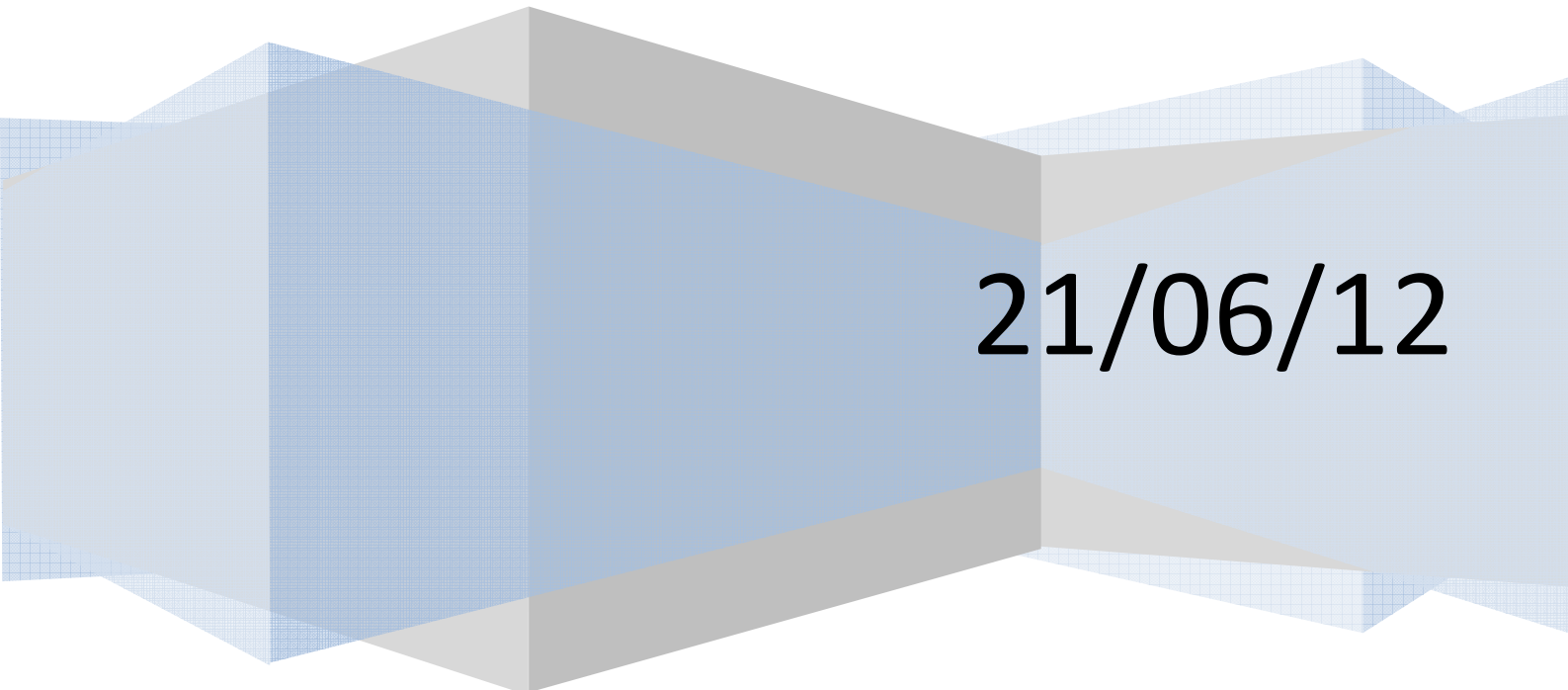


IPERLAB DOCUMENT

ANALISI ELETTROACUSTICHE DEI CAMPIONI SONORI REGISTRATI A MONTEBELLO IL 21-6-2012

**ESPERIMENTI EFFETTUATI DAL GRUPPO IPERLAB
CAPITANATO DA D. GULLA' E DAL GRUPPO XBI
CAPITANATO DA M. ROSSINI.**

C.T.U. Daniele GULLA'



21/06/12

Fri Jun 29 07:23:30 2012

Speaker info: REC 21\06\2012 MONTEBELLO

Recordin: [analysis voice: \CIAO\](#)

Time interval: 0.024 - 1.284 S (1.260 S)

Pitch	Formants	Ltas
MVD: 0.9s	QF ₁ : 5	Max.: 592 Hz
Voiced: 57.4%	QF ₂ : 5	Min.: 6215 Hz
Jitter: 4.2%	QF ₃ : 3	BED: 25.4 dB
Shimmer: 35.4%	QF ₄ : 6 [Median(F _i)/Median(B _i)]	CoG: 727 Hz [0.024; 1.284] S
Mean: 345 Hz		
SD: 140.1 Hz		
Median: 305 Hz		
Intensity	Harmonicity	
Max.: 87.3 dB	Max.: 15.1 dB	
Min.: 59.0 dB	Min.: -0.3 dB	
Mean: 80.7 dB	Mean: 3.7 dB	
SD: 8.77 dB	SD: 4.08 dB	
	GNE: 0.732	

