Downstep

Jonathan Harrington

Downstep

ist eine phonetische Regel, in der H-Töne in derselben Phrase wegen eines davor kommenden H-Tons gesenkt werden.

Die Wirkung ist kumulativ: eine **progressive** Senkung der H-Töne in der selben Phrase.

Zuerst für Tonsprachen gezeigt worden.

Aus Laniran et al. (2003).

Lexikalische Töne in Yoruba

H-Töne

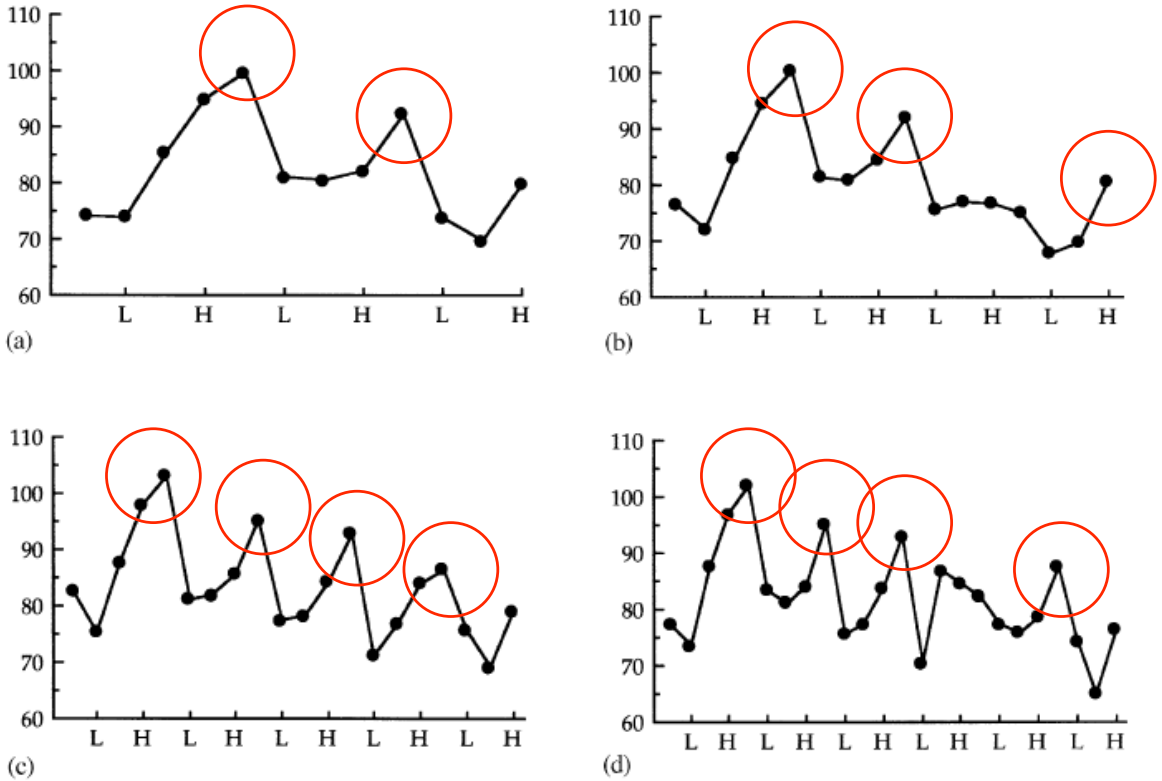
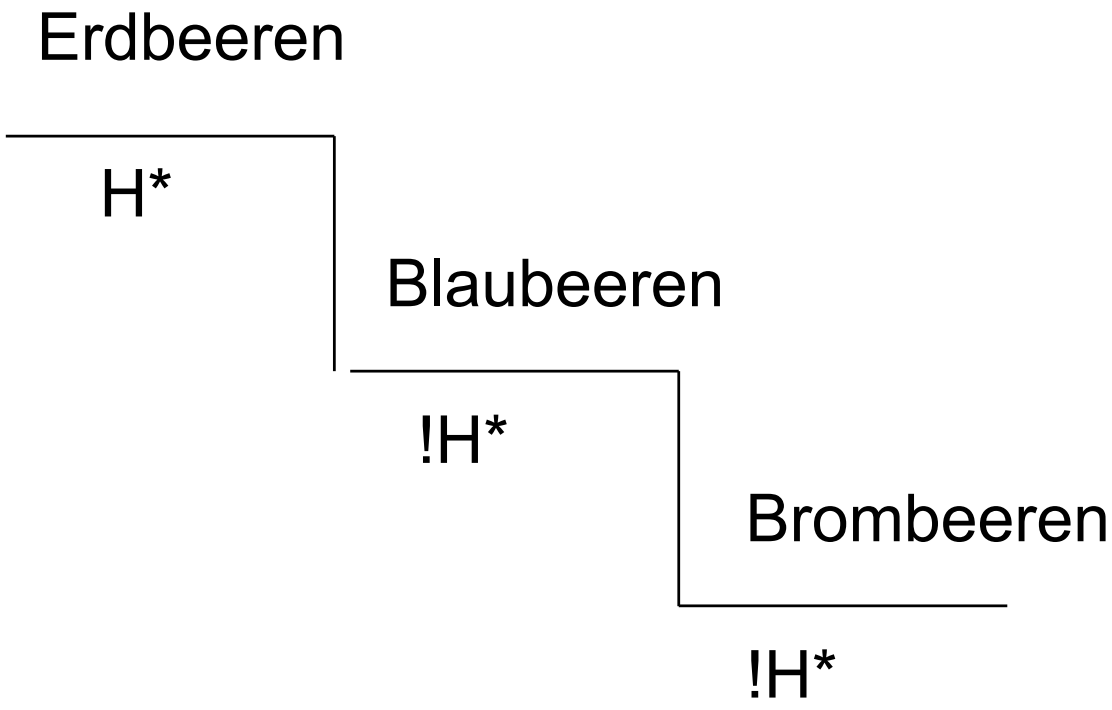


Fig. 1. Downstepping patterns in Yoruba. Mean f_0 values in Hz of four mixed-HL sentences, differing in length, are shown for speaker TJ. Each syllable, labelled along the *x*-axis by its lexical tone, is represented by two data points on the graph, one directly over it and the other just to its left. These patterns reflect the operation of Tone Spread, which spreads each lexical H or L tone onto the beginning of the following syllable.

Kommt auch in Intonationssprachen wie deutsch vor. Das prototypische Beispiel ist der sogenannte Treppeneffekt (staircase effect)

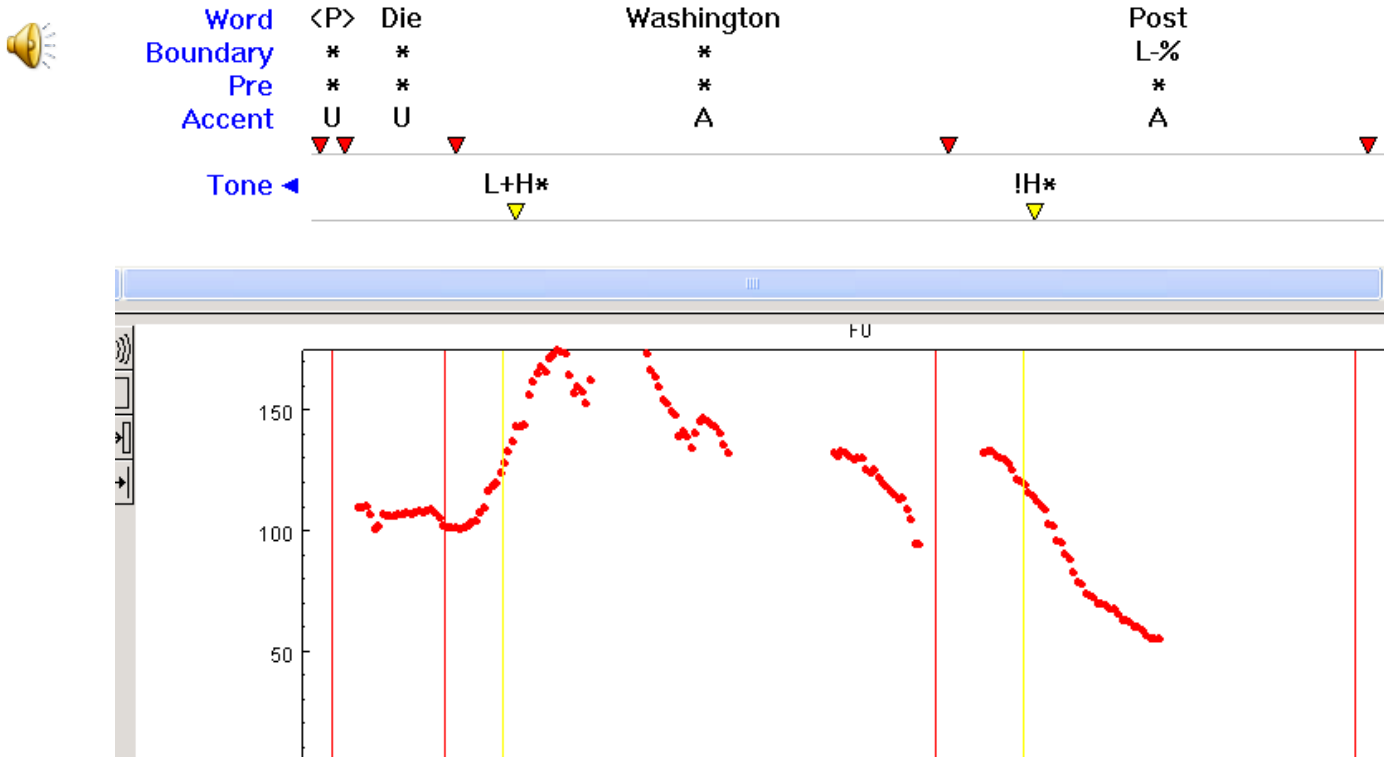


!H* = H* mit Downstep.

Einige Downsteps

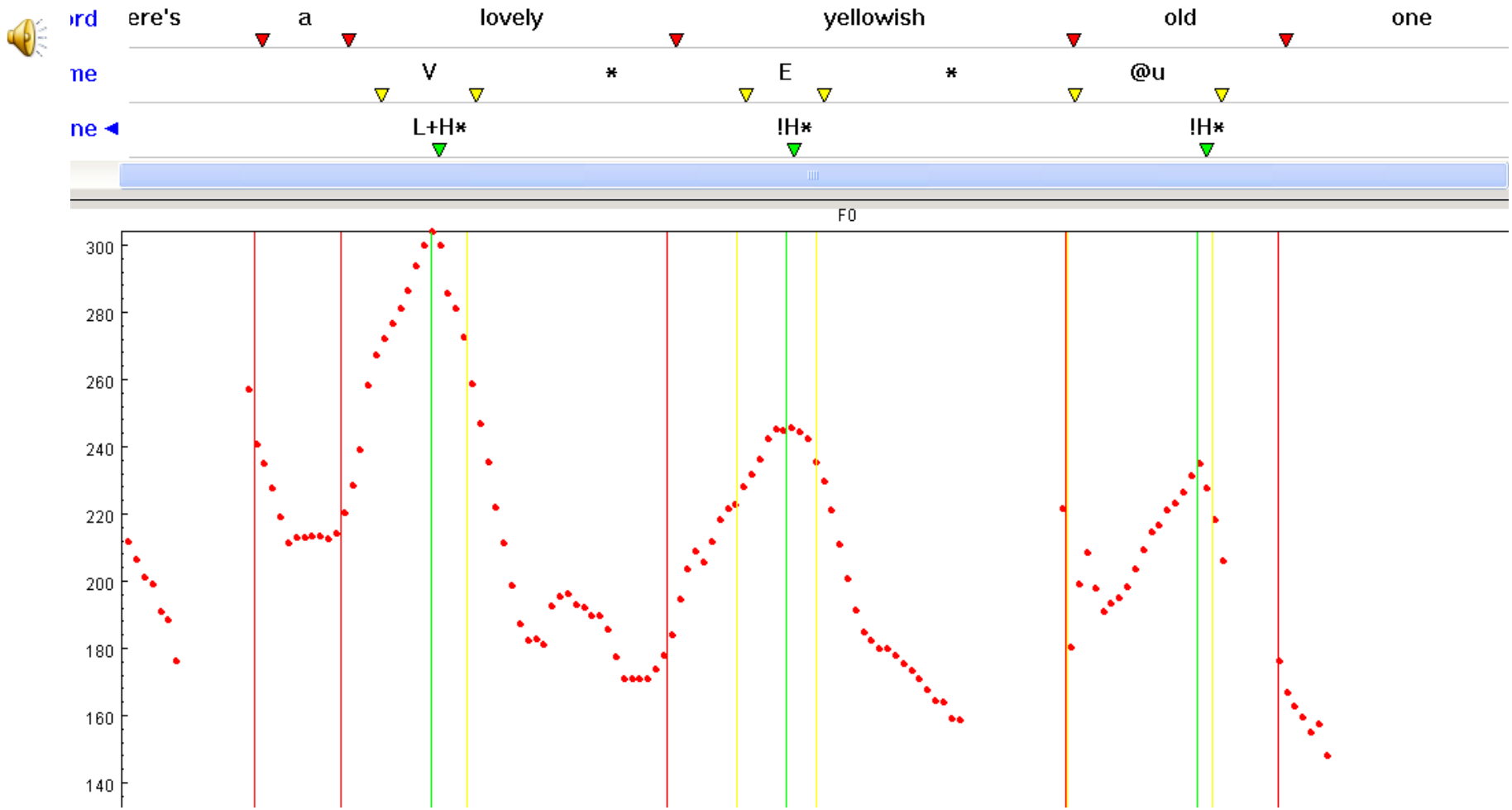
laengs

Downstep (fortgesetzt)



train8

Downstep (fortgesetzt)



Downstep !H*

- !H* muss innerhalb einer ip einem nicht-Downstepped-Tonakzent (fast immer H* oder L+H*) folgen.

- Alle Tonakzente (wenn vorhanden) in derselben ip nach einem !H* müssen !H* sein (und mit einem weiteren Downstep).

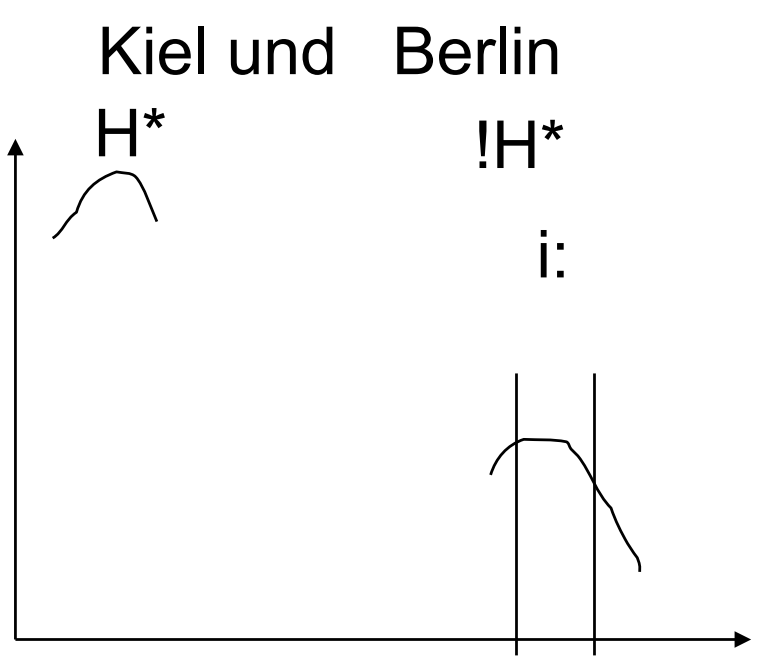
Möglich	Nicht möglich
(… H* … !H* …)	(…!H*…)
(… L+H*… !H* … !H*…)	(… H*… !H* … H* …)
	(… !H* … H* …)

