

Reducing linguistic information enhances pitch proficiency in occasional singers

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INTRODUCTION

Most believe that individuals without musical training are unable to carry a tune. In contrast, it has been recently shown that occasional singers can sing proficiently in tune and in time, provided that they perform at a slow tempo (Dalla Bella, Giguère, & Peretz, 2007). Still, some individuals are poor singers (e.g., Dalla Bella et al., 2007; Pfordresher & Brown, 2007; Wise and Sloboda, in press).

GOAL

Examine non-musicians' singing proficiency when they are singing on a syllable (i.e., thus limiting the potential linguistic bias due to lyrics) as compared to singing with lyrics.

METHOD

PARTICIPANTS

40 occasional singers (10 males and 30 females), mostly university students, aged between 19 and 39 years (Mean = 25.8 years), without formal musical training

TASKS

Familiar Melody Production Task (spontaneous tempo)

Participants sang 3 familiar melodies on the syllable /la/ (i.e., "Brother John", "Jingle bells", "Sto lat") and the same melodies with lyrics

Familiar Melody Repetition Task (controlled tempo)

Participants produced the same melodies on /la/ and with lyrics as in the previous task, but at a given slow tempo (quarter note = 100 beats/min) as indicated by a metronome

MEASURES OF SINGING PROFICIENCY

Pitch dimension

Acoustical analyses of the performances allowed to extract measures of pitch and time proficiency

Pitch dimension

N. of pitch interval errors

An error was scored when the produced interval was larger or smaller than at least 1 semitone as compared to the interval prescribed by the score

Pitch interval deviation

mean absolute interval deviation of the performance from the score

Time dimension

Number of time errors

an error was scored when the produced note was at least 50% longer or shorter than the duration predicted from the preceding note, as prescribed by the score

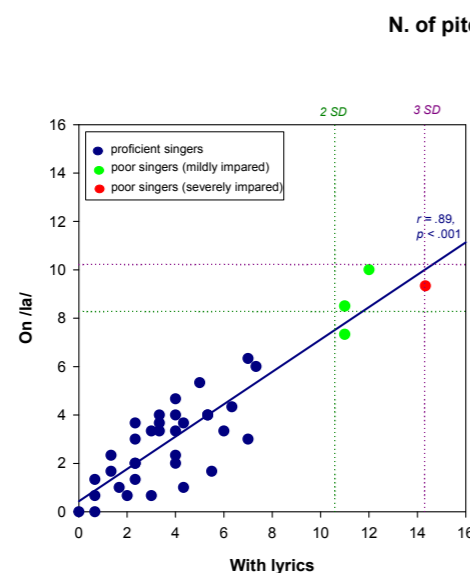
Temporal variability

coefficient of variation (CV) of the quarter-note IOIs, calculated by dividing the Standard Deviation of the IOIs by the mean IOI

QUESTION 1

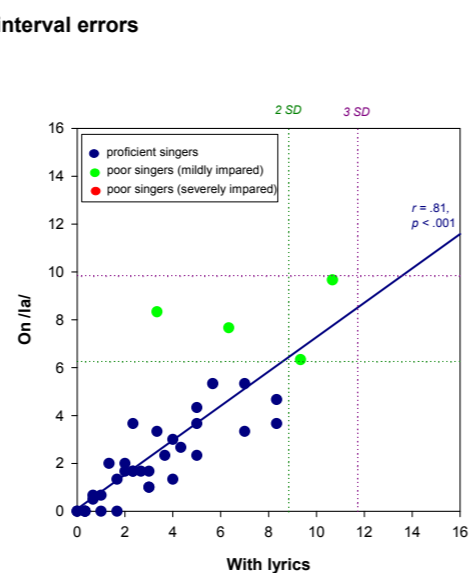
Were occasional singers more proficient on the pitch dimension when singing with lyrics than when singing on /la/?

