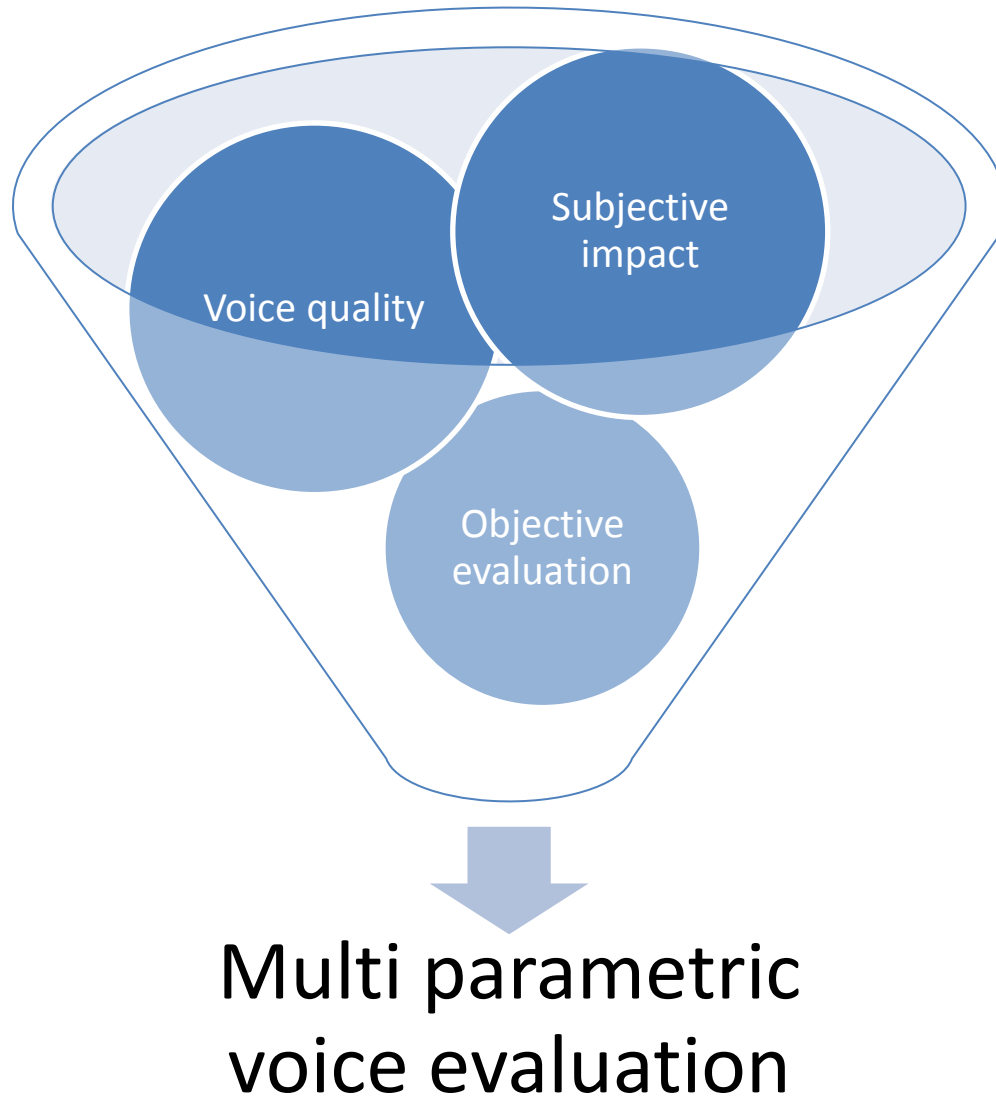


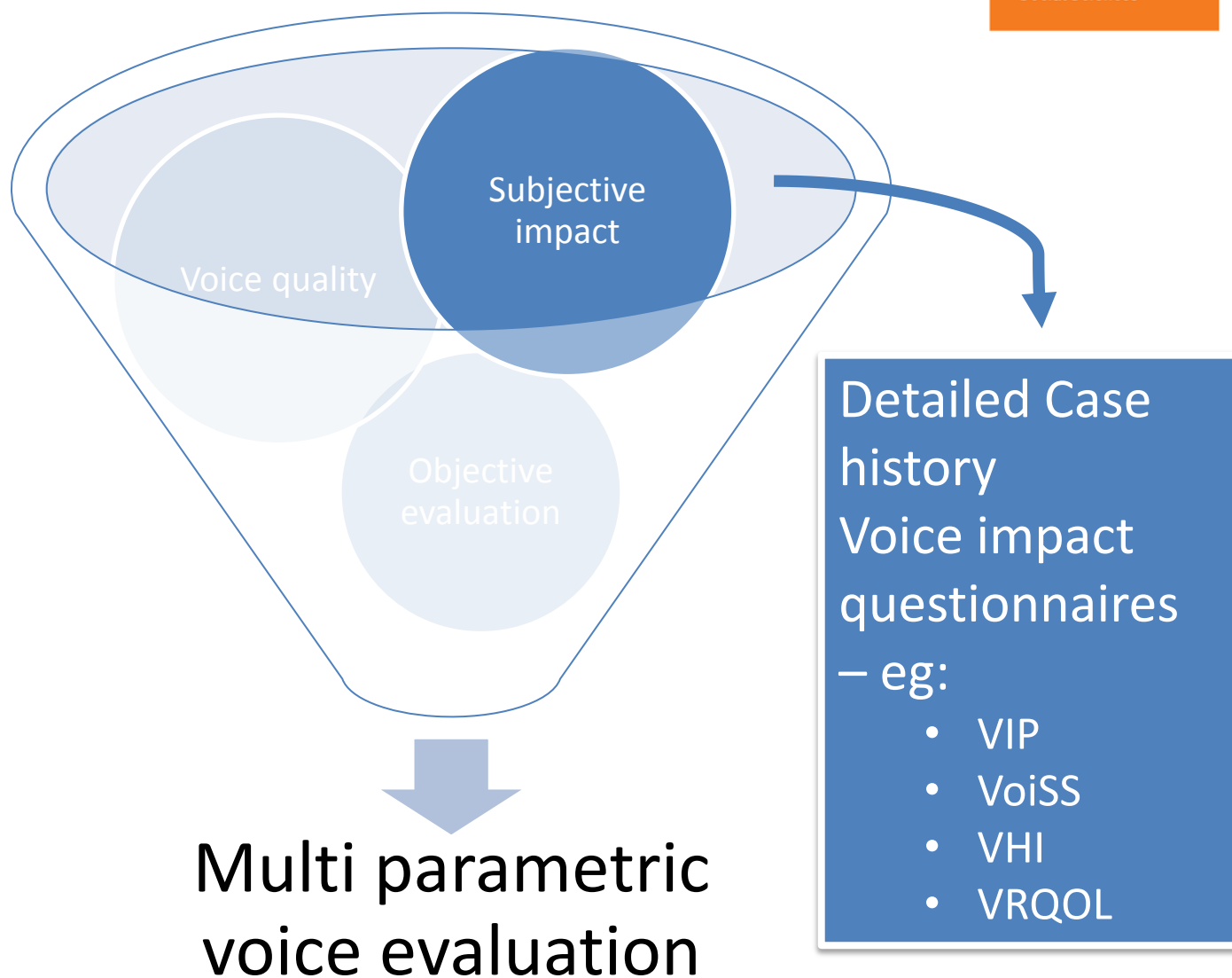
Reliability of GRBAS evaluation of voice quality in children who have a history of airway reconstruction surgery and how this compares to parental report of voice-related quality of life

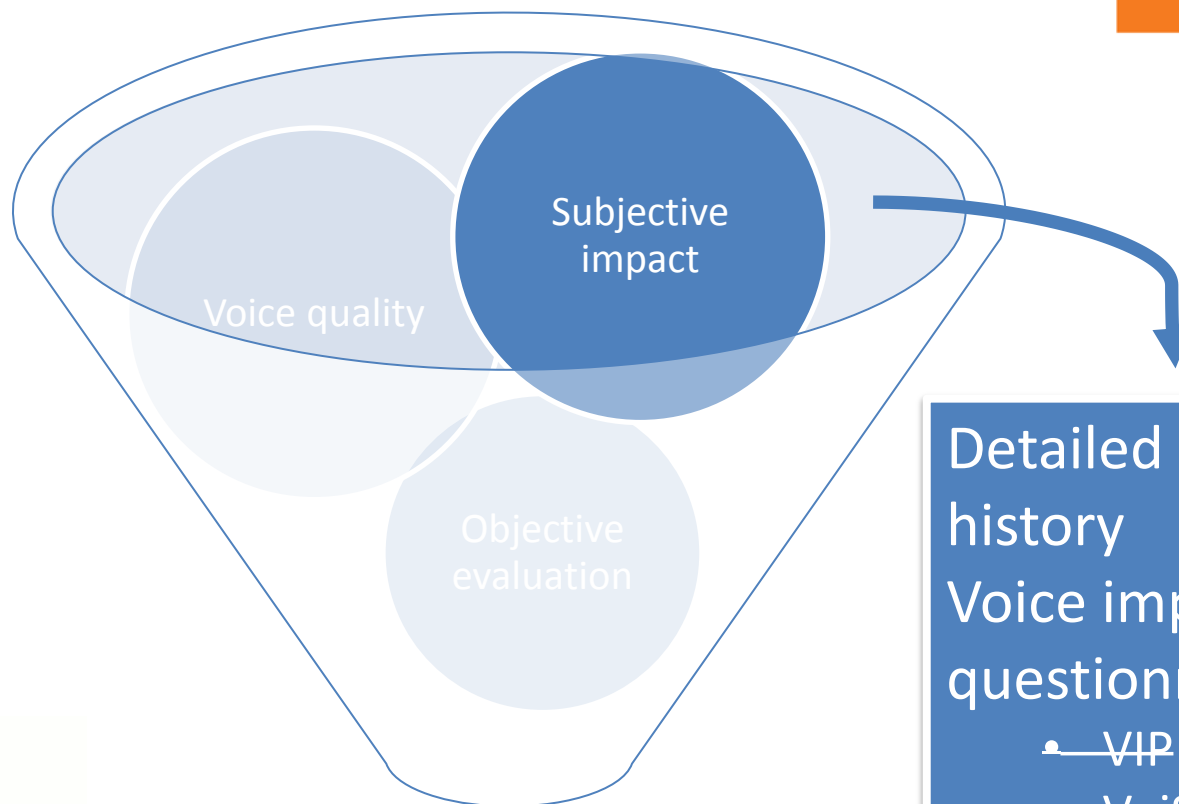
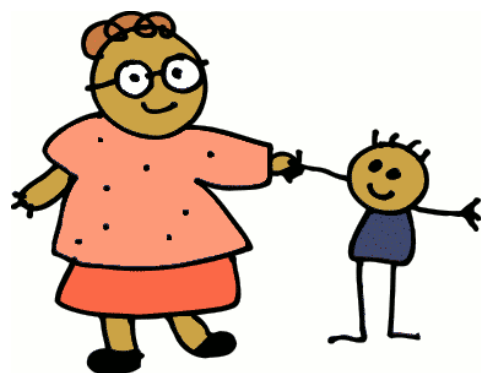
Wendy Cohen, Susan Lloyd, David M
Wynne and Richard B Townsley

