

Sentence Focus in Individuals with Parkinson's Disease Who Speak Mandarin

Xi Chen, Diana Van Lancker Sidtis
Department of Communicative Sciences and Disorders



Introduction

- Speech in Parkinson's disease (PD)
 - Hypokinetic dysarthria
 - Deficits of respiration, phonation and articulation (Goberman & Coelho, 2002).
- Deficient basal ganglia function
 - Abnormal speech prosody
 - Poor intelligibility of speech (Kempler & Van Lancker, 2002; Miller et al., 2007).
- Sentence focus
 - Communicates speakers' intended topic in a sentence
 - Many languages use pitch and duration cues
- In a tone language:
 - Pitch patterns of sentence focus are more complicated
 - Both tone and focus make use of pitch (Xu, 1999)
- Differential effects of speech task (mode) are found in speech-disordered populations (Andrews et al., 1982; Gordon, 1991; Yang & Sidtis, 2015; Kempler & Van Lancker, 2002)
- Rationale: the acoustic patterns and strategies for sentence focus production could be different for tone language PD speakers due to complicated tone patterns of the language and their impaired speech prosody; speech mode is a factor which influences production.

Research Questions

1. What is the performance of Mandarin-speaking PD individuals in the production of sentence focus, based on listeners' perceptions?
2. How do speech mode influence the production of sentence focus?

Methods

Speaking Experiment

Participants

- 16 individuals with PD (8M, 8F)
- 21 age-matched controls (9M, 11F)
- Native Mandarin speakers

Procedures

Elicitation

- Described activities depicted in drawings.
- Questions regarding three different focus positions of the sentence were asked.
- Answered the questions with responses appropriate to each drawing.