- Pathological Type: 3

Created with VOICE ANALYSIS TOOL 3.0: 8359B63BE2 2012-02-22T15:46:45Z

LEGEND:

GNE (glottal to noise excitation ratio)

BED (band energy difference)

CoG (spectral center of gravity)

Maximum Voicing Duration (MVD)

Formant quality factors (QF_i)

PHATOLOGY TYPES:

Type I - Stable & Harmonic (press 1)

- Stable signal for longer than two seconds
- Clear harmonics up to at least 1000 Hz

Type II - Stable & At least one harmonic (press 2)

- Stable signal for longer than two seconds
- At least one stable harmonic at the fundamental frequency for longer than two seconds

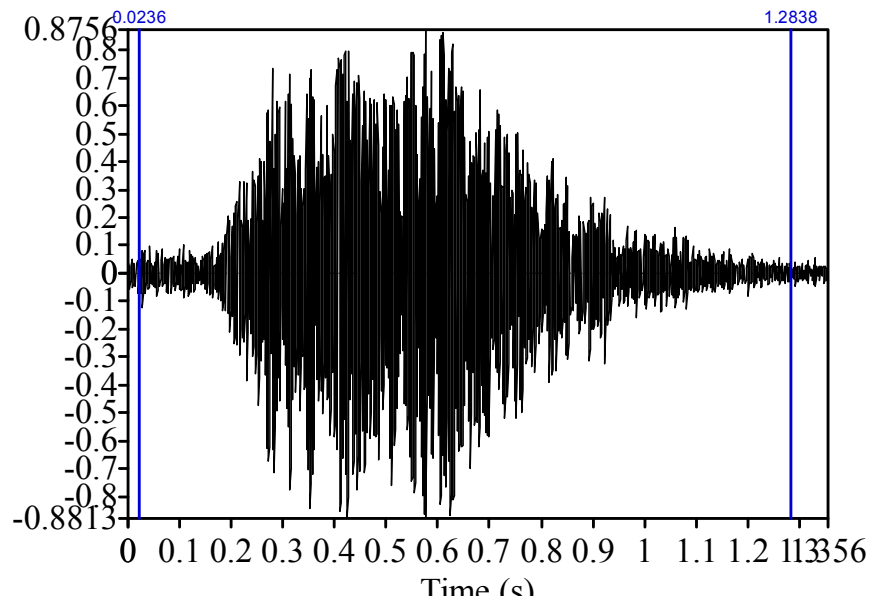
Type III - Unstable or Partly harmonic (press 3)

- No stable signal for longer than two seconds, or
- Harmonics in only part of the sample (for longer than 1 second)

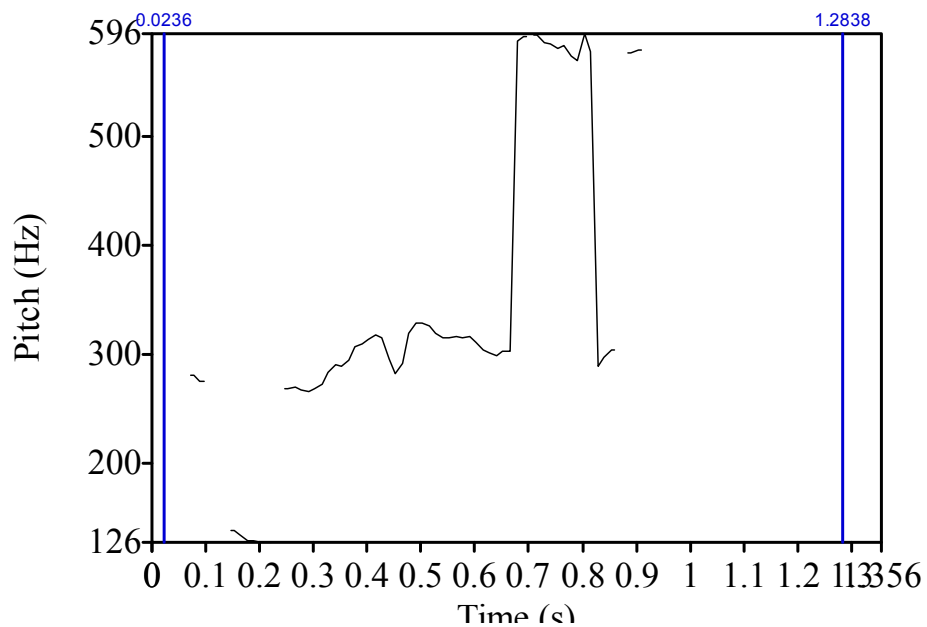
Type IV - Barely harmonic (press 4)