University of Strathclyde and Royal Hospital for Children,
Glasgow

Background to the study



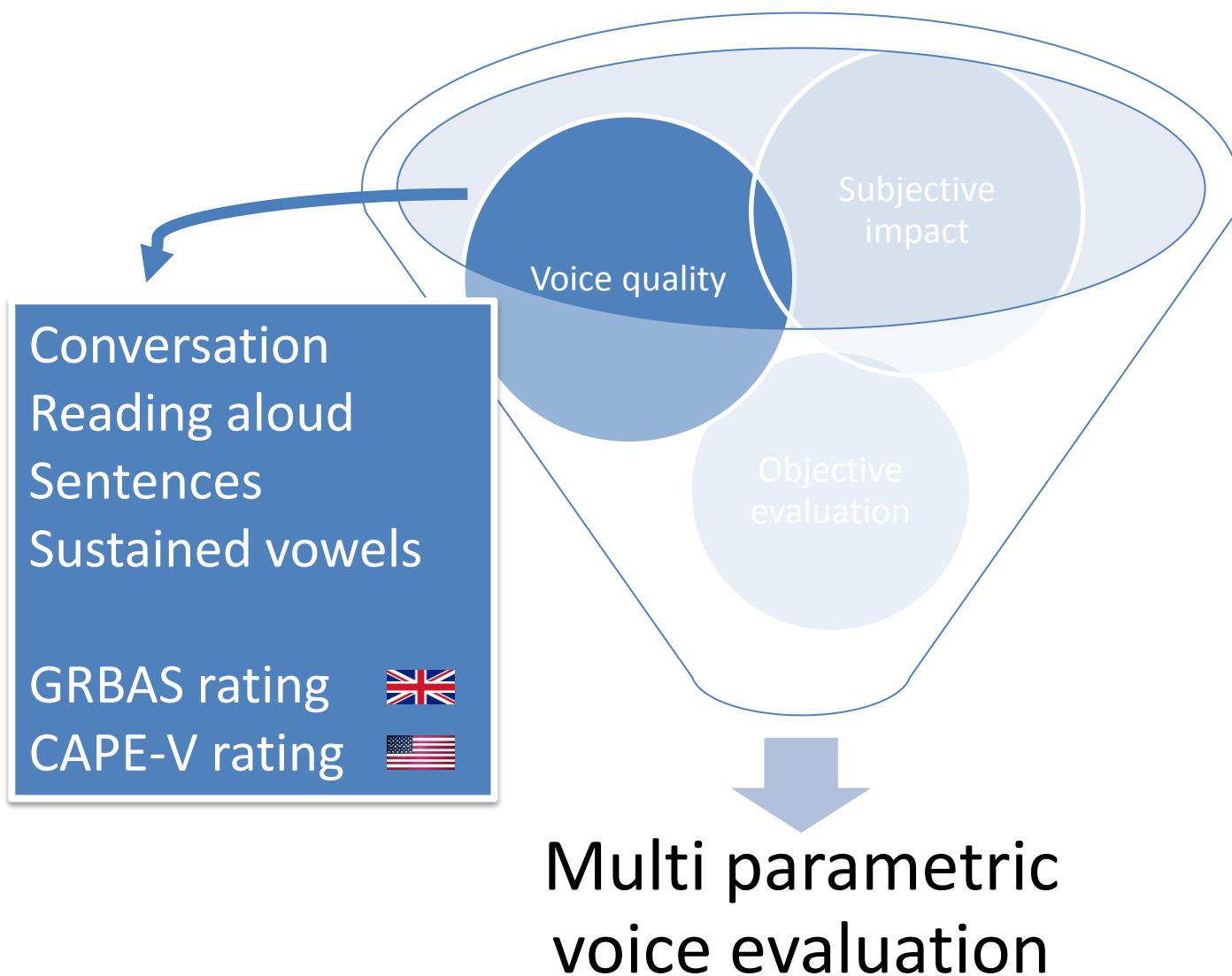


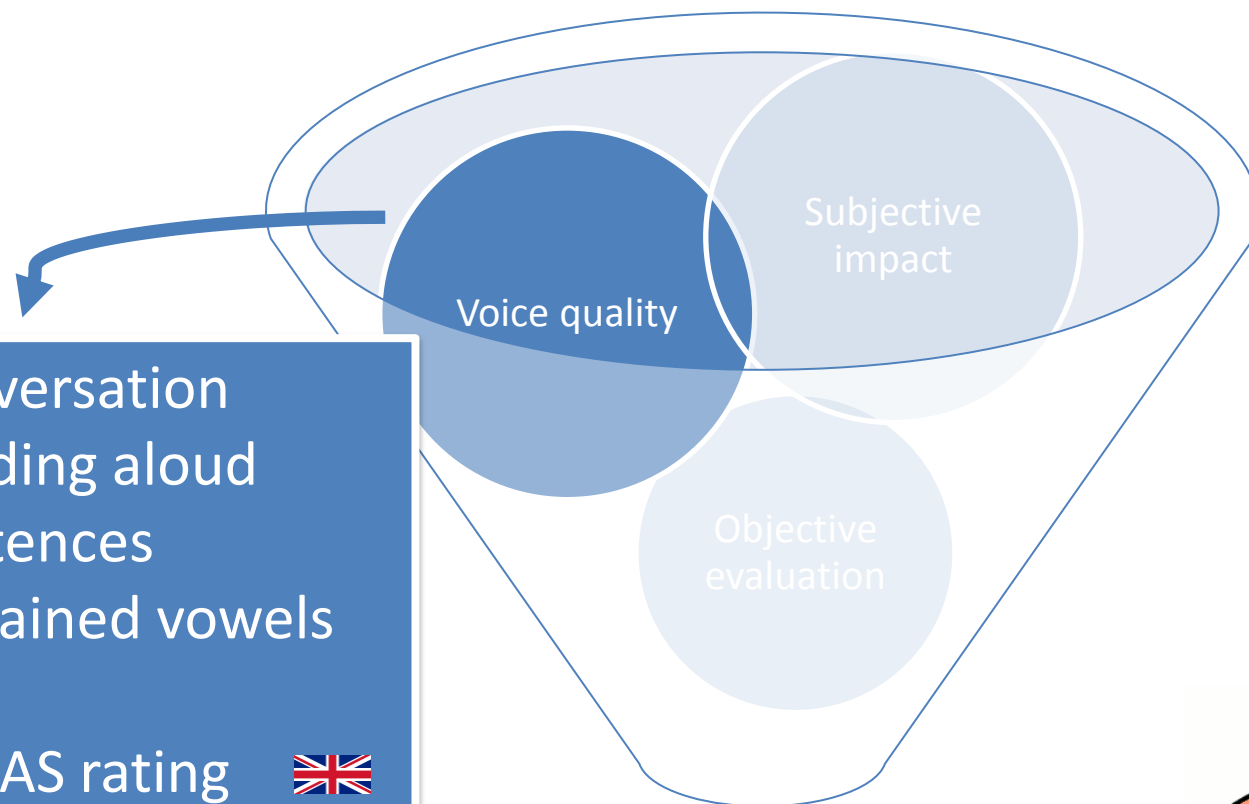


Multi parametric
voice evaluation

Detailed Case
history
Voice impact
questionnaires

- —VIP
- —VoiSS
- PVHI (Ref)
- PVRQOL (Ref)





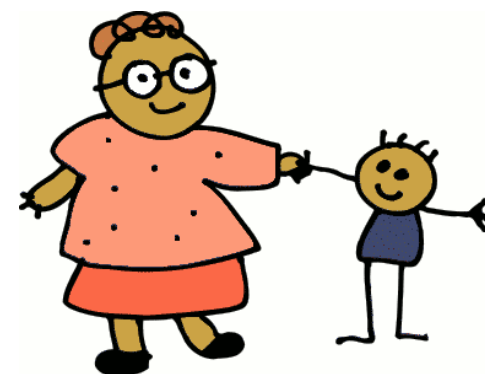
Conversation
Reading aloud
Sentences
Sustained vowels

