Dear Dr. Stojanovik,

Please find attached a revised version of manuscript entitled, "**Hypernasality associated with basal ganglia dysfunction: Evidence from Parkinson's disease and Huntington's disease**."

We wish to thank both reviewers for their valuable recommendations related to the first version of the manuscript. We have rewritten the respective parts of the text to meet the reviewer's requirements. All changes are underlined in the current version of the manuscript.

Thank you for your time and consideration in this matter.

Yours sincerely,

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Specific responses to reviewer's comments:

Reviewer #1:

- *Experimental design: The description of participants is adequate. Data collection, perceptual analysis, and acoustic analysis have been implemented appropriately and are adequately described. The approach to assessment of nasality contributes to the literature on these disorders. Statistical tests are appropriate to the data.*
- *Another strong contribution from Rusz et al.*
- *This article provides an acoustic and perceptual characterisation of nasal resonance in idiopathic Parkinson's disease and Huntington's disease. The article is clearly written, and adds novel analysis of speech disorder in these disorders, particularly Huntington's disease. The article would be of interest to researchers of motor speech disorders.*
- *The relevant literature has been clearly discussed, and the purpose of the study have been clearly explained.*

Thank you for positive comments.

Validity of the Findings

- *I'd like to see data on correlations between disease severity, overall dysarthria severity and nasality scores, both acoustic and perceptual. This would strengthen the applicability of the methods and place them in context of the diseases as whole entities.*

We agree. We introduced new Table 2 showing correlations between disease severity, dysarthria severity, disease duration and both acoustic and perceptual nasality evaluations.

- *Could the authors explore the role of severity in the context of acoustic accuracy. Irrespective of diagnosis, how does the acoustic methods match up with moderate and severe ratings?*

We agree. We provided short discussion regarding revealed correlation between perceptual speech severity in Huntington's disease and acoustic measure of hypernasality. However, we could not pool together perceptual speech evaluation using UPDRS and UHDRS speech items as those metrics refer to slightly different scaling, i.e. UHRDS speech item score of 2 already refers to partially unintelligible speech (must repeat to be understood) whereas UPDRS III speech item score of 2 refers only to moderately impaired speech (slurred but understandable).

Methods:

- *- The Vogel et al. paper was verified in pediatric patients, with structural abnormalities – bot aspects different to the current groups. Perhaps this would affect sensitivity of the acoustic parameters.*

We agree that this formulation was not appropriate. We wanted to highlight that 1/3-octave spectra method has been previously found to be superior to other acoustic measure of hypernasality (based on finding in paper by Vogel et al. 2009) and later successfully applied to patients with Friedreich ataxia resulting in velopharyngeal incompetency. We changed this sentence accordingly.

- *- Further explanation of exactly which variables were examined for correlation would be useful (lines 288-291)*

We agree. All both significant and non-significant correlations performed are currently listed in the manuscript and Table 2. In addition, we provided in the Methods/Statistics more detailed information that "Pearson's correlation was applied to normally distributed data (acoustic speech metrics and disease severity scores),

whereas Spearman's correlation was used for non-normally distributed data (perceptual assessment of nasality and dysarthria severity)."

Results:

- *- Suggest that some mention of hypernasality be added to the caption of Figure 2*

We agree. We changed the caption of Figure 2 to "Percentage occurrence of hypernasality across participants according to the four grades perceptual score (0 = no, 1 = mild, 2 = moderate, 3 = severe) based on GOS.SP.ASS.'98."

Discussion:

- *- What does "our raters tended to score PD speakers more strictly," mean?*

We agree that this sentence was not clear. Therefore, we reworded sentence as: "However, our raters tended to evaluate PD utterances with higher scores in ambiquous cases."

- *- Some additional discussion of whether the measures identified in the study should be further explored is warranted. The reader is left wondering whether there could be any clinical utility of the measures of nasalence for clinical diagnosis, or further characterisation of motor speech disorders in progressive neurological disorders.*

We agree. We included short paragraph regarding discussion of the potential clinical utility and future research directions in the conclusion of the manuscript.

- *- The Duffy textbook was referred to as though it included peer reviewed empirical data. Ideally the authors would find alternative primary sources to support findings.*

We agree. In case of hypernasality in Parkinson's disease, we avoided the reference to Duffy textbook as it was not necessary due to the sufficient number of previous studies based on empirical data. However, in case of hypernasality in Huntington's disease, this topic seems to be highly under-explored and, to the best of our knowledge, there is no primary source to support our findings. We therefore slightly reworded the "Nasality in Huntington's disease" paragraph and provided information that "Although our finding seem to be in accordance with Duffy (2013) that perceptually indicated intermittent hypernasality as a salient feature of patients manifesting chorea, there appear to be no other empirical data to support the results of the present study."

Clarity:

- *- Line 85: suggest adding that Hypernasality is the presence of inappropriate air leakage through the nasal cavity during phonation. In order to distinguish from nasal aim emission.*

We agree. We added suggested formulation into the sentence.

- *- Line 107-109: suggest rewording the sentence "Although the dysarthria … manifestations has been found" , as the meaning is not immediately clear*

We agree. We reworded the sentence to "Although the dysarthria is typically attributed to the disrupted motor control, little correspondence between speech and limb manifestations has been found".

- *- Line 177 & 194 : suggest introducing the fact that SD is given after the mean in the first instance on line 177, rather than line 194*

We agree. We changed the position of SD definition to the suggested line. We also changed the position of the range definition in the brackets after SD definition.

- *- Line 341: Should Fig. 3 in fact be referring to Figure 4*

We corrected the erroneous reference.

- *- Line 438 – Friedreich ataxia is misspelled*

We corrected misspelled word.

Reviewer #2:

- *Basic reporting: Appropriate and sufficient information for readers*
- *Experimental design: Reasonable design and methodology for the study.*
- *Validity of the findings: Data treated in an appropriate way and the findings reasonably stem from this.*

Thank you for positive comments.

- *typological errors e.g. 'hyfernasality'*

We thoroughly checked entire manuscript again and revealed as well as corrected several typological errors.