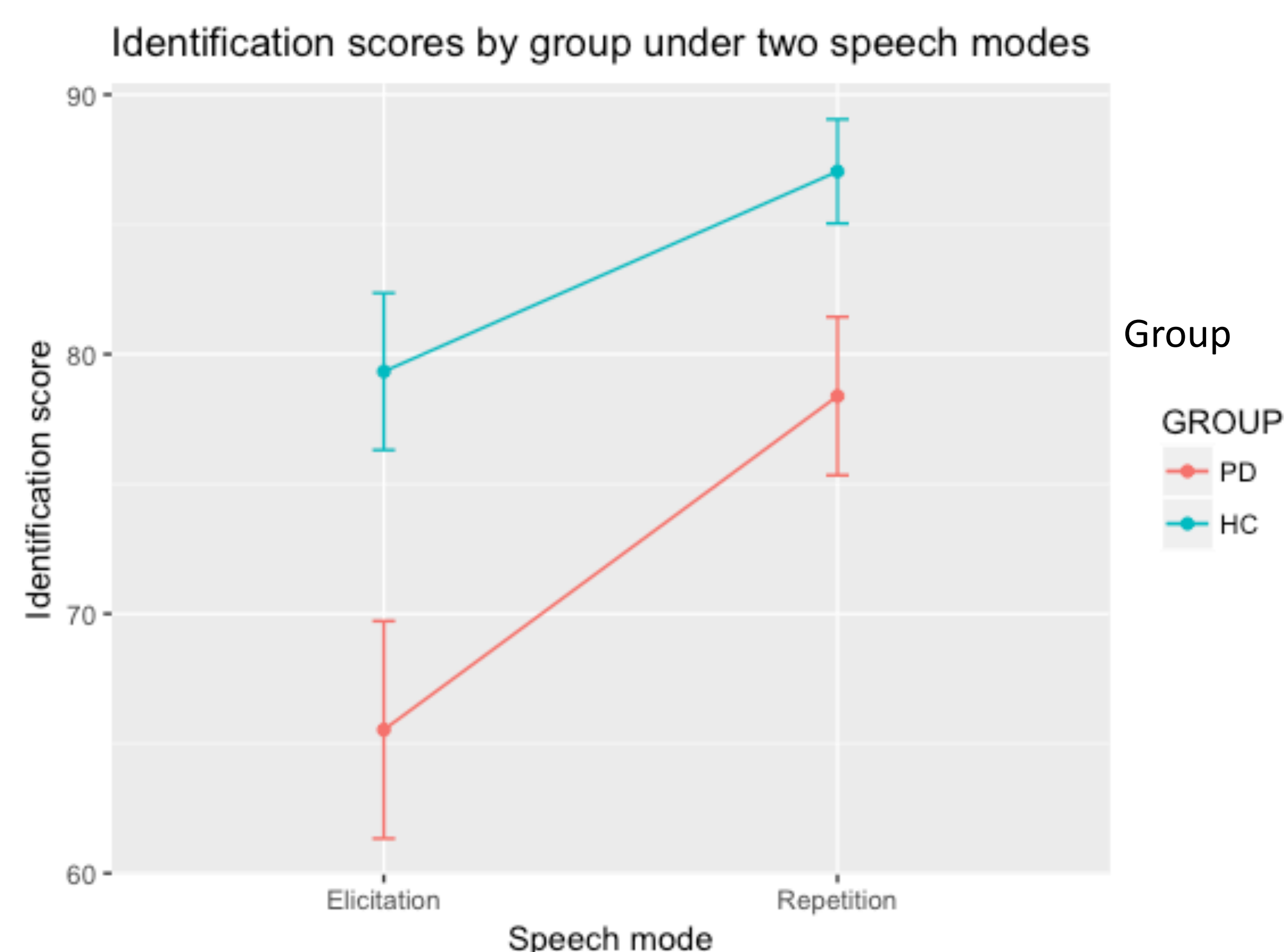
Repetition

- Repeated the sentences produced by the audiotape. The sentences have either three different sentence foci or neutral focus.

x.chen@nyu.edu

ANOVA for Identification scores by speech mode and group

- Significant main effects of speech mode ($F = 43.55, p < 0.001$) and group ($F = 29.51, p < 0.001$)
 - HC > PD (95% CI: [8.11, 14.37])
 - Repetition > Elicitation (95% CI: [6.83, 13.07])
- No interaction between speech mode & group ($F = 2.73, p = 0.10$)

