



Measuring Speech Intelligibility in Young Children (2.6y – 4.6y)

Dr. Romain Buekers, Maastricht

R.Buekers@srl.nl

Janine Bindels
Tineke Ramakers
Hogeschool Zuyd Heerlen

Drs.Griet vande Broek
Drs.Nele Baudonck
L&A, UGENT

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1. Motive

- How (un-)intelligible is the speaking of a child of 3y?
And what is normal/normative?
- The goal is NOT the diagnosis of the disorder (fonetic, fonologic, dysarthric, developmental apraxia of speech..) but objectivation of the (gravity of) disability...

we measure the extent of the childs handicap by scoring the comprehension of the listener
- Make oneself understood is a classification of functioning (and not of disorders)
 - There are no tests and no standards for children
 - Only clinical observations or rating scales (eg.SIR, Nottingham)
 - "descriptions" of intelligibility are exceptional, subjective and indefinite

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2. Definition Speech Intelligibility

How much does the listener understand of what the child means to say?

[pofoon] we hear and write down "pofoon"
but you have to write what the child means:
popcorn ? telephone ? policeman ?

We score 0 or 1 when the (distorted/ partial) spoken message is (mis)understood

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subtest 1 (25 words)

- Dylan, 3.3 y, looks at item 5 and says:

[fafa]

(The listener doesn't see the picture)

What does Dylan mean?

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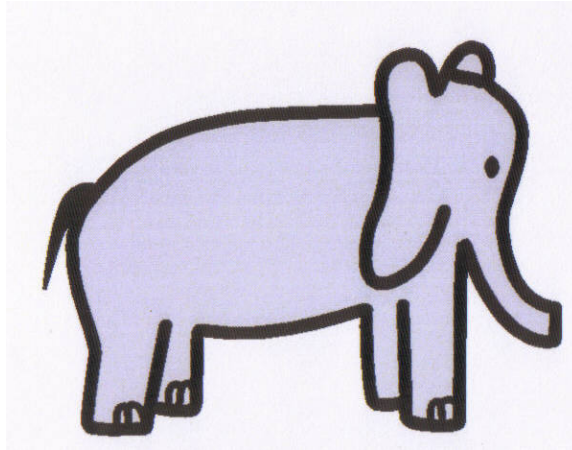


Scoring 25 woorden:

- eg. mother wrote : olifant : 1
father : fanta : 0
- Correctly understood word = 1 point

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Words, item 5: olifant



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Intelligibilities...

- The same procedure for Subtest 2 Sentences and Subtest 3 Little Story: speech intelligibility is more than correct hearing of a phonetic realisation, we include also semantic and pragmatics because it's indispensable in daily conversation
- Audiometric intelligibility: measures the % the hearing impaired understands (of perfect words) on the different intensity levels (is a problem of the listener and measures correct hearing, audibility)
- Linguistic comprehensibility: for the same message, there are different interpretations
 - * for Lea a nod is as good as a wink
 - * mother understands ..., daughter understands °°°°
 - * we hear the same but A understands more than B

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Speech production is more than sound production

- Rick, 4.3j
 1. Lil menee patot *1. De bril van meneer is kapot*
 2. It en telijn ope toto *2. Ik en mijn konijn op de foto*
 3. Die nouw met tie lalle *3. Die mevrouw is met de fiets gevallen*
- *Mother understands 90%*
- *You hear 100%, you understand 30%*

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To speak is more than speech production

- Pim, 4y:
 - "I make this and Gino knew; nothing has come... Mom does it always this way and than he fell. He tries ones again, but they were too late. Trains don't wait".
- *All speech sounds are correct, this speech is intelligible; words are correct, syntactic structure is correct, but the listener doesn't understand what the child means.*

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Literature: some conclusions

- There are no good standards for the (un)intelligibility of children and patients (phonologic, deaf/CI, dysarthric, laryngectomee...) despite the fact that this lack is a common complaint and at a same time a realistic target in speech therapy
- Articulation is an important factor in speech intelligibility (but not the one and only)
- Speech production tests have no standards for this young ages
- Investigation of speech intelligibility (adults) is commonly limited to sound production (words and non-sense words)

