

Methodological issues of the Non-word repetition test: recorded stimuli vs. live stimuli



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Introduction

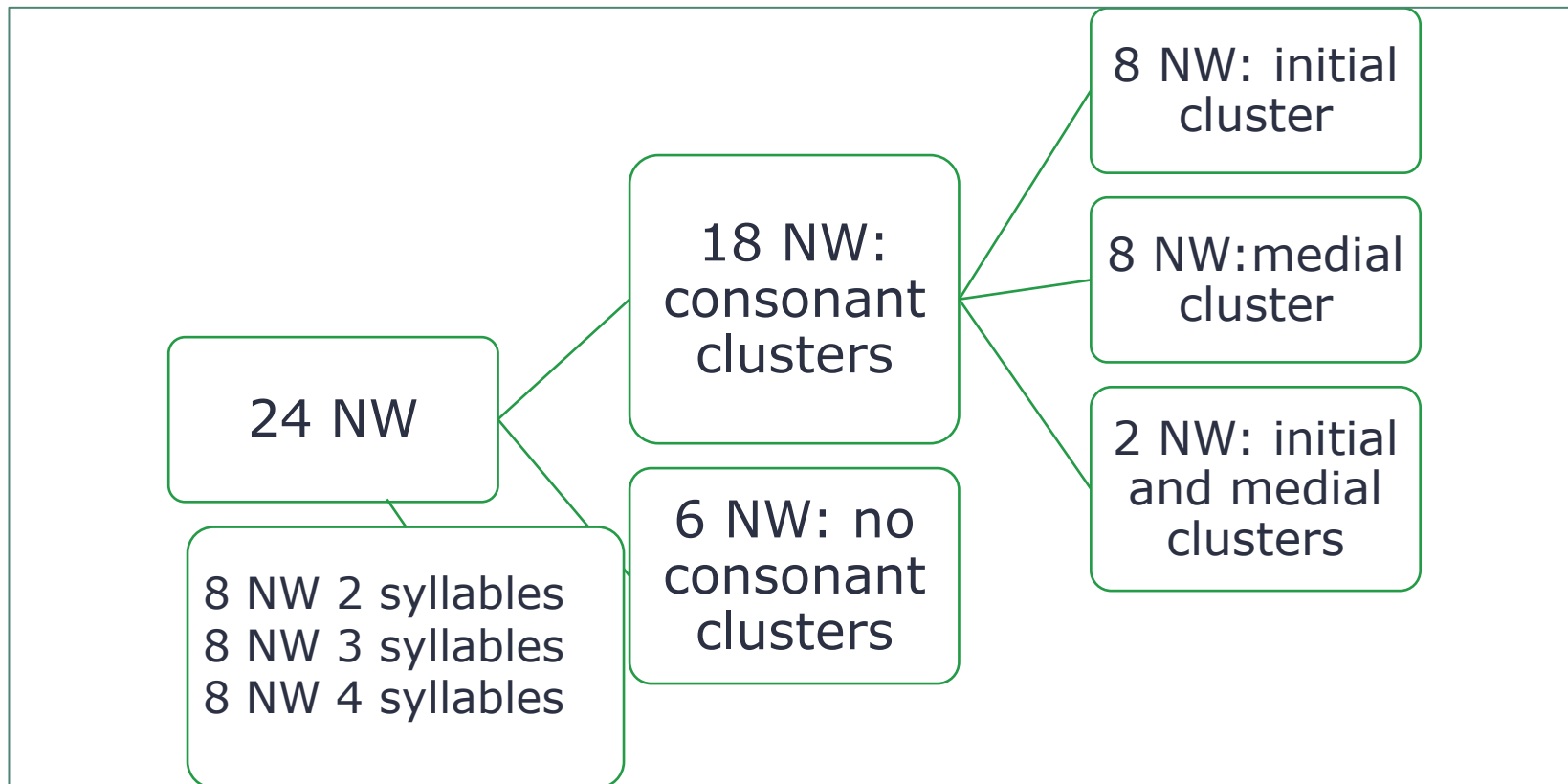
- Speech is a multimodal phenomenon in which the articulatory movements of the speaker produce correlated information in vision (i.e., lip movements) and audition (linguistic sounds). Indeed, the brain integrates both sources of information in order to decode the spoken message (Navarra and Soto-Faraco 2007).
- People are sensitive not only to acoustic cues in the speech signal but also to the visual cues present in a speaker's lips movements in face-to-face conversations. Watching a speaker's facial movements can enhance listener's ability to comprehend words especially in noisy environments (Hidalgo-Barnes & Massaro 2007; Okada & Hickok 2009).
- Using visual cues from the speaker's face to improve speech perception occurs automatically and implicitly, even when the auditory input is not impoverished (Iarocci et al. 2010).
- Speech development during childhood is not a straightforward auditory-only process but rather a complex process that is influenced by non-auditory sources of information such as visual speech (Erdener & Burnham 2013).