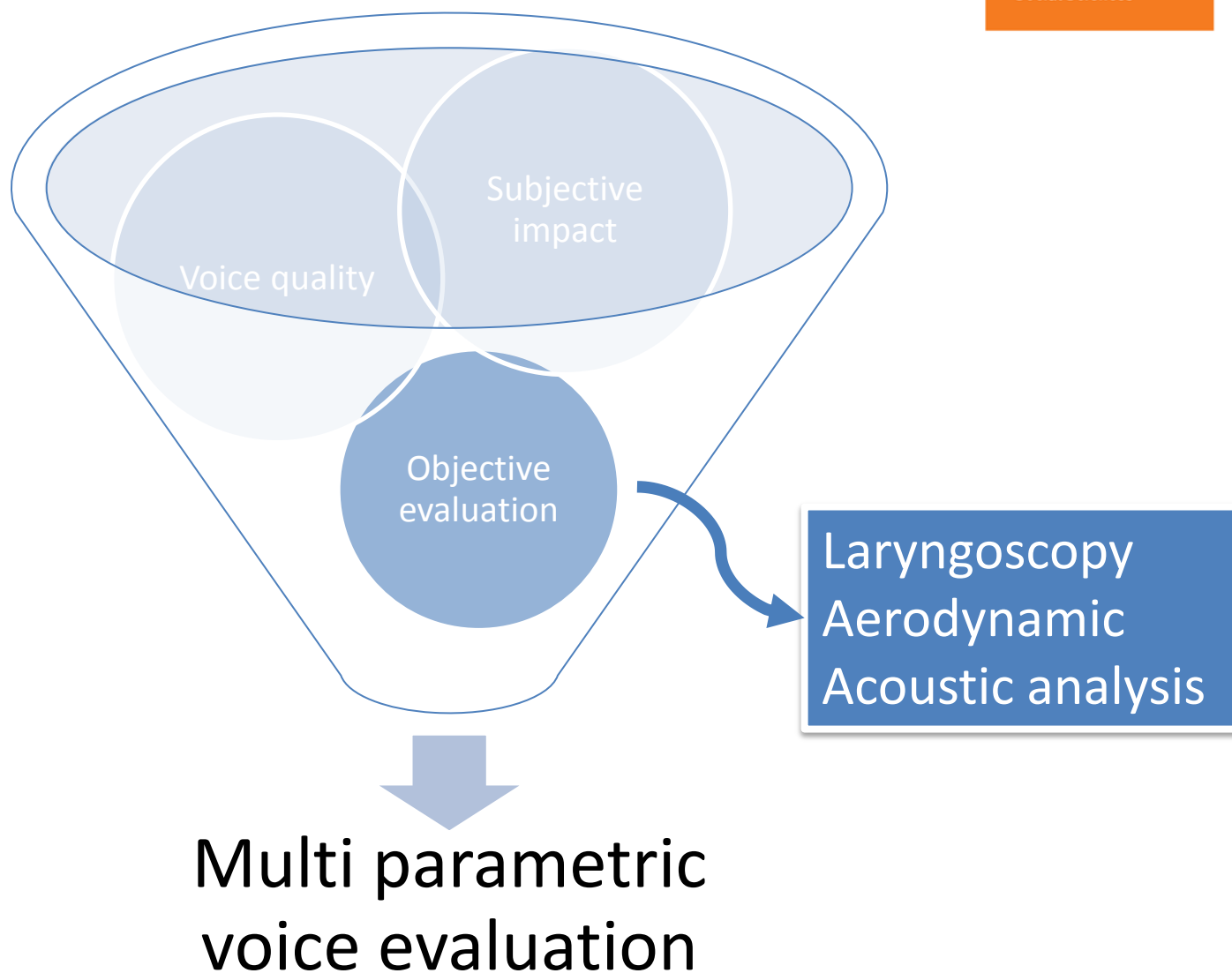
GRBAS rating 

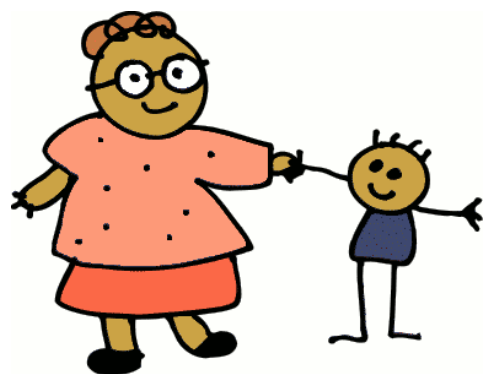
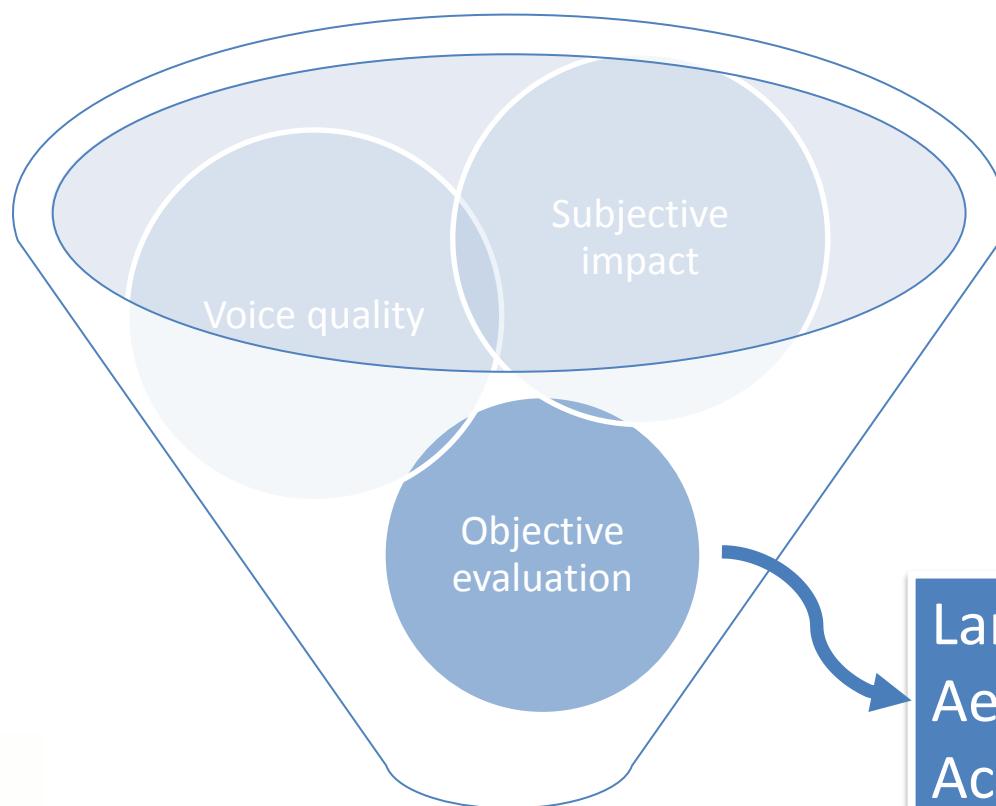
CAPE-V rating 

Evidence of reliability
with the CAPE-V in
paediatrics (Kelchner et
al, 2008)

Multi parametric
voice evaluation

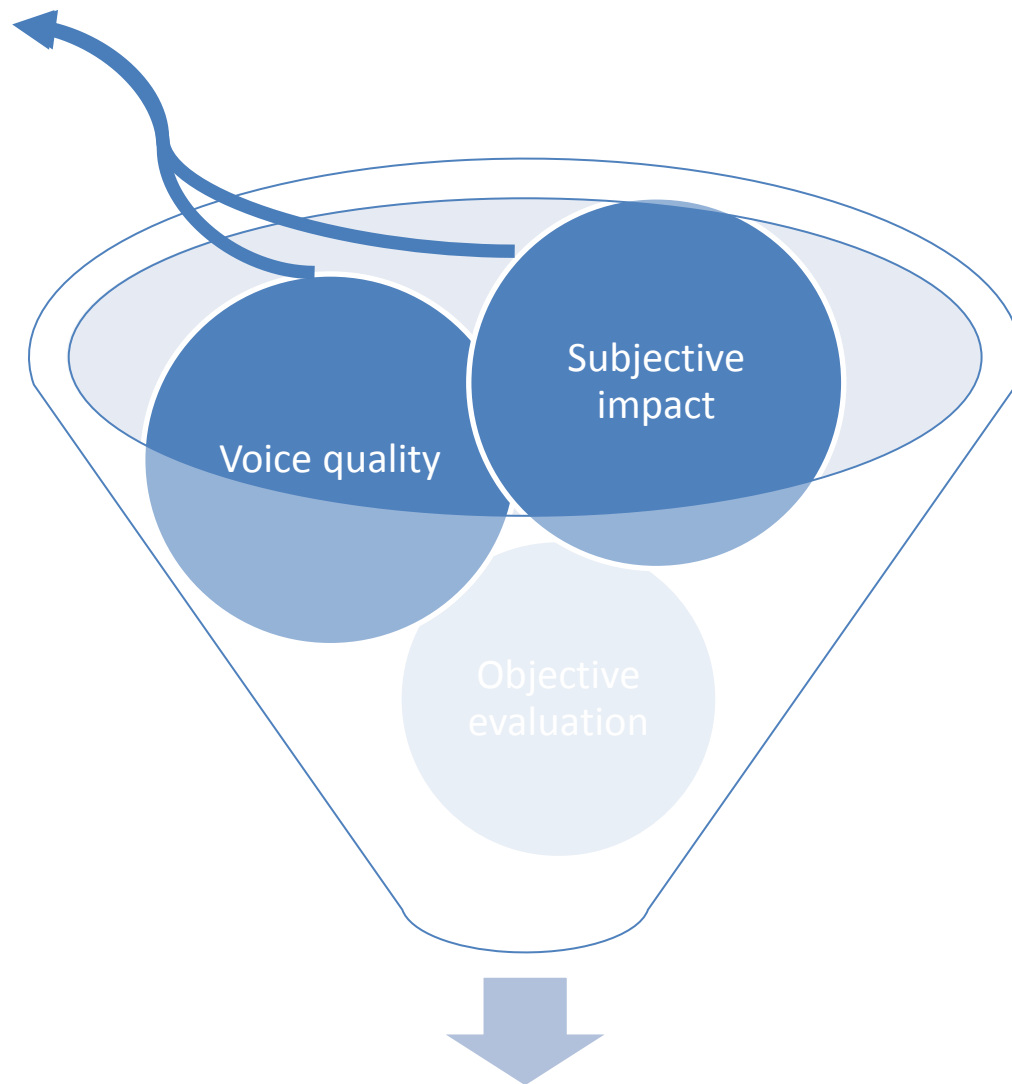






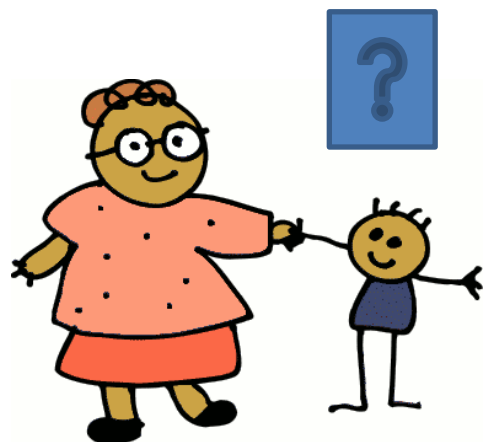
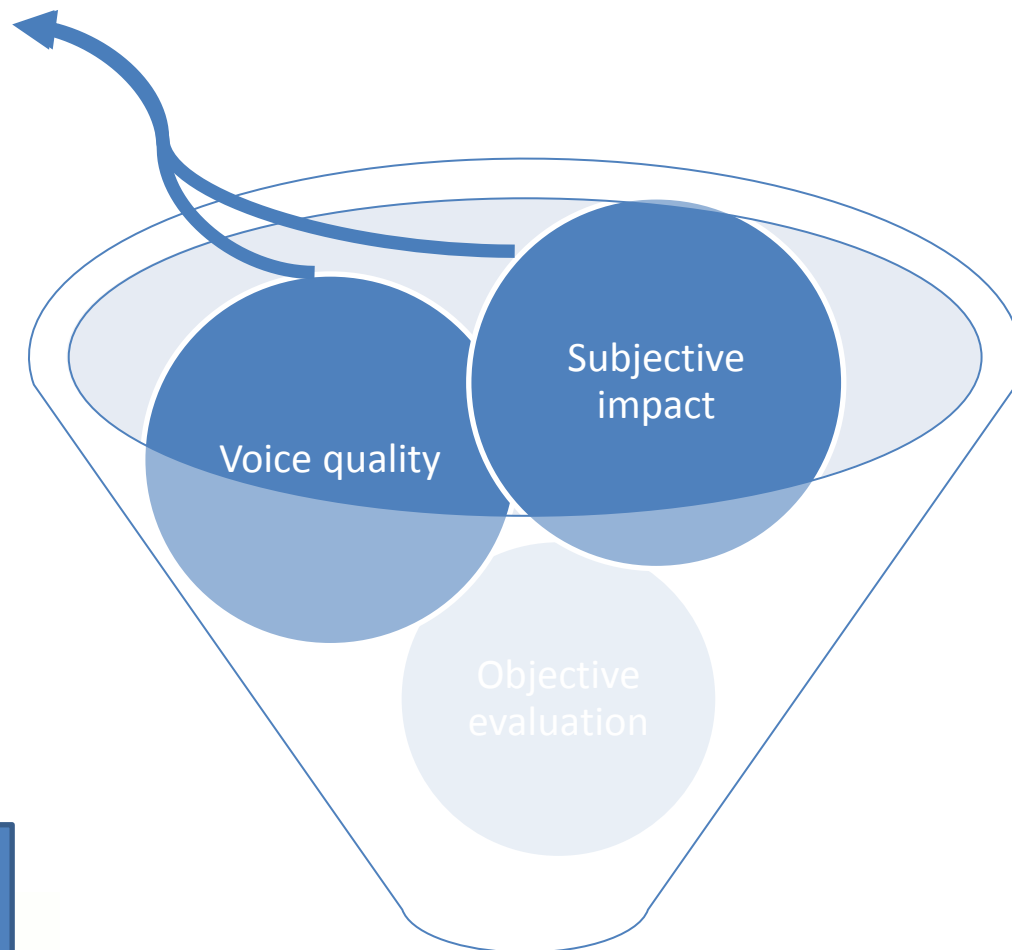
Multi parametric
voice evaluation