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Literature

- Allen&Nikolopoulos: Speech Intelligibility Rating in CI children
- Clark et al.:Speech ratings by speech clinicians, parents and children
- De Bodt et al. Handleiding NL Spraakvertstaanbaarheidsonderzoek
- Peter Flipsen: Measuring the intelligibility of conversational speech
- David Ingram: The measurement of whole-word productions
- Petra Jongmans:The intelligibility of tracheoesophgeal speech
- Ray Kent et al.: The intelligibility of children's speech
- Emy Konst: An intelligibility assessment of toddlers with cleft lip...
- Kwiatkowski&Shriberg:Intelligibility assessment in phonological diso.
- Scheringa:De spraakvertstaanbaarheid op woordniveau bij doven
- Wilcox&Morris: Preschool Speech Intelligibility Measure
- Yorkston et al.: Comprehensibility of dysarthric speech

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3. Measuring P% Speech Inlligibility

- AIM: how well or how poorly has the **communication partner** understood the child
- For comparable conditions, the context has to be the same, this means unknown
- Mimicry and gestures are excluded : the speech of the child is recorded (md-pc). (therefore no video)
- Content: perceptual evaluation and 3 subtests

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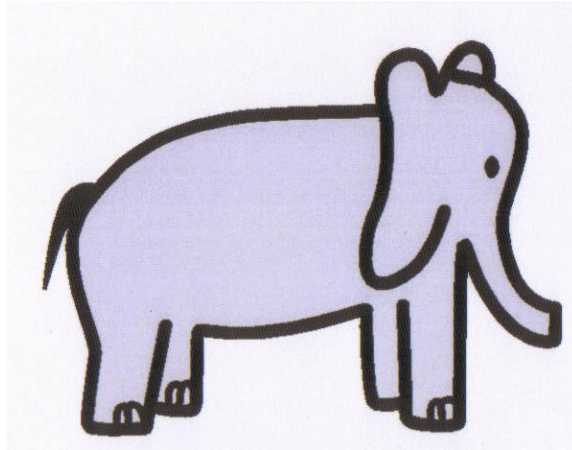
Perceptual evaluation

(before, familiar with)

- | | |
|--|----------------|
| ■ 1. Totally unintelligible
(only sounds, no words) | 0-20% |
| ■ 2. Largely unintelligible
(sometimes recognition of a word) | 20-40% |
| ■ 3. Poor intelligible
(only in well-known context) | 40-70% |
| ■ 4. Largely intelligible
(here and there misunderstanding) | 70-90% |
| ■ 5. Normal intelligible
(without efforts of the communication partner) | >90% |

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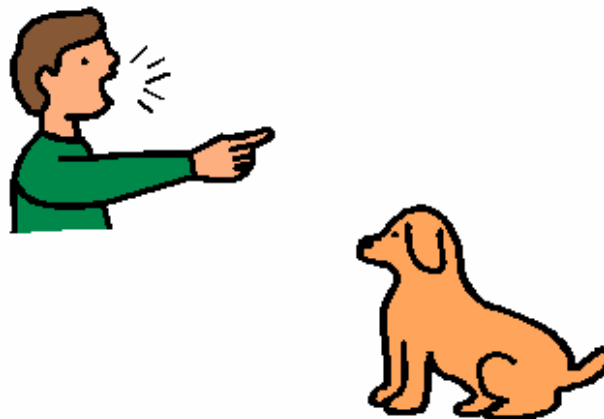
Subtest 1: naming or imitating
25 words



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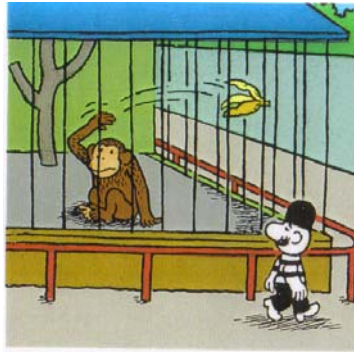
Subtest 2: Sentence production
(imitation) (7 sentences – scoring 30 words)

1. Het hondje is stout geweest.



Deel 3: Story (retell)

(4 pictures -4 sentences, scoring 13 words)



Vb.3: De aap gooit de schil weg.

