris Halle

- Syntax: a combinatorial system in which meaningful elements (words) are put together to create larger meaningful elements (phrases)
- Phonology:a combinatorial system in which *meaningless* elements (consonants and vowels) are put together to create meaningful elements (words)



PHONOLOGY



Roman Jakobson

Morris Halle

- Syntax: a combinatorial system in which meaningful elements (words) are put together to create larger meaningful elements (phrases)
- Phonology:a combinatorial system in which meaningless elements (consonants and vowels) are put together to create meaningful elements (words)
- Not many other communication systems (e.g. primate calls, traffic lights, bee dances) involve this *simultaneous combinatoriality at two levels*, called 'duality of patterning'









<image>

• Encoding & decoding at two levels



- Encoding & decoding at two levels
- Consonants and vowels have their own syntax



- Encoding & decoding at two levels
- Consonants and vowels have their own syntax
- For the same reason that *\*linguists happy* is ill-formed,



- Encoding & decoding at two levels
- Consonants and vowels have their own syntax
- For the same reason that *\*linguists happy* is ill-formed,
- brand but not \*rbadn is a well-formed sequence at this 'other level'



#### COMBINATORIAL CODES

#### COMBINATORIAL

CODES

J•	S●●●
K -•-	Т-
	Ü • • -
M <b></b>	V • • •
	W/ • • •
0	VV •
0 <b></b>	
P <b>•</b> •	Y - • - •
Q•-	∠•
R ● <b>-</b> ●	
	J• K ••- L •-•• M N -• O P•• Q•- R •-•

.

#### COMBINATORIAL

A•-	J <b>●</b> ———	S●●
B <b>−●●●</b>	K-•-	т –
C -•-•	L●−●●	U • 1
D <b>- • •</b>	M <b></b>	V • •
E●	N <b>-</b> •	Ŵ•
F • • - •	0	X - 0
G●		Ŷ-•
H●●●●	0	7
	Re=e	2

CODES



		CC	OMBINATORIAL
A • - B - • • • C - • - • D - • • E • F • - • G • H • • •	J● K -●- L ●-●● M N -● O P● Q●- R ●-●	S••• T - U ••- V •••- W • X -••- Y-• Z••	CODES



Meaningless elements are used to transmit meaningful messages

		CC	<b>MBINATORIAL</b>
A • -	J●	S•••	CODES
B - • • •	K -●-	T -	
C - • - •	M	U ••-	
D - • •	N -●	V •••-	
E •	O	W •	
F • • - •	P●	X -•	
G •	Q	Y-•	
H • • •	R ●-●	Z••	



 Meaningless elements are used to transmit meaningful messages

• You might imagine a traffic light with no colors, or with only one red/yellow/green alternating bulb. The redundant encoding is useful

A • -	J●	S•••
B - • • •	K -●-	T -
C - • - •	M	U••-
D - • •	N -●	V•••-
E •	O	W•
F • • - •	P●	X -•-
G •	Q	Y-•
H • • •	R ●-●	Z••

#### COMBINATORIAL

CODFS



- Meaningless elements are used to transmit meaningful messages
- You might imagine a traffic light with no colors, or with only one red/yellow/green alternating bulb. The redundant encoding is useful
- Suppose, if the philosopher Jerry Fodor is right, all humans have around 50,000 concepts that they lexicalize, and must turn into *cod*es that can be transmitted and received












• 1) If a language has only three vowels, they will be a,i,u



- 1) If a language has only three vowels, they will be a,i,u
- 2) If a language has [z], it will also have [s]



- I) If a language has only three vowels, they will be a,i,u
- 2) If a language has [z], it will also have [s]
- 3) If a language has [s], it will also have [t]



- I) If a language has only three vowels, they will be a,i,u
- 2) If a language has [z], it will also have [s]
- 3) If a language has [s], it will also have [t]
- Like a traffic light, these reflect good design choices in a system of coding rules, given our systems of speech production and perception











