



CLINICALLY IMPORTANT CHANGE IN SPEECH INTELLIGIBILITY FROM DIFFERENT PERSPECTIVES

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K. Stipancic – salary from University at Buffalo

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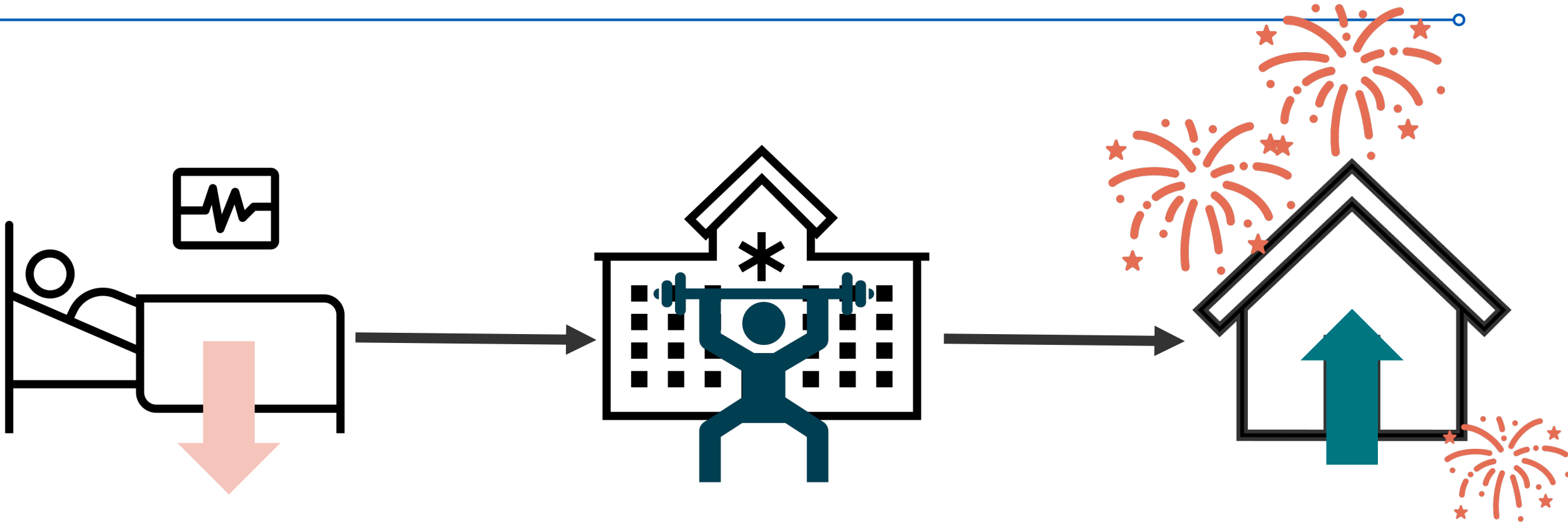
- We have no non-financial relationships to disclose.

Thank you:

Emmanuelle Spronk

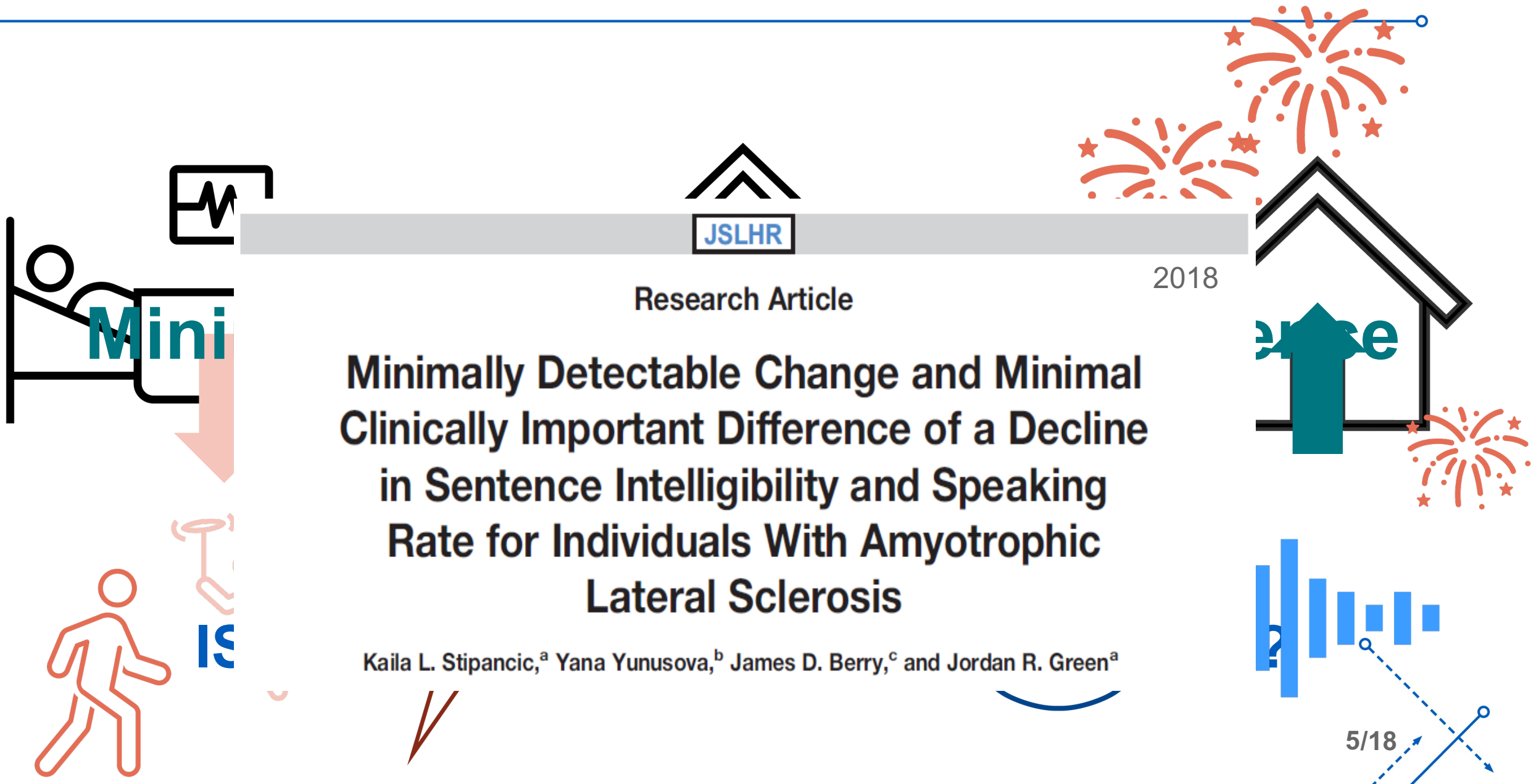
All speaker and listener participants!