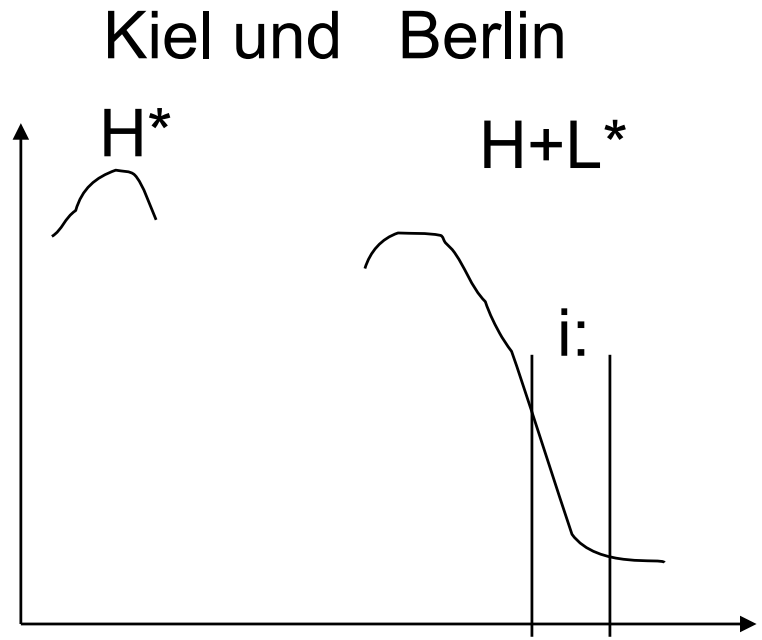
( ) ip Grenzen

… Fakultativ unakzentuierte Wörter

Einige Unterschiede zwischen !H* und H+L*

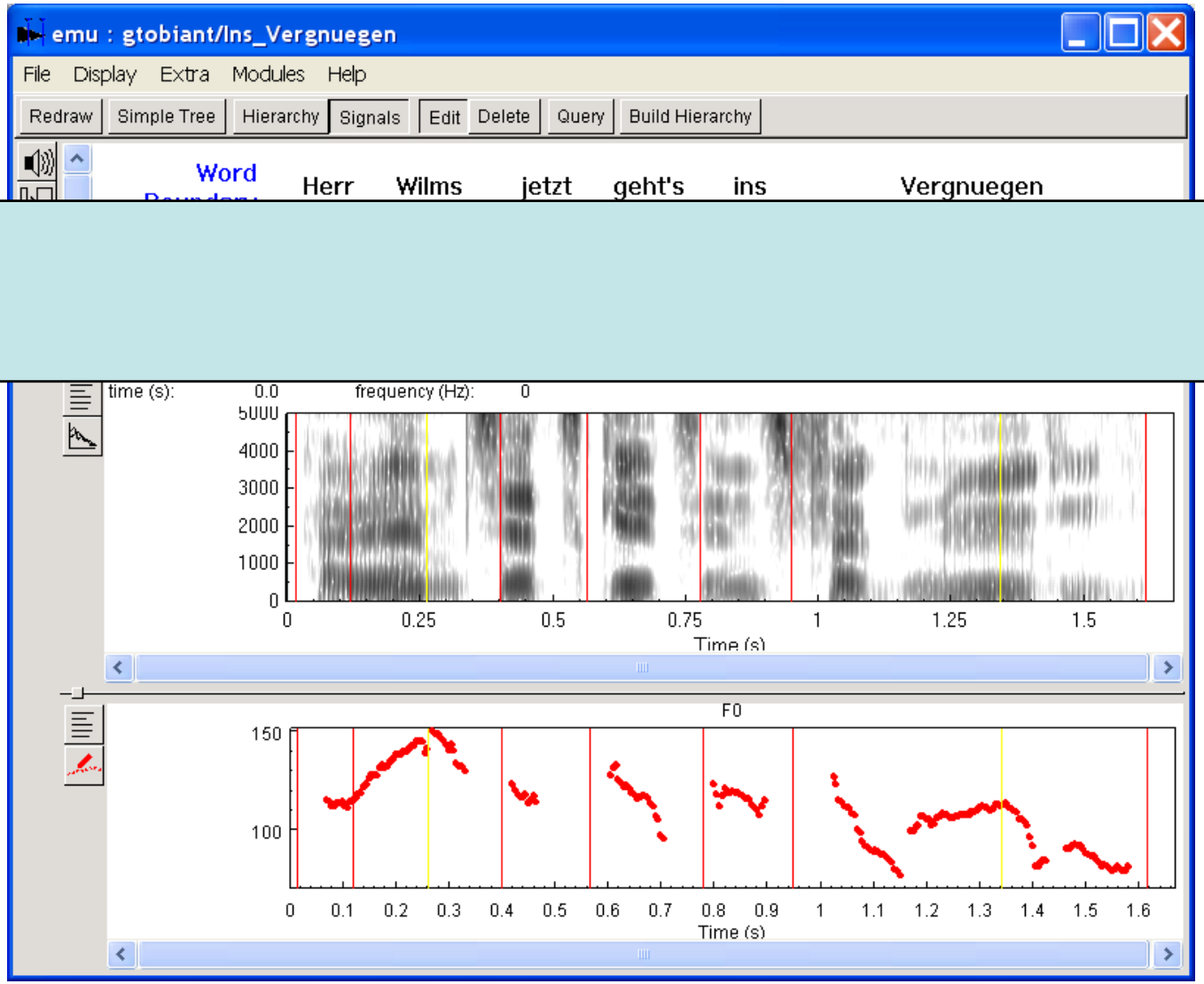
- H+L* hat einen steilen f0-Abstieg, und einen Tal im Vokal.
- !H* hat einen Gipfel und keinen steilen Abstieg davor.
- H+L* kann der einzige Tonakzent einer ip sein (und daher auch eine ip beginnen).

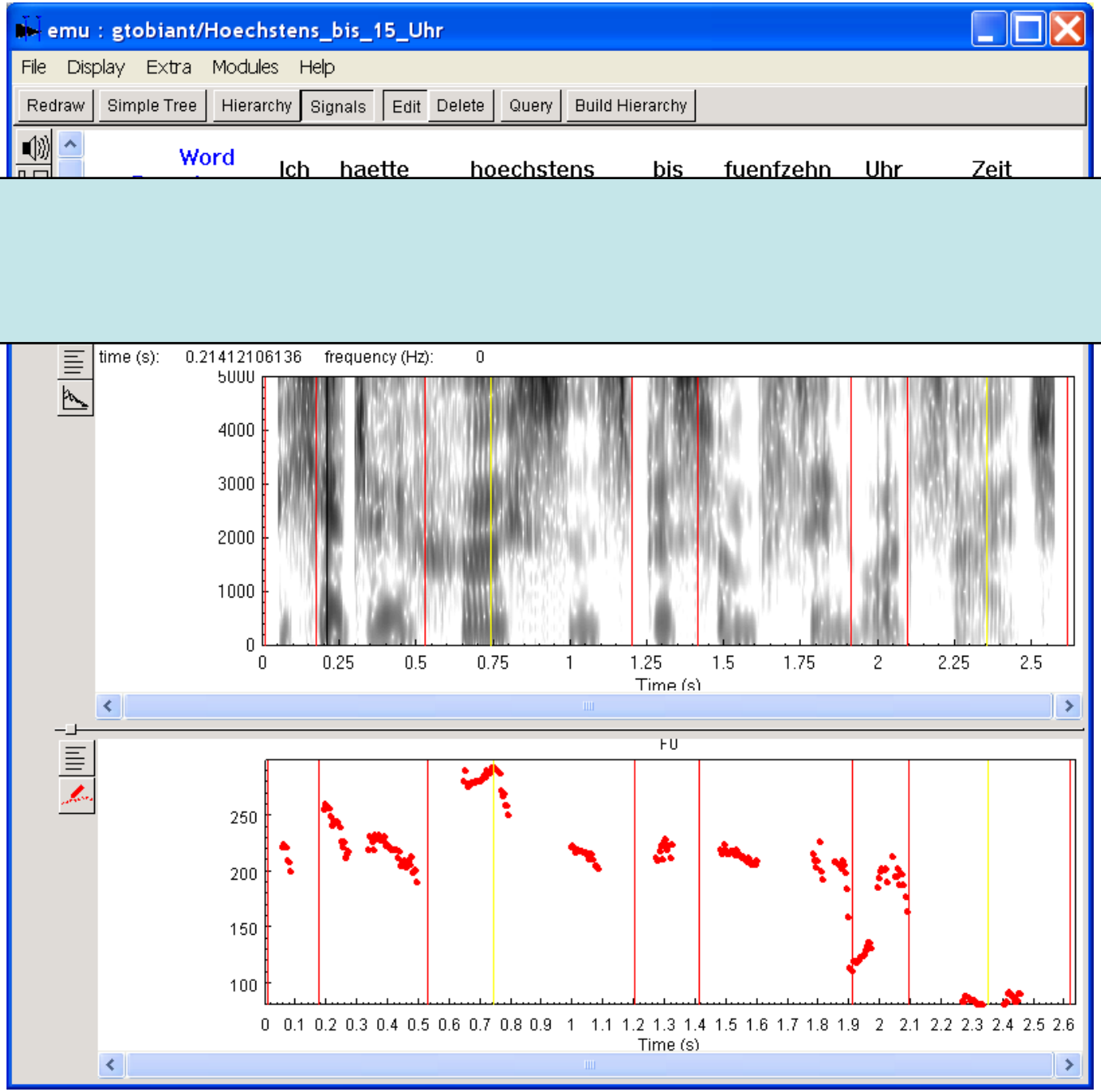




Aufgabe I: train8.wav (= Washington Post) mit H +L* statt !H* auf Post resynthetisieren.

Töne (L*, H*, !H*, H+L*, L*+H), sowie Phrasentöne (L-, H-) und Phrasen-Grenztöne (L-L%, H-H%, L-H%, H-H%) für diese Äußerungen markieren.


emu : gtobiant/Ins_Vergnuegen
File Display Extra Modules Help
Redraw Simple Tree Hierarchy Signals Edit Delete Query Build Hierarchy
Word
Herr Wilms jetzt geht's ins Vergnuegen
time (s): 0.0 frequency (Hz): 0
5000
4000
3000
2000
1000
0
0 0.25 0.5 0.75 1 1.25 1.5
Time (s)
F0
150
100
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 1.1 1.2 1.3 1.4 1.5 1.6
Time (s)


emu : gtobiant/Hoechstens_bis_15_Uhr
File Display Extra Modules Help
Redraw Simple Tree Hierarchy Signals Edit Delete Query Build Hierarchy
Word
Ich haette hoechstens bis fuenfzehn Uhr Zeit
time (s): 0.21412106136 frequency (Hz): 0
5000
4000
3000
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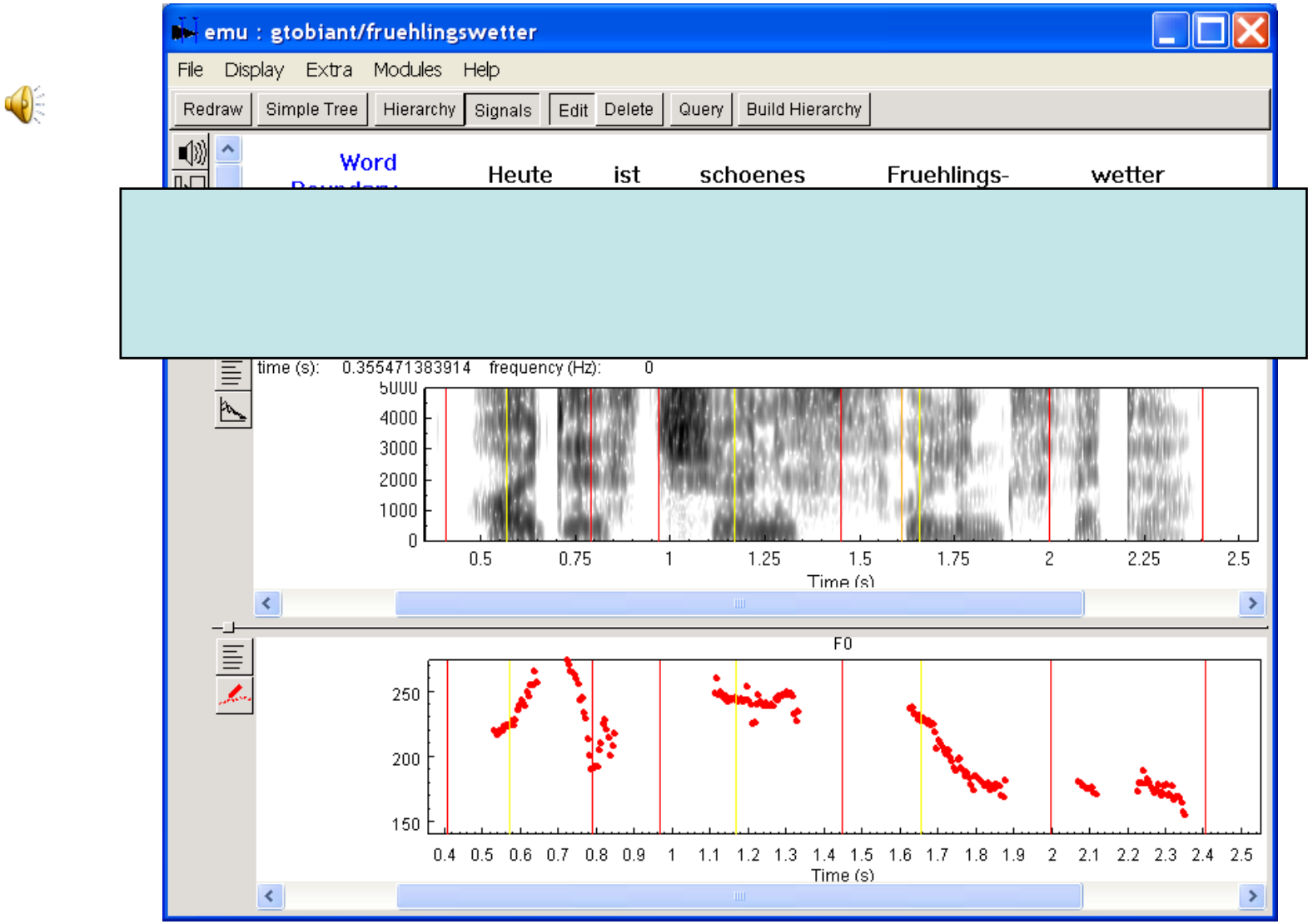
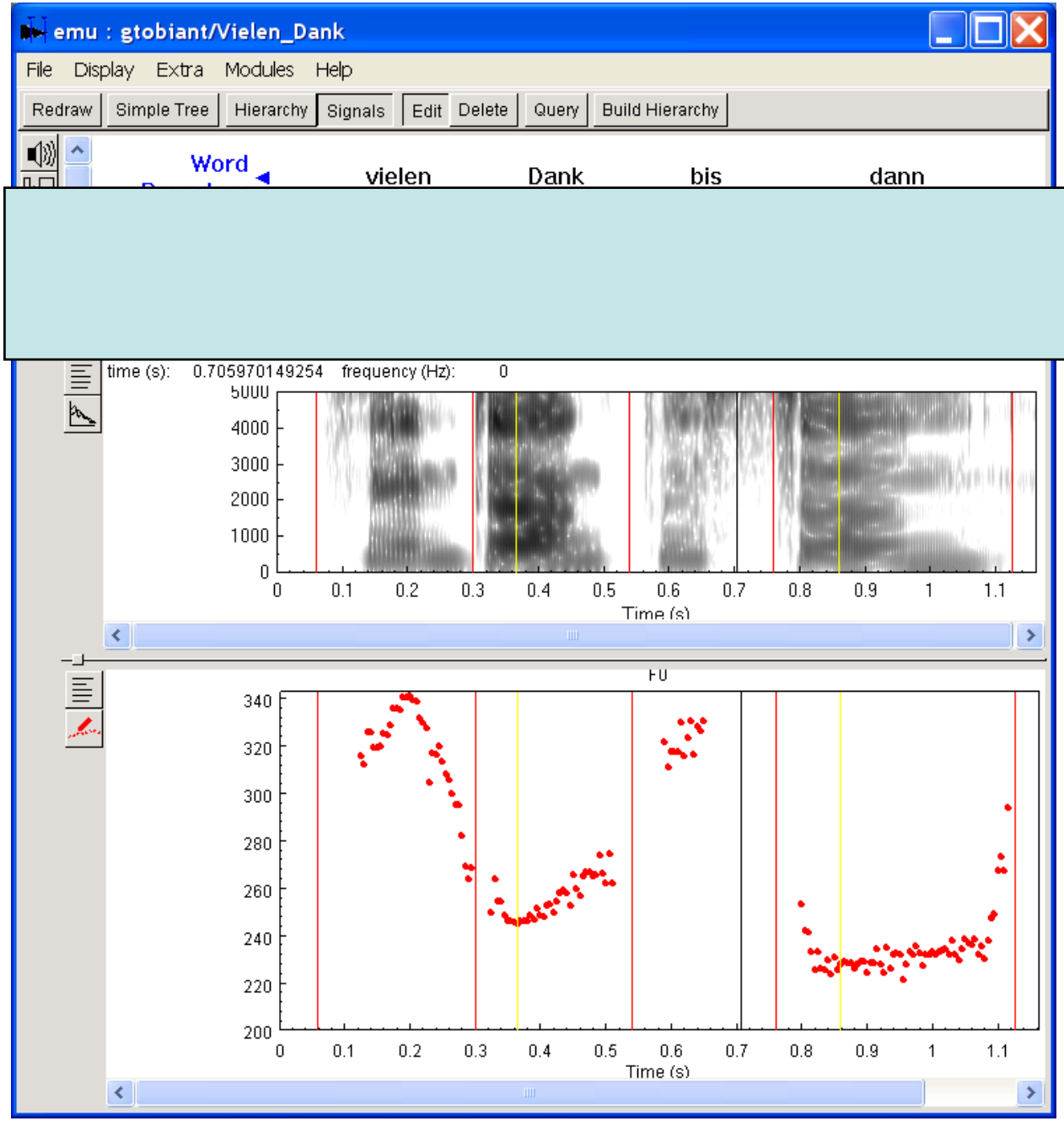
0
0 0.25 0.5 0.75 1 1.25 1.5 1.75 2 2.25 2.5
Time (s)
F0
250
200
150
100
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2 2.1 2.2 2.3 2.4 2.5 2.6
Time (s)