### ERROR RATES FOR T,K,P IN THE MONDEGREEN CORPUS





• The system has to cope with ambiguity

- The system has to cope with ambiguity
- Ambiguity: when the same percept can be grouped into two different structural interpretations

- The system has to cope with ambiguity
- Ambiguity: when the same percept can be grouped into two different structural interpretations
- Acute back pain ~ A cute back pain

- The system has to cope with ambiguity
- Ambiguity: when the same percept can be grouped into two different structural interpretations
- Acute back pain ~ A cute back pain
- Wait, you might say, but they're distinguished in writing....

- The system has to cope with ambiguity
- Ambiguity: when the same percept can be grouped into two different structural interpretations
- Acute back pain ~ A cute back pain
- Wait, you might say, but they're distinguished in writing....
- But does your ear 'see' spaces between words?



## WOR DEDGES AND ORONYMS

## WOR DEDGES AND ORONYMS



### WILLEMS PARK WEG





### WILLEM SPARK WEG

Rarity of place names with genitive; Rembrandtplein more common than Rembrandtsplein













we never say "both.. i can't decide!"



## SOUND CHANGE OVERTIME

## SOUND CHANGE OVERTIME

• Mishearings as 'mutations' in conversation
- Mishearings as 'mutations' in conversation
- Consistent, recurrent such mutations across time, like biological mutations, lead to evolutionary change

- Mishearings as 'mutations' in conversation
- Consistent, recurrent such mutations across time, like biological mutations, lead to evolutionary change
- "Today's errors are tomorrow's rules"

- Mishearings as 'mutations' in conversation
- Consistent, recurrent such mutations across time, like biological mutations, lead to evolutionary change
- "Today's errors are tomorrow's rules"
- Words like historical a napron > an apron by just such repeated, consistent misparsings

- Mishearings as 'mutations' in conversation
- Consistent, recurrent such mutations across time, like biological mutations, lead to evolutionary change
- "Today's errors are tomorrow's rules"
- Words like historical a napron > an apron by just such repeated, consistent misparsings
- Slips of the ear are a window onto sound change in progress

 The longest ever played game of Chinese Whispers involved the Las Vegas magician Mac King stringing along 614 people

- The longest ever played game of Chinese Whispers involved the Las Vegas magician Mac King stringing along 614 people
- Beginning phrase: Mac King is a comedy magic genius

- The longest ever played game of Chinese Whispers involved the Las Vegas magician Mac King stringing along 614 people
- Beginning phrase: Mac King is a comedy magic genius
- Ending phrase: Macaroni cantaloupe knows the future

- The longest ever played game of Chinese Whispers involved the Las Vegas magician Mac King stringing along 614 people
- Beginning phrase: Mac King is a comedy magic genius
- Ending phrase: Macaroni cantaloupe knows the future



• The kind of consonant (less sonorous ones more vulnerable)

- The kind of consonant (less sonorous ones more vulnerable)
- Unstressed syllables She's adopted > She's a doctor?

- The kind of consonant (less sonorous ones more vulnerable)
- Unstressed syllables She's adopted > She's a doctor?
- Fragile phonetic environments: consonants not followed by vowels. Latin okto > Italian otto

- The kind of consonant (less sonorous ones more vulnerable)
- Unstressed syllables She's adopted > She's a doctor?
- Fragile phonetic environments: consonants not followed by vowels. Latin okto > Italian otto
- Noisy pubs; limited cellphone transmission

- The kind of consonant (less sonorous ones more vulnerable)
- Unstressed syllables She's adopted > She's a doctor?
- Fragile phonetic environments: consonants not followed by vowels. Latin okto > Italian otto
- Noisy pubs; limited cellphone transmission
- Proper names, idioms, colloquialisms