- No or only short-term detectable harmonics (for shorter than 1 second)

Sound

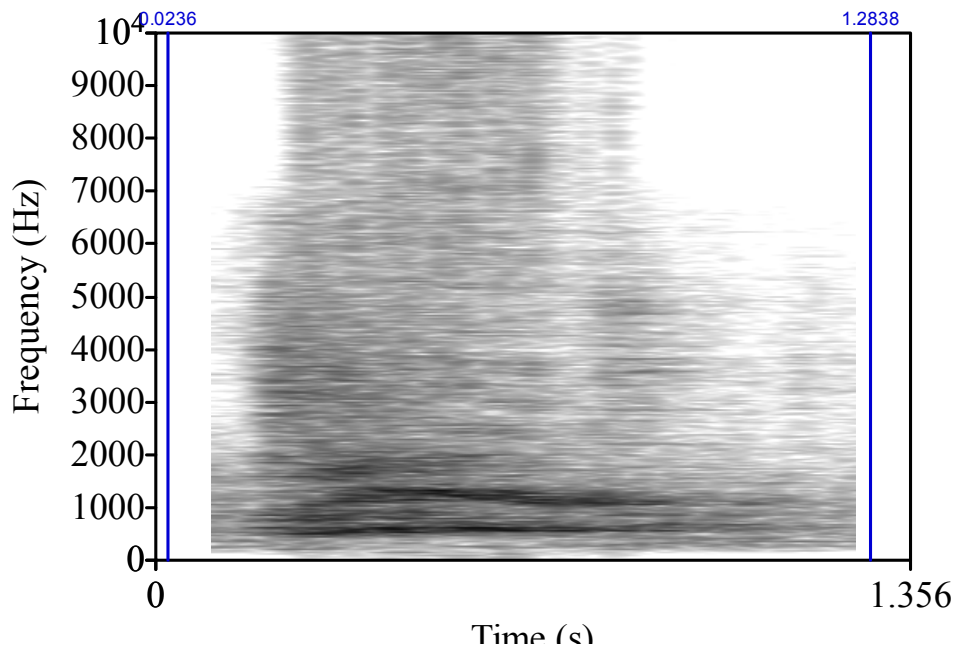


Pitch



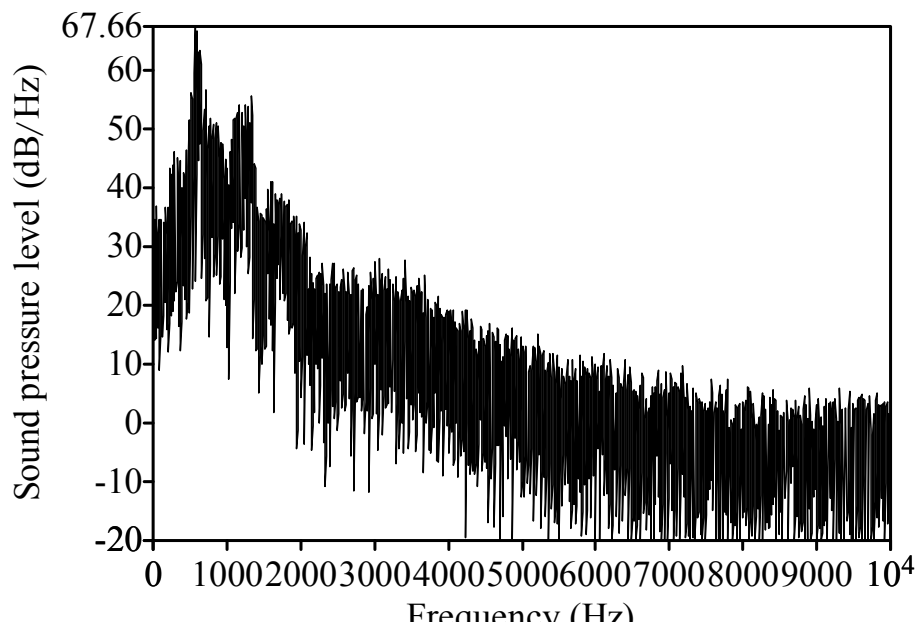
Pitch - MVD: 0.9s , Voiced: 57.4% , Jitter: 4.2% , Shimmer: 35.4% , Mean: 345 Hz, SD: 140.1 Hz,
Median: 305 Hz