emu : gtobiant/fruehlingswetter
File Display Extra Modules Help
Redraw Simple Tree Hierarchy Signals Edit Delete Query Build Hierarchy
Word
Heute ist schoenes Fruehlings- wetter
time (s): 0.355471383914 frequency (Hz): 0
5000
4000
3000
2000
1000
0
0.5 0.75 1 1.25 1.5 1.75 2 2.25 2.5
Time (s)
F0
250
200
150
0.4 0.5 0.6 0.7 0.8 0.9 1 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2 2.1 2.2 2.3 2.4 2.5
Time (s)


emu : gtobiant/Vielen_Dank
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Word
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dann
time (s): 0.705970149254 frequency (Hz): 0
5000
4000
3000
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0
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 1.1
Time (s)
F0
340
320
300
280
260
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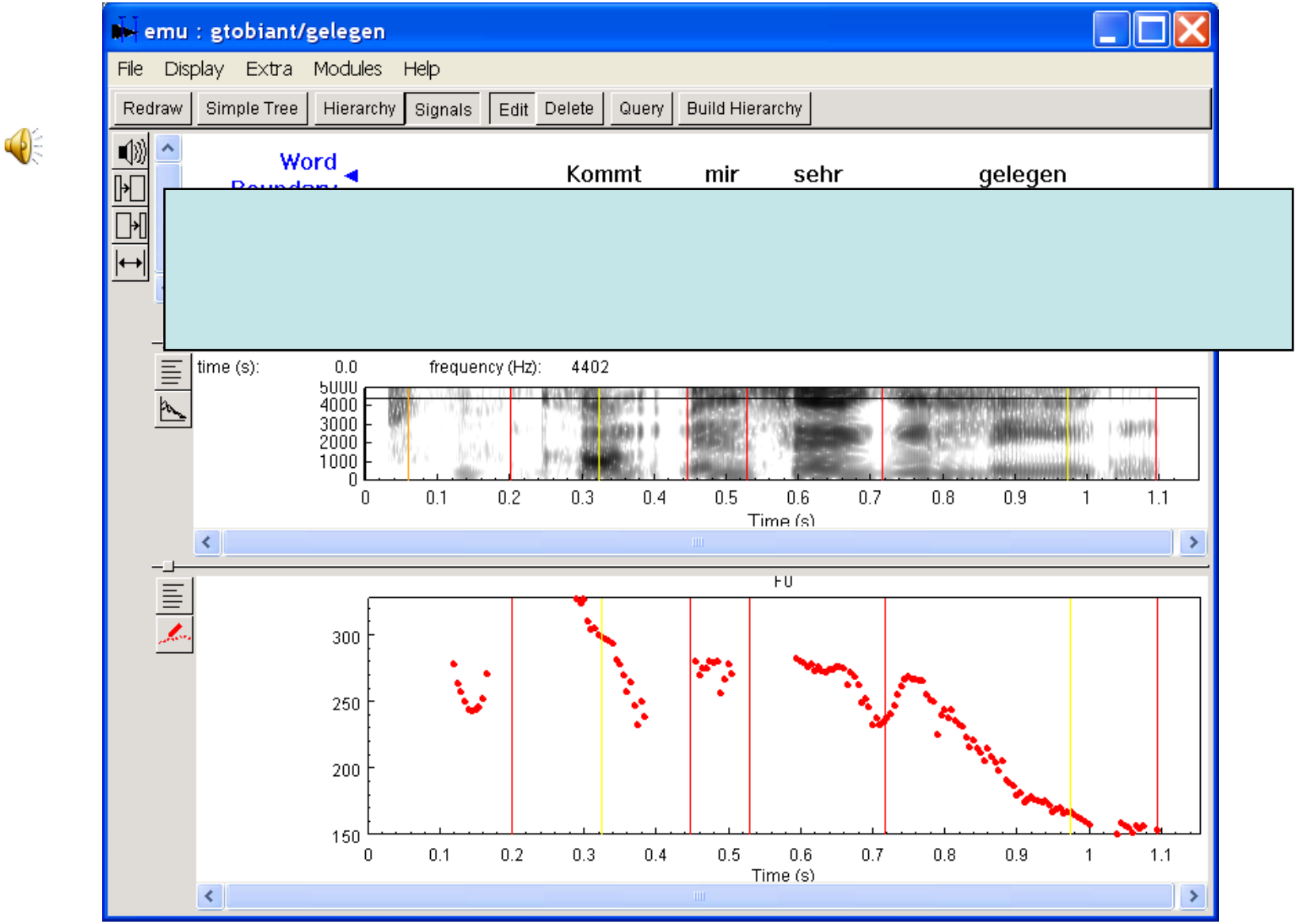
220
200
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 1.1
Time (s)


emu : gtobiant/gelegen
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0.9
1
1.1
Time (s)
F0
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0.1
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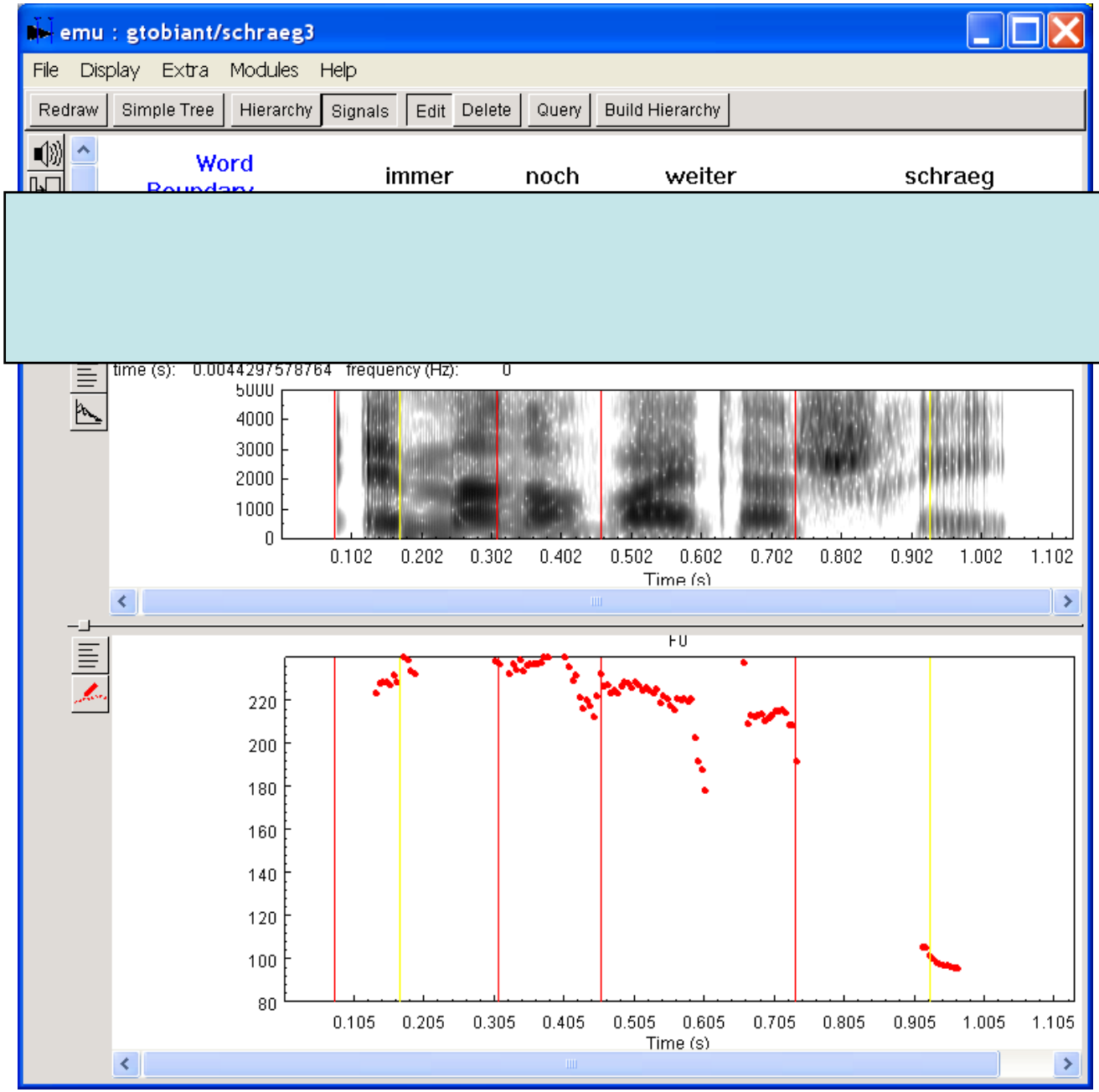
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
Time (s)


emu : gtobiant/schraeg3
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Query
Build Hierarchy
Word
immer
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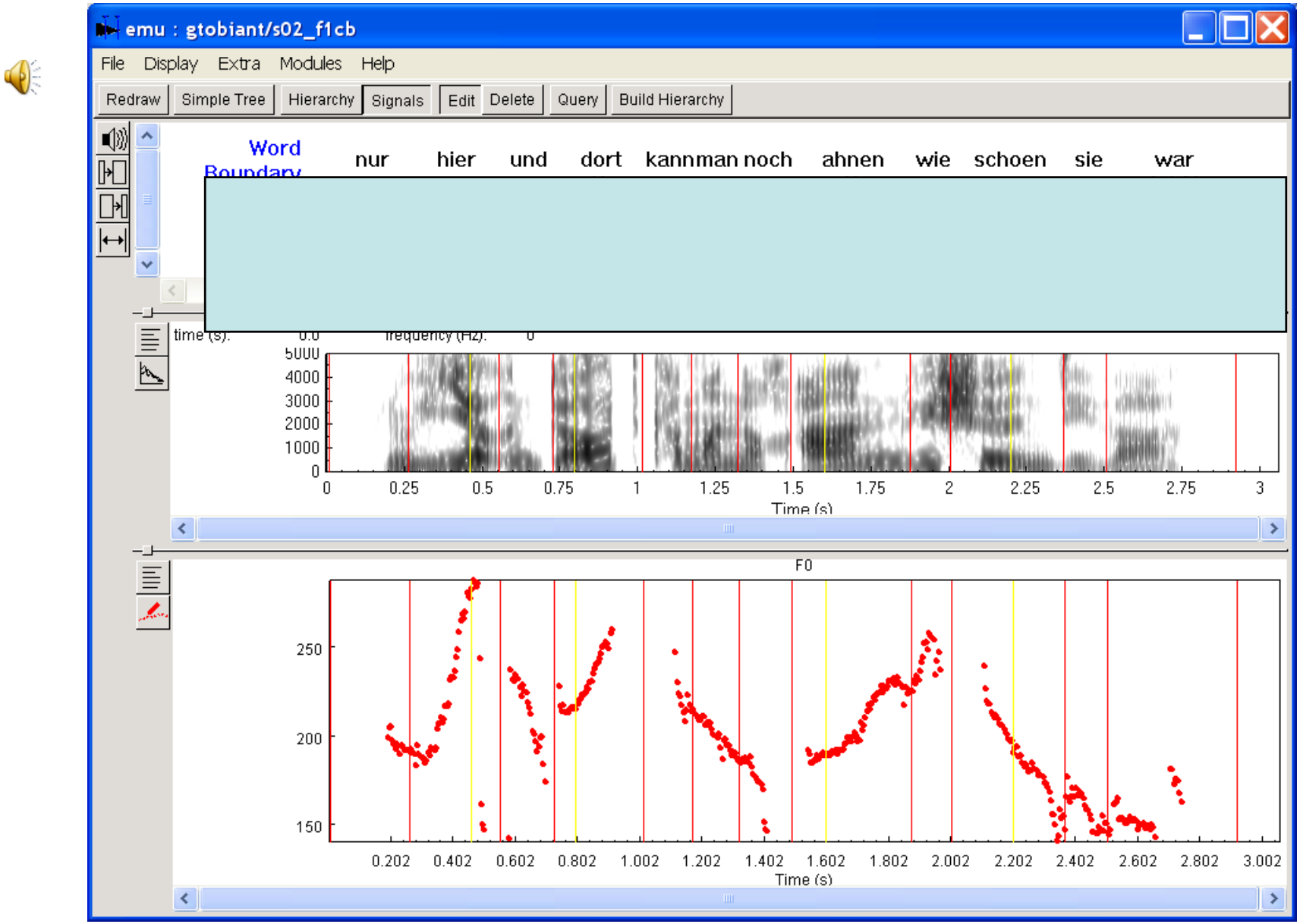
weiter
schraeg
time (s): 0.0044297578764 frequency (Hz): 0
5000
4000
3000
2000
1000
0
0.102
0.202
0.302
0.402
0.502
0.602
0.702
0.802
0.902
1.002
1.102
Time (s)
F0
220
200
180
160
140
120
100
80
0.105
0.205
0.305
0.405
0.505
0.605
0.705
0.805
0.905
1.005
1.105
Time (s)


