

Singing in tune is a matter of time

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BACKGROUND IN EVOLUTIONARY AND DEVELOPMENTAL PSYCHOLOGY

Most believe that the majority of individuals are unable to carry a tune. However, singing is quite natural for humans. Singing, a universal form of vocal expression, is a group activity which is typically associated with a highly pleasurable experience and which is thought to promote group cohesion (Wallin et al., 2000). In addition, singing emerges precociously during development (e.g. at 18 months, children start to generate recognizable songs) and is remarkably consistent in adults when considering both starting pitch and tempo (Bergeson & Trehub, 2002; Levitin & Cook, 1996). Therefore, singing, because of its universality, precociousness, consistency, and social function, represents one of the richest sources of information regarding the biological underpinnings of musical behavior.

BACKGROUND IN MUSIC PERFORMANCE

Surprisingly, evidence is scant regarding singing proficiency in the general population. Little is known beyond adult nonmusicians' accurate memory for initial pitch and tempo of popular songs but poor vocal pitch matching abilities (e.g. Amir et al., 2003). Indeed, the analysis of sung performance poses several difficulties as compared to the measurement of other kinds of music performance (e.g. piano performance). In the past, singing accuracy was mostly assessed by expert musicians (e.g. Alcock, 2000). However, expert judgments are constrained by the music notation system and subject to perceptual biases leading to quite subjective ratings. Objective methods based on pitch extraction were successfully applied to the analysis of single pitch performance (e.g. Amir et al., 2003). Nonetheless, there is no consensus on how to apply similar methods to obtain objective measures from sung melodies.

AIMS

The main goal of the present study was to examine pitch and time accuracy of sung performance in the general population as compared to professional singing using an objective acoustically-based method.

MAIN CONTRIBUTION

Method: We asked occasional singers ($n = 62$) to sing a well-known song in both the laboratory and in a natural setting (Experiment 1). The performance of four professional vocalists singing the same song was also recorded. The performance of occasional singers was judged by peers for proficiency. In addition, objective measures of pitch and time accuracy (e.g. the number of pitch interval errors and the number of time errors) were computed based on the acoustical signal and compared to professional singing.

Results: Singing proficiency was normally distributed with a majority of occasional singers being able to sing on time, with few pitch deviations, as compared to professional singing. Average pitch deviation was typically smaller than a semitone. A significant proportion of occasional singers sang at a faster tempo and with more pitch errors than professionals. To assess the role of tempo on pitch accuracy, fifteen non-musicians from Experiment 1 sang the same song at a slow tempo (Experiment 2). At the slower tempo, most non-musicians sang as accurately as professional singers.

Conclusions: in sum, singing appears to be a widespread ability. However, two individuals were qualified as poor singers because they sang out-of-tune. This poor performance did not result from impaired pitch perception, thus indicating that tone-deafness may exist in a purely vocal form.

IMPLICATIONS

The acoustically-based method adopted in the present study, by affording an objective and detailed assessment of singing abilities, has proven particularly useful to characterize singing proficiency. This method is likely to foster further interdisciplinary research on singing proficiency and poor singing, involving music educators, psychoacousticians, and researchers interested in music performance. In addition, this method has the potential to be adopted by music educators in order to obtain objective measures of poor singing.

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