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INTRODUCTION

The accuracy in singing voice is analyzed on the basis of the fundamental frequency (f0) and can access the quality of vocal production¹.
The general population can sing in tune when the tempo is slow².
The accuracy of singing voice increases with musical training³.

AIMS

- Effect of vocal expertise and « lyrical » vocal technique on pitch, tempo and accuracy.
- Validity of analysis tools for accuracy.

METHOD

Participants:

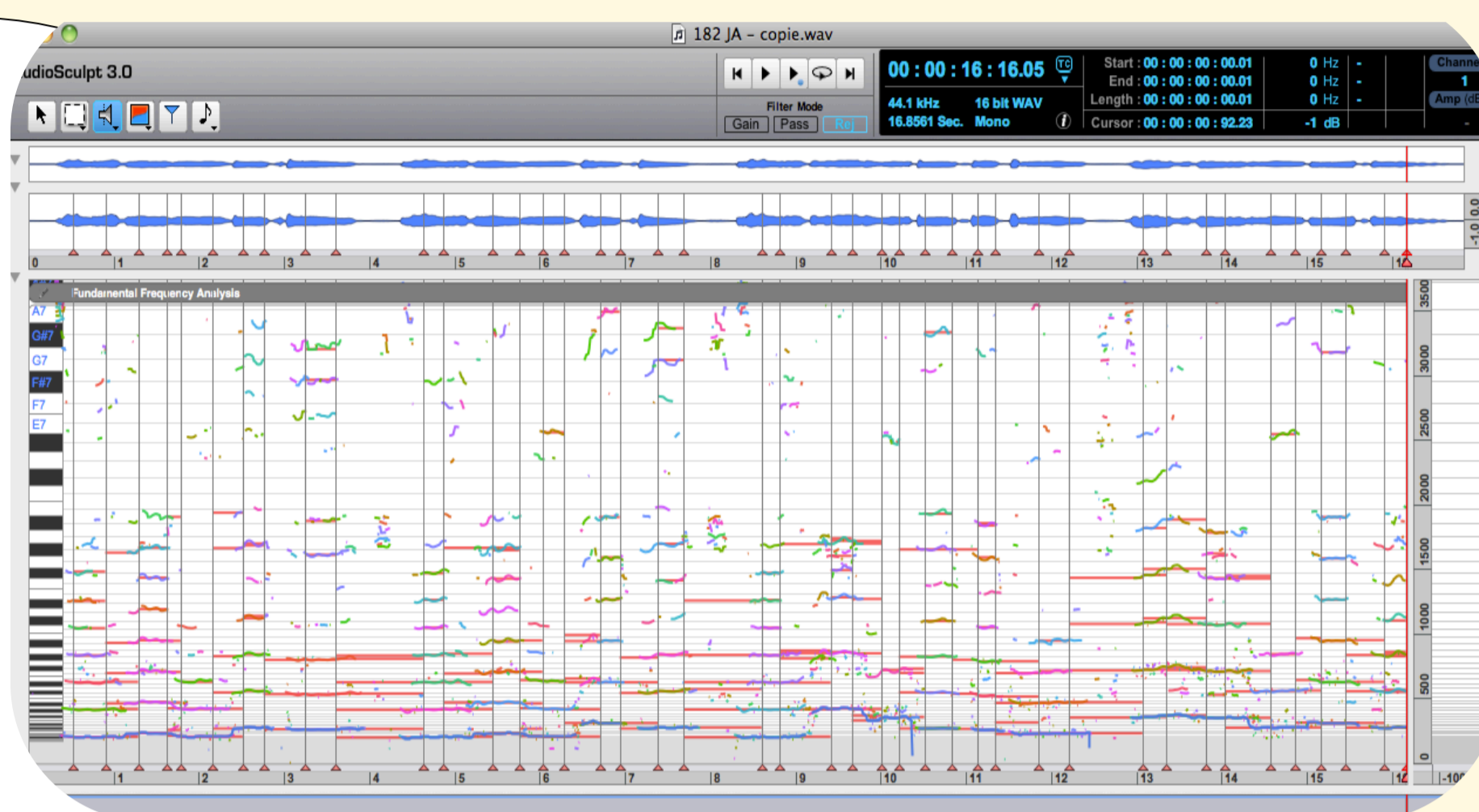
- 14 Professional Singers (19-54 years old) m=24,21 ; SD=8,79
- 63 Occasional Singers (OS) without musical training (15-75 years old) m=29,83 ; SD=14,99

Tasks :