emu : gtobiant/s02_f1cb
File
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Query
Build Hierarchy
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sie
war
time (s):
frequency (Hz):
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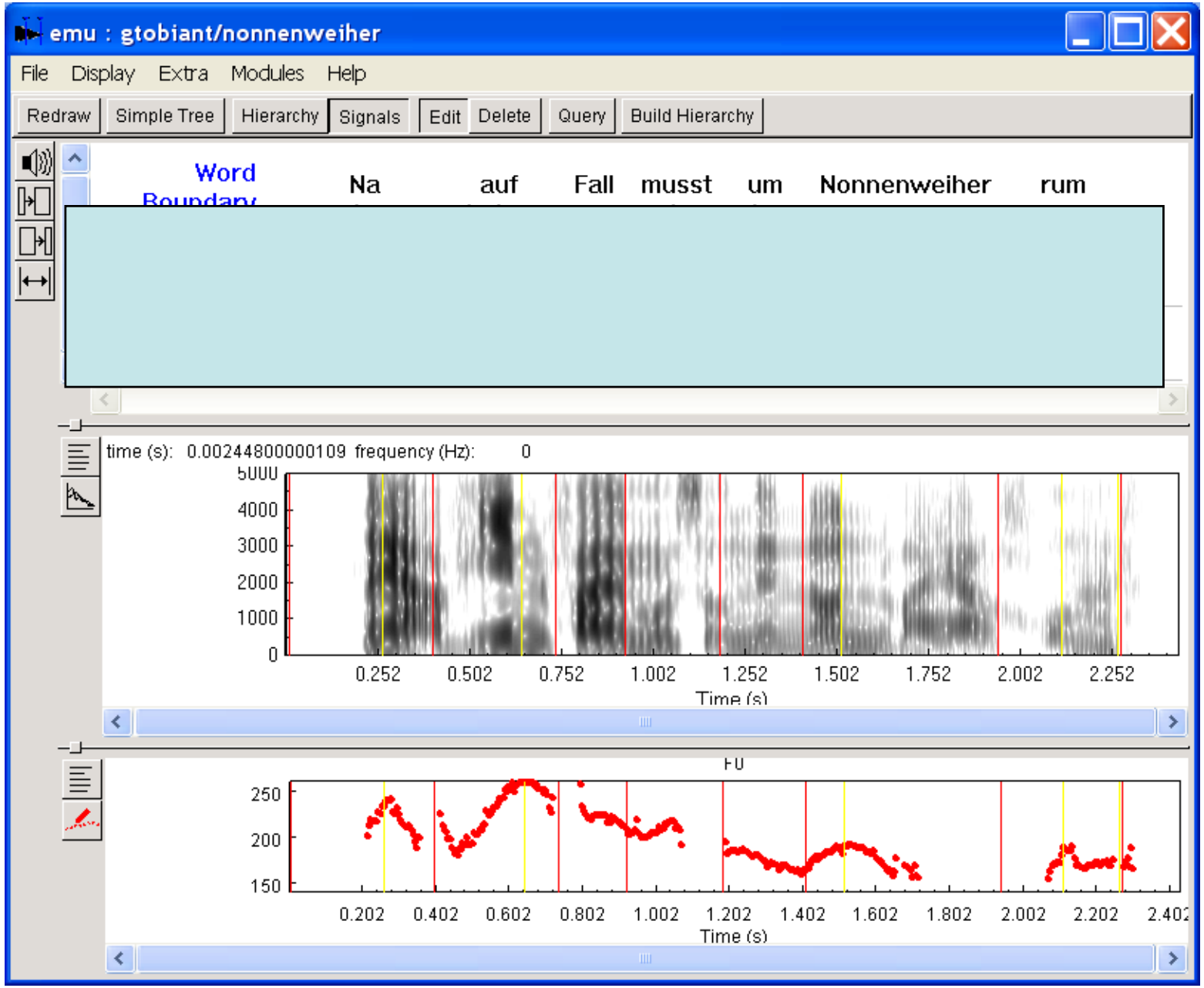
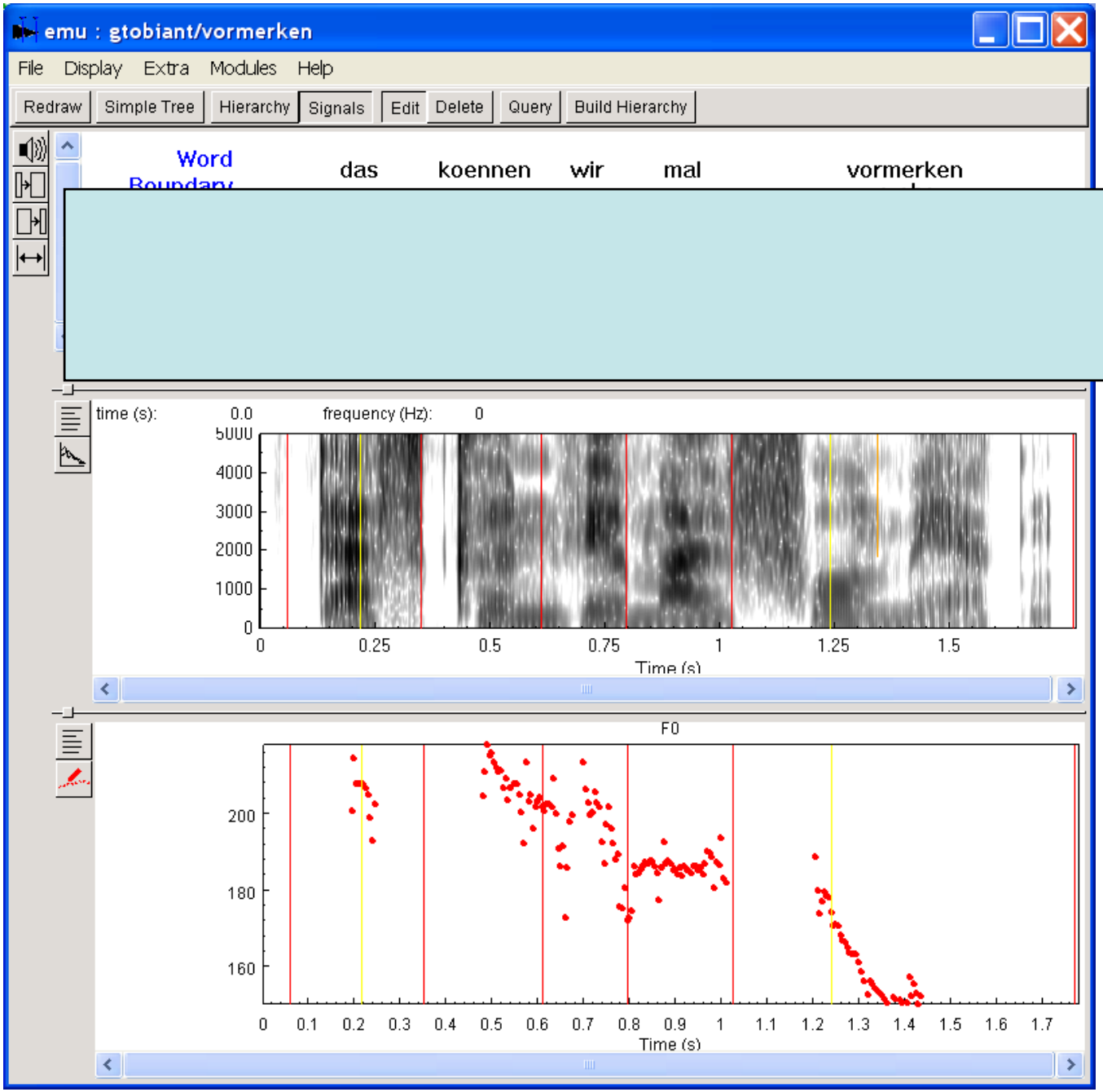
2000
1000
0
0
0.25
0.5
0.75
1
1.25
1.5
1.75
2
2.25
2.5
2.75
3
Time (s)
F0
250
200
150
0.202
0.402
0.602
0.802
1.002
1.202
1.402
1.602
1.802
2.002
2.202
2.402
2.602
2.802
3.002
Time (s)


emu : gtobiant/nonnenweiher
File Display Extra Modules Help
Redraw Simple Tree Hierarchy Signals Edit Delete Query Build Hierarchy
Word
Boundary
Na auf Fall musst um Nonnenweiher rum
time (s): 0.00244800000109 frequency (Hz): 0
5000
4000
3000
2000
1000
0
0.252 0.502 0.752 1.002 1.252 1.502 1.752 2.002 2.252
Time (s)
F0
250
200
150
0.202 0.402 0.602 0.802 1.002 1.202 1.402 1.602 1.802 2.002 2.202 2.402
Time (s)


emu : gtobiant/vormerken
File
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Hierarchy
Signals
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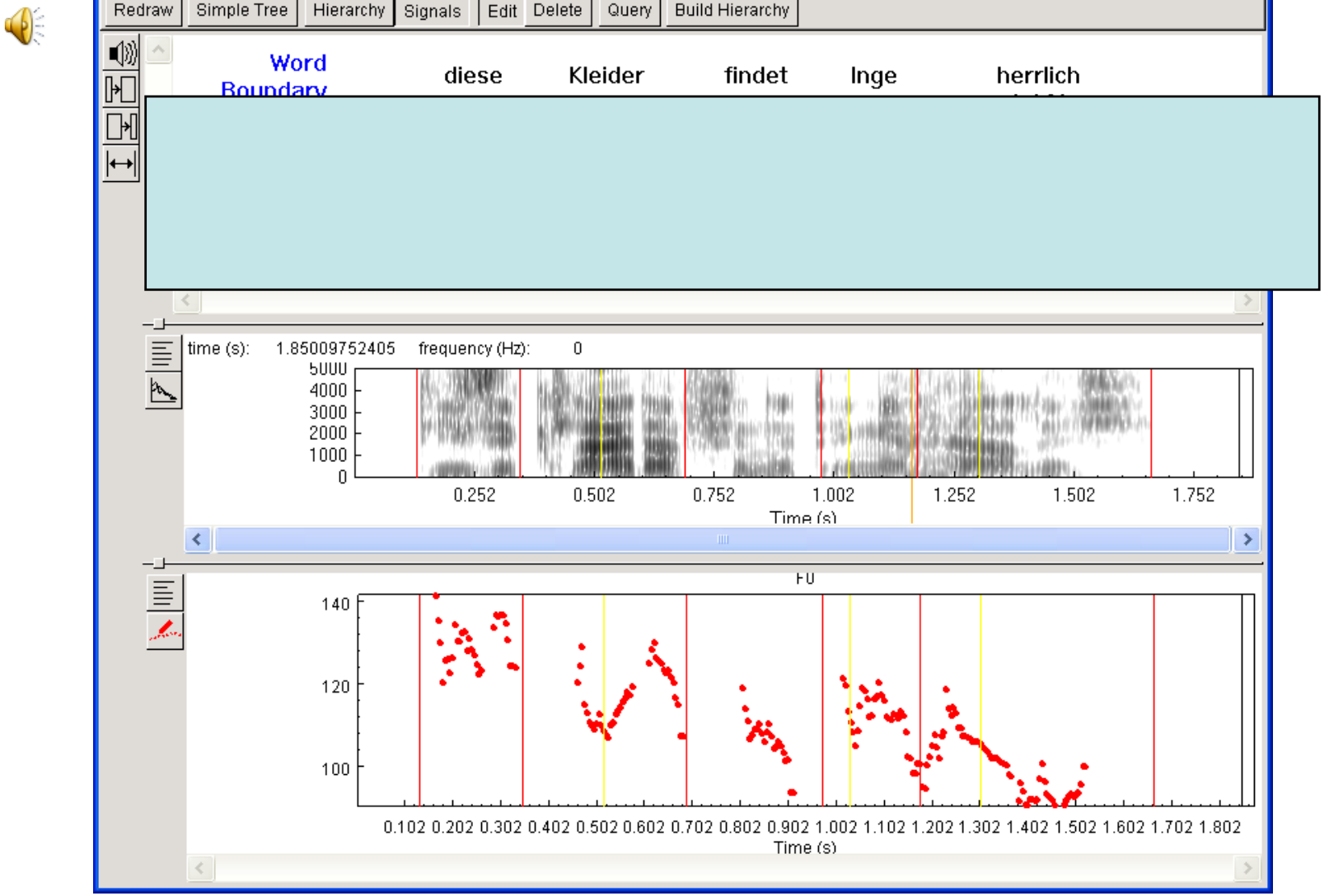
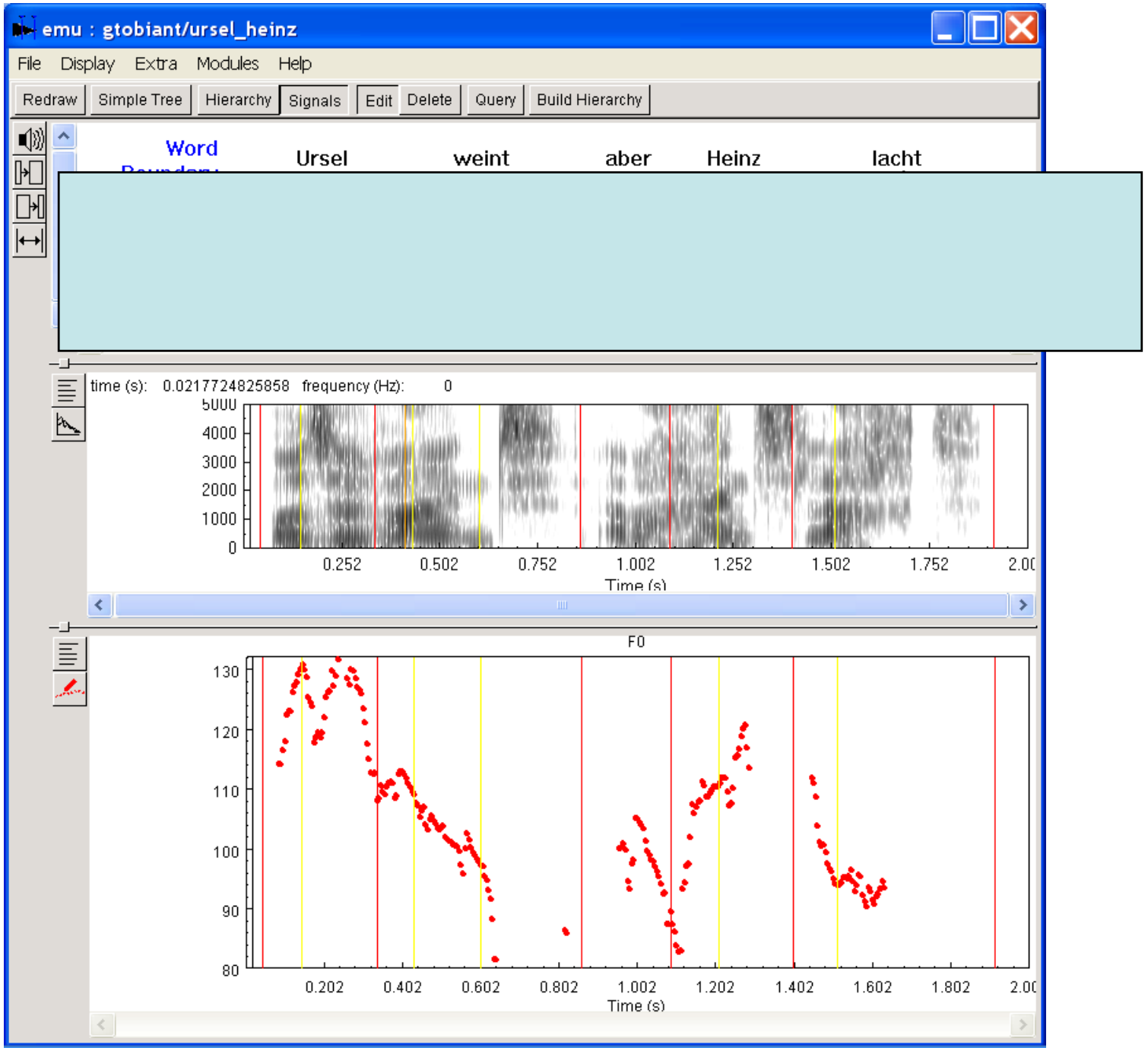
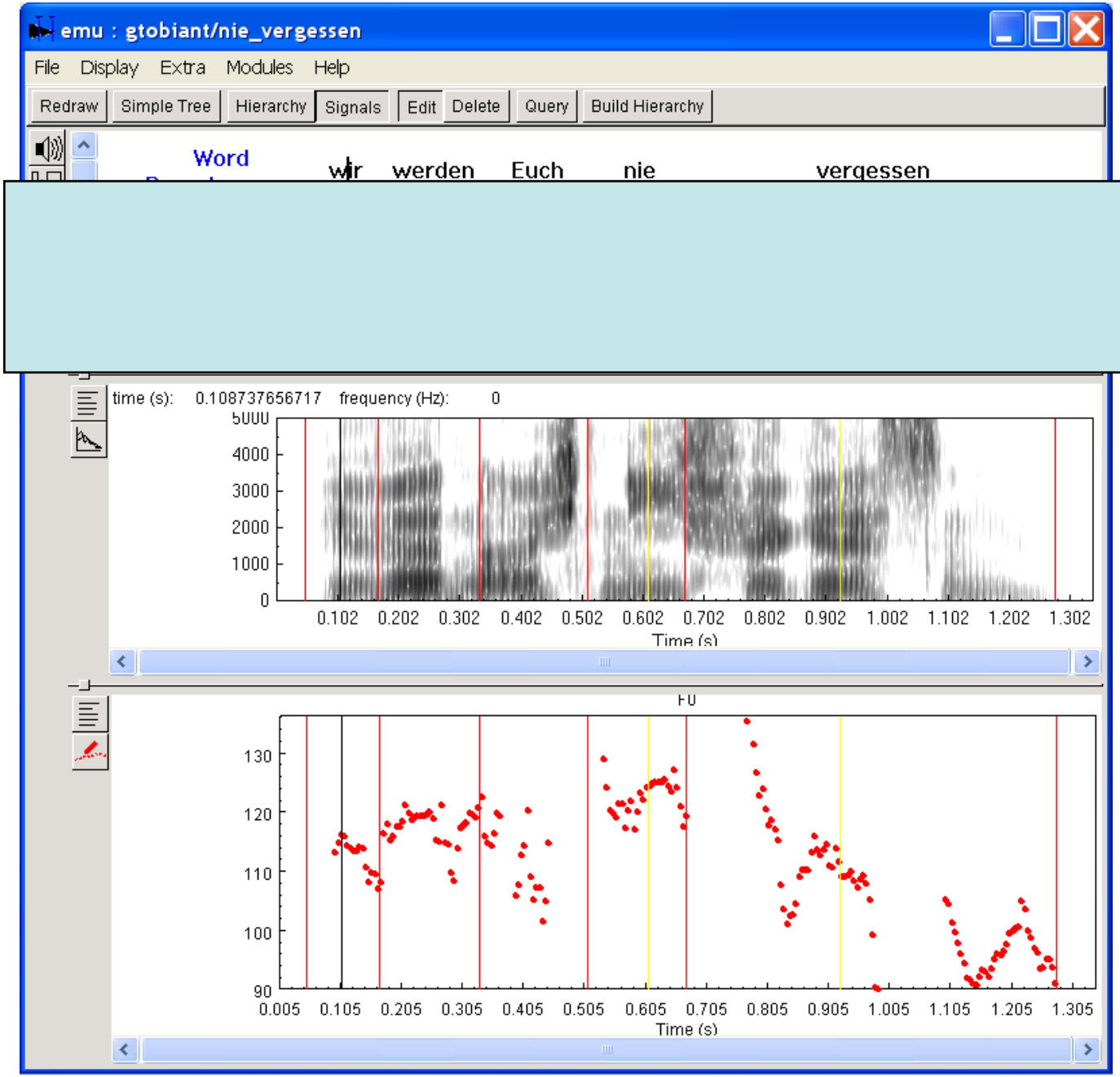
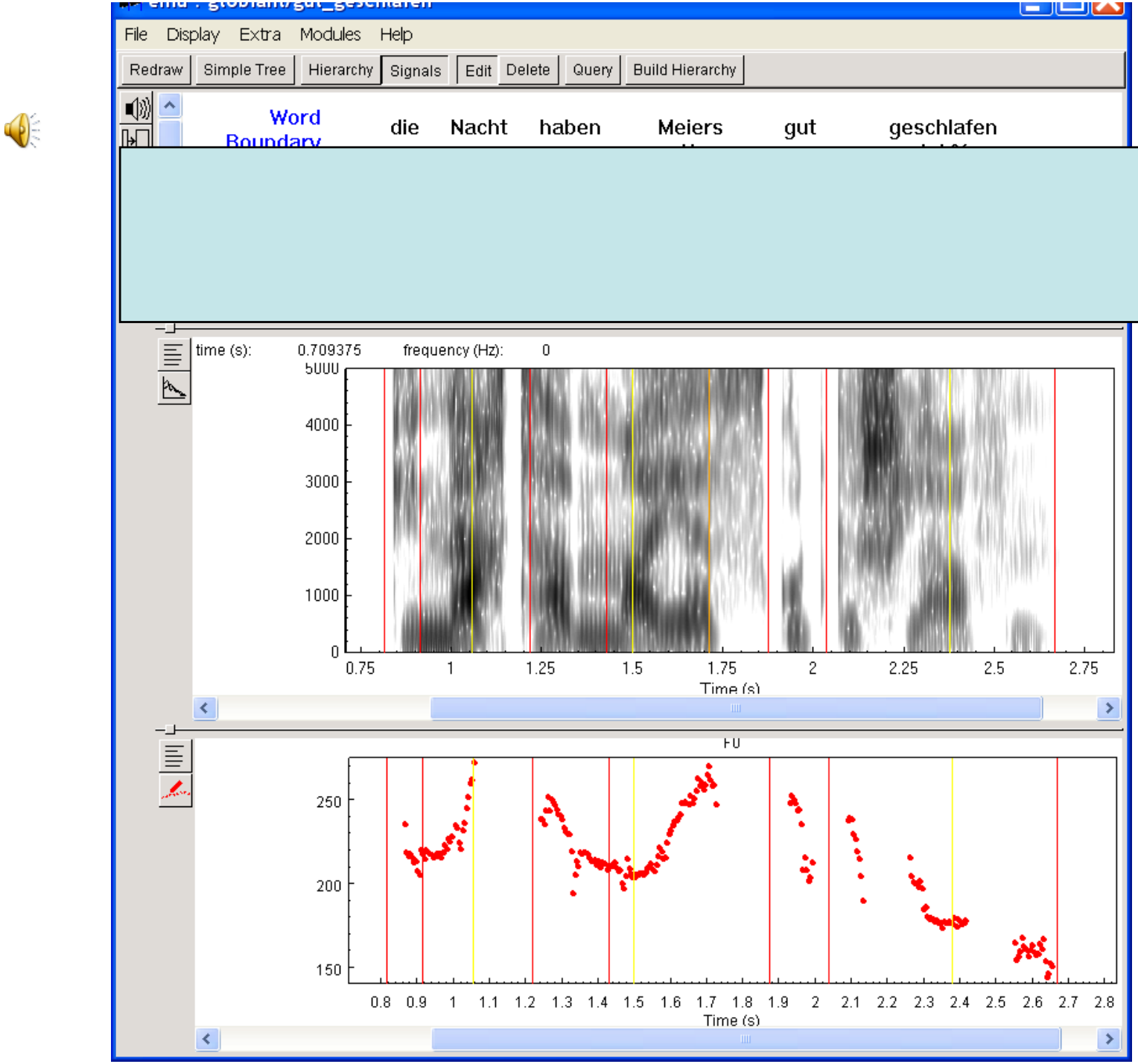
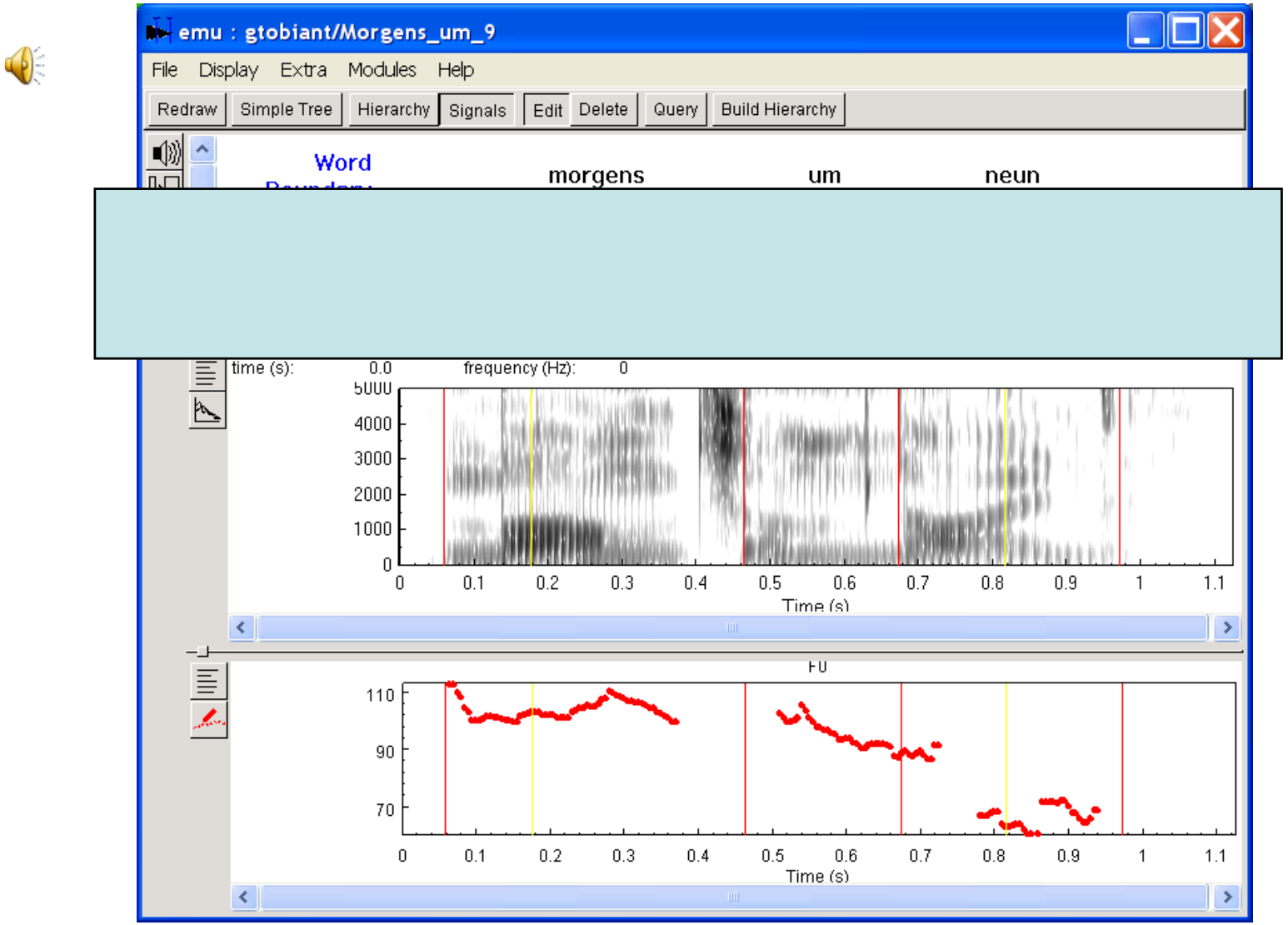
Delete
Query
Build Hierarchy
Word
Boundary
das
koennen
wir
mal
vormerken
time (s):
0.0
frequency (Hz):
0
5000
4000
3000
2000
1000
0
0
0.25
0.5
0.75
1
1.25
1.5
Time (s)
F0
200
180
160
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
1.3
1.4
1.5
1.6
1.7
Time (s)