Weak correlation between patient and clinician reports of voice in adults (Karnell et al, 2006)



Multi parametric
voice evaluation

Weak
correlation
between
patient and
clinician
reports of
voice in adults
(ref)



Multi parametric
voice evaluation

Background to the study: our unique population



- Scotland's National Complex Airway Service hosted at Royal Hospital for Children in Glasgow
- Children with complex airway obstructions are referred to this service

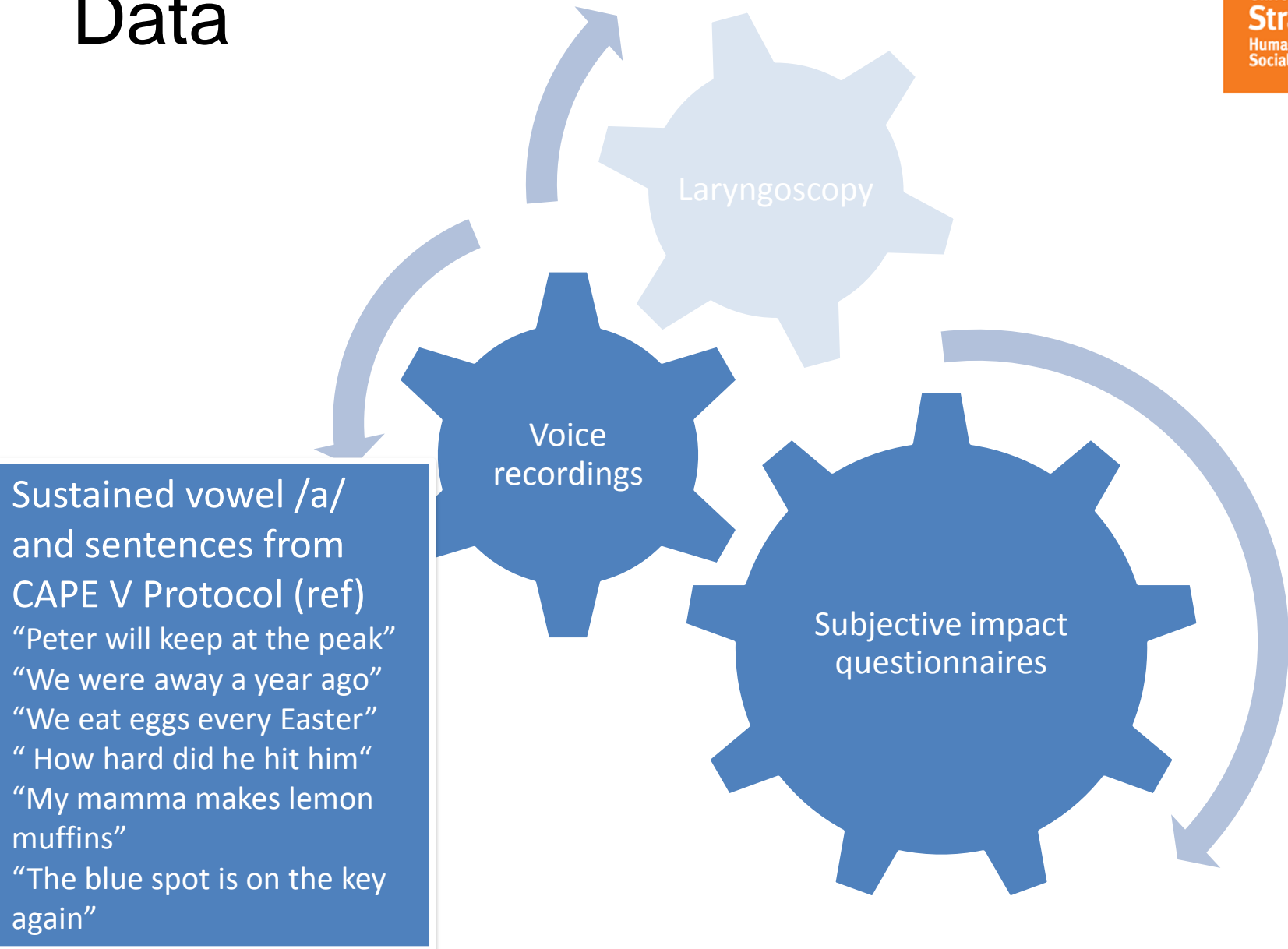
Laryngotracheal reconstruction surgery

- Subglottic stenosis
- Either congenital or acquired
- Rib cartilage is inserted into trachea to ensure an obstruction free airway
- Action Medical Research funded a study of long term voice outcomes
- Generally voice outcome is good through childhood and into adolescence if general health is good