BACKGROUND



WHO CARES?

IS THE IMPROVEMENT *MEANINGFUL*?



Mini

JSLHR

Research Article

2018

Minimally Detectable Change and Minimal Clinically Important Difference of a Decline in Sentence Intelligibility and Speaking Rate for Individuals With Amyotrophic Lateral Sclerosis

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Previous work...

- Calculated the MCID of intelligibility for individuals with dysarthria secondary to ALS

- Resulting MCIDs were invalid (Riddle & Stratford, 2013; Stratford & Riddle, 2012)

- Minimally detectable change (MDC)

Thresholds for important change MUST be outside of measurement error

Therefore, MCID must be $>$ MDC

Lateral Sclerosis

- Demonstrated the effect of perspective on MCIDs (Wright, 1996)

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Purpose of the current work

- Define the MCID of intelligibility...
 - Derived from non-expert listeners and speech-language pathologists (SLPs)
 - To examine the effect of different perspectives on clinically important change
 - For neurologically healthy speakers and speakers with multiple sclerosis (MS) and Parkinson's disease (PD)

METHODS

Participants

Speakers

Healthy controls

N = 16

MS

N = 16

PD

N = 16

Recorded reading a subset of
Harvard psychoacoustic sentences in 5 conditions:

1. Habitual
2. Clear
3. Fast
4. Loud
5. Slow

DIFFERENCE vs. NO DIFFERENCE
in intelligibility between condition-combinations

*previously collected transcription intelligibility
data was used

Listeners

Non-expert

N = 240

Crowdsourced listeners
recruited via Prolific

Average age =
24.13 years (18-30)

170 female
55 male
9 other/prefer not to say
5 unspecified
1 unknown

SLPs

N = 10

Practicing for 3-24 years
(average = 10 years)

Average age =
35.2 years (28-46)

Experience with patients
with dysarthria


9 female
1 male


Listening task

Programmed and executed in jsPsych and hosted on Pavlovia (pavlovia.org)

% intelligibility difference


Amount of perceived difference between samples


Set One 

Set Two 

Is there any difference in understandability between the two sets?

Yes No

Set One 

Set Two 

Which set is MORE understandable?

Set One Set Two

HOW MUCH MORE understandable?

1. Almost the same, hardly any better at all
2. A little better
3. Somewhat better
4. Moderately better
5. A good deal better
6. A great deal better
7. A very great deal better

Anchor scale for calculating the MCID adapted from the Global Ratings of Change Scale (GROC; Jaeschke et al., 1989)