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Perceptual Evaluation and scoring by parents

- "disadvantage": familiarity with the child, more favourable scoring
- advantage:same "judge" for each child
 - :clinical reality
 - :can give a perceptual evaluation before (validity)
- other familiar persons:babysitter,au pair,grandmother
- Also an unfamiliar person may score (no PE)
- As soon as the judges knows the context, they are no longer usefull for scoring

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Test Subjects

INCLUSION:

- Children from Limburg, Vlaams-Brabant, Oost-Vlaanderen, **Limburg, N-Brabant, Gelderland, Flevoland**
- Infant classes + **crèches /day nursery**
- A select group of children
(excluded: hearing impaired, schisis, bilingual)

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Test Subjects

	boys	girls	
2y6m – 3y	20+ 23	20+ 29	92
3y1d-3y6m	20+ 30	20+ 22	92
3y6m1d-4y	20+ 25	20+ 27	92
4y1d-4y6m	20+ 21	20+ 20	81
4y6m1d-5y	(6)	(6)	
total	179	178	357

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P.E. score – P%SI score

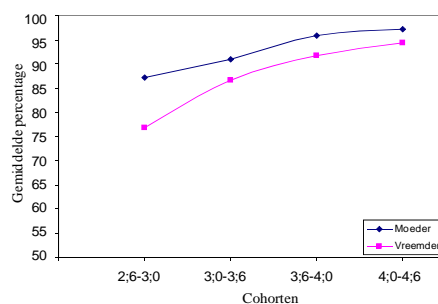
- Mothers estimate P%SI more correctly than fathers (if there is a speech-language problem)
- Estimation of mother is correct in 45%, in 35% they estimate too favourable
- general: PE corresponds best with the score of Words, than with the Story telling and worst with the Sentences

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Result Subtest Words

Cohort	Mother		Unfam	
	M	SD	M	SD
2;6-3;0	87,2	10,1	76,7	12,7
3;0-3;6	90,9	6,8	86,7	10,0
3;6-4;0	95,8	3,6	91,7	5,0
4;0-4;6	97,1	2,7	94,3	5,9



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4. Conclusions: (a)

- P%SI increases with age (alike for words, sentences and story)
- More than 90% of the 3.6y old children have more than 90% intelligibility with the mother (in this test/this degree of difficulty)
- Girls score slightly better than boys (NS).

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Conclusions: (b)

- Mothers understand their children better than fathers.
- Parents understand 5-15% better than unfamiliar persons
 - if the child has a developmental language problem
 - the discrepancy is more extensive in children with dld

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Conclusions: (c)

- 1: good scores on the 3 subs
- 2: low scores on the 3 subs: speech and language problem
- 3: low scores on words and better scores on sentences and story: speech problem
- 4: good scores on words and low scores on sentences and story: language problem

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5. From one's own experience

- Parents are faced with reality of the communicative disability of their child
- P%SI = recognizable notion, measures functional communication, no (differential) diagnostic or etiologic value
- Objectivates the problem a child's speech-language causes while interacting with others
- Objectivates the gravity of the problem
- Can measure the output effect of an intervention(...) and makes (...) transparent

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Clinical example

- Conner, °mrt 2004, Δ sep 2008 (4.6y)
- PE: mother evaluates 4 (70-90%)
father evaluates 3 (40-70%)

P%SI	words	sentences	story
Mother	88%	56%	38%
i.s.teacher	72%	46%	46%

Intelligibility is >-2SD

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6. Next...

- Publishing the manual, materials, instructions, reliability, normatives...
- Further on a parallel version and one for older children (4-6y?)
- Corresponds better in ICF context (than ICD classification)

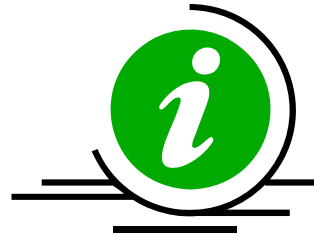
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Time...

- questions,
- remarks

R.Buekers@srl.nl



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