File Display Extra Modules Help
Redraw Simple Tree Hierarchy Signals Edit Delete Query Build Hierarchy
Word
Boundary
diese
Kleider
findet
Inge
herrlich
time (s): 1.85009752405 frequency (Hz): 0
5000
4000
3000
2000
1000
0
0.252 0.502 0.752 1.002 1.252 1.502 1.752
Time (s)
F0
140
120
100
0.102 0.202 0.302 0.402 0.502 0.602 0.702 0.802 0.902 1.002 1.102 1.202 1.302 1.402 1.502 1.602 1.702 1.802
Time (s)


emu : gtobiant/ursel_heinz
File Display Extra Modules Help
Redraw Simple Tree Hierarchy Signals Edit Delete Query Build Hierarchy
Word
Ursel
weint
aber
Heinz
lacht
time (s): 0.0217724825858 frequency (Hz): 0
5000
4000
3000
2000
1000
0
0.252
0.502
0.752
1.002
1.252
1.502
1.752
Time (s)
F0
130
120
110
100
90
80
0.202
0.402
0.602
0.802
1.002
1.202
1.402
1.602
1.802
Time (s)


emu : gtobiant/nie_vergessen
File Display Extra Modules Help
Redraw Simple Tree Hierarchy Signals Edit Delete Query Build Hierarchy
Word
wir werden Euch nie vergessen
time (s): 0.108737656717 frequency (Hz): 0
5000
4000
3000
2000
1000
0
0.102 0.202 0.302 0.402 0.502 0.602 0.702 0.802 0.902 1.002 1.102 1.202 1.302
Time (s)
F0
130
120
110
100
90
0.005 0.105 0.205 0.305 0.405 0.505 0.605 0.705 0.805 0.905 1.005 1.105 1.205 1.305
Time (s)


File Display Extra Modules Help
Redraw Simple Tree Hierarchy Signals Edit Delete Query Build Hierarchy
Word
Boundary
die Nacht haben Meiers gut geschlafen
time (s): 0.709375 frequency (Hz): 0
5000
4000
3000
2000
1000
0
0.75 1 1.25 1.5 1.75 2 2.25 2.5 2.75
Time (s)
F0
250
200
150
0.8 0.9 1 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8
Time (s)


emu : gtobiant/Morgens_um_9
File
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Query
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time (s):
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frequency (Hz):
0
5000
4000
3000
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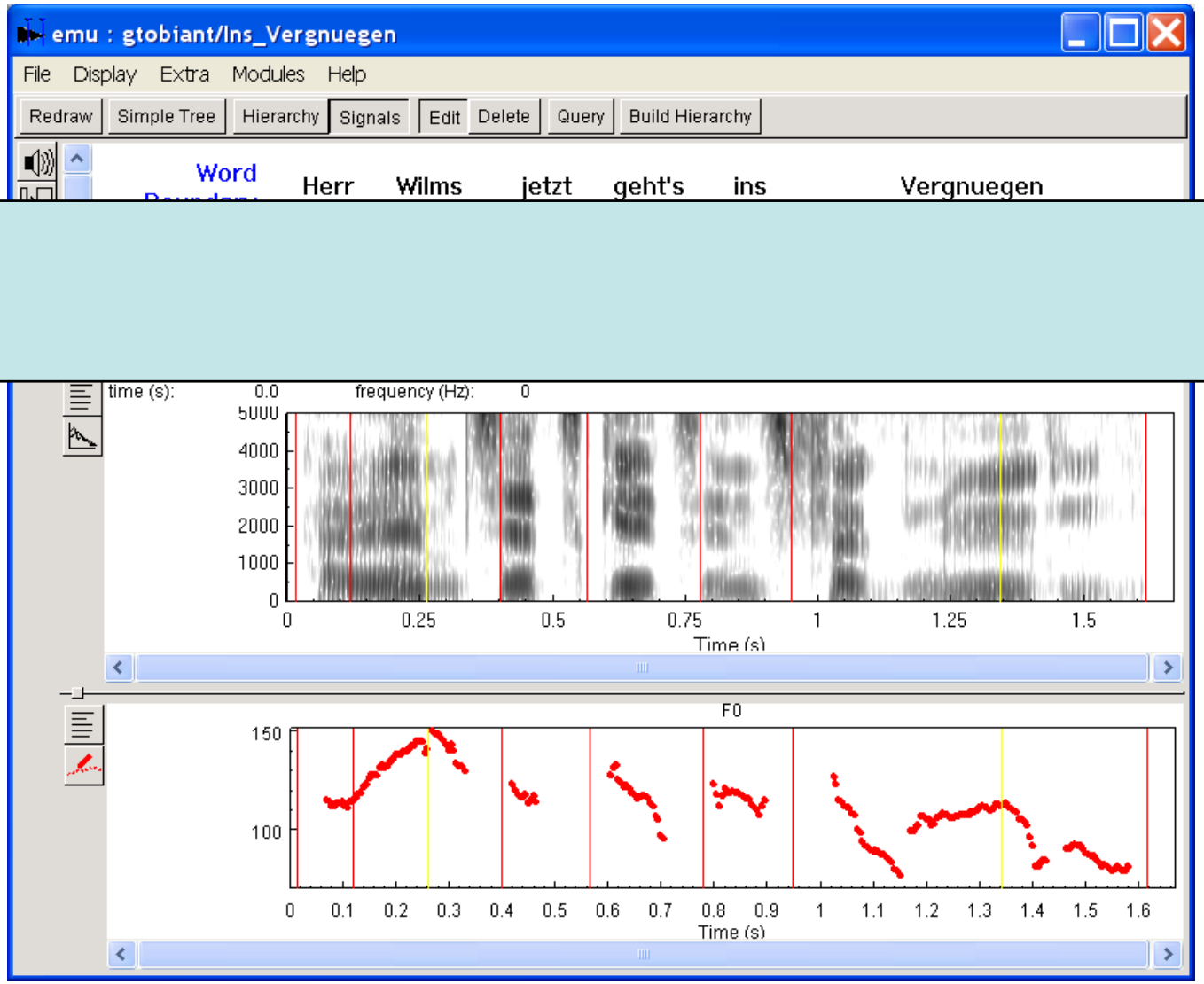
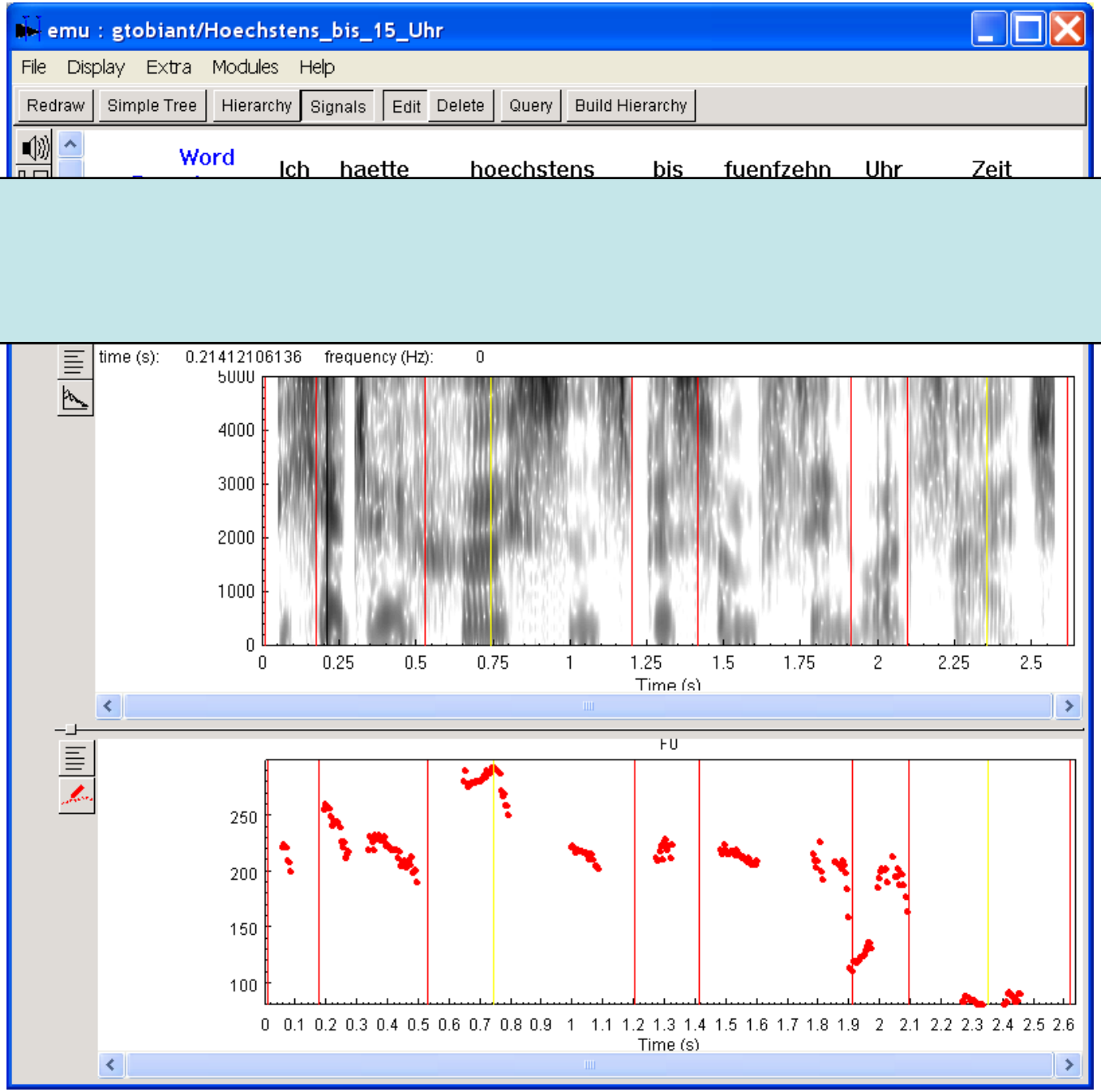
1000
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
Time (s)
F0
110
90
70
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
Time (s)