Spectrogram



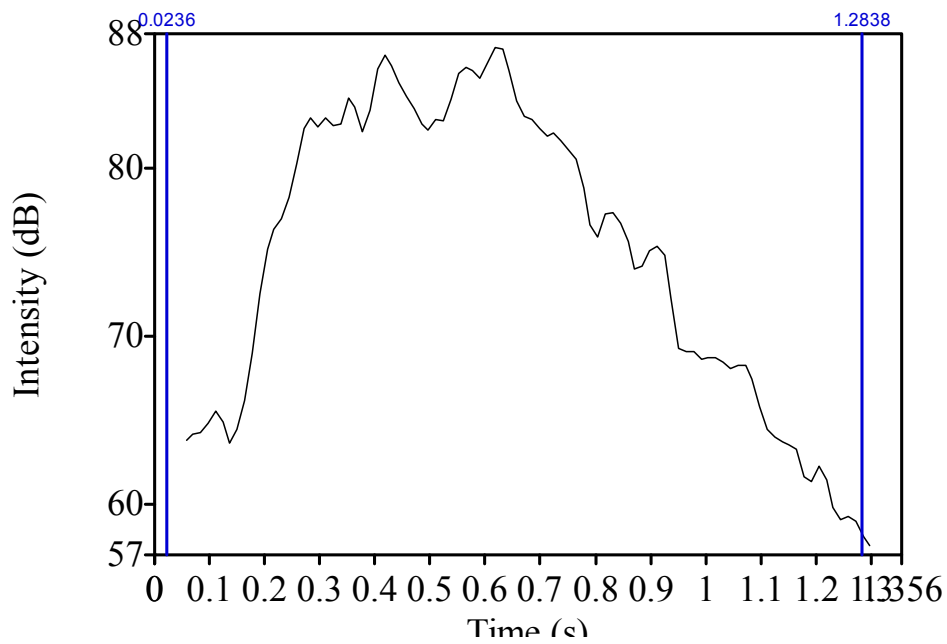
Formants - QF₁: 5 , QF₂: 5 , QF₃: 3 , QF₄: 6 [Median(F_i)/Median(B_i)]

Ltas



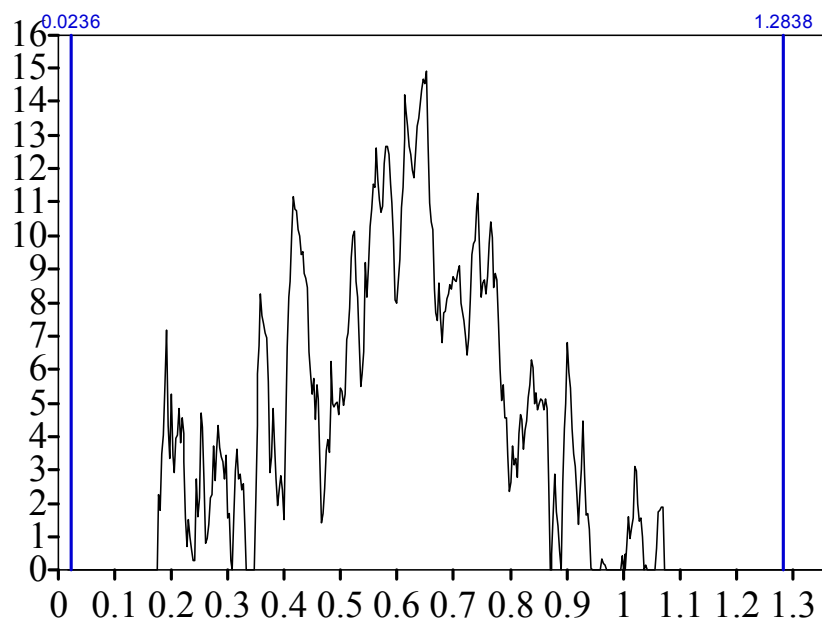
Ltas - Max.: 592 Hz, Min.: 6215 Hz, BED: 25.4 dB, CoG: 727 Hz [0.024; 1.284] S

Intensity



Intensity - Max.: 87.3 dB, Min.: 59.0 dB, Mean: 80.7 dB, SD: 8.77 dB

Harmonicity



Harmonicity - Max.: 15.1 dB, Min.: -0.3 dB, Mean: 3.7 dB, SD: 4.08 dB, GNE: 0.732

Fri Jun 29 07:26:08 2012

Speaker info: REC 21\06\2012 MONTEBELLO

Recording: [analysis voice \MAMMA\MAMMA\](#)