- The kind of consonant (less sonorous ones more vulnerable)
- Unstressed syllables She's adopted > She's a doctor?
- Fragile phonetic environments: consonants not followed by vowels. Latin okto > Italian otto
- Noisy pubs; limited cellphone transmission
- Proper names, idioms, colloquialisms



(My first slip of the ear)



(My first slip of the ear)



(My first slip of the ear)

# I: American English syllable-final [t] is reduced to glottal stop
#2: "piece" and "meat" are more frequent collocations than "piece" and "me"
#3: A "piece of me" is much more abstract, especially given a 6 year old's conceptual playground



Infant passport photos > Instant passport photos

- Infant passport photos > Instant passport photos
- Is it phonetically close enough to instant passport photos?

- Infant passport photos > Instant passport photos
- Is it phonetically close enough to instant passport photos?
- Is instant passport photos an utterance one is expecting to hear?

- Infant passport photos > Instant passport photos
- Is it phonetically close enough to instant passport photos?
- Is instant passport photos an utterance one is expecting to hear?
- We have found that there is no <u>overall</u> effect of going to the more frequent (a result also found by Vitevitch 2002)



In 2171 naturally spoken pairs (all the testable examples), 1072 went towards more frequent percept, and 1099 towards less frequent -- clearly no significant trend

In 2171 naturally spoken pairs (all the testable examples), 1072 went towards more frequent percept, and 1099 towards less frequent -- clearly no significant trend



In 2171 naturally spoken pairs (all the testable examples), 1072 went towards more frequent percept, and 1099 towards less frequent -- clearly no significant trend

Interestingly, however, many such pairs often remained within the same overall *frequency class*, e.g. replacing high by high or low by low; suggesting 'graceful degradation' in which errors are made 'close to home' (see also Felty 2013)





#### A PARADOXICAL EFFECT?

#### A PARADOXICAL EFFECT?

 Wouldn't you have to know the frequency of the word that was intended in order to replace it with a word of a similar frequency? How could this happen?
### A PARADOXICAL EFFECT?

- Wouldn't you have to know the frequency of the word that was intended in order to replace it with a word of a similar frequency? How could this happen?
- Duration: They know that more frequent words are pronounced with shorter duration and use that to infer the frequency of the misperceived word

### A PARADOXICAL EFFECT?

- Wouldn't you have to know the frequency of the word that was intended in order to replace it with a word of a similar frequency? How could this happen?
- Duration: They know that more frequent words are pronounced with shorter duration and use that to infer the frequency of the misperceived word
- Interestingly, although word-level frequency had no predictive correlation on slips, sentence-level frequency did

### A PARADOXICAL EFFECT?

- Wouldn't you have to know the frequency of the word that was intended in order to replace it with a word of a similar frequency? How could this happen?
- Duration: They know that more frequent words are pronounced with shorter duration and use that to infer the frequency of the misperceived word
- Interestingly, although word-level frequency had no predictive correlation on slips, sentence-level frequency did
- Sentence-level probability: according to Jaeger and Levy, the distribution of frequency (e.g. of relative peaks and troughs)



• Slips & mondegreens involve regrouping stimuli into phonologically wellformed and syntatically well-formed units

- Slips & mondegreens involve regrouping stimuli into phonologically wellformed and syntatically well-formed units
- But the effects of structural well-formedness and perceptual robustness seem to play as large, if not a larger role, than pragmatic, contextual, and lexical effects

- Slips & mondegreens involve regrouping stimuli into phonologically wellformed and syntatically well-formed units
- But the effects of structural well-formedness and perceptual robustness seem to play as large, if not a larger role, than pragmatic, contextual, and lexical effects
- Do computers make the same errors? It is hard to know based on the literature, given that reports are usually on global accuracy rates, rather than specific pairs / phrases

- Slips & mondegreens involve regrouping stimuli into phonologically wellformed and syntatically well-formed units
- But the effects of structural well-formedness and perceptual robustness seem to play as large, if not a larger role, than pragmatic, contextual, and lexical effects
- Do computers make the same errors? It is hard to know based on the literature, given that reports are usually on global accuracy rates, rather than specific pairs / phrases





A n[j]eurologist An urologist?