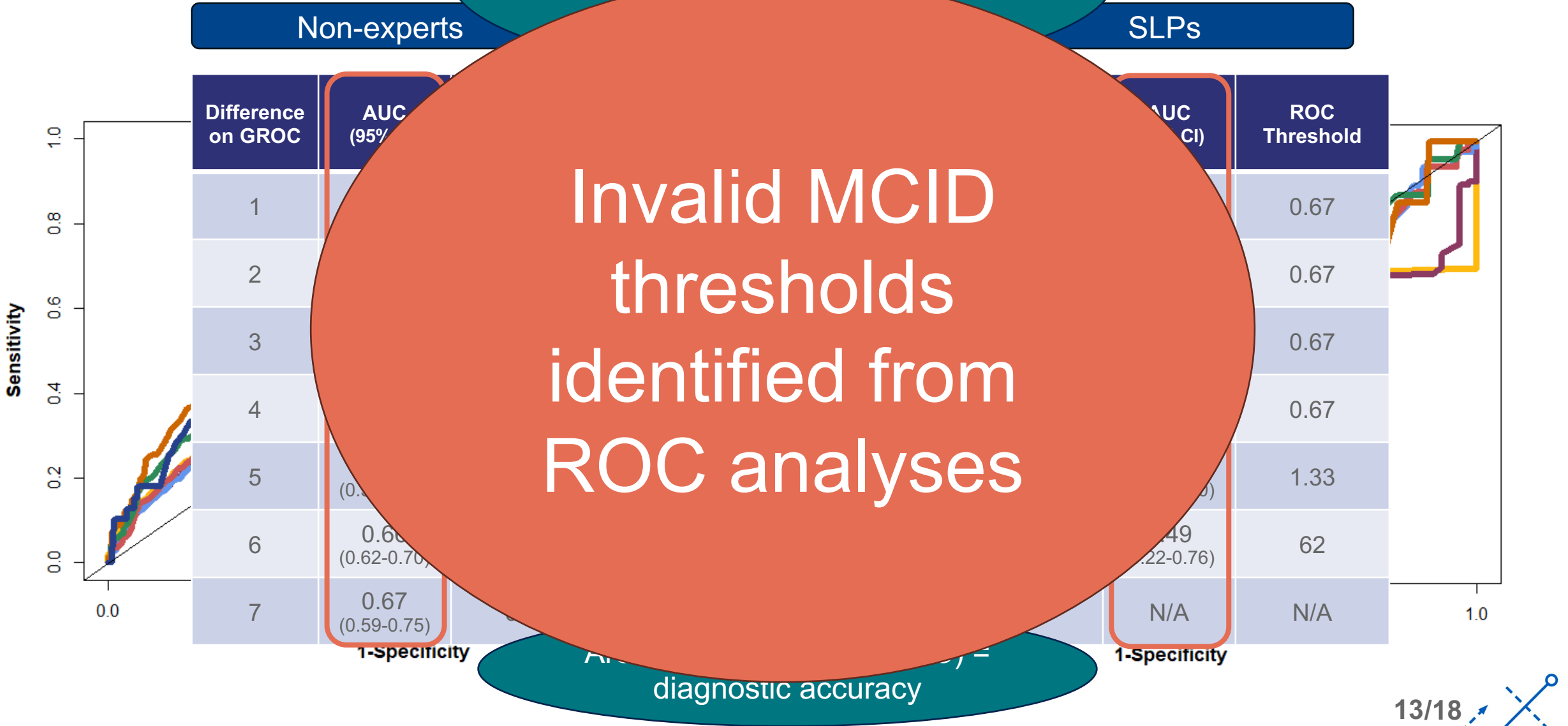
Data analysis

- Two analyses for calculating the MCID:
 1. Receiver operating characteristic (ROC) curves for each level of the GROC scale – identified thresholds
 2. Average % intelligibility difference between samples rated by listeners on each level of the GROC scale
- Resulting MCIDs descriptively compared the between non-expert listeners and SLPs



RESULTS & INTERPRETATION

ROC Curves



Average intelligibility difference

HOW MUCH MORE
understandable?

1. Almost the same, hardly any better at all
2. A little better
3. Somewhat better
4. Moderately better
5. A good deal better
6. A great deal better
7. A very great deal better

Non-experts

SLPs

Similarities in MCIDs
evaluated from the
perspective of
non-expert listeners
and SLPs

MODERATE-
LARGE
DIFFERENCE
= 13%

SM
DIFFE
=

NO DIFFERENCE
= 0%

% Intelligibility Difference

10

5

0

0

1

2

3

4

How much more understandable?
(on GROC scale)

2

3

4

5

6

How much more understandable?
(on GROC scale)

CONCLUSIONS & FUTURE WORK

Implications

- Demonstrates **feasibility** of novel experimental paradigm for collecting perceptual data for estimating MCID
- Aligns with previous work (Stipancic et al., 2018; Stipancic & Tjaden, 2022) which calculated the **minimally detectable change (MDC)** of intelligibility
- Provides evidence that similar clinical tools for the perception of intelligibility change should only have 3 categories (“**no difference**”, “**a little bit of difference**”, “**a moderate/large amount of difference**”)
- Contextualizes published and future work by facilitating **enhanced interpretation** of intelligibility change/difference
 - **At least 7%** change in intelligibility is needed to be clinically meaningful
- Demonstrates **similarities** between non-expert and expert listeners in terms of their perception of clinically meaningful change
 - Implications for listeners recruited for future studies

Future directions & Conclusions

- MCIDs should be calculated for each **context** in which intelligibility is used as an outcome measure (e.g., across patient populations, types of listeners, methods used, etc.)
- Future work in this line will examine **patient** and **communication partner perception** of clinically meaningful changes in relevant speech outcomes
- Critical step toward development of a **universal language** with which to evaluate changes in intelligibility due to speech-language therapy and disease progression

THANK YOU

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