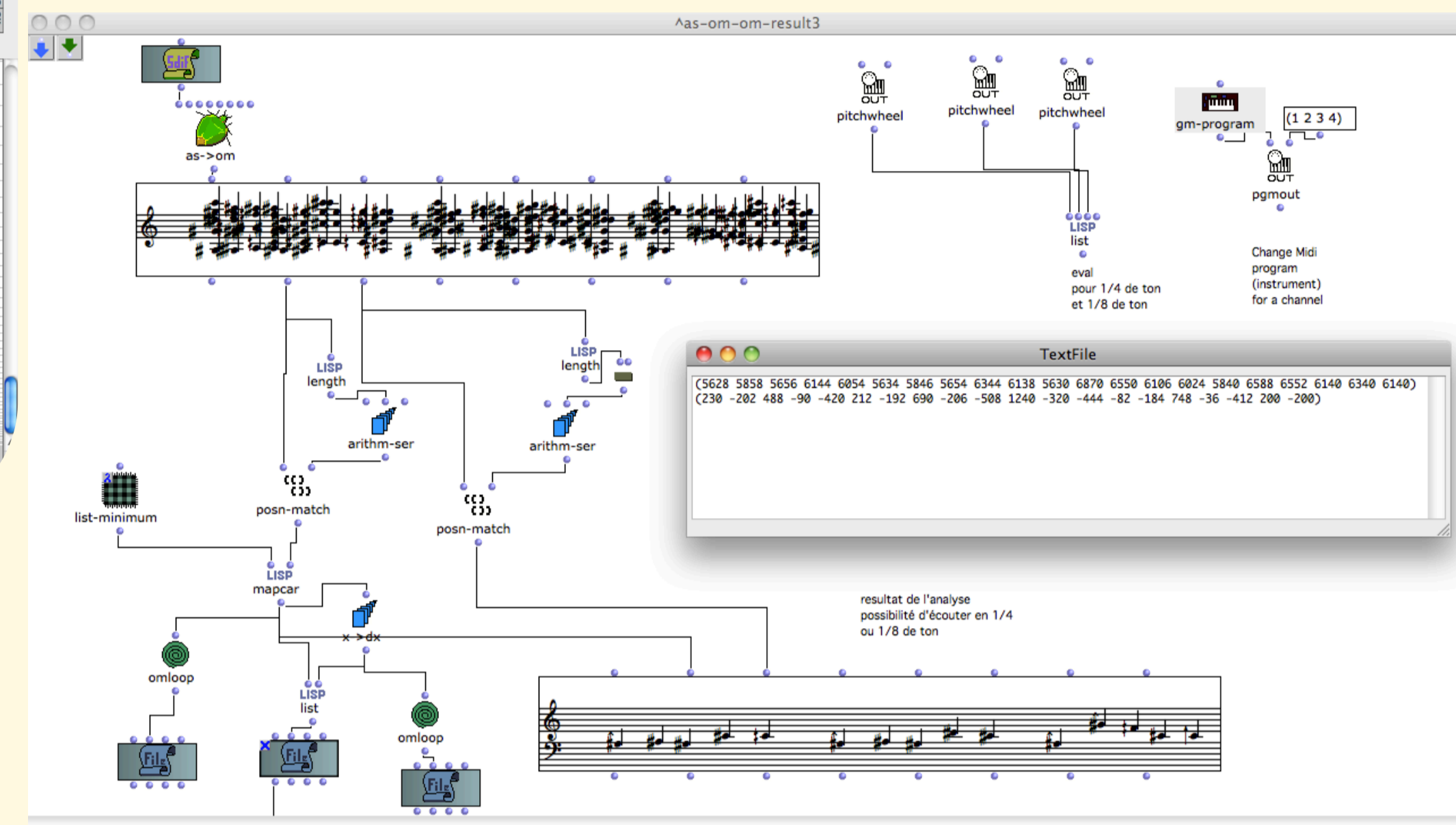
- 2 Glissandi
- Sing « Joyeux Anniversaire »

For professional singers :

- Sing a self-chosen melody then JA in stage-like conditions
- Therefore one Technique-less (TL) condition and one With-technique (WT)