A n[j]eurologist An urologist?

He's sco<r>ed a goal He's caught a goal?

A n[j]eurologist An urologist?

He's sco<r>ed a goal He's caught a goal?

Where can I find a basin? Where can I find a bison?

A n[j]eurologist An urologist?

He's sco<r>ed a goal He's caught a goal?

Where can I find a basin? Where can I find a bison?

A bottle of wine A barrel of wine?





One of the first scholars of slips of the ear, and a contemporary / rival of Freud, Rudolf Meringer (1908) reports ordering *Backhuhn* (baked chicken) and a waitress delivering *Brathuhn* (roast chicken)



One of the first scholars of slips of the ear, and a contemporary / rival of Freud, Rudolf Meringer (1908) reports ordering *Backhuhn* (baked chicken) and a waitress delivering *Brathuhn* (roast chicken)



UCL PhD student Kevin Tang is investigating the patterns of slips of the ear in Chinese, a language in which tones play a huge role in distinguishing words

















Unfamiliar word causes 'Domino' effect of regrouping





Nonlocal facilitation and backwards revision



Nonlocal facilitation and backwards revision



Nonlocal facilitation and backwards revision



Nonlocal facilitation and backwards revision

# EEN PAKKETJE STROOP MET EEN DUN LAAGJE ROOM



Nonlocal facilitation and backwards revision

# EEN PAKKETJE STROOP MET EEN DUN LAAGJE ROOM



### ZIEKE GIJ KENT GEEN PIJN



### ZIEKE GIJ KENT GEEN PIJN



### ZIEKE GIJ KENT GEEN PIJN



#### ZIEKIGHEID KENT GEEN PIJN
## ZIEKE GIJ KENT GEEN PIJN



## ZIEKIGHEID KENT GEEN PIJN

## ZIEKE GIJ KENT GEEN PIJN



Pronoun gij is archaic; final [t] would disappear before [k] as in postkoets

## ZIEKIGHEID KENT GEEN PIJN

## ZIEKE GIJ KENT GEEN PIJN



Pronoun gij is archaic; final [t] would disappear before [k] as in postkoets

Resulting syntax is still well-formed; noun still agrees with singular verb

## ZIEKIGHEID KENT GEEN PIJN



Nonlocal facilitation and backwards revision



Nonlocal facilitation and backwards revision



Nonlocal facilitation and backwards revision



Nonlocal facilitation and backwards revision

# EEN PAKKETJE STROOP MET EEN DUN LAAGJE ROOM



Nonlocal facilitation and backwards revision

# EEN PAKKETJE STROOP MET EEN DUN LAAGJE ROOM









### THINK I BETTER DEEP-FRY IT NOW



### THINK I BETTER DEEP-FRY IT NOW









#### WIE WIL ER BLOED OP DE ACHTERBANK VALLEN TEGEN EEN KEI



#### WIE WIL ER BLOED OP DE ACHTERBANK VALLEN TEGEN EEN KEI









### WIE WIL ER BLOED OP DE ACHTERBANKVAN EEN EDELE GEIT



### WIE WIL ER BLOED OP DE ACHTERBANKVAN EEN EDELE GEIT









#### DIERINNENBLOED OP DE ACHTERBANK VAN EEN EDELE GEIT



#### DIERINNENBLOED OP DE ACHTERBANK VAN EEN EDELE GEIT













Buridan's Ass: A donkey starves to death choosing between equally appealing bales of hay. But our speech perception doesn't 'halt' in this way





Buridan's Ass: A donkey starves to death choosing between equally appealing bales of hay. But our speech perception doesn't 'halt' in this way

A 'survival skill' held over from language acquisition...