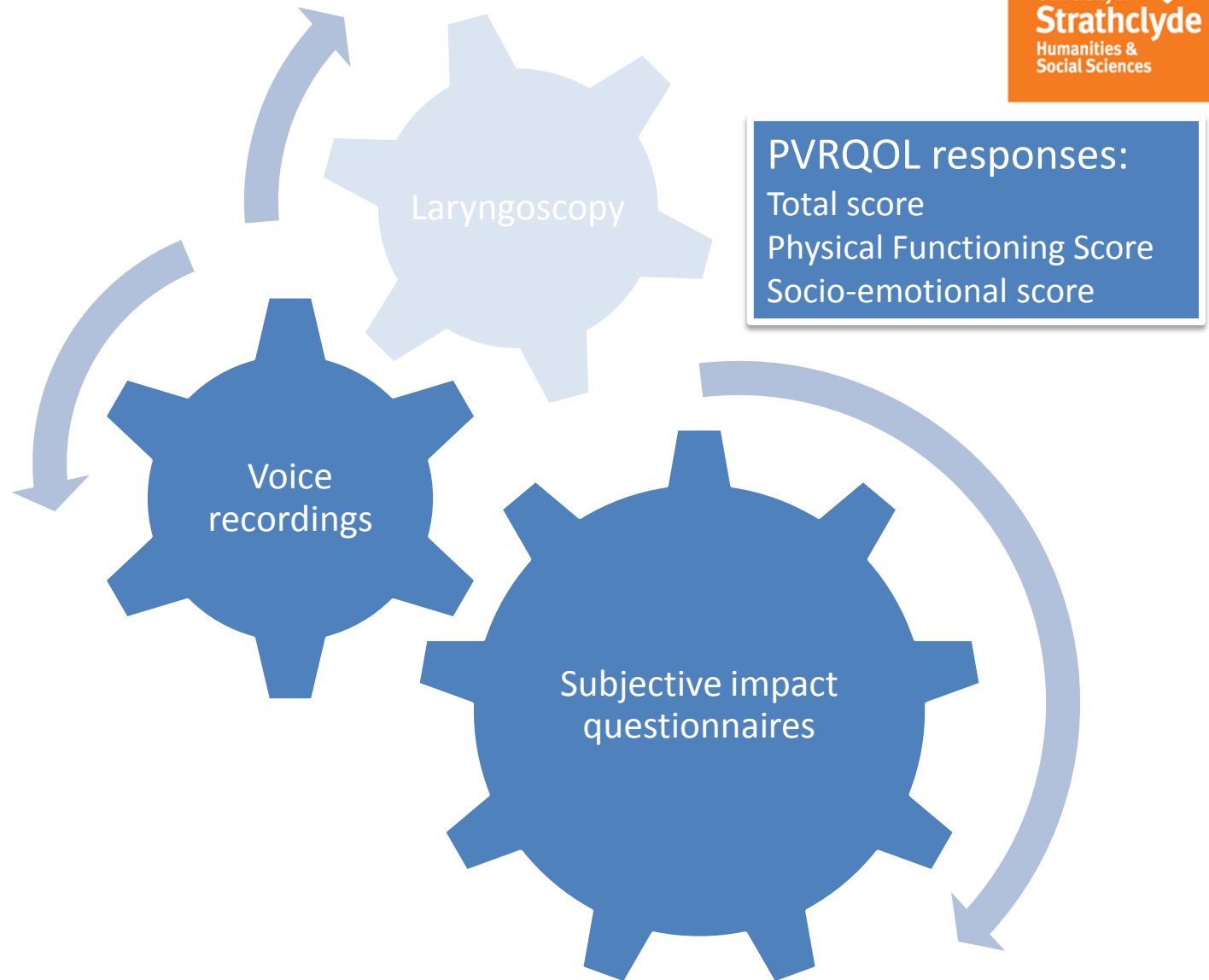
Data



Data



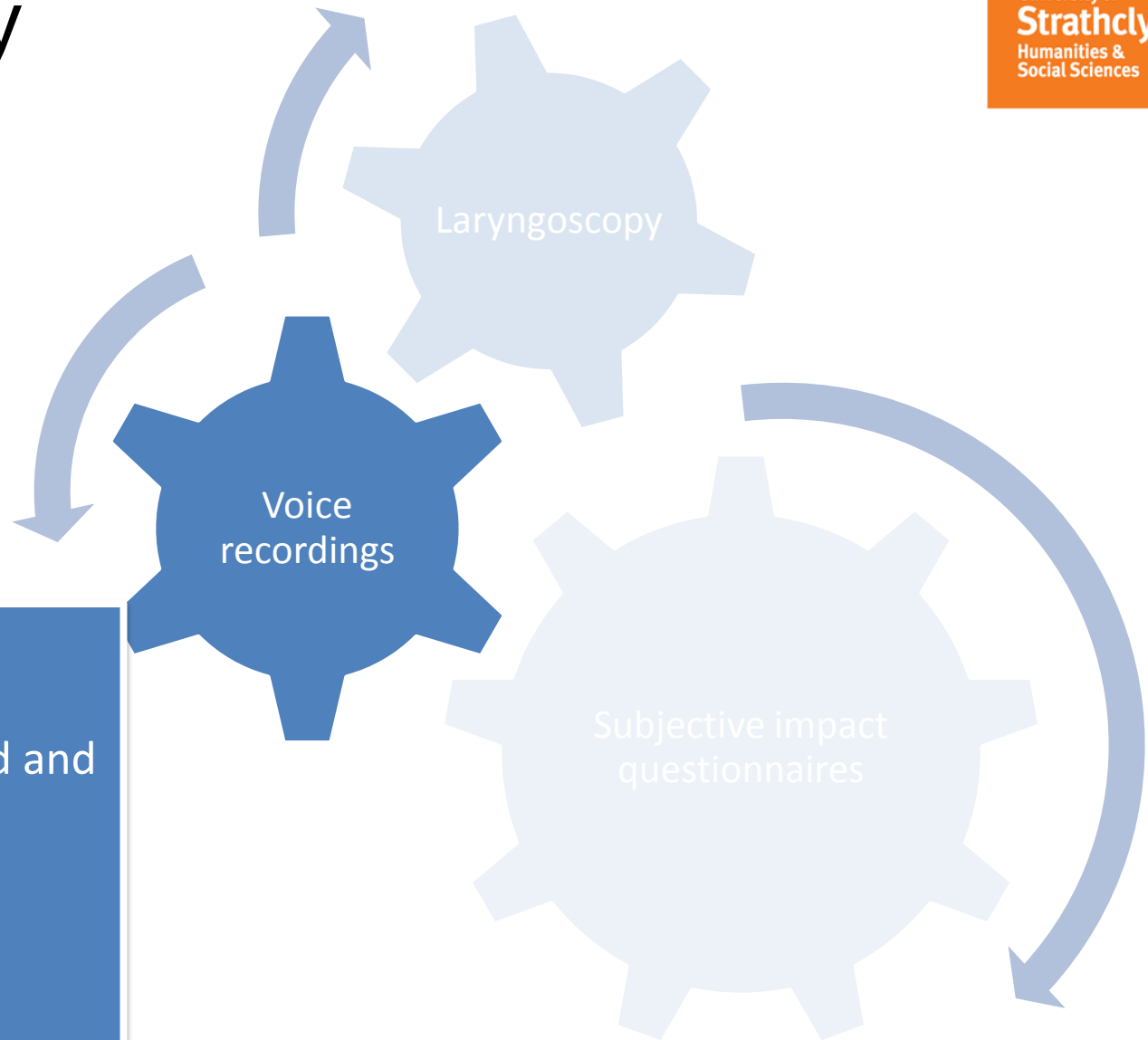
Data



Research questions

1. What is the inter/intra-rater reliability of clinician rated voice quality using GRBAS in children with history of LTR?
2. Is there a correlation between parent reported subjective impact and clinician rating of voice quality for these children?

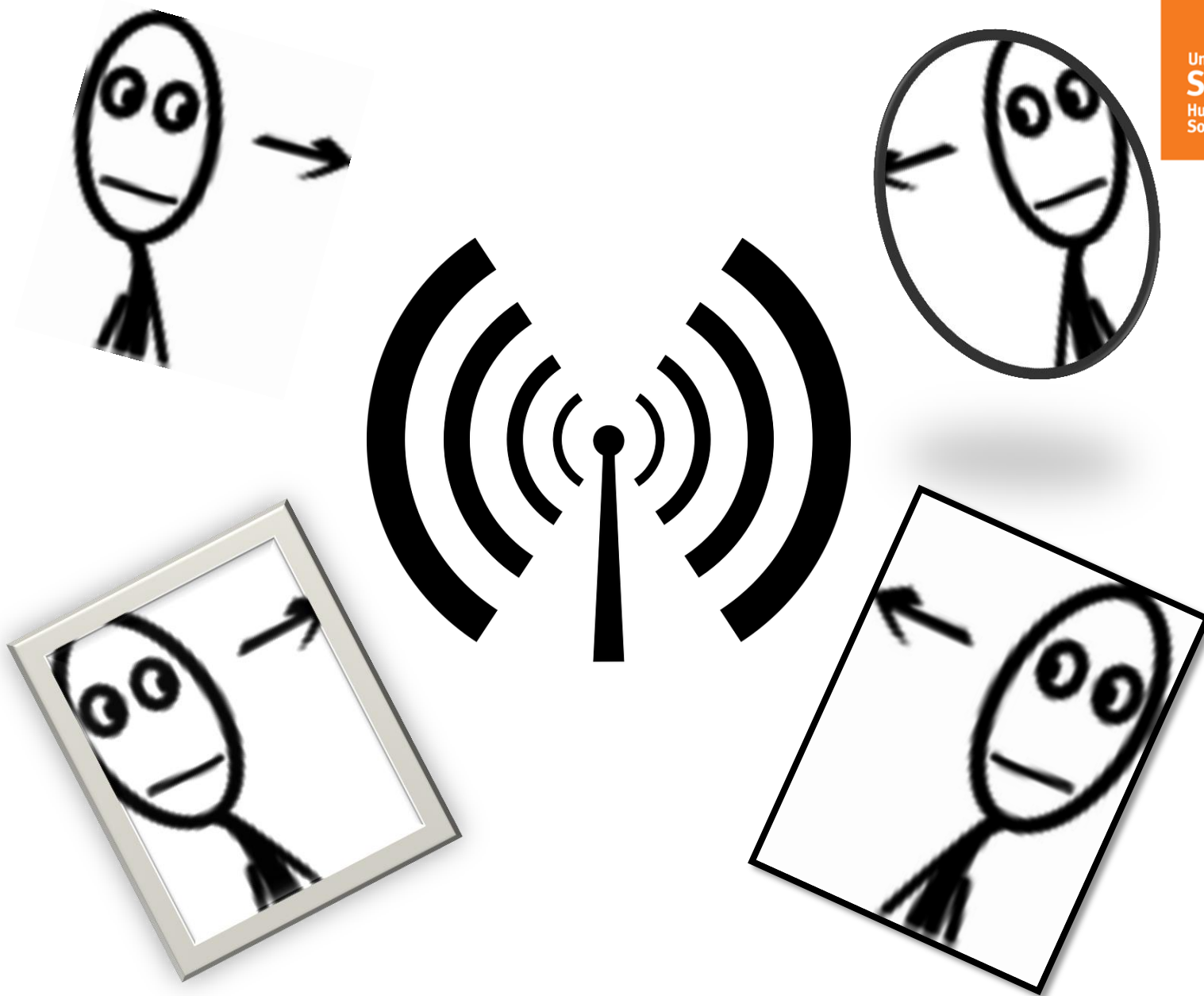
Reliability



12 children

Recordings duplicated and
randomised

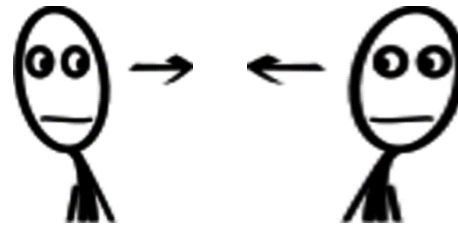
Four trained listeners
rated using GRBAS
protocol





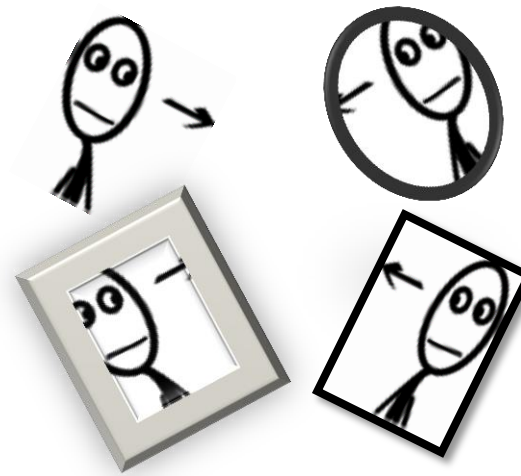
- Grade
 - Roughness
 - Breathiness
 - Asthenia
 - Strain
- 0 normal
 - 1 mild
 - 2 moderate
 - 3 severe

Intra rater reliability



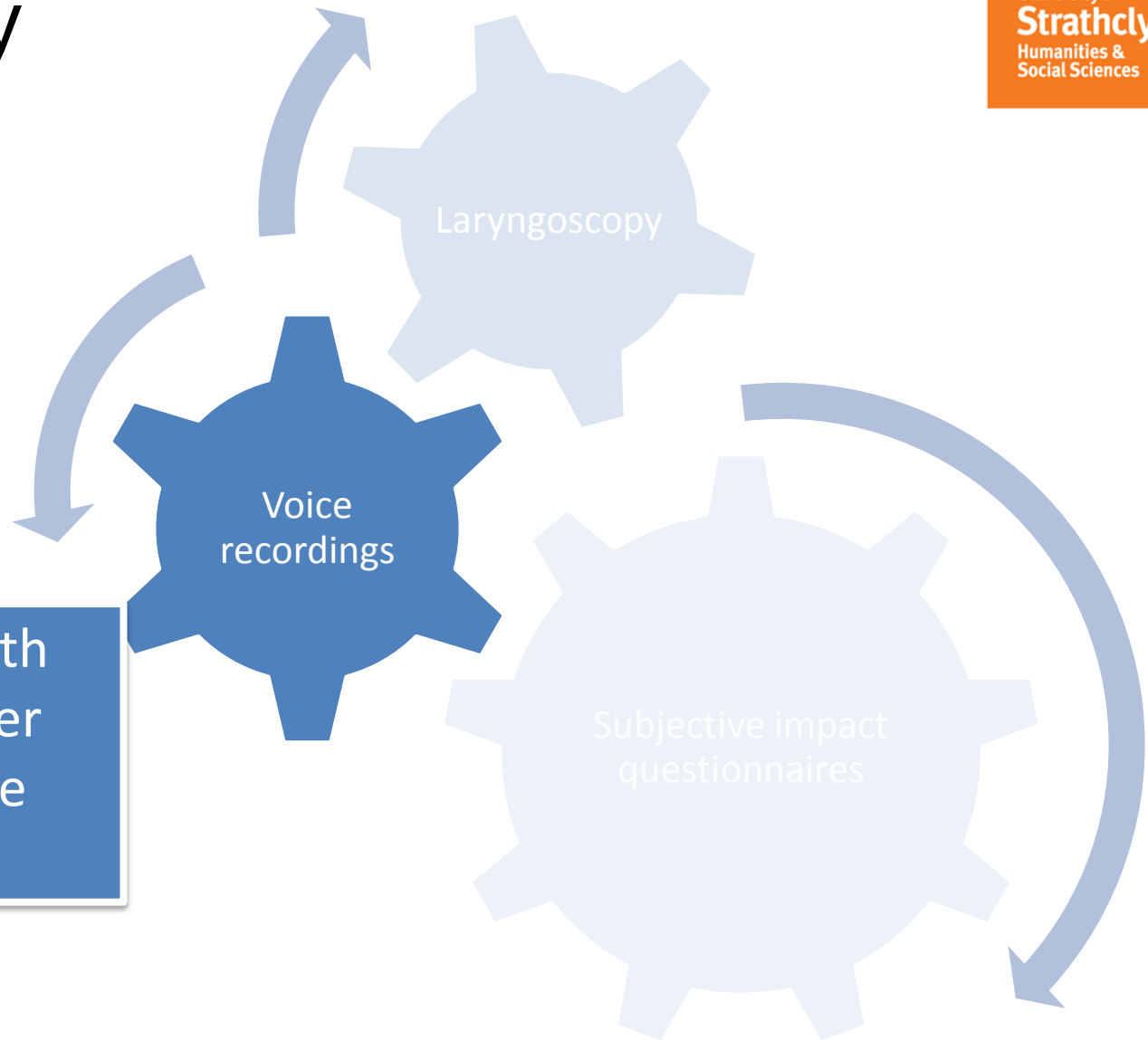
	Intraclass correlation coefficient	95% Confidence Interval	
		Lower bound	Upper bound
Grade	0.928	0.912	0.941
Roughness	0.918	0.900	0.933
Breathiness	0.810	0.768	0.845
Asthenia	0.894	0.871	0.913
Strain	0.892	0.856	0.904