Familiar Melody Production Task (spontaneous tempo)



Mean pitch interval errors:
- with lyrics: 4.4 (SD = 3.3) (t(37) = 4.07, p < .001)
- on /la/: 3.4 (SD = 2.5)

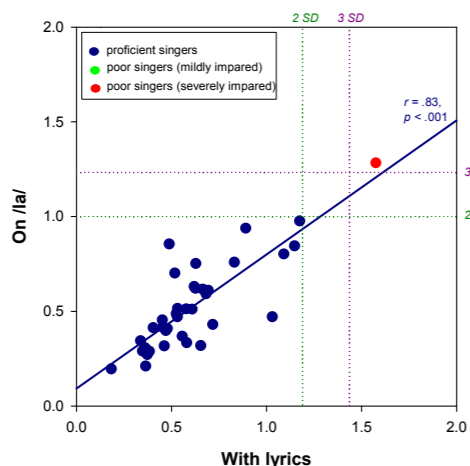
Familiar Melody Repetition Task (controlled tempo)



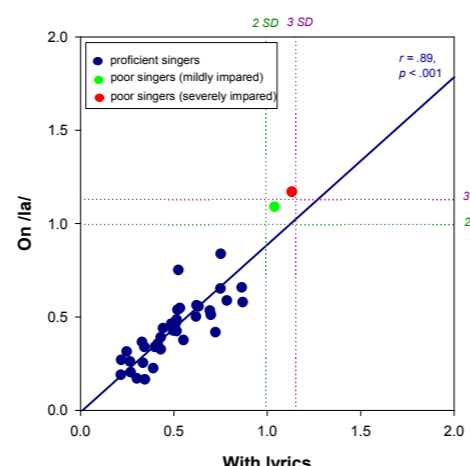
Mean pitch interval errors:
- with lyrics: 3.5 (SD = 2.8) (t(37) = 3.32, p < .01)
- on /la/: 2.6 (SD = 2.5)

Participants made fewer pitch interval errors when singing at the controlled tempo than at the faster spontaneous tempo (F(1,37)=17.17, p<.001)

Pitch interval deviation (semitones)



Mean pitch interval deviation:
- with lyrics: 0.6 semit. (SD = 0.3) (t(37) = 3.43, p < .01)
- on /la/: 0.5 semit. (SD = 0.2)



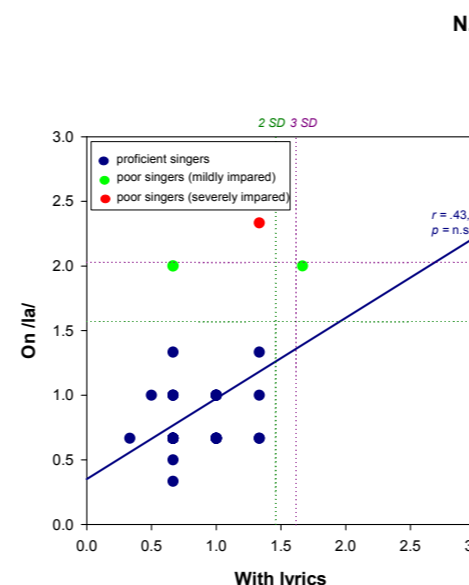
Mean pitch interval deviation:
- with lyrics: 0.53 semit. (SD = 0.2) (t(37) = 3.71, p < .01)
- on /la/: 0.47 semit. (SD = 0.2)

Pitch interval deviation was smaller when participants sung at the controlled tempo than when they sung at the faster spontaneous tempo (F(1,37)=16.26, p<.001)

QUESTION 2

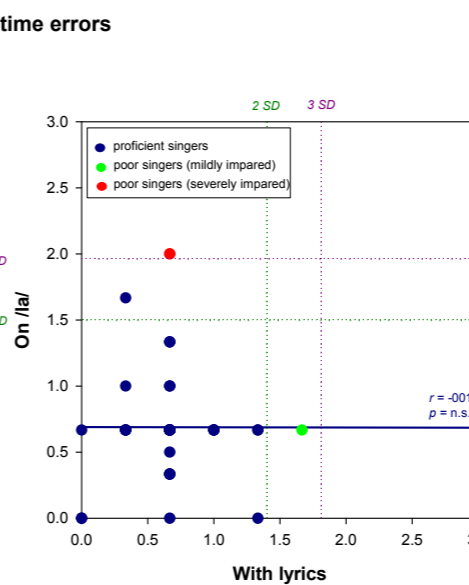
Were occasional singers more proficient on the time dimension when singing with lyrics than when singing on /la/?