## SLIPS AND MONDEGREENS FROM CHILDHOOD TO ADULTHOOD




 I contend that mondegreens exist because children do not learn language with word boundaries, nor do they say 'I can't decide'



- I contend that mondegreens exist because children do not learn language with word boundaries, nor do they say 'I can't decide'
- If Italian kids hear l'orco as a single word, they might later say uno lorco



- I contend that mondegreens exist because children do not learn language with word boundaries, nor do they say 'I can't decide'
- If Italian kids hear l'orco as a single word, they might later say uno lorco
- This strategy continues into adulthood; a 'survival skill'



- I contend that mondegreens exist because children do not learn language with word boundaries, nor do they say 'I can't decide'
- If Italian kids hear l'orco as a single word, they might later say uno lorco
- This strategy continues into adulthood; a 'survival skill'
- In music, there is no conversational give-and-take between listener and hearer to create a 'common ground'



• If this is all on the right track, it means that children are learning from ambiguous evidence - at least word learning

- If this is all on the right track, it means that children are learning from ambiguous evidence at least word learning
- How does this square with Janet Fodor's dictum of parameter-setting fro strictly unambiguous evidence?

- If this is all on the right track, it means that children are learning from ambiguous evidence at least word learning
- How does this square with Janet Fodor's dictum of parameter-setting fro strictly unambiguous evidence?
- Endress & Nevins (2011) experiment: participants trained to learn 123
  →321 martian ritual

- If this is all on the right track, it means that children are learning from ambiguous evidence at least word learning
- How does this square with Janet Fodor's dictum of parameter-setting fro strictly unambiguous evidence?
- Endress & Nevins (2011) experiment: participants trained to learn 123
  →321 martian ritual
- This is 'ambiguous' between total reversal and 'exchange first and last', and indeed participants then mapped 1234 to either 4321 or 4231

- If this is all on the right track, it means that children are learning from ambiguous evidence at least word learning
- How does this square with Janet Fodor's dictum of parameter-setting fro strictly unambiguous evidence?
- Endress & Nevins (2011) experiment: participants trained to learn 123
  →321 martian ritual
- This is 'ambiguous' between total reversal and 'exchange first and last', and indeed participants then mapped 1234 to either 4321 or 4231
- Barlow 2003: Pig Latin of ambiguous *ju* sequences in English provides divergent outputs



 Naturalistic misperception is a valid way to study perceptual forces that lead to reanalysis and language change over time: the real world can be a good model of the real world

- Naturalistic misperception is a valid way to study perceptual forces that lead to reanalysis and language change over time: the real world can be a good model of the real world
- Replacing a misheard word with another is not as simplistic as choosing something more frequent; top-down and bottom-up interact at various levels of combinatoriality

- Naturalistic misperception is a valid way to study perceptual forces that lead to reanalysis and language change over time: the real world can be a good model of the real world
- Replacing a misheard word with another is not as simplistic as choosing something more frequent; top-down and bottom-up interact at various levels of combinatoriality
- The fact that we pareidoilically impose structure on ambiguous sequences suggests that language learners do pounce upon ambiguous data



 And I hope that I've given you an idea of how they reflect, not a system which is imperfect, but rather one in which the combinatorial possibilities are so rich and elaborate, that we often have more than one decoding choice

- And I hope that I've given you an idea of how they reflect, not a system which is imperfect, but rather one in which the combinatorial possibilities are so rich and elaborate, that we often have more than one decoding choice
- (Even if it's not the one that was intended by the listener)

- And I hope that I've given you an idea of how they reflect, not a system which is imperfect, but rather one in which the combinatorial possibilities are so rich and elaborate, that we often have more than one decoding choice
- (Even if it's not the one that was intended by the listener)



- And I hope that I've given you an idea of how they reflect, not a system which is imperfect, but rather one in which the combinatorial possibilities are so rich and elaborate, that we often have more than one decoding choice
- (Even if it's not the one that was intended by the listener)

Contribute & share yours at #ohmightear



## EXTRA SLIDES AND EXAMPLES



South Slavic has the possibility of closest conjunct agreement:

#### South Slavic has the possibility of closest conjunct agreement:

[<sub>&P</sub> Sva odela i sve haljine] su juče prodate. all suit.NPL and all dress.FPL are yesterday sell.PRT.FPL 'All suits and all dresses were sold yesterday.'

