The listener as a source of sound change

summary and experiment

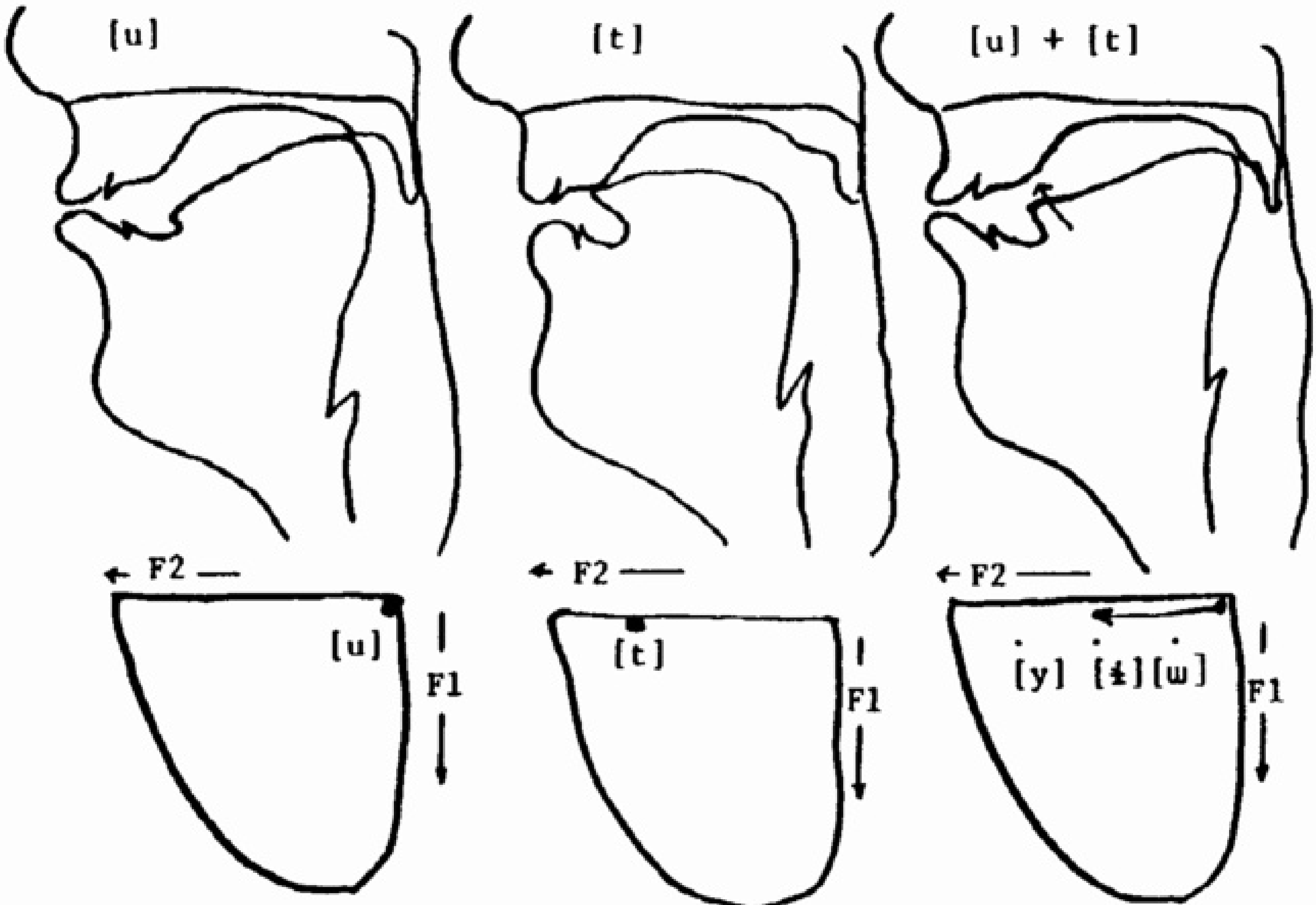
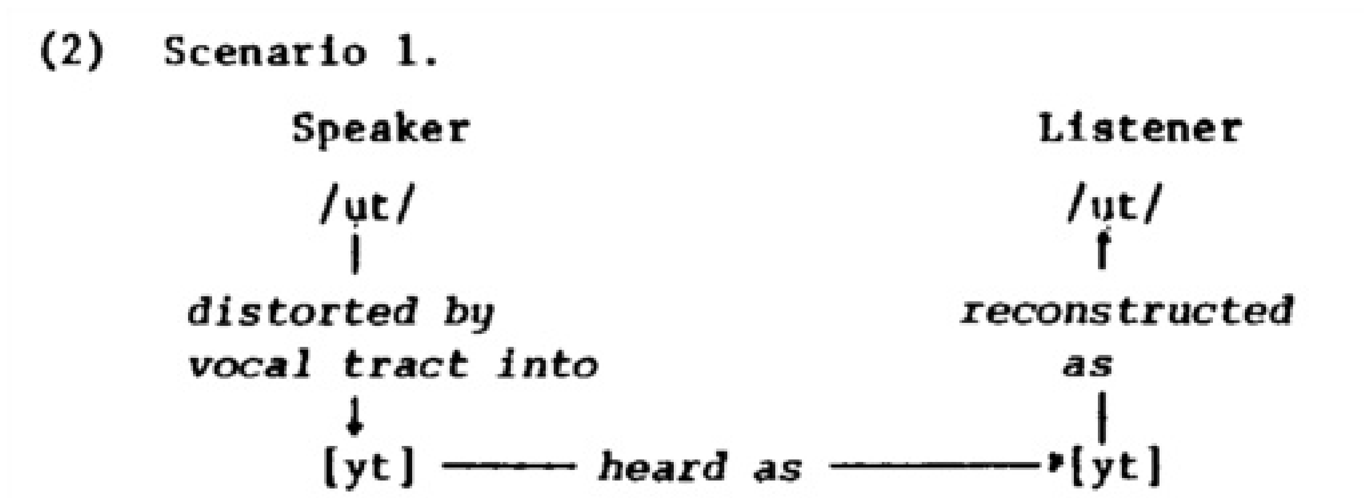