emu : gtobiant/Ins_Vergnuegen
File Display Extra Modules Help
Redraw Simple Tree Hierarchy Signals Edit Delete Query Build Hierarchy
Word
Herr Wilms jetzt geht's ins Vergnuegen
time (s): 0.0 frequency (Hz): 0
5000
4000
3000
2000
1000
0
0 0.25 0.5 0.75 1 1.25 1.5
Time (s)
F0
150
100
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 1.1 1.2 1.3 1.4 1.5 1.6
Time (s)


emu : gtobiant/Hoechstens_bis_15_Uhr
File Display Extra Modules Help
Redraw Simple Tree Hierarchy Signals Edit Delete Query Build Hierarchy
Word
Ich haette hoechstens bis fuenfzehn Uhr Zeit
time (s): 0.21412106136 frequency (Hz): 0
5000
4000
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2000
1000
0
0 0.25 0.5 0.75 1 1.25 1.5 1.75 2 2.25 2.5
Time (s)
F0
250
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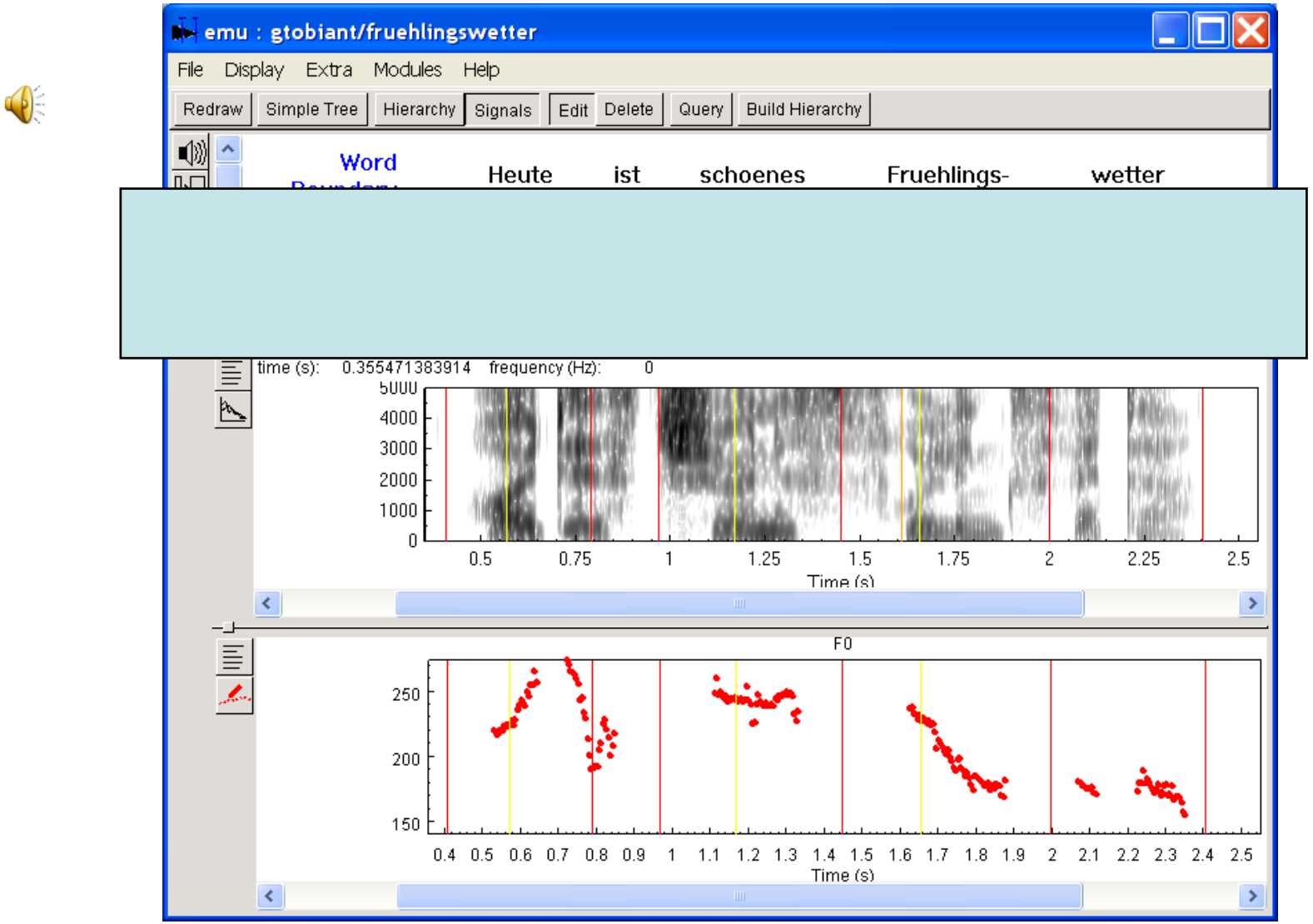
100
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2 2.1 2.2 2.3 2.4 2.5 2.6
Time (s)


emu : gtobiant/fruehlingswetter
File Display Extra Modules Help
Redraw Simple Tree Hierarchy Signals Edit Delete Query Build Hierarchy
Word
Heute ist schoenes Fruehlings- wetter
time (s): 0.355471383914 frequency (Hz): 0
5000
4000
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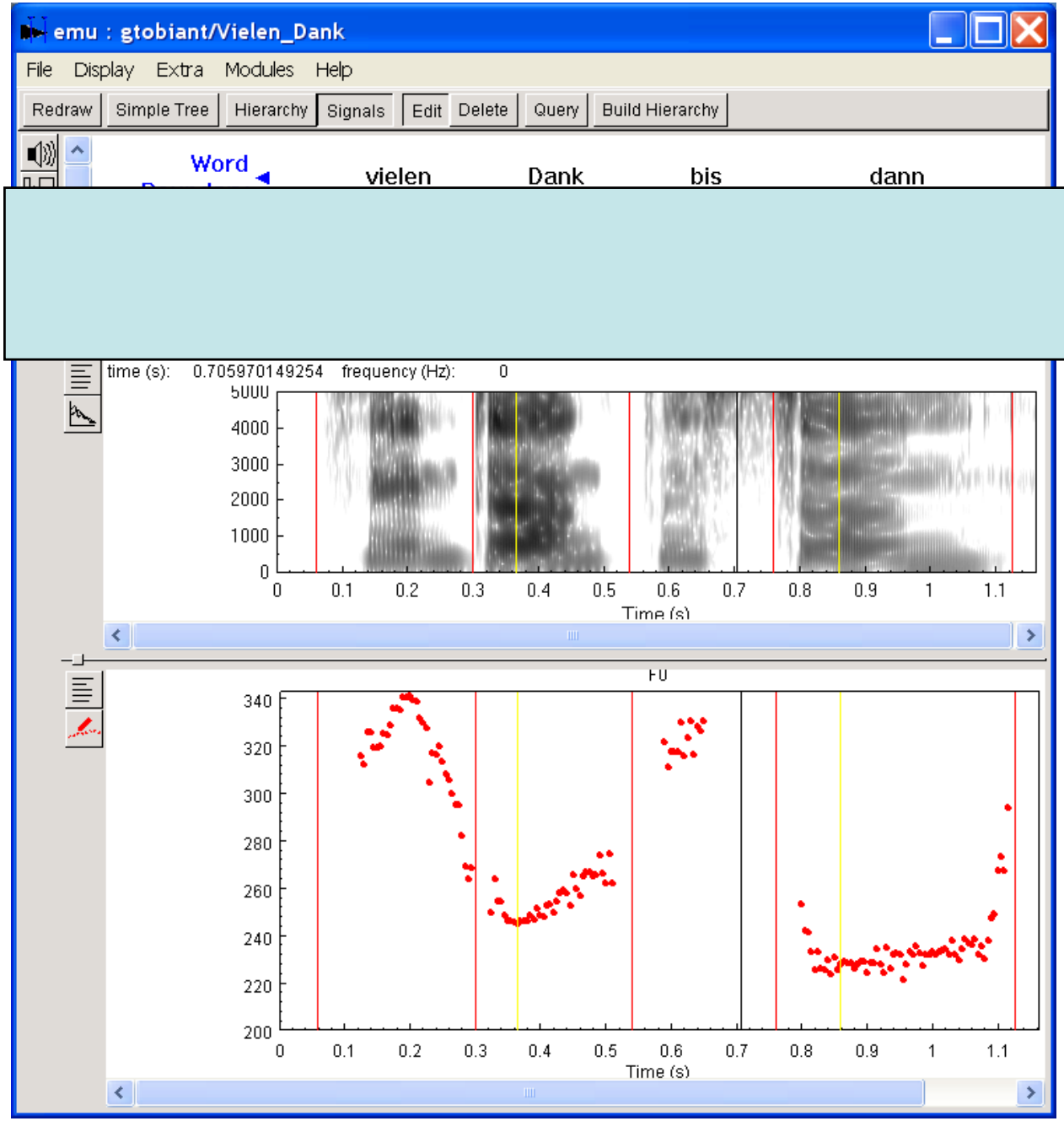
0
0.5 0.75 1 1.25 1.5 1.75 2 2.25 2.5
Time (s)
F0
250
200
150
0.4 0.5 0.6 0.7 0.8 0.9 1 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2 2.1 2.2 2.3 2.4 2.5
Time (s)


emu : gtobiant/Vielen_Dank
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Hierarchy
Signals
Edit
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Query
Build Hierarchy
Word
vielen
Dank
bis
dann
time (s): 0.705970149254 frequency (Hz): 0
5000
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0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 1.1
Time (s)
F0
340
320
300
280
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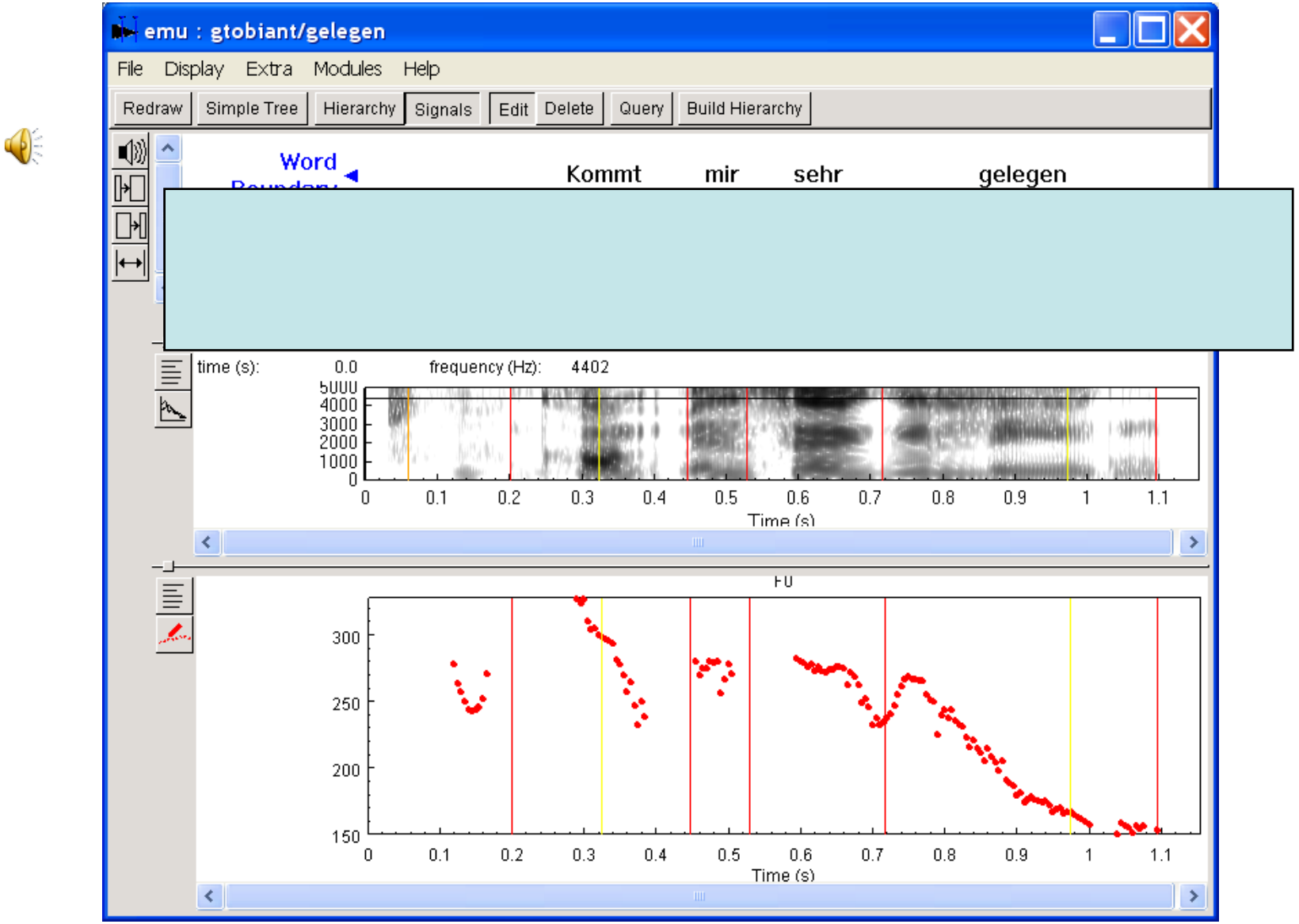
240
220
200
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 1.1
Time (s)