#### South Slavic has the possibility of closest conjunct agreement:

[<sub>&P</sub> Sva odela i sve haljine] su juče prodate. all suit.NPL and all dress.FPL are yesterday sell.PRT.FPL 'All suits and all dresses were sold yesterday.'

Yes, it's a possible human language, but what triggers it?

### AME

#### South Slavic has the possibility of closest conjunct agreemen

TISM:

[<sub>&P</sub> Sva odela i sve haljine] su juče prodate. all suit.NPL and all dress.FPL are yesterday sell.PRT.FPL 'All suits and all dresses were sold yesterday.'

#### Yes, it's a possible human language, but what triggers it?

	Singular	Dual	Plural
Masculine	-Ø	-a	-i
Feminine	-a	-i	-е
Neuter	-0	-i	-a

### AME

#### South Slavic has the possibility of closest conjunct agreement:

[<sub>&P</sub> Sva odela i sve haljine] su juče prodate. all suit.NPL and all dress.FPL are yesterday sell.PRT.FPL

'All suits and all dresses were sold yesterday.'

#### Yes, it's a possible human language, but what triggers it?

	Singular	Dual	Plural
Masculine	-Ø	-a	-i
Feminine	-a	-i	-е
Neuter	-0	-i	-a

 $\begin{array}{l} \mathsf{Msg} + \mathsf{Fsg} \to \mathsf{-a} \,\, \mathsf{could} \,\, \mathsf{be} \,\, \mathsf{MDu} \,\, \mathsf{or} \,\, \mathsf{Fsg} \\ \mathsf{Mdu} + \mathsf{Fdu} \to \mathsf{-i} \,\, \mathsf{could} \,\, \mathsf{be} \,\, \mathsf{MPI} \,\, \mathsf{or} \,\, \mathsf{Fdu} \\ \mathsf{Npl} + \mathsf{Mdu} \to \mathsf{-a} \,\, \mathsf{could} \,\, \mathsf{be} \,\, \mathsf{Npl} \,\, \mathsf{or} \,\, \mathsf{Mdu} \end{array}$ 



• Lahiri & Reetz (2002) summarize a great deal of laboratory research suggesting that coronal consonants such as *t* are 'special' in the sense that they are *primed* by other consonants, but not vice versa.

- Lahiri & Reetz (2002) summarize a great deal of laboratory research suggesting that coronal consonants such as *t* are 'special' in the sense that they are *primed* by other consonants, but not vice versa.
- For example, hearing *lake* makes it easier to recognize *late*, but not vice-versa

- Lahiri & Reetz (2002) summarize a great deal of laboratory research suggesting that coronal consonants such as *t* are 'special' in the sense that they are *primed* by other consonants, but not vice versa.
- For example, hearing *lake* makes it easier to recognize *late*, but not vice-versa
- Their idea is that coronals are represented in such a way as to make them compatible with a variety of surface pronunciations
## THE SPECIAL STATUS OF CORONALS

- Lahiri & Reetz (2002) summarize a great deal of laboratory research suggesting that coronal consonants such as *t* are 'special' in the sense that they are *primed* by other consonants, but not vice versa.
- For example, hearing *lake* makes it easier to recognize *late*, but not vice-versa
- Their idea is that coronals are represented in such a way as to make them compatible with a variety of surface pronunciations
- Pronouncing hot cakes as hock kakes trains listeners to 'undo' sounds into /t/, <u>sometimes more often than they should</u>