Figure 1. Vocal tract shape (top) and acoustic output (bottom) of [u], [t] and simultaneous coarticulation of [u] + [t].

Listeners “parse” the speech signal



Fronted [y] is still heard as /u/ in alveolar consonant context.
[œ] is still /ɔ/.

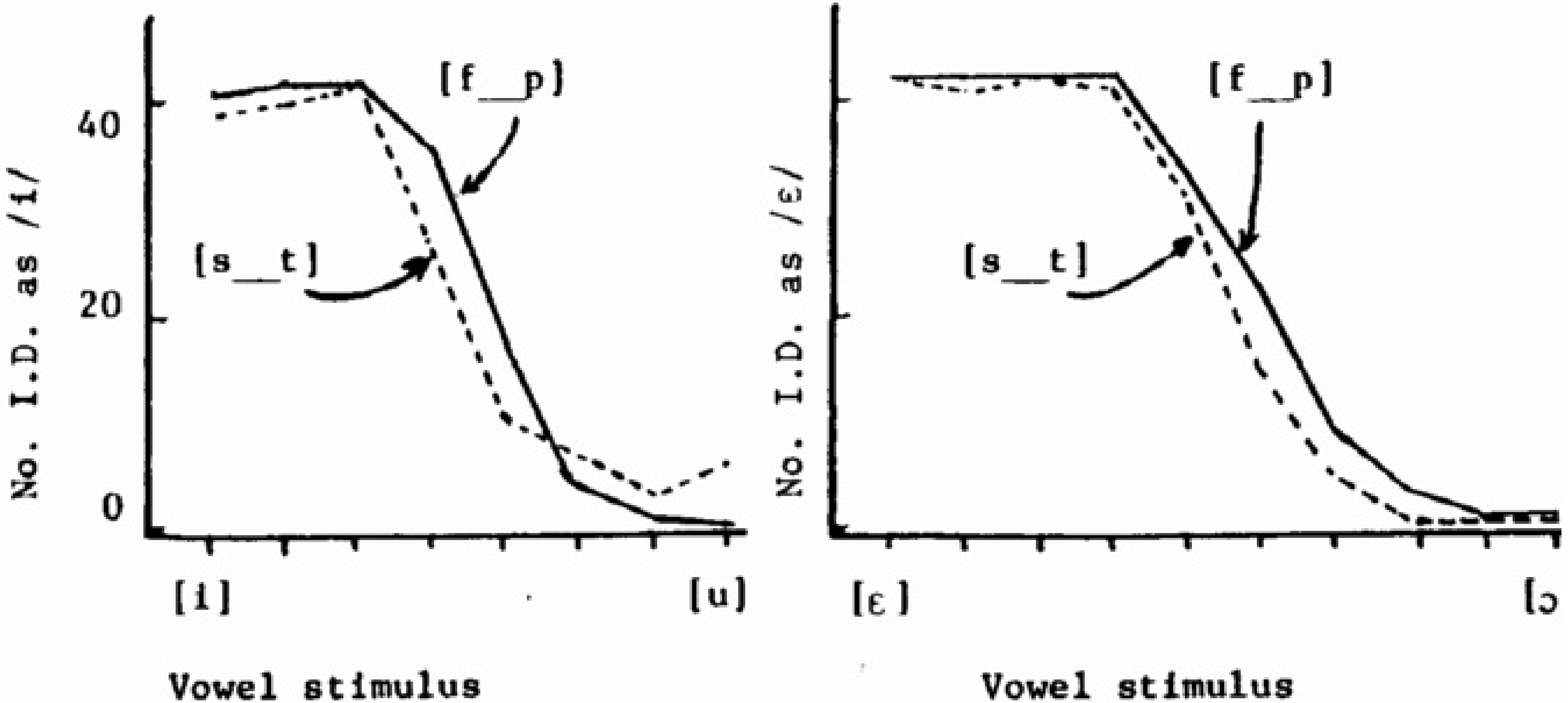
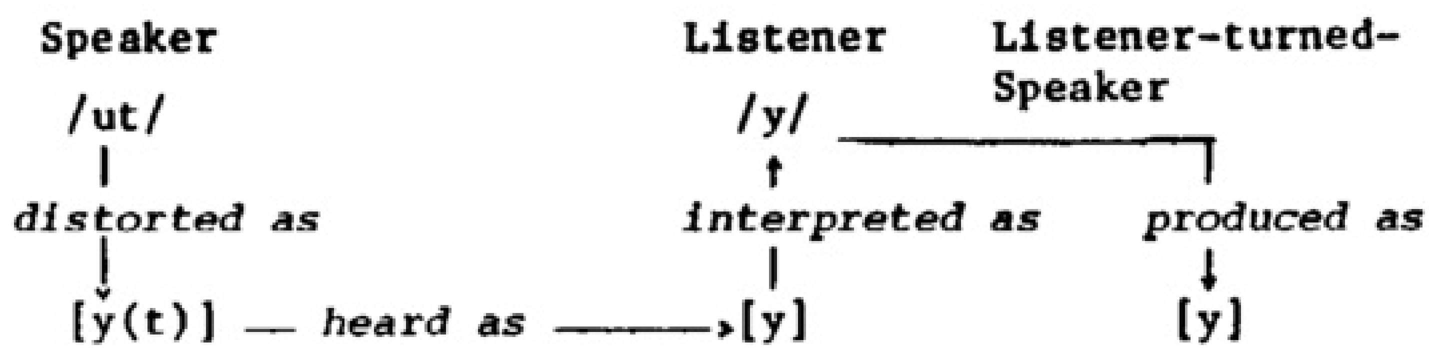


Figure 2. Identification of vowel quality as function of consonantal environment.