Non-word repetition test

- The non-word repetition test is important in monitoring the child's language development.
- It is an experimental method when the respondent is asked to repeat non-words – the phonological sequence of sounds which corresponds to phonotactic rules of a specific language and do not have any meaning and function in a sentence.
- To be able to repeat the word which is heard for the first time and does not have any meaning, linguistic-cognitive abilities are necessary: phonological processing, short-term memory, articulation abilities, etc. (Rispen, Parigger 2010).
- At a young age, the child's ability to repeat a new polysyllabic word that s/he hears for the first time shows his/her ability to learn new words and broaden his/her lexicon (Gathercole, 2006). Each word that the child heard for the first time some time ago sounded unusual and strange as the words in this test do (Chiat and Roy, 2007).

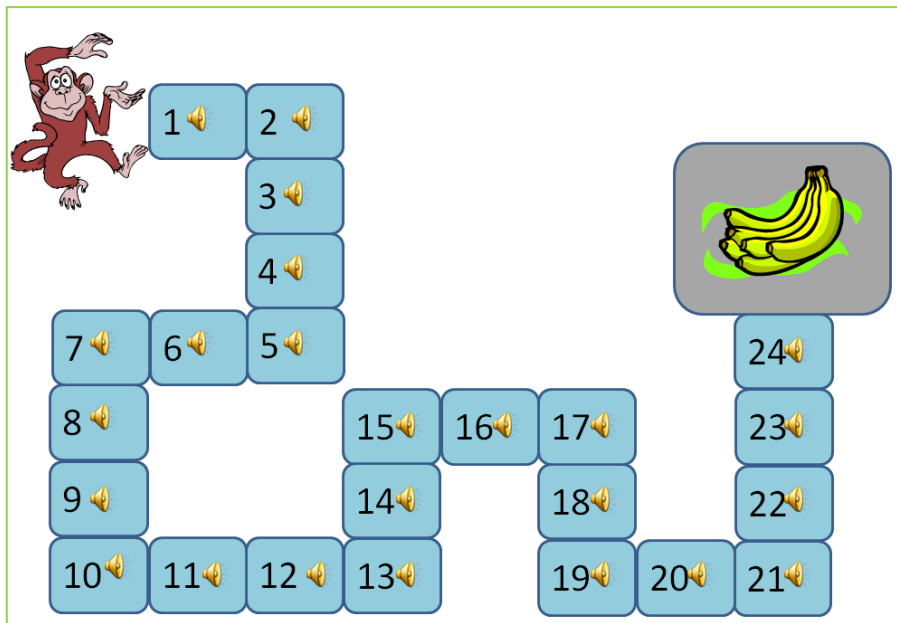
- The non-words can be presented in a two ways:
 - by researcher's live voice
 - by audiotaped recording.
- Live presentation is more flexible and may well assist in increasing engagement through greater opportunity for interaction, but it does mean that the delivery will be less consistent, and there is a greater likelihood of production errors by the experimenter (Polišenská and Kapalková 2014).
- One of the key reasons why recorded stimuli are used is being that this eliminates any visual cues. Furthermore usage of recorded stimuli ensures uniformity of input, eliminating variations in rate, pitch, volume, and other phonetic and auditory features of input that may occur when the tester delivers the stimuli and that may enhance or depress children's performance (Kapalková et al. 2013; Chiat, Roy 2007).