Inter rater reliability



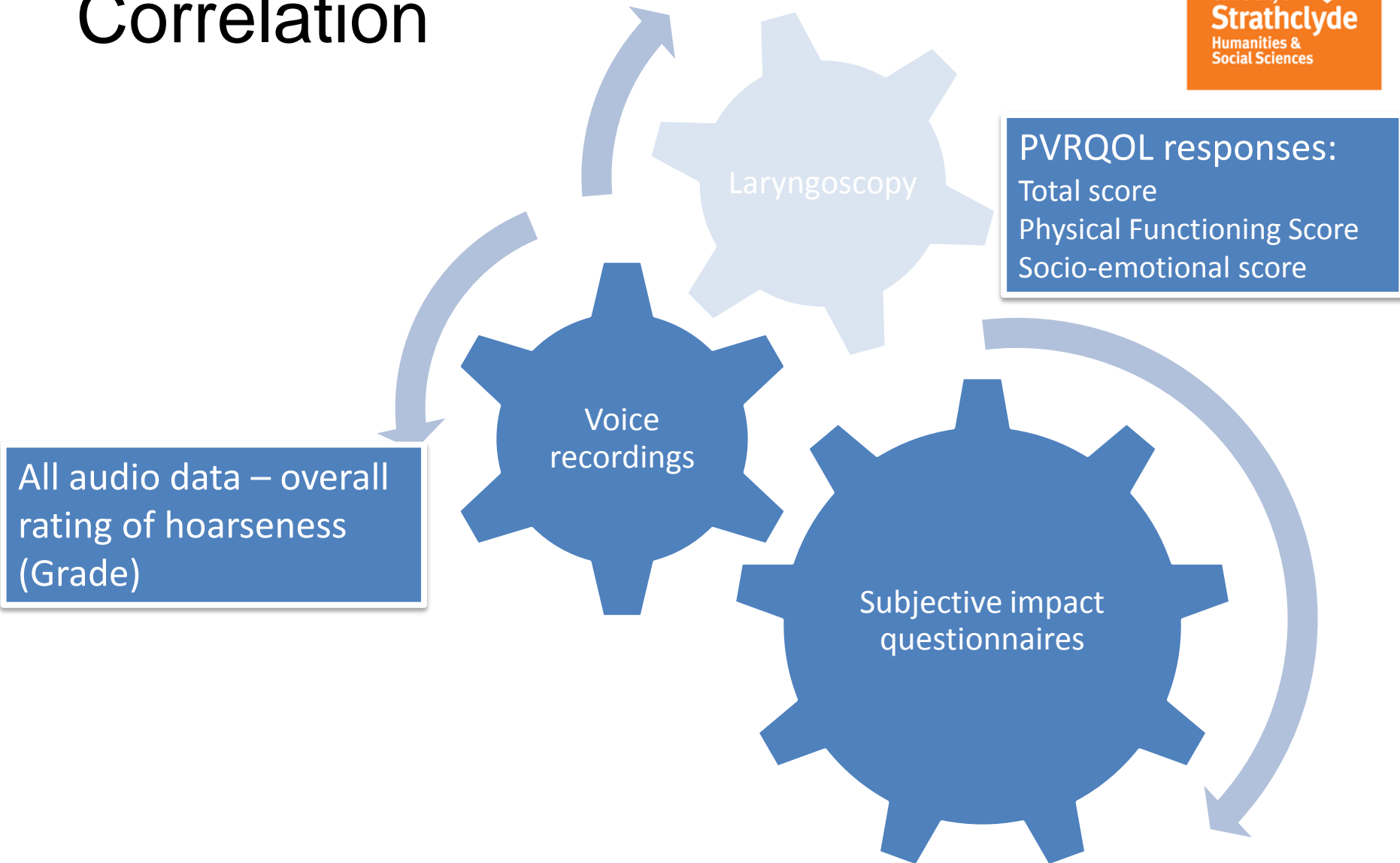
	Intraclass correlation coefficient	95% Confidence Interval	
		Lower bound	Upper bound
Grade	0.930	0.903	0.950
Roughness	0.929	0.902	0.949
Breathiness	0.816	0.747	0.869
Asthenia	0.909	0.875	0.935
Strain	0.879	0.834	0.914

Reliability



High degree of both
inter and intra rater
reliability using the
GRBAS

Correlation

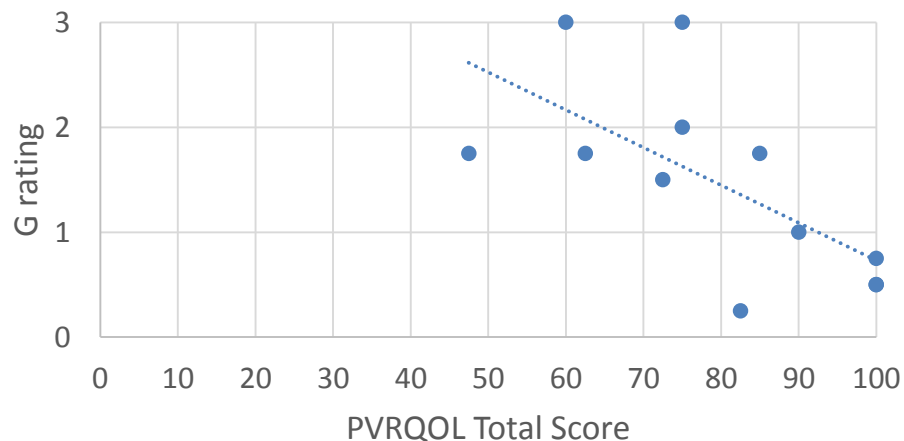




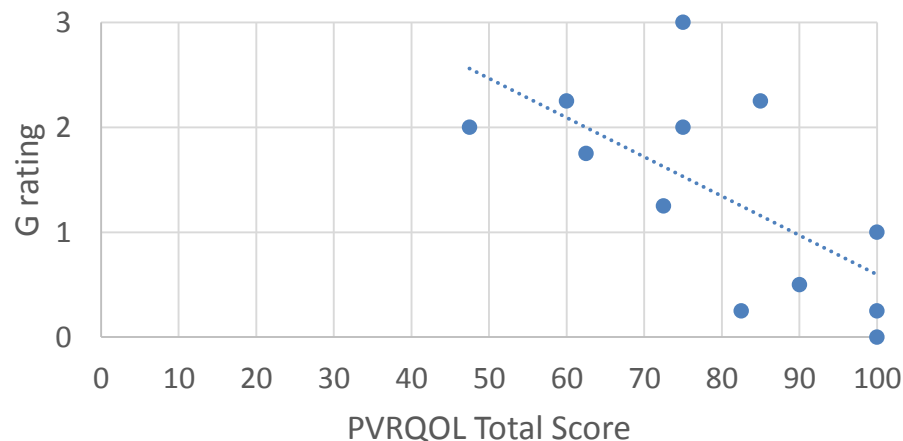
		PVRQOLTOTAL	Sustained vowel	How hard did he hit him	We were away a year ago	We eat eggs every Easter	Peter will keep at the peak	The blue spot is on the key again	My mama makes lemon muffins
PVRQOLTOTAL	Correlation Coefficient	1.000							
	Sig. (2-tailed)	.							
	N	12							
Sustained vowel	Correlation Coefficient	-.435	1.000						
	Sig. (2-tailed)	.158	.						
	N	12	12						
How hard did he hit him	Correlation Coefficient	-.504	.812**	1.000					
	Sig. (2-tailed)	.095	.001	.					
	N	12	12	12					
We were away a year ago	Correlation Coefficient	-.629*	.750**	.870**	1.000				
	Sig. (2-tailed)	.028	.005	.000	.				
	N	12	12	12	12				
We eat eggs every Easter	Correlation Coefficient	-.635*	.857**	.862**	.853**	1.000			
	Sig. (2-tailed)	.027	.000	.000	.000	.			
	N	12	12	12	12	12			
Peter will keep at the peak	Correlation Coefficient	-.641*	.826**	.926**	.836**	.859**	1.000		
	Sig. (2-tailed)	.025	.001	.000	.001	.000	.		
	N	12	12	12	12	12	12		
The blue spot is on the key again	Correlation Coefficient	-.676*	.738**	.869**	.938**	.807**	.887**	1.000	
	Sig. (2-tailed)	.016	.006	.000	.000	.002	.000	.	
	N	12	12	12	12	12	12	12	
My mama makes lemon muffins	Correlation Coefficient	-.494	.789**	.862**	.840**	.885**	.888**	.818**	1.000
	Sig. (2-tailed)	.103	.002	.000	.001	.000	.000	.001	.
	N	12	12	12	12	12	12	12	12

Significant correlation between PVRQOL total score and perceptual analysis of 4 sentences ($p < 0.05$)