Loss of conditioning environment

(3) Scenario 2.

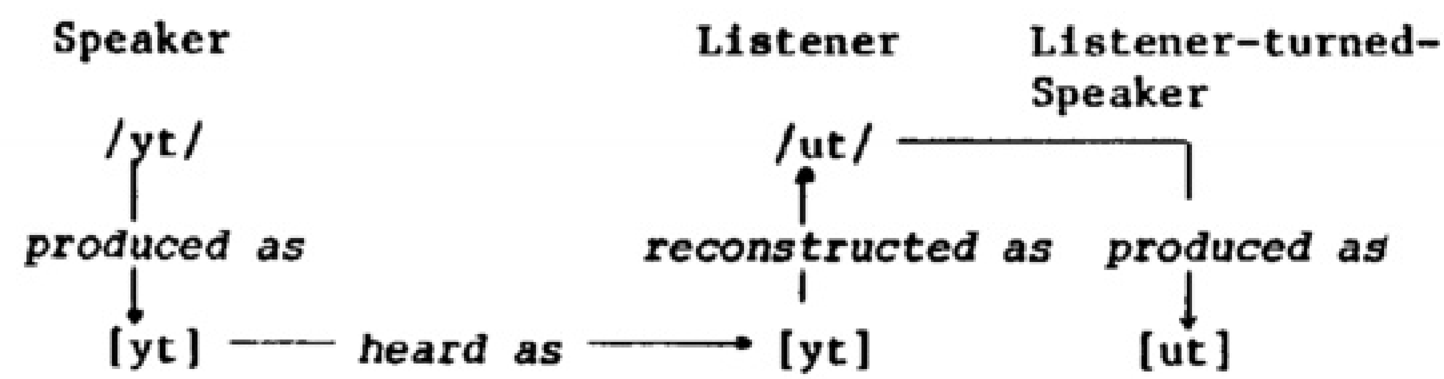


ba > [bà] > pà tonogenesis
pa > [pá] > pá

pen > [pẽn] > pẽ distinctive nasalization
pe > [pe] > pe

Dissimilation - /yt/ > /ut/

(6) Scenario 3.



Contact Dissimilation:

stoja > stojɑ	"stand"	Slavic
kumwa > kumɣa	"to drink"	Shona

Dissimilation at a distance:

t^{h}rik^{h}os > trik^{h}os	"hair"	Greek
pjam > pin	"diminish"	Cantonese
t'ant'a > t'anta	"bread"	Quechua

Loss of conditioning environment: An experiment.

Q: Does anticipatory vowel nasalization influence the perception of final nasal segment?

Why do we care?

If so, then lexical contrasts conveyed by final nasal could be recoded in terms of distinctive nasalization.

tunz > [tũnz] > tũz
tuz > [tuz] > tuz

An initial condition for such a scenario is that listeners use vowel nasality as a perceptual cue for coda /n/.

This is what we were testing in the "twos" - "tunes" experiment.

Some other conditions which would need to be met for the change to occur.

a) cue reweighting - “tunes” perception with minimal nasal segment.
b) homophony tolerance - “tunes” vs. “tombs” vs. [tuŋz]
c) sociolinguistic support for change.
d) loss of conditioning environment.

Note: Lexical diffusion of sound change allows incremental fulfillment of conditions such as these.

Note 2: Exemplar representation of words allows gradual shift in distributions.

Construct two continua by adding/subtracting glottal pulses.