emu : gtobiant/gelegen
File
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Signals
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Build Hierarchy
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time (s):
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frequency (Hz):
4402
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3000
2000
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0.1
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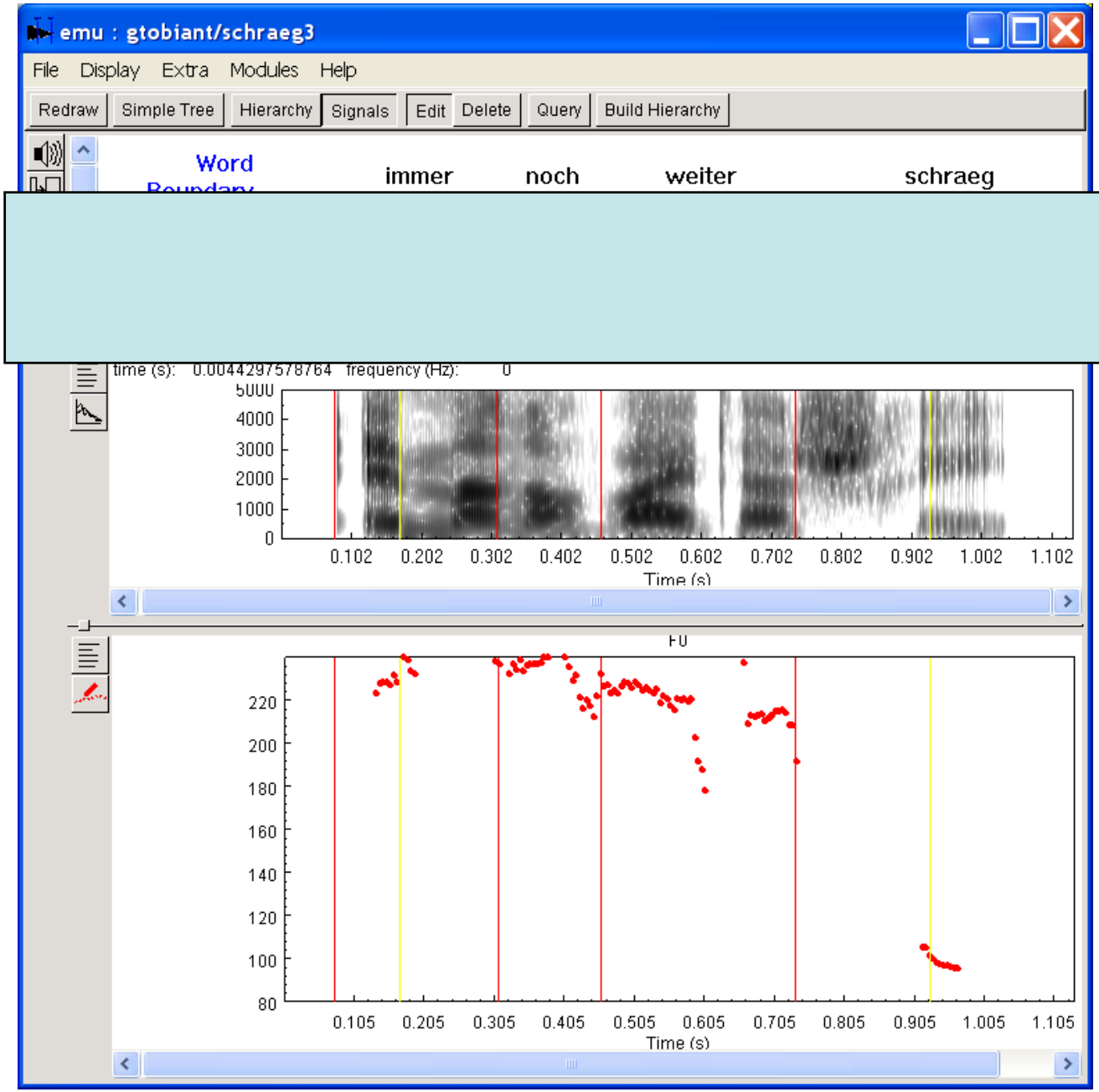
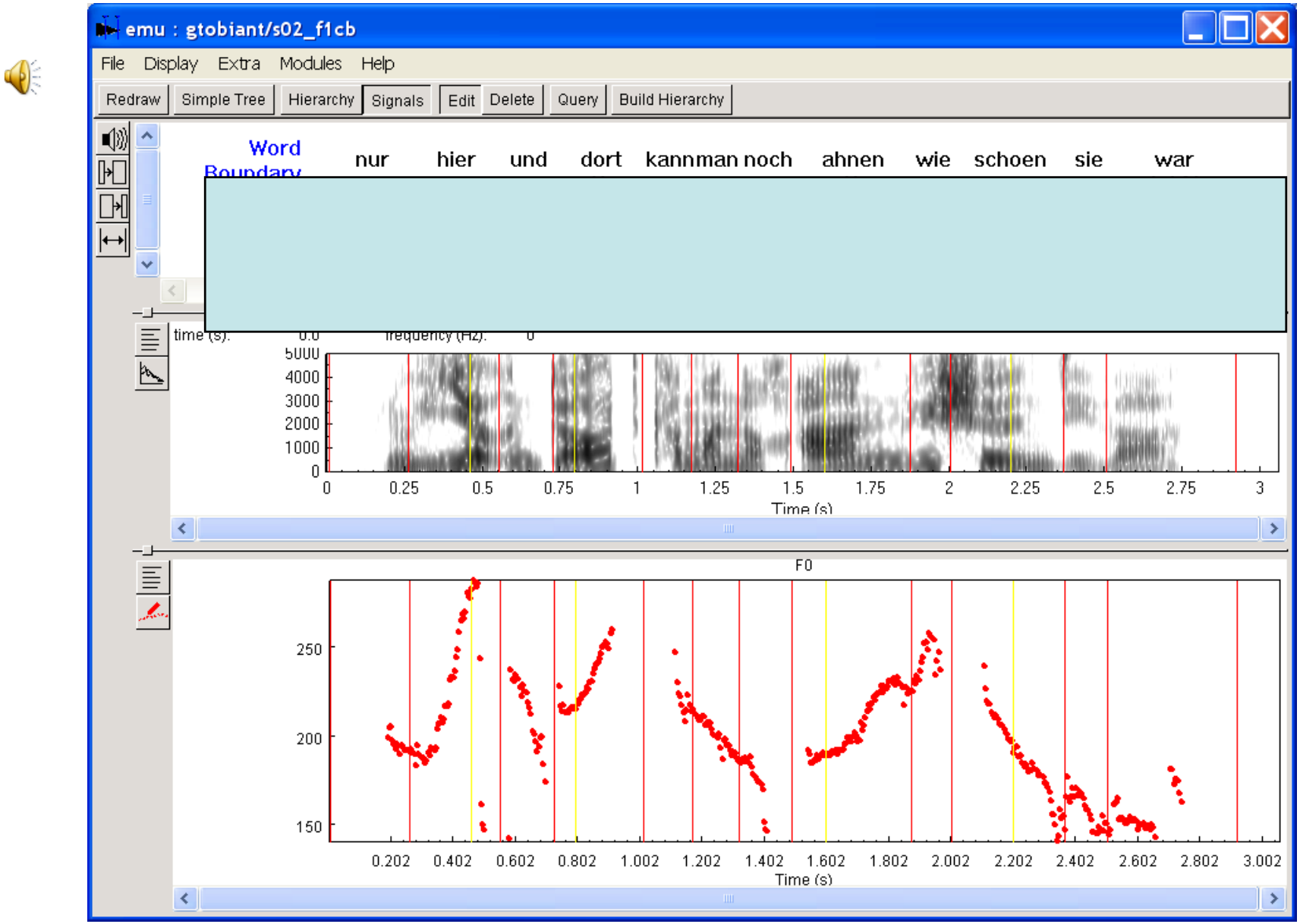
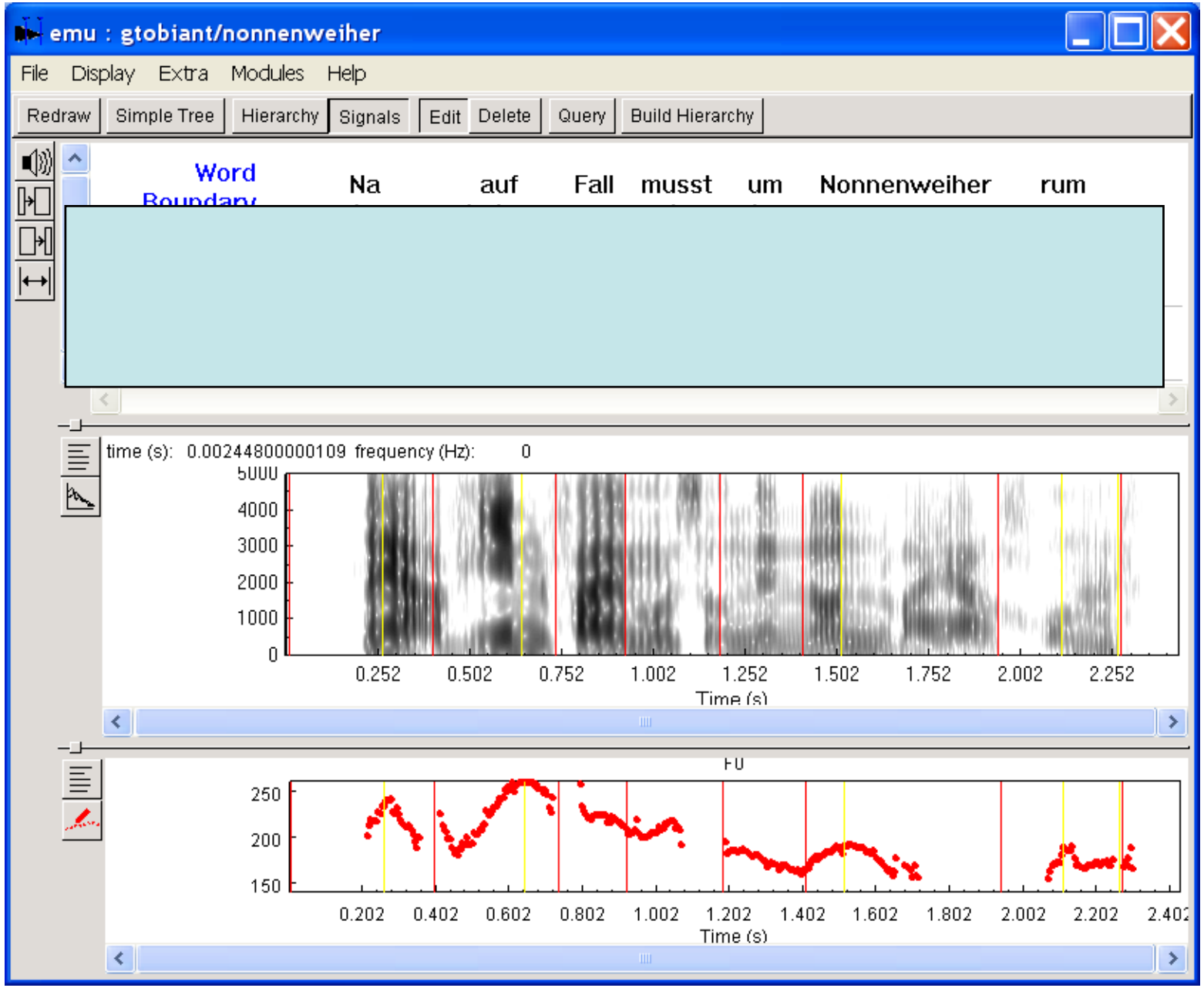
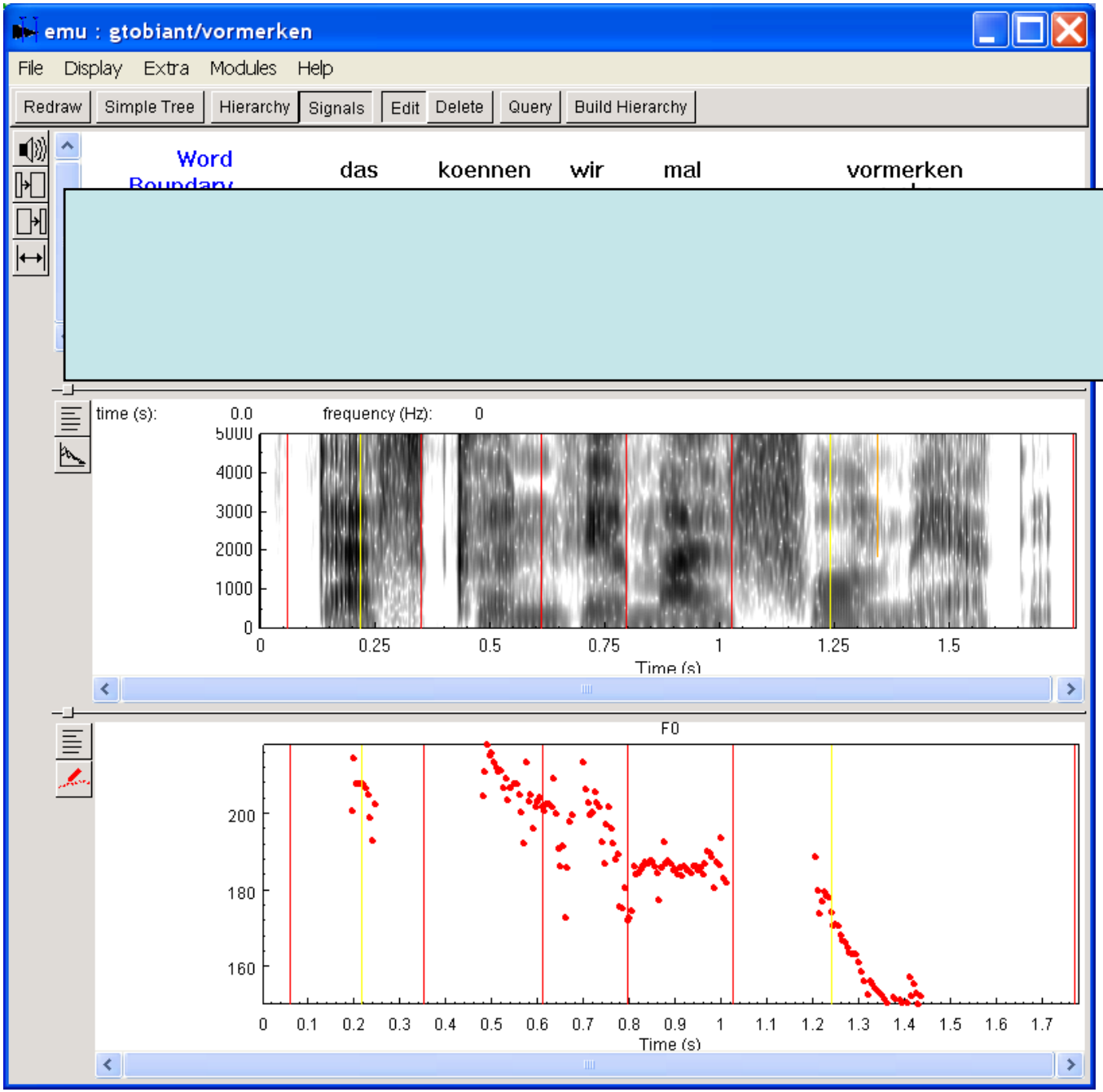
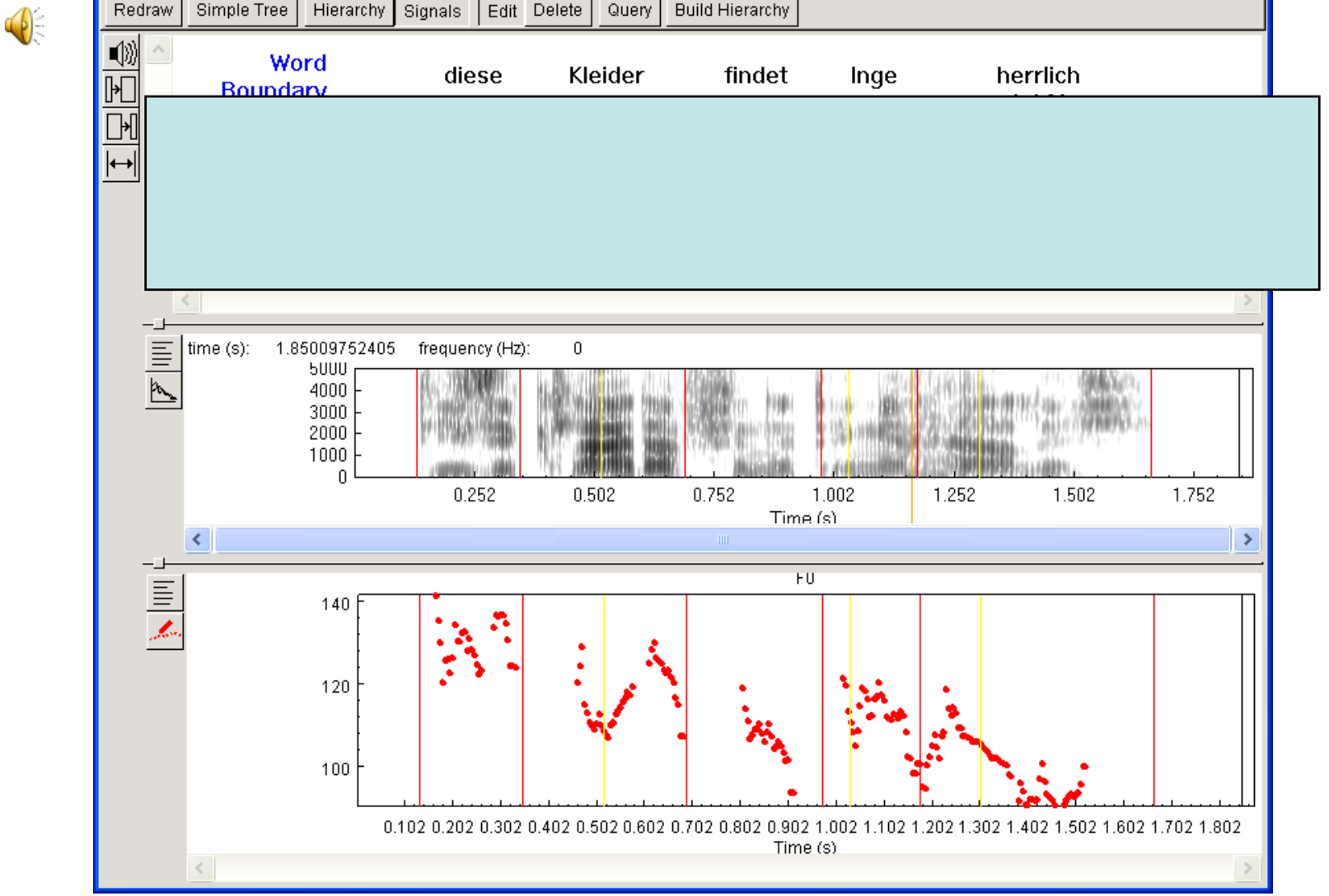
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
Time (s)
F0
300
250
200
150
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
Time (s)