Time interval: 0.007 - 0.939 S (0.933 S)

Pitch

MVD: 0.8s
Voiced: 70.7%
Jitter: 2.7%
Shimmer: 38.4%
Mean: 259 Hz
SD: 56.0 Hz
Median: 267 Hz

Formants

QF₁: 5
QF₂: 3
QF₃: 1
QF₄: 4 [Median(F_i)/Median(B_i)]

Ltas

Max.: 626 Hz
Min.: 8366 Hz
BED: 31.4 dB
CoG: 653 Hz [0.007; 0.939] S

Intensity

Max.: 87.9 dB
Min.: 72.7 dB
Mean: 83.5 dB
SD: 4.03 dB

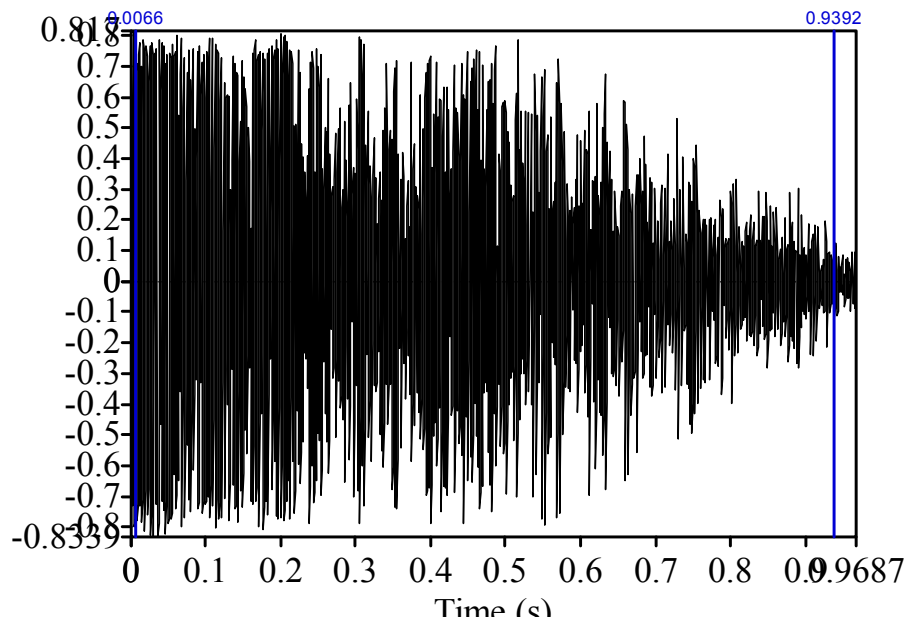
Harmonicity