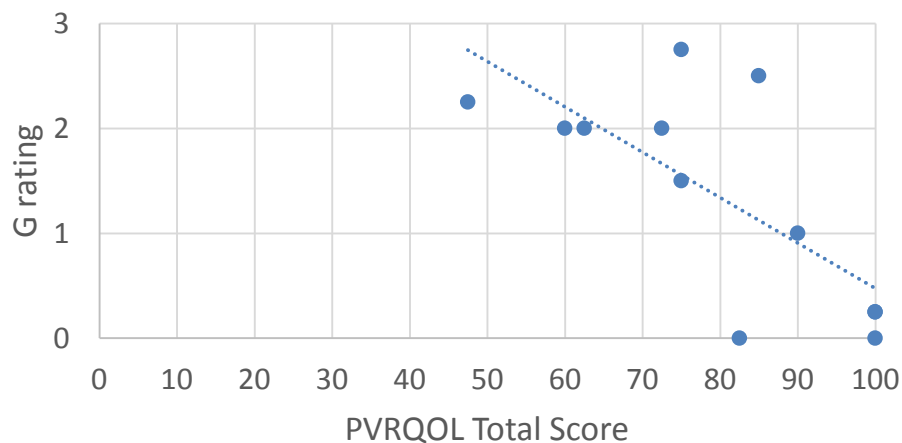
The blue spot is on the key again



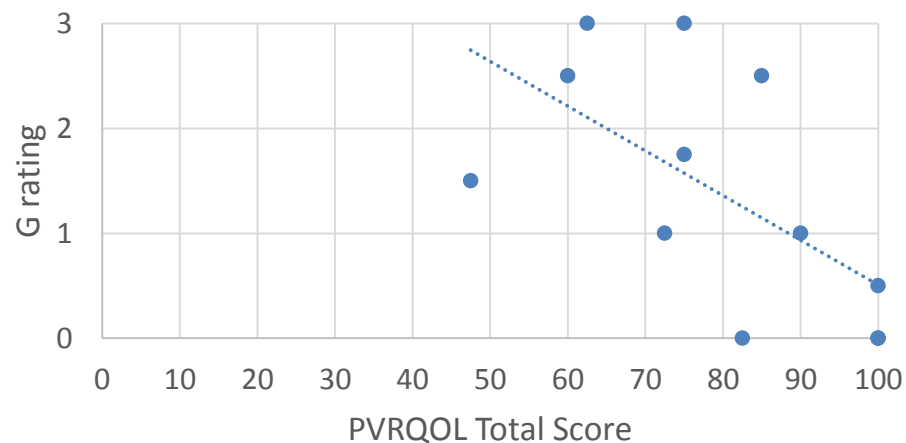
We eat eggs every Easter



We were away a year ago



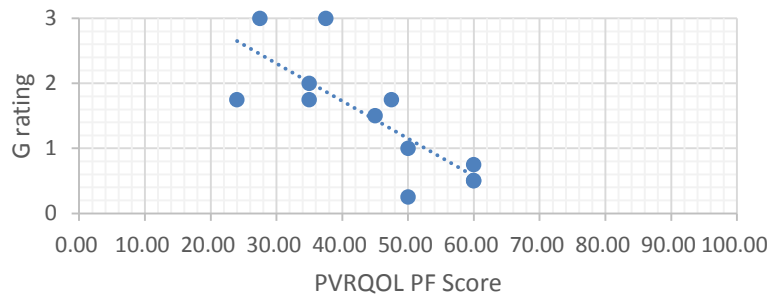
Peter will keep at the peak



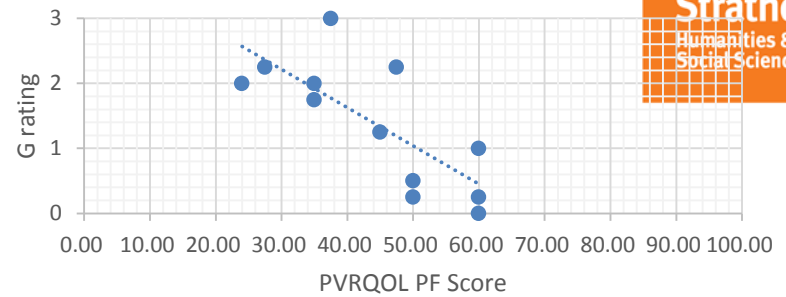
		PVRQOLPF	Sustained vowel	How hard did he hit him	We were away a year ago	We eat eggs every Easter	Peter will keep at the peak	The blue spot is on the key again	My mama makes lemon muffins
PVRQOLPF	Correlation Coefficient	1.000							
	Sig. (2-tailed)	.							
	N	12							
Sustained vowel	Correlation Coefficient	-.563	1.000						
	Sig. (2-tailed)	.057	.						
	N	12	12						
How hard did he hit him	Correlation Coefficient	-.643*	.812**	1.000					
	Sig. (2-tailed)	.024	.001	.					
	N	12	12	12					
We were away a year ago	Correlation Coefficient	-.746**	.750**	.870**	1.000				
	Sig. (2-tailed)	.005	.005	.000	.				
	N	12	12	12	12				
We eat eggs every Easter	Correlation Coefficient	-.702*	.857**	.862**	.853**	1.000			
	Sig. (2-tailed)	.011	.000	.000	.000	.			
	N	12	12	12	12	12			
Peter will keep at the peak	Correlation Coefficient	-.744**	.826**	.926**	.836**	.859**	1.000		
	Sig. (2-tailed)	.006	.001	.000	.001	.000	.		
	N	12	12	12	12	12	12		
The blue spot is on the key again	Correlation Coefficient	-.811**	.738**	.869**	.938**	.807**	.887**	1.000	
	Sig. (2-tailed)	.001	.006	.000	.000	.002	.000	.	
	N	12	12	12	12	12	12	12	
My mama makes lemon muffins	Correlation Coefficient	-.616*	.789**	.862**	.840**	.885**	.888**	.818**	1.000
	Sig. (2-tailed)	.033	.002	.000	.001	.000	.000	.001	.
	N	12	12	12	12	12	12	12	12

Significant correlation between PVRQOL physical functioning score and perceptual analysis of 5 sentences (p<0.05)

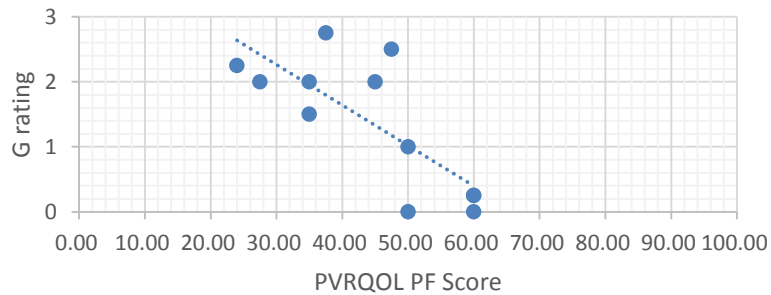
The blue spot is on the key again



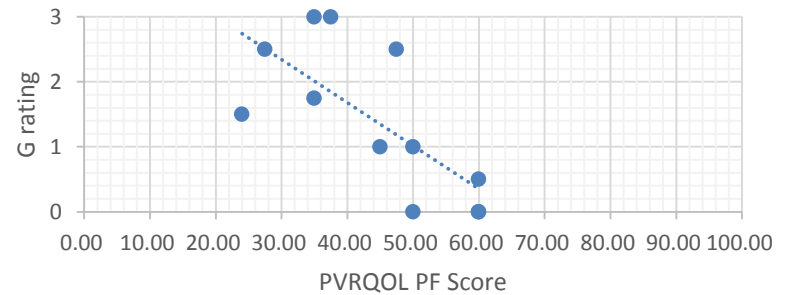
We eat eggs every Easter



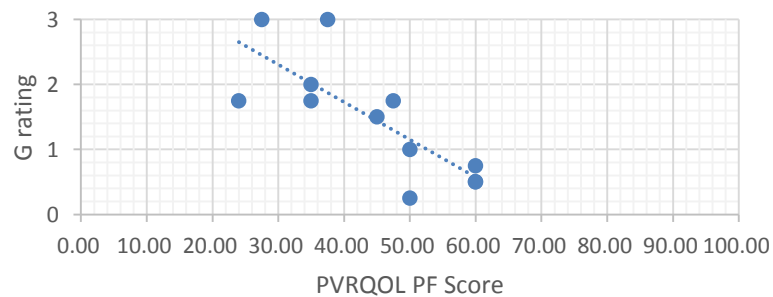
We were away a yaer ago



Peter will keep at the peak



The blue spot is on the key again



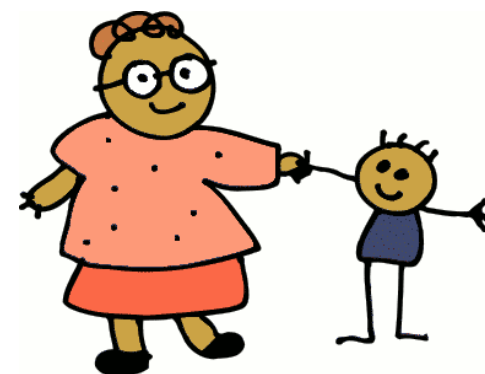
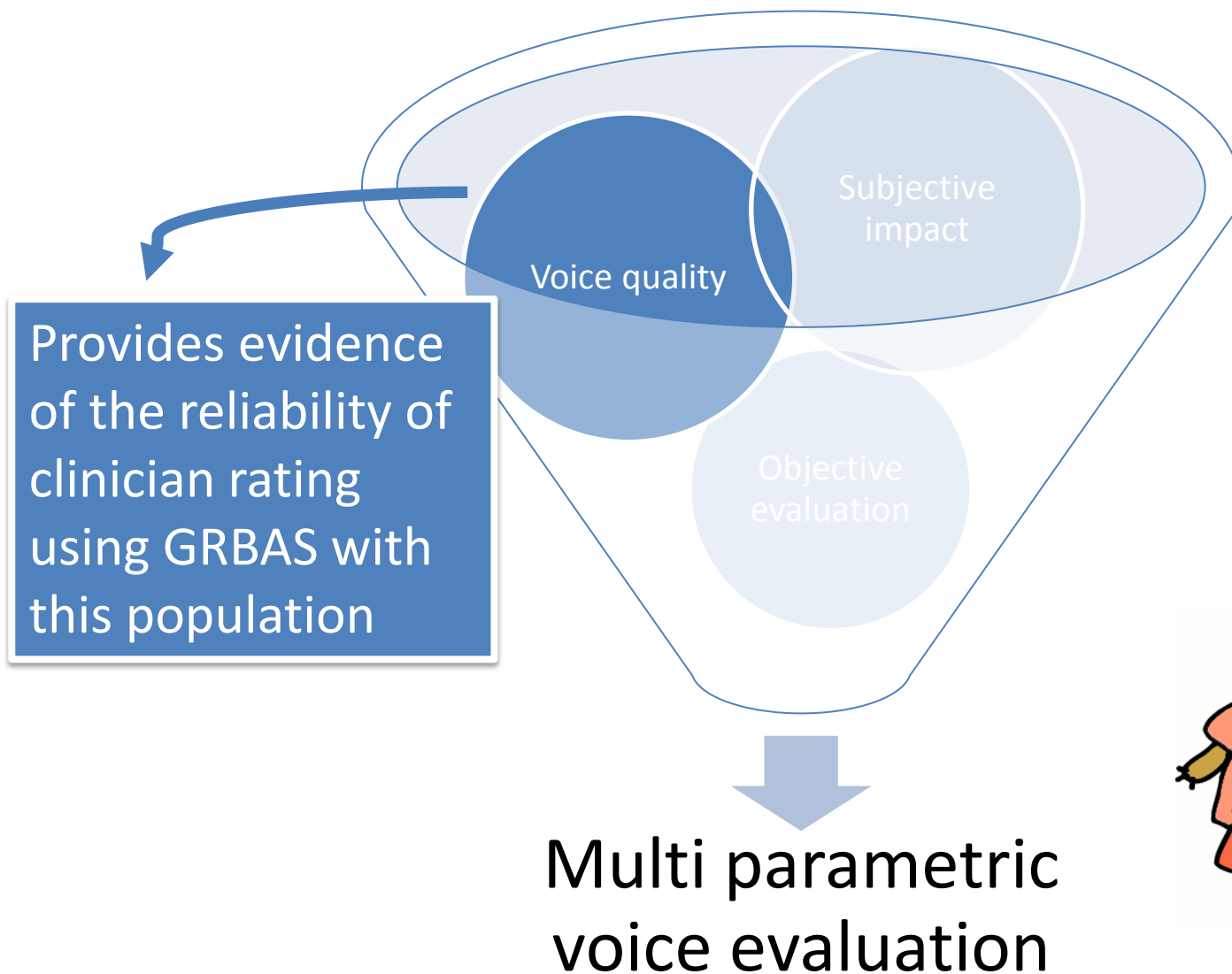
		PVRQOLSE	Sustained vowel	How hard did he hit him	We were away a year ago	We eat eggs every Easter	Peter will keep at the peak	The blue spot is on the key again	My mama makes lemon muffins
PVRQOLSE	Correlation Coefficient	1.000							
	Sig. (2-tailed)	.							
	N	12							
Sustained vowel	Correlation Coefficient	-.174	1.000						
	Sig. (2-tailed)	.588	.						
	N	12	12						
How hard did he hit him	Correlation Coefficient	-.133	.812**	1.000					
	Sig. (2-tailed)	.680	.001	.					
	N	12	12	12					
We were away a year ago	Correlation Coefficient	-.273	.750**	.870**	1.000				
	Sig. (2-tailed)	.390	.005	.000	.				
	N	12	12	12	12				
We eat eggs every Easter	Correlation Coefficient	-.398	.857**	.862**	.853**	1.000			
	Sig. (2-tailed)	.200	.000	.000	.000	.			
	N	12	12	12	12	12			
Peter will keep at the peak	Correlation Coefficient	-.321	.826**	.926**	.836**	.859**	1.000		
	Sig. (2-tailed)	.310	.001	.000	.001	.000	.		
	N	12	12	12	12	12	12		
The blue spot is on the key again	Correlation Coefficient	-.263	.738**	.869**	.938**	.807**	.887**	1.000	
	Sig. (2-tailed)	.408	.006	.000	.000	.002	.000	.	
	N	12	12	12	12	12	12	12	
My mama makes lemon muffins	Correlation Coefficient	-.190	.789**	.862**	.840**	.885**	.888**	.818**	1.000
	Sig. (2-tailed)	.555	.002	.000	.001	.000	.000	.001	.
	N	12	12	12	12	12	12	12	12