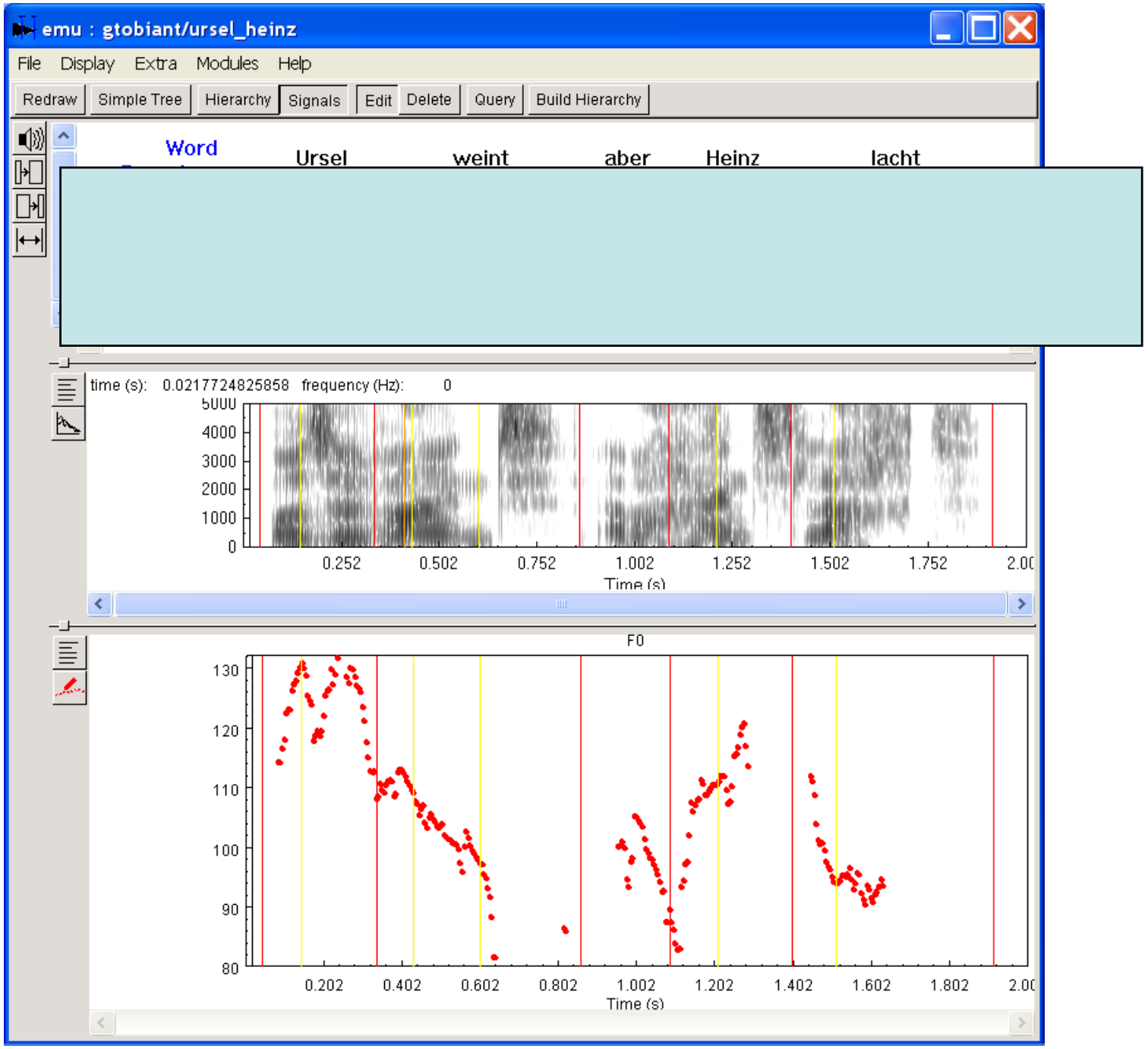

emu : gtobiant/schraeg3
File
Display
Extra
Modules
Help
Redraw
Simple Tree
Hierarchy
Signals
Edit
Delete
Query
Build Hierarchy
Word
immer
noch
weiter
schraeg
time (s): 0.0044297578764 frequency (Hz): 0
5000
4000
3000
2000
1000
0
0.102
0.202
0.302
0.402
0.502
0.602
0.702
0.802
0.902
1.002
1.102
Time (s)
F0
220
200
180
160
140
120
100
80
0.105
0.205
0.305
0.405
0.505
0.605
0.705
0.805
0.905
1.005
1.105
Time (s)

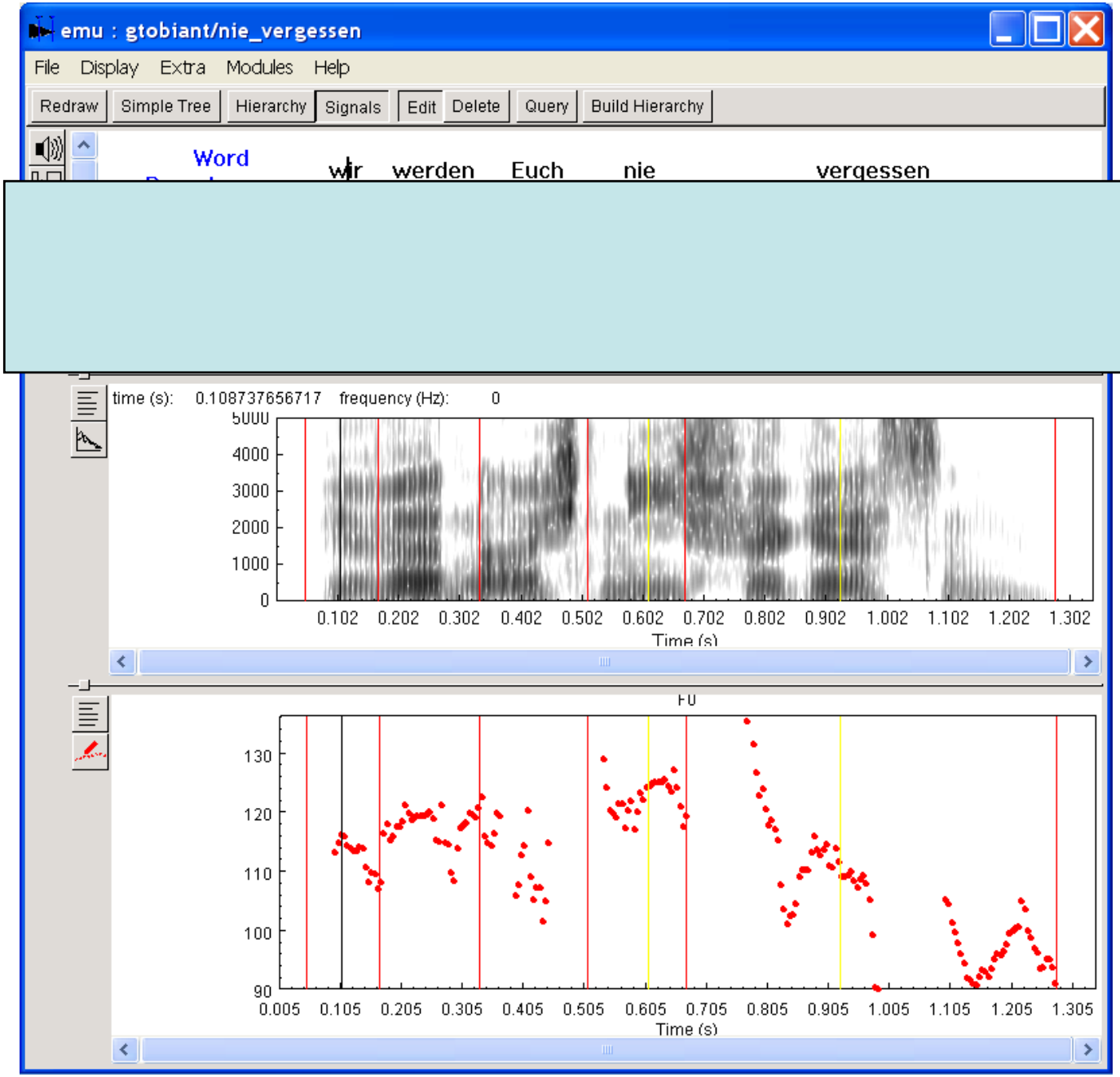

emu : gtobiant/s02_f1cb
File
Display
Extra
Modules
Help
Redraw
Simple Tree
Hierarchy
Signals
Edit
Delete
Query
Build Hierarchy
Word
Boundary
nur
hier
und
dort
kannman
noch
ahnen
wie
schoen
sie
war
time (s):
frequency (Hz):
5000
4000
3000
2000
1000
0
0
0.25
0.5
0.75
1
1.25
1.5
1.75
2
2.25
2.5
2.75
3
Time (s)
F0
250
200
150
0.202
0.402
0.602
0.802
1.002
1.202
1.402
1.602
1.802
2.002
2.202
2.402
2.602
2.802
3.002
Time (s)

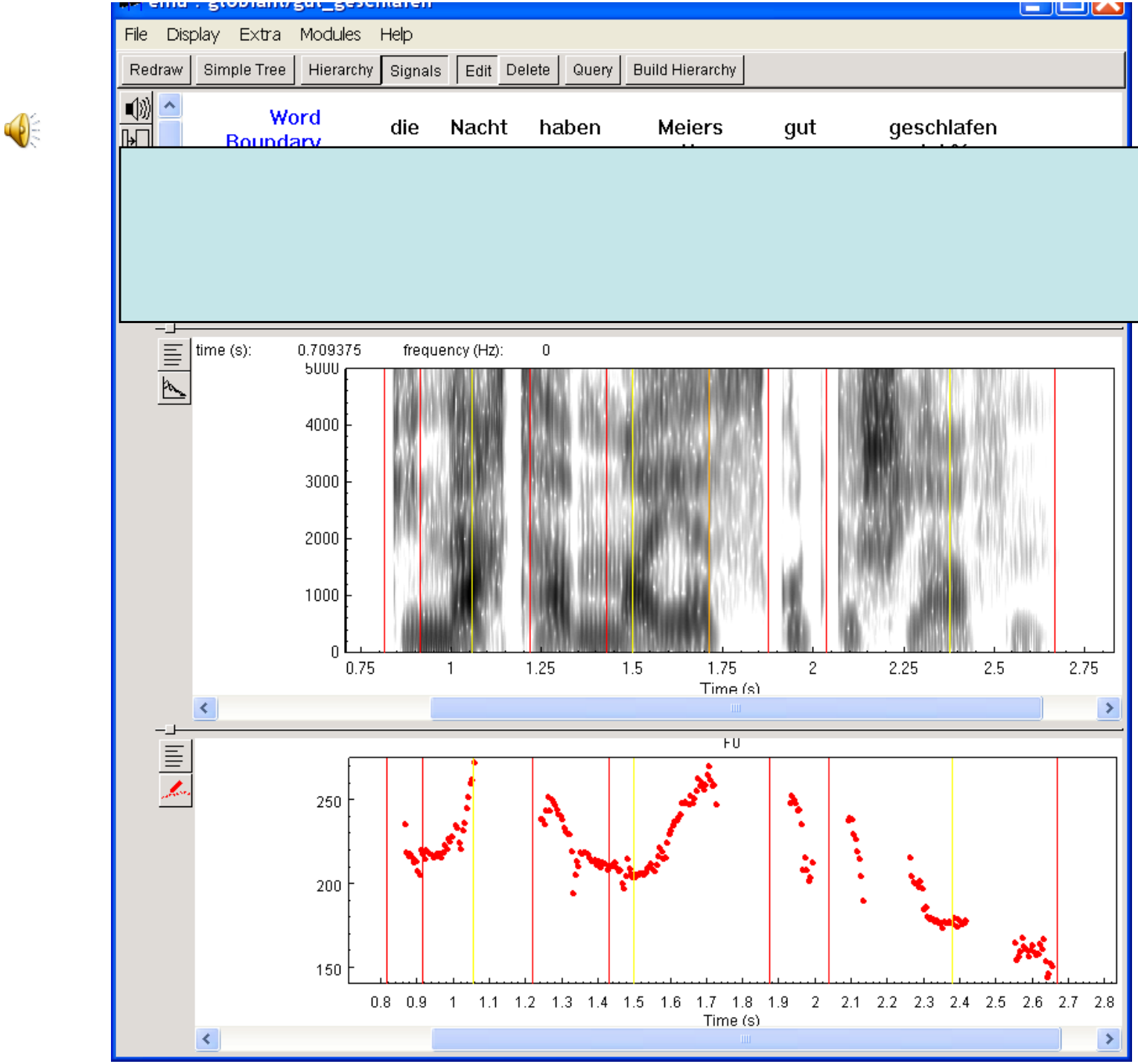

emu : gtobiant/nonnenweiher
File Display Extra Modules Help
Redraw Simple Tree Hierarchy Signals Edit Delete Query Build Hierarchy
Word
Boundary
Na auf Fall musst um Nonnenweiher rum
time (s): 0.00244800000109 frequency (Hz): 0
5000
4000
3000
2000
1000
0
0.252 0.502 0.752 1.002 1.252 1.502 1.752 2.002 2.252
Time (s)
F0
250
200
150
0.202 0.402 0.602 0.802 1.002 1.202 1.402 1.602 1.802 2.002 2.202 2.402
Time (s)


emu : gtobiant/vormerken
File
Display
Extra
Modules
Help
Redraw
Simple Tree
Hierarchy
Signals
Edit
Delete
Query
Build Hierarchy
Word
Boundary
das
koennen
wir
mal
vormerken
time (s):
0.0
frequency (Hz):
0
5000
4000
3000
2000
1000
0
0
0.25
0.5
0.75
1
1.25
1.5
Time (s)
F0
200
180
160
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
1.3
1.4
1.5
1.6
1.7
Time (s)


File Display Extra Modules Help
Redraw Simple Tree Hierarchy Signals Edit Delete Query Build Hierarchy
Word
Boundary
diese
Kleider
findet
Inge
herrlich
time (s): 1.85009752405 frequency (Hz): 0
5000
4000
3000
2000
1000
0
0.252 0.502 0.752 1.002 1.252 1.502 1.752
Time (s)
F0
140
120
100
0.102 0.202 0.302 0.402 0.502 0.602 0.702 0.802 0.902 1.002 1.102 1.202 1.302 1.402 1.502 1.602 1.702 1.802
Time (s)


emu : gtobiant/ursel_heinz
File Display Extra Modules Help
Redraw Simple Tree Hierarchy Signals Edit Delete Query Build Hierarchy
Word
Ursel
weint
aber
Heinz
lacht
time (s): 0.0217724825858 frequency (Hz): 0
5000
4000
3000
2000
1000
0
0.252
0.502
0.752
1.002
1.252
1.502
1.752
Time (s)
F0
130
120
110
100
90
80
0.202
0.402
0.602
0.802
1.002
1.202
1.402
1.602
1.802
Time (s)


emu : gtobiant/nie_vergessen
File Display Extra Modules Help
Redraw Simple Tree Hierarchy Signals Edit Delete Query Build Hierarchy
Word
wir werden Euch nie vergessen
time (s): 0.108737656717 frequency (Hz): 0
5000
4000
3000
2000
1000
0
0.102 0.202 0.302 0.402 0.502 0.602 0.702 0.802 0.902 1.002 1.102 1.202 1.302
Time (s)
F0
130
120
110
100
90
0.005 0.105 0.205 0.305 0.405 0.505 0.605 0.705 0.805 0.905 1.005 1.105 1.205 1.305
Time (s)


File Display Extra Modules Help
Redraw Simple Tree Hierarchy Signals Edit Delete Query Build Hierarchy
Word
Boundary
die Nacht haben Meiers gut geschlafen
time (s): 0.709375 frequency (Hz): 0
5000
4000
3000
2000
1000
0
0.75 1 1.25 1.5 1.75 2 2.25 2.5 2.75
Time (s)
F0
250
200
150
0.8 0.9 1 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8
Time (s)