Structure of Lithuanian non-word repetition test



Procedure

1. The non-words were presented by experimenter live voice.
2. The non-words were presented by audiotaped recording.



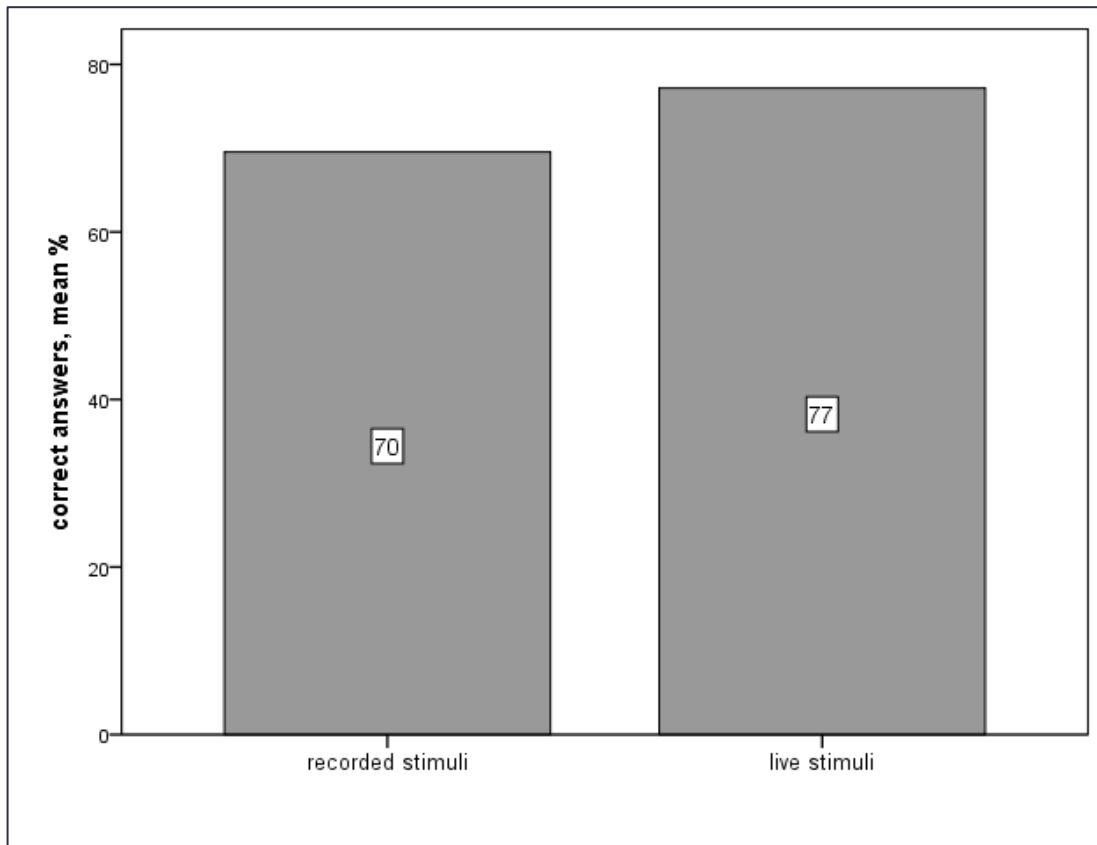
Visual of the Non-word repetition test (design by Kunnari, Tolonen, and Chiat, 2011)

Participants