Max.: 9.3 dB
Min.: -0.3 dB
Mean: 2.5 dB
SD: 2.10 dB
GNE: 0.777

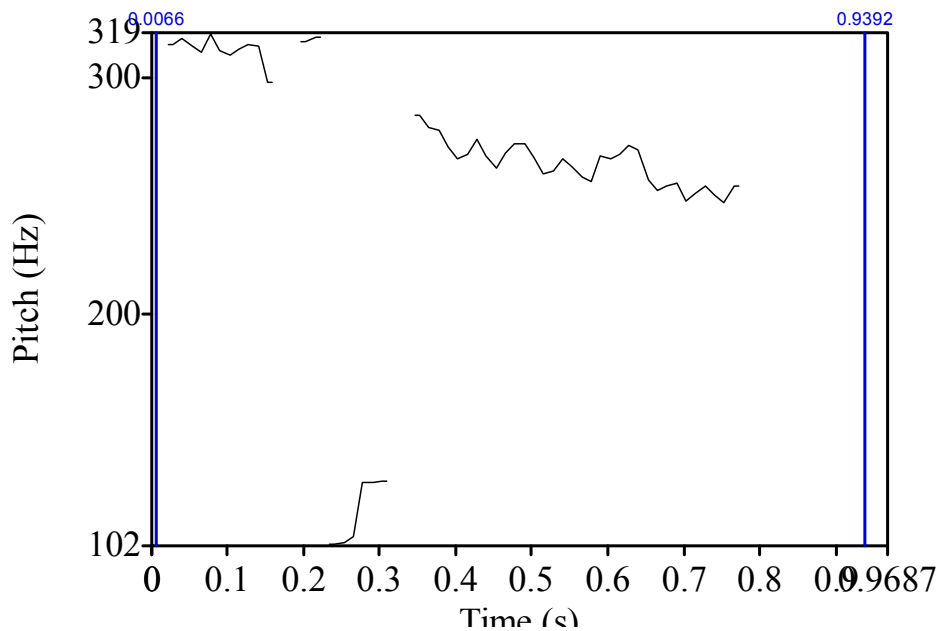
- Pathological Type: 3

Created with VOICE ANALYSIS TOOL 3.0: 8359B63BE2 2012-02-22T15:46:45Z

Sound

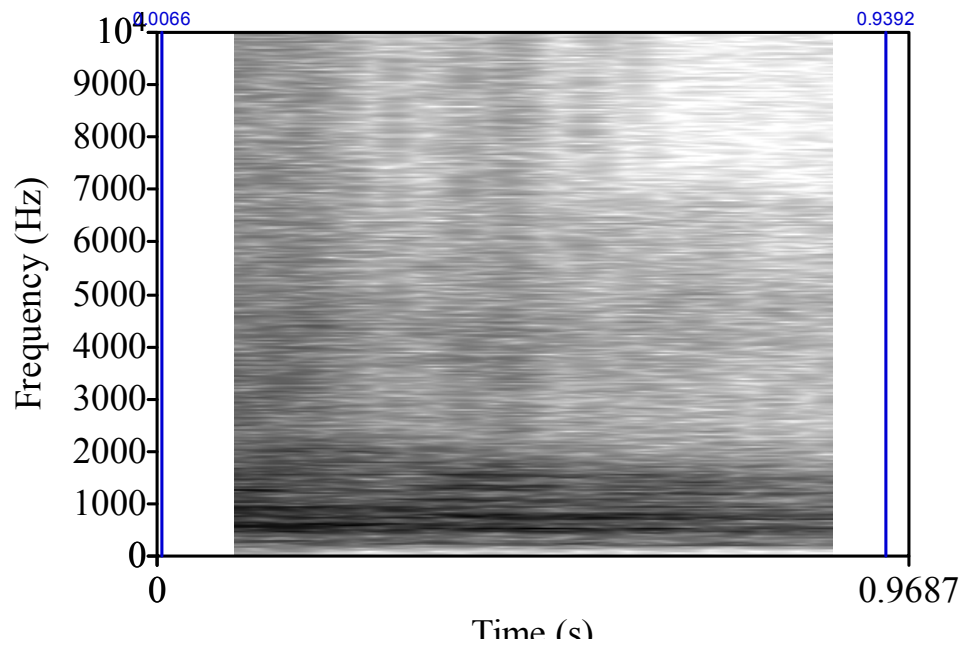


Pitch



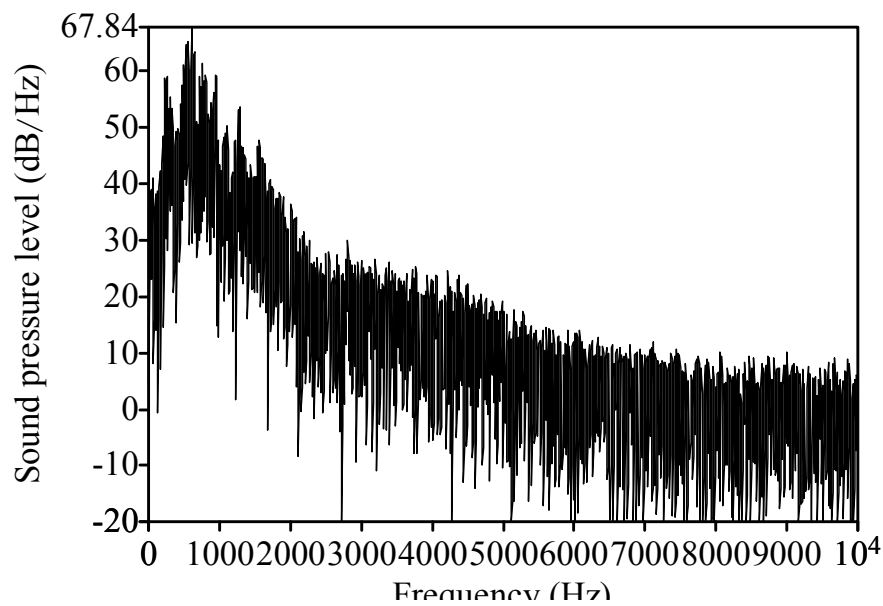
Pitch - MVD: 0.8s , Voiced: 70.7% , Jitter: 2.7% , Shimmer: 38.4% , Mean: 259 Hz, SD: 56.0 Hz, Median: 267 Hz