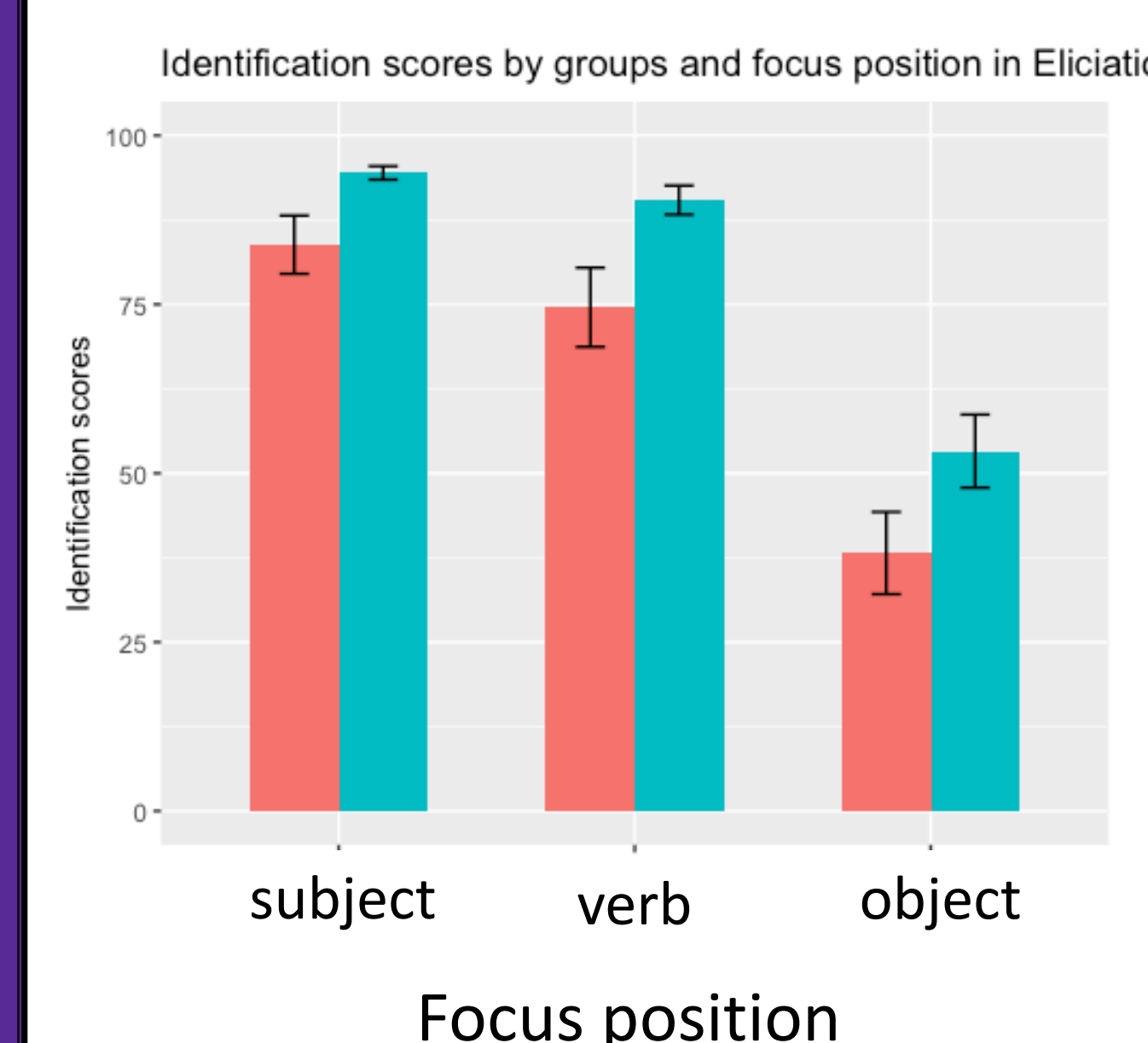


Results

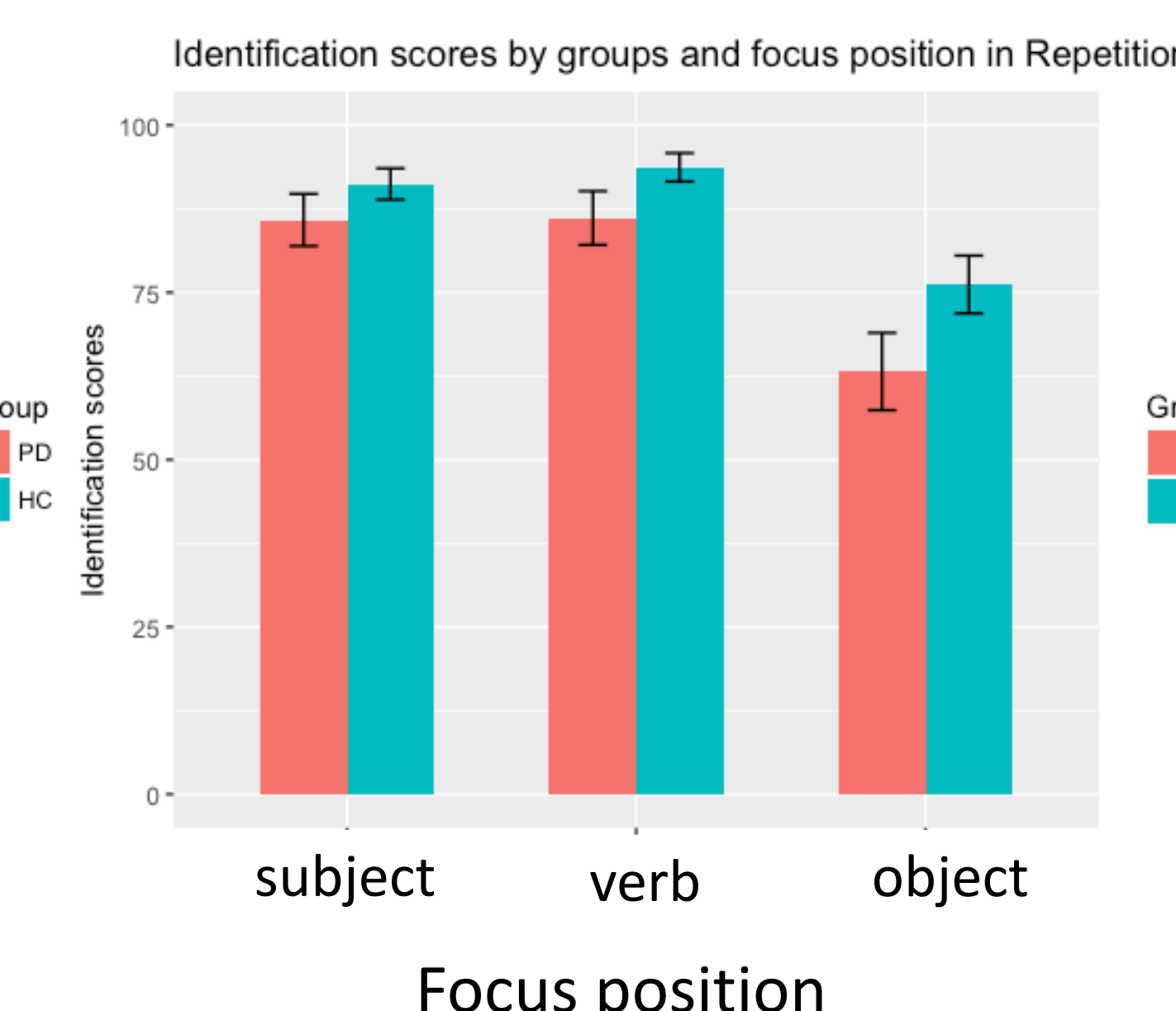
Focus Position Analysis

- ANOVA for identification scores by group and position of target focus
 - Significant main effects of group and position of target focus in Elicitation and Repetition
 - PD < HC (both Eli (95% CI: [8.78, 18.83]) & Rep (95% CI: [5.15, 12.16]))
 - Objects < Subjects & Verbs (both Eli & Rep)
 - Verbs < Subjects (for Eli)
 - Subjects & Verbs: no significant difference (for Rep)
- No interaction between group & focus position

Elicitation



Repetition



Discussion

- Sentence foci produced by PD group were identified less accurately than those produced by HC group.
- Sentence foci produced in elicited speech were identified less accurately than those in repeated speech for both PD and HC groups—elicitation is more effortful in speech planning, execution, and monitoring.
- In elicited speech, subjects received the highest accuracy in listeners' identification.
- Objects received the lowest accuracy in listeners' identification in both elicitation and repetition—may be because of speech declination.
- Further analysis: acoustic analysis will be done to investigate how PD individuals utilize different acoustic cues to realize sentence focus; more produced stimuli should be involved to see PD speakers' performance on stimuli with different tone patterns.

Example to elicit contrastive focus

Examiner: "是小猫开飞机吗?" / Is a cat flying the plane?
 Subject: "不, 是乌龟开飞机。" / No, a **TURTLE** is flying the plane.
 Examiner: "是乌龟修飞机吗?" / Is the turtle fixing the plane?
 Subject: "不, 是乌龟开飞机。" / No, the turtle is **FLYING** the plane.



Listeners' Perception Experiment

Participants

- 64 healthy listeners (24M, 40F)
- Native Mandarin speakers
- Listened to speakers' utterances (both PD's and HC's).
- Identified which word carries the sentence focus.
- Gave ratings to the goodness of the sentence focus of the heard utterance.
 - Scale: 1 (Very hard to identify a focus) - 5 (Very clear focus)

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