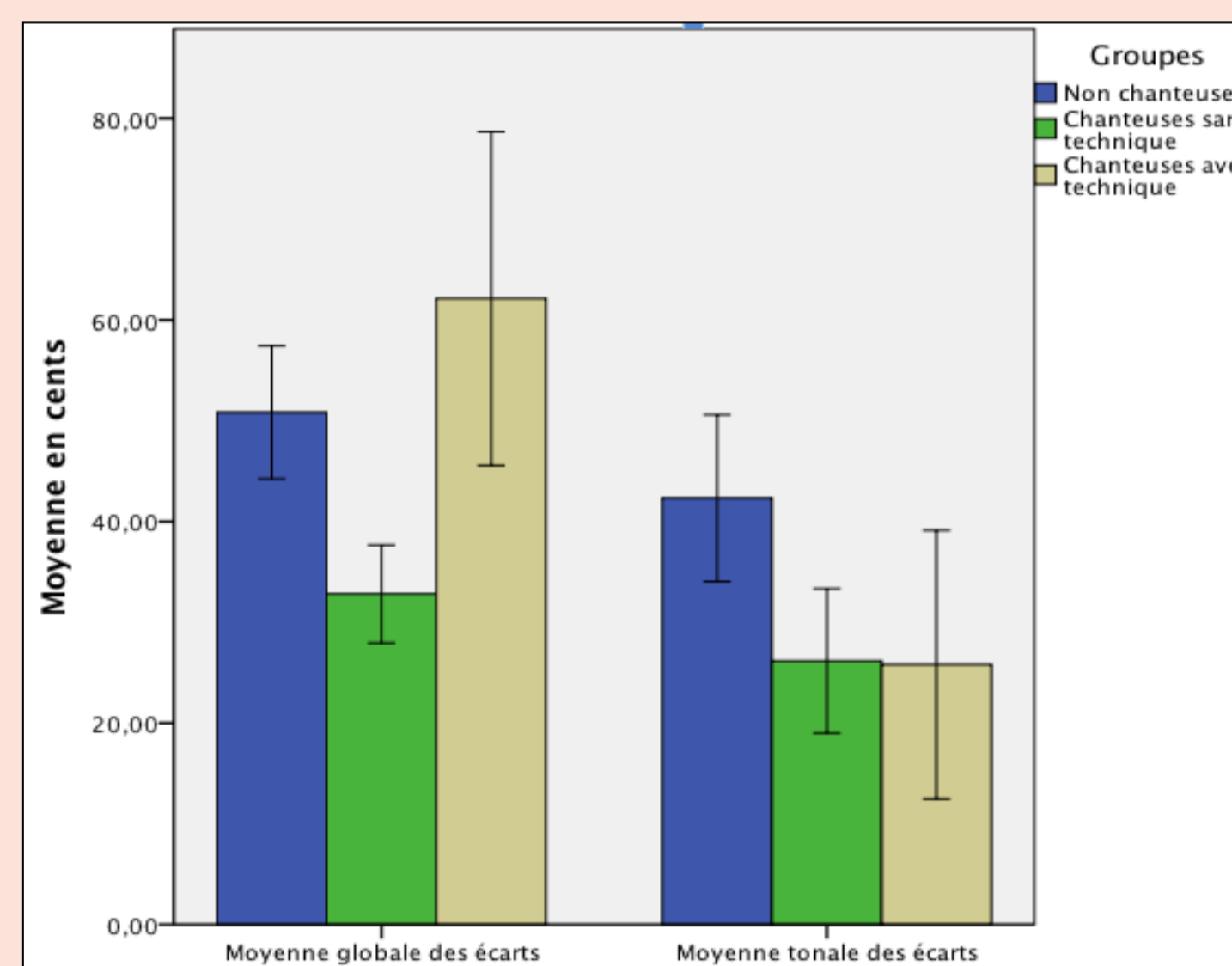
ACOUSTICAL ANALYSIS



1. Segmentation of each syllable
2. f0 extraction of stable segments for each note
3. Average f0 and intervals between each note :
 - Interval accuracy
 - Tonal center

RESULTS

	Non Singers	Singers		Differences between groups
		TL	WT	
Tempo	98,37	112,99	80,13	F(2, 88)= 16.61 p < .001
Pitch	5446,51	5966,29	6406,29	F(2, 88)=165,63 p < .001
Tonal center	42,33	26,17	25,81	F(2, 88)=3,001 p=.055 (tendance)
Interval accuracy	50,82	32,81	62,13	F(2, 88)=5,072 p=.008



Tonal center

- OS < TL t=3,046 p=.004
- OS < WT t=2,224 p=.035
- TL = WT

Interval accuracy

- OS < TL t=4,514 p<.001
- WT < TL t=4,27 p=.001
- OS = WT

Correlations « tempo-interval accuracy » (rho de Spearman)

- OS : r=.321, p=.01 The slower the more accurate
- TL : r=.130, p=.659 No significant correlation
- WT : r= -.662, p=.01 The faster the more accurate

Occasional singers :

- Less accurate than singers TL
- More accurate when the tempo is slow

Professional singers :

	Vocal expertise	« Lyrical » vocal technique
Control tempo	+	++
Pitch	+	++
Tonal center	+	+
Interval accuracy	+	-

DISCUSSION

Effect of vocal expertise :

- Efficient vocal technique
- Training which increases the accuracy

Effect of « lyrical » vocal technique :

- Utterly out of tune (vibrato, large harmonic content, excessive musical interpretation)
- Relativize the role of f0 to analyze these voices

→ Impact of vocal training on singing accuracy
Validity of analysis tools for accuracy but not when « lyrical technique » is involved

References :

1. Watts, C. (2003). Potential factors related to untrained singing talent: A survey of singing pedagogues. *Journal of Voice*, 17(3), 298-307.
2. Dalla Bella, S., Giguère, F., & Peretz, I. (2007). Singing proficiency in the general population. *The journal of the Acoustical Society of America*, 121(2), 1182-1189.
3. Amir, O., Amir, N., & Kishon-Rabin, L. (2003). The effect of superior auditory skills on vocal accuracy. *The Journal of the Acoustical Society of America*, 113(2), 1102-1108.