Spectrogram



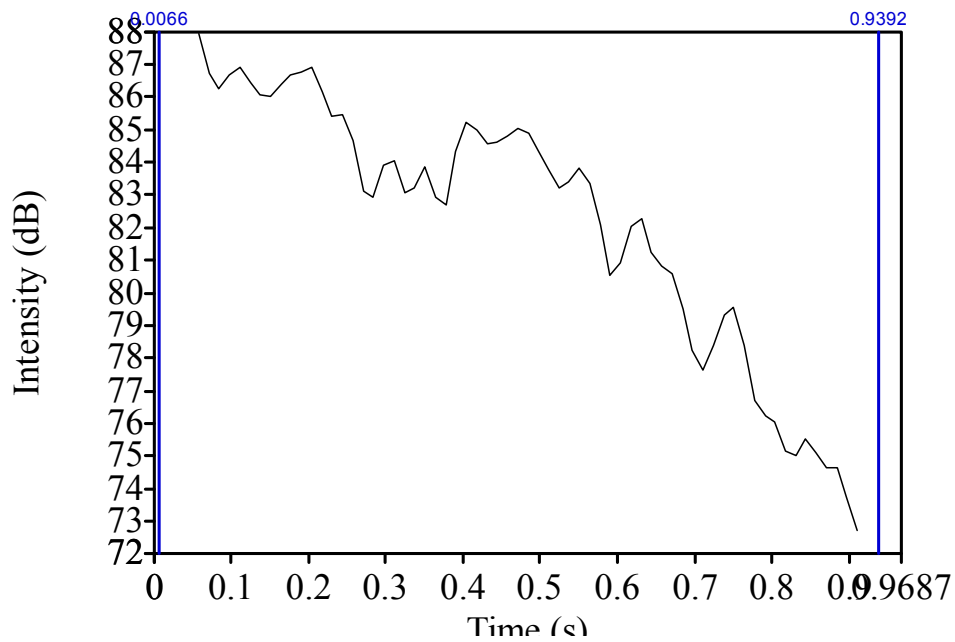
Formants - QF₁: 5 , QF₂: 3 , QF₃: 1 , QF₄: 4 [Median(F_i)/Median(B_i)]

Ltas



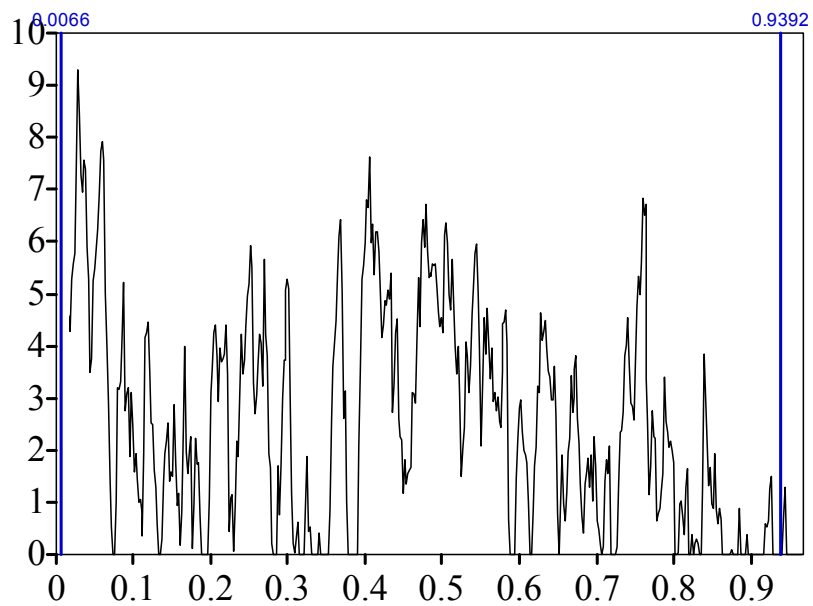
Ltas - Max.: 626 Hz, Min.: 8366 Hz, BED: 31.4 dB, CoG: 653 Hz [0.007; 0.939] S

Intensity



Intensity - Max.: 87.9 dB, Min.: 72.7 dB, Mean: 83.5 dB, SD: 4.03 dB

Harmonicity



Harmonicity - Max.: 9.3 dB, Min.: -0.3 dB, Mean: 2.5 dB, SD: 2.10 dB, GNE: 0.777

CONCLUSIONI

QUESTI SONO GLI UNICI DUE REPERTI (\CIAO\ E \MAMMA\MAMMA\) CHE PER RAPPORTO IDONEO SNR SUPERIORE A 8 dB SI PRESTANO AD UNA ANALISI ELETTROCASTUCA.

