The facilitating effect of music on motor coordination in patients with Parkinson’s Disease suggests that music might have a similar effect on vocal behavior. In this study, an attempt was made to quantify the extent to which prosodic impairment was paralleled by melodic and rhythmic impairments while singing.

**SUBJECTS**

15 Parkinson patients and 15 healthy controls matched for age and gender. Patients recruited via Parkinson website:
- mean age: 65 years
- mean duration: 8 years
- mean Hoehn & Yahr: 2
- assymetry: 8 left, 7 right
- gender: 9 female, 6 male
- none professional musician

**METHOD**

Recordings (WAV) were made in the home, using a Roland OS handrecorder. Patients did not abstain from medication. Subjects chose lyrics (2) and melodies (3) themselves. Continuations (4) were prompted by a set of nine phrases, composed and sung by the researcher. The monologues (1) and the rhythmic recitation (2) were analyzed in Praat. Syllable onset was inserted manually in the textgrid. Singing was digitalized (0.01 s window) for analysis. Melody tones were computed on the basis of the median pitch between onsets.

**PAIRWISE CONTRASTS**

Significant pairwise differences between patient and control groups were found only in task 2 (smaller pitch variability in rhythmic speech) and in task 4 (slightly larger pitch variability while singing).

**GENDER CONTRASTS**

Significant patient-control differences of means were found within one sex only for: task 1 & 2: pitch variability (male controls > male patients); task 4, pitch variability (female controls > female patients).

**GENDER x GROUP**

Significant patient-control differences of means were found within one sex only for: task 1 & 2: pitch variability (male controls > male patients); task 4, pitch variability (female controls > female patients).

**BASELINE**

Recordings of the normal speaking voice were edited into short (20 - 30 s) soundbytes and presented to resident neurologists (n=5) from the UMCG in randomized order to determine whether the speech of Parkinson patients could be distinguished aurally from the speech of healthy subjects.

**ANALYSIS**

Pairwise and groupwise differences in pitch, pitch variability, pitch range, tempo, and rhythmic variability were investigated, contrasting: pitch, scale mean, density peak; mean interval, normalized pairwise variability index of pitch, mean absolute slope: pitch range; interonset interval; and normalized pairwise variability index of interonset interval.

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Pairwise and groupwise differences in pitch, pitch variability, pitch range, tempo, and rhythmic variability were investigated, contrasting: pitch, scale mean, density peak; mean interval, normalized pairwise variability index of pitch, mean absolute slope: pitch range; interonset interval; and normalized pairwise variability index of interonset interval.

**CORRELATIONS**

A significant, positive correlation (rs: 0.53) was found between Hoehn & Yahr score and pitch nPVI in task 3 and between patients and controls for mean pitch in task 3 (rs: 0.74) and task 4 (rs: 0.80), but not for task 1 and 2. No correlations were found with age.

**TASKS**

1. Baseline measurement of speech impairment: monologue on a theme of subject’s own choice
2. Recite the lyrics of a familiar song in the rhythm of the song
3. Sing a familiar theme or melody without lyrics (pom-pom-pom; la-la-la, etc.)
4. Improvise (vocally) a continuation to a phrase (pom-pom-pom; la-la-la, etc.)

**ANALYSIS**

Pairwise and groupwise differences in pitch, pitch variability, pitch range, tempo, and rhythmic variability were investigated, contrasting: pitch, scale mean, density peak; mean interval, normalized pairwise variability index of pitch, mean absolute slope: pitch range; interonset interval; and normalized pairwise variability index of interonset interval.

**TASK vs. TASK**

Contrasting task 1:2, task 3:2, and task 4:2, significant patient-control difference of the ratio between tasks was found for rhythmic variability, I10 nPVI (controls > patients).

The results of this study suggest that, in Parkinson’s disease, in contrast with speech, singing may not be significantly impaired. Mean pitch and pitch range are not different from healthy controls. Mean sung interval is no different from healthy controls and pitch variability may even be slightly larger. Tempo is not reduced, nor is rhythmic variability. It seems that music facilitates vocal motor behavior as well as body movement. The results of the rhythmic recitation task suggest, however, that rhythm does not facilitate vocal behavior as well as melodic pitch variation.

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r.i.harris@pl.hanze.nl