Familiar Melody Production Task (spontaneous tempo)



Mean temporal variability:
- with lyrics: 0.9 (SD = 0.3) (t(37) = 1.00, p < n.s.)
- on /la/: 0.9 (SD = 0.4)

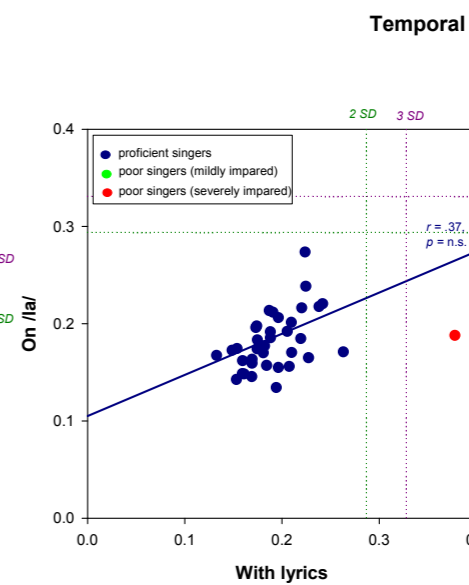
Familiar Melody Repetition Task (controlled tempo)



Mean temporal variability:
- with lyrics: 0.7 (SD = 0.4) (t(37) = -0.15, p < n.s.)
- on /la/: 0.7 (SD = 0.4)

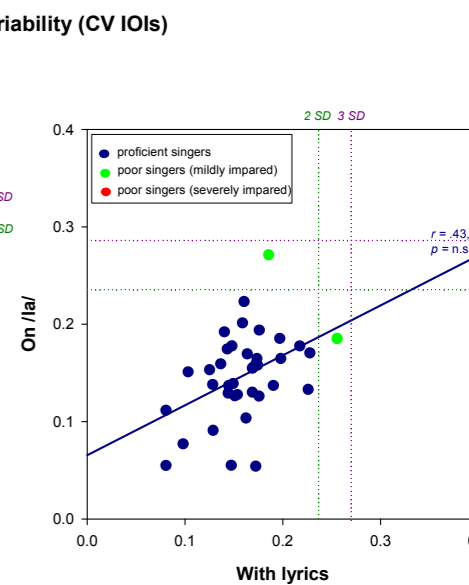
Participants made fewer time errors when singing at the controlled tempo than at the faster spontaneous tempo (F(1,37)=15.85, p<.01)

Familiar Melody Production Task (spontaneous tempo)



Mean temporal variability:
- with lyrics: 0.20 (SD = 0.04) (t(37) = -1.42, p < n.s.)
- on /la/: 0.19 (SD = 0.05)

Familiar Melody Repetition Task (controlled tempo)



Mean temporal variability:
- with lyrics: 0.16 (SD = 0.04) (t(37) = 1.75, p < n.s.)
- on /la/: 0.15 (SD = 0.05)

Participants' renditions were less temporally variable when singing at the controlled tempo than at the faster spontaneous tempo (F(1,37)=48.09, p<.001)

QUESTION 3

Are poor singers more proficient when singing with lyrics than when singing on /la/?

PARTICIPANT	PITCH				TIME			
	LYRICS		LA		LYRICS		LA	
	PITCH ERRORS	PITCH INT. DEV.	PITCH ERRORS	PITCH INT. DEV.	TIME ERRORS	TEMP. VAR.	TIME ERRORS	TEMP. VAR.
o12								
o23								
o27								
o31								
o32								
o33								
o42								
o43								
o62								

MILDLY IMPAIRED
 SEVERELY IMPAIRED

CONCLUSIONS

Occasional singers exhibited increased proficiency when they performed melodies on the syllable /la/ as compared to singing with lyrics.

Performing the melodies at a controlled tempo enhanced both pitch and time proficiency.

Some participants were qualified as "poor singers". Their deficit mostly (although not exclusively) concerned pitch production. Four participants (10% of the tested population) were extremely poor singers.

This suggests that tone deafness might be more remarkable in performance than in perception.

References

Dalla Bella, S., Giguère, J-F., & Peretz, I. (2007). Singing proficiency in the general population. *Journal of the Acoustical Society of America*, 121, 1182-1189.

Pfordresher, P. & Brown, S. (2007). Poor-Pitch in the absence of "Tone Deafness". *Music Perception*, 25(2), 95-115.

Wise, K.J., & Sloboda, J.A. (in press). Establishing an empirical profile of self-defined "tone deafness": Perception, singing performance and self-assessment. *Musicae Scientiae*.