DAI DATI CHE EMERGONO SI EVINCE UNA ANDAMENTO F_n , E VALORI DI F_0 , IN LINEA CON I VALORI MISURATI NELLE REGISTRAZIONI DEL 1995 – 2000 – 2003 – 2012 (ANCHE DA IPERLAB AD APRILE), CON LA VOCE DI BIMBO\A DI ETA' COMPRESA TRA 3 E 5 ANNI.

I DATI PARAMETRICO\STATISTICI CONFERMANO CHE I VARI SEGNALE ACUSTICI REGISTRATI NEL CORSO DEL TEMPO, SONO CORRELABILI TRA LORO E COMPATIBILI. L'IPOTESI CHE SI TRATTI DELLA MEDESIMA VOCE E' MOLTO PLAUSIBILE. LE CARATTERISTICHE PROSODICHE E LE DISTORSIONI DELLA FONAZIONE EVIDENZIANO POTENZIALI PATOLOGIE RILEVATE NELLO STESSO MODO NEL 2000 E NEL 2012. I DATI CHE SEGUONO MOSTRANO LA SOMIGLIANZA CON LE VOCI DEL PASSATO REGISTRATE DAL SOTTOSCRITTO A MONTEBELLO CON QUELLE DI M. ROSSINI DI XBI..

TEST COMPARATIVO TRA LA VOCE DEL 2000 E QUELLA DEL 2012

Euclidean distance

At comparison we use average of variances of parameters of File-Test

(1) without using of F-ratio

(2) rejecting parameters with low F-ratio

(3) with using of F-ratio

	(1)	(2)	(3)
RMS difference of spectrum	1.097	1.160	1.262
RMS difference of cepstrum	0.435	0.691	0.497
RMS difference of cep.coef	1.453	1.517	1.781
RMS difference F0-3,AF,Na	0.360	0.244	0.319
RMS difference of LPC	1.445	1.445	1.455
Total Euclidean distance	0.987	1.130	1.123

Mahalanobis distance

group of other parameters	8.825
cepstral coefficients	62.089
LPC	54.079

Parametric statistical test - Comparing of variances

Romanovsky test R, P=0.889

F0	R= 0.85	R < 3	difference is small, H0 - OK
F1	R= 0.91	R < 3	difference is small, H0 - OK
F2	R= 2.85	R < 3	difference is small, H0 - OK
F3	R= 7.25	R >= 3	difference is big, H0 - false !!!
AF	R= 2.15	R < 3	difference is small, H0 – OK

Non-parametric statistical test - Wilcoxon test

if P=0.99 and n >25 Zlim= 2.58

F0	T=1156162	Tlow=1119029	Thigh=1193296	H0 - OK
F1	T=1139022	Tlow=1102302	Thigh=1175743	H0 - OK
F2	T=1092548	Tlow=1056957	Thigh=1128138	H0 - OK
F3	T=865365	Tlow=835484	Thigh=895246	H0 - OK
AF	T=1084202	Tlow=1048815	Thigh=1119588	H0 - OK
F1/F0	T=1134758	Tlow=1098141	Thigh=1171374	H0 - OK
F2/F1	T=1071742	Tlow=1036662	Thigh=1106823	H0 - OK
Slope	T=1156162	Tlow=1119029	Thigh=1193296	H0 - OK
RMS	T=1156162	Tlow=1119029	Thigh=1193296	H0 - OK
dF0	T=970718	Tlow=938147	Thigh=1003288	H0 - OK

Table of statistical tests

	Means	Variances	Wilcoxon
F0		OK	OK
F1	OK	OK	OK
F2		OK	OK
F3			OK
AF		OK	OK
F1/F0	OK		OK
F2/F1			OK
Slope			OK
RMS	OK	--	OK
dF0			OK

OK - comparison shows the proximity of parameters

-- - comparison wasn't made

P – Value¹ = 0.05934 !!

Bologna, li 15/07/2012. Analisi C.T.U. Daniele Gullà di IPERLAB²

C.T.U. DANIELE GULLÀ - CONSULENTE TECNICO
PHONETIC VOICE ANALYSIS LABORATORY



¹ $P > 0.10$ Non evidente, ipotesi nulla.

$0.05 < P < 0.10$ Evidenza debole, favorisce ipotesi alternative.

$0.01 < P < 0.05$ Evidenza significativa.

$0.001 < P < 0.01$ Evidenza molto significativa.

$P < 0.001$ Evidenza estrema.

² IPERLAB è un gruppo di ricercatori indipendenti che mettono a disposizione gratuita i loro studi effettuati in team. Il gruppo è formato dal P.F. Daniele Gullà, dall'Ing. Luciano Pederzoli, dai ricercatori Florentina e Diana Richeldi.