No correlation between PVRQOL socio-emotional score and perceptual analysis

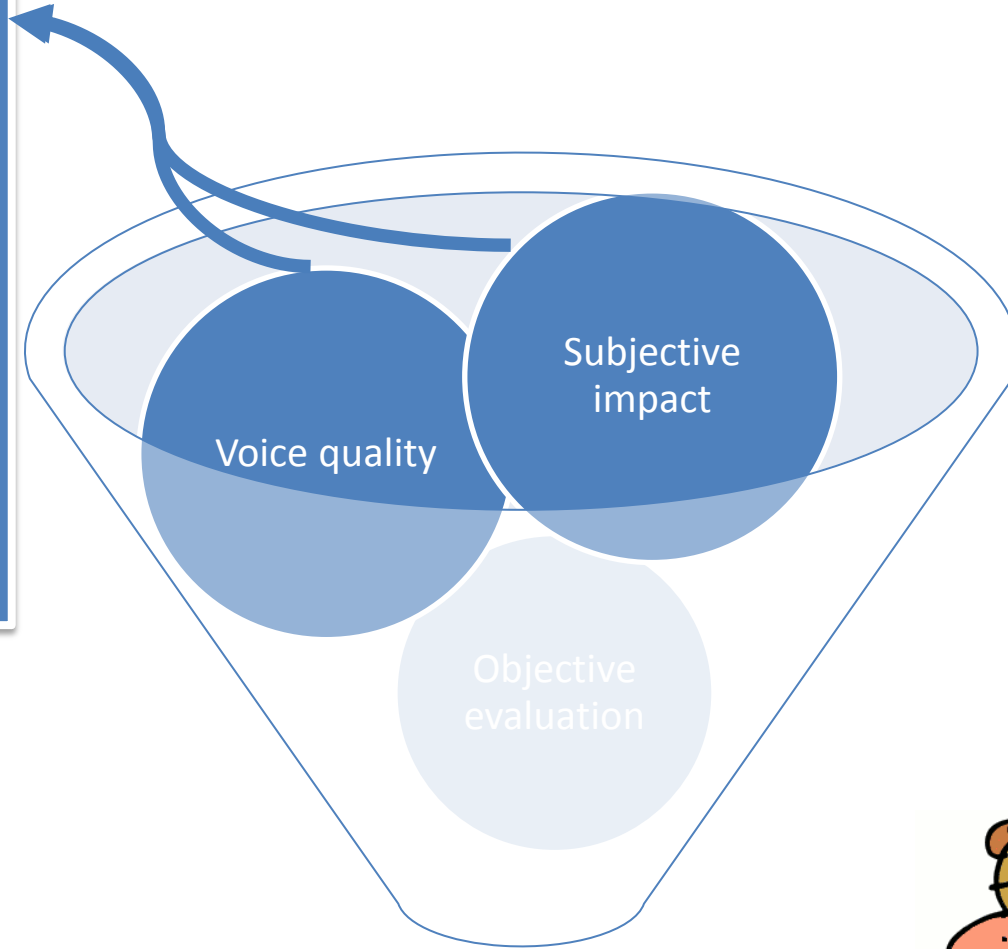
Findings

1. GRBAS is a reliable measure of paediatric voice
2. The relationship between parent reported subjective impact and clinician rating of voice quality is as complex in children as it is in adults
 - Parents' concern focus on physical functioning which we have found before (Cohen et al 2015) and this correlates with clinician rating

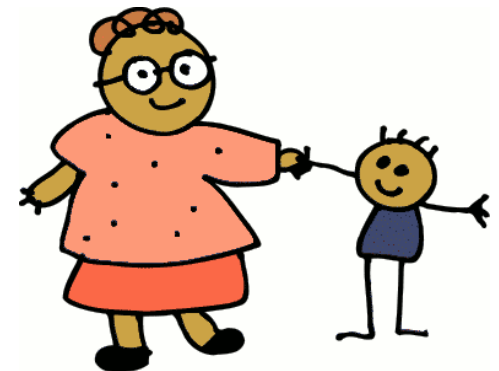
What this means for SLT



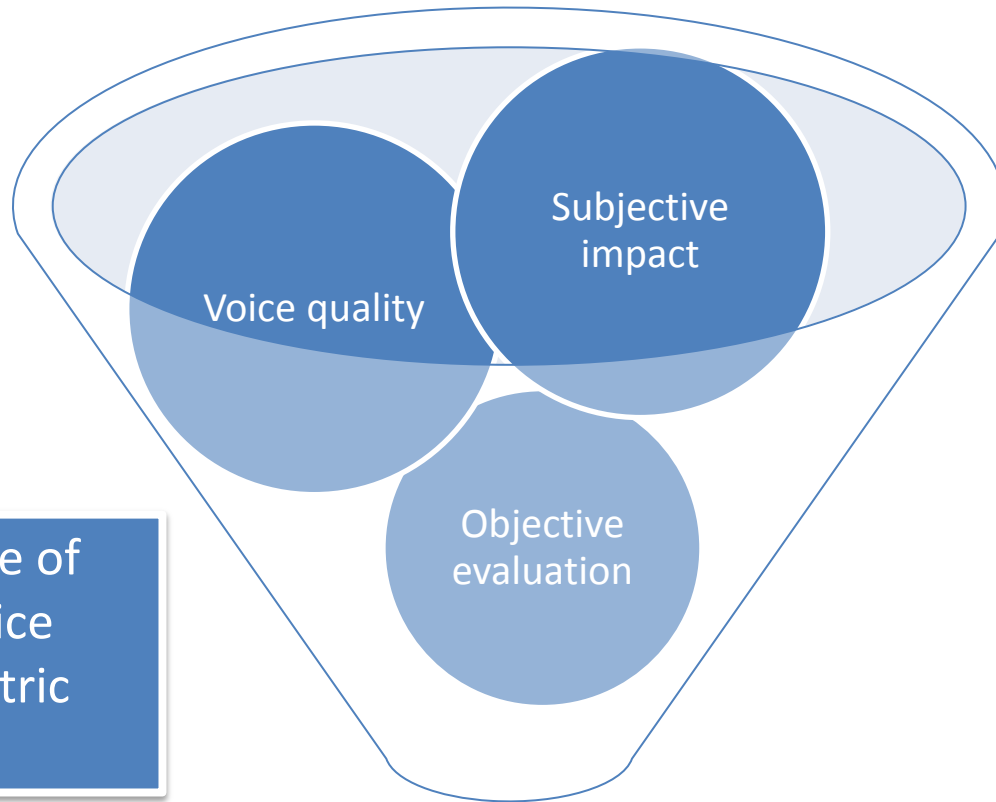
Correlation
between
parent report
and clinical
report –
particularly in
relation to
physical
functioning



Multi parametric
voice evaluation



So..



Evidence of the value of
multi-parametric voice
evaluation in paediatric
voice

Multi parametric
voice evaluation

References

- Cohen W & Wynne DM. (2015). Parent and Child Responses to the Paediatric Voice Related Quality of Life Questionnaire: A Pilot Study. *Journal of Voice*, 29(3):299–303.
- Karnell MP, Melton SD, Childes JM, Coleman TC, Dailey SA & Hoffman HT. (2007). Reliability of Clinician-Based (GRBAS and CAPE-V) and Patient-Based (V-RQOL and IPVI) Documentation of Voice Disorders. *Journal of Voice*, 21(5):576 – 590.
- Kelchner LN, Brehm SB, Weinrich B, Middendorf J, deAlaracon A, Levin L & Elluru R. (2008). Perceptual Evaluation of Severe Pediatric Voice Disorders: Rater Reliability Using the Consensus Auditory Perceptual Evaluation of Voice. *Journal of Voice*, 24(4):441-449.

With thanks to..

- Action Medical Research including The Hugh Fraser Foundation and Jeffrey Charitable Trust.
- The children and their families
- The listeners

What do these children sound like?

- Sustained /a/
- “We eat eggs every Easter”