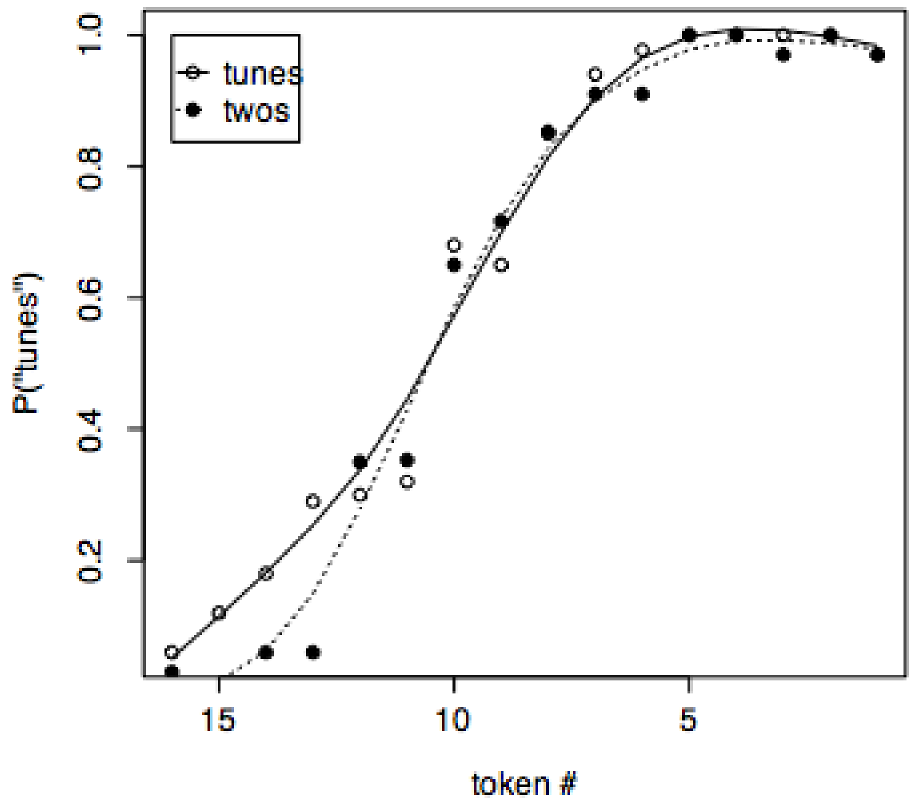
[tuz] .... [tunz] - the word “twos” was the base
[tũz] .... [tũnz] - the word “tunes” was the base

Q: Is there more of a tendency to hear “tunes” when the vowel is nasalized?

Sixteen listeners (8 men, 8 women).
Students at LSA institute.

Estimated boundaries:

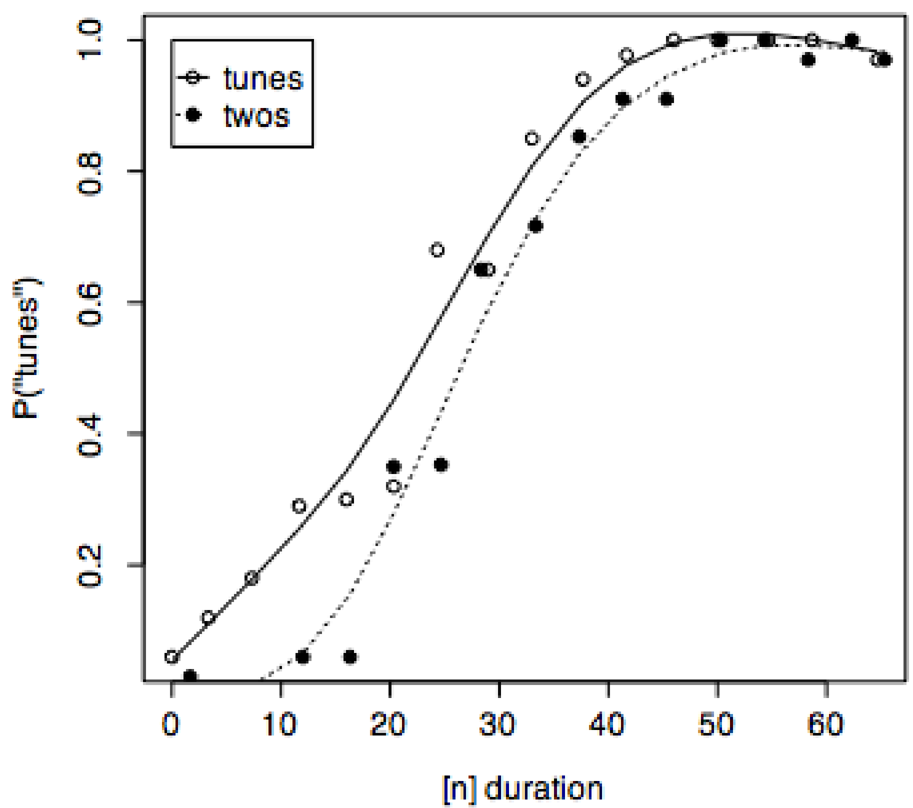
	[tuz]	[tũz]
RM	12.5	11
KJ	11	13*
AS	11	10.5
JH	9	9.5*
KM	11	10
K	13	12
AS	9.5	9.5
JT	10.5	9.5
XZ	7	10*
AK	5.5	7.5*
JB	10.5	9.5
TL	11	9.5
SA	9.5	11.5*
NF	12	14*
PJ	13	16*
AK	10	10.5*



tunes
twos
P("tunes")
1.0
0.8
0.6
0.4
0.2
15
10
5
token #

Nasal durations are not matched

	Token	Student 1	Student 2	Student 3	Average
Tunes	1	64	64	66	64.67
	2	57	60	59	58.67
	3	53	56	55	54.67
	4	48	52	50	50
	5	45	47	46	46
	6	40	43	42	41.67
	7	36	39	38	37.67
	8	32	35	32	33
	9	28	30	29	29
	10	22	26	25	24.33
	11	18	22	21	20.33
	12	15	18	15	16
	13	10	13	12	11.67
	14	6	8	8	7.33
	15	3	4	3	3.33
	16	0	0	0	0
Twos	1	65	64	67	65.33
	2	61	64	62	62.33
	3	57	60	58	58.33
	4	53	56	54	54.33
	5	49	52	50	50.33
	6	44	47	45	45.33
	7	40	43	41	41.33
	8	36	39	37	37.33
	9	32	35	33	33.33
	10	27	30	28	28.33
	11	24	26	24	24.67
	12	19	22	20	20.33
	13	15	18	16	16.33
	14	11	13	12	12
	15	5	9	7	7
	16	2	0	3	1.67



tunes
twos
P("tunes")
[n] duration
0.2
0.4
0.6
0.8
1.0
0
10
20
30
40
50
60

“R” code that produces these graphs.

“tab.out” is an ascii text file that has four columns separated by a space:

n = duration of the [n] segment,
word = “toons” or “twos”,
token = 1..16,
resp = probability of a “tunes” response (0-1).

```
> tab <- read.delim("tab.out",sep=" ")
> toons <- subset(tab,word=="toons")
> twos <- subset(tab,word=="twos")

> plot(resp~token, data = subset(tab,word=="toons"), xlab="token #", xlim=c(16,1),
ylab="P\(\"tunes\"\)")
> points(resp~token, data = subset(tab,word=="twos"),pch=19)

> lines(smooth.spline(toons$token,toons$resp),lty=1)
> lines(smooth.spline(twos$token,twos$resp),lty=3)

> legend(16,1,c("tunes","twos"),lty=c(1,3),pch=c(1,19))
```

Conclusion

One of the preconditions for the development of distinctively nasalized vowels exists in English.

Listeners use vowel nasality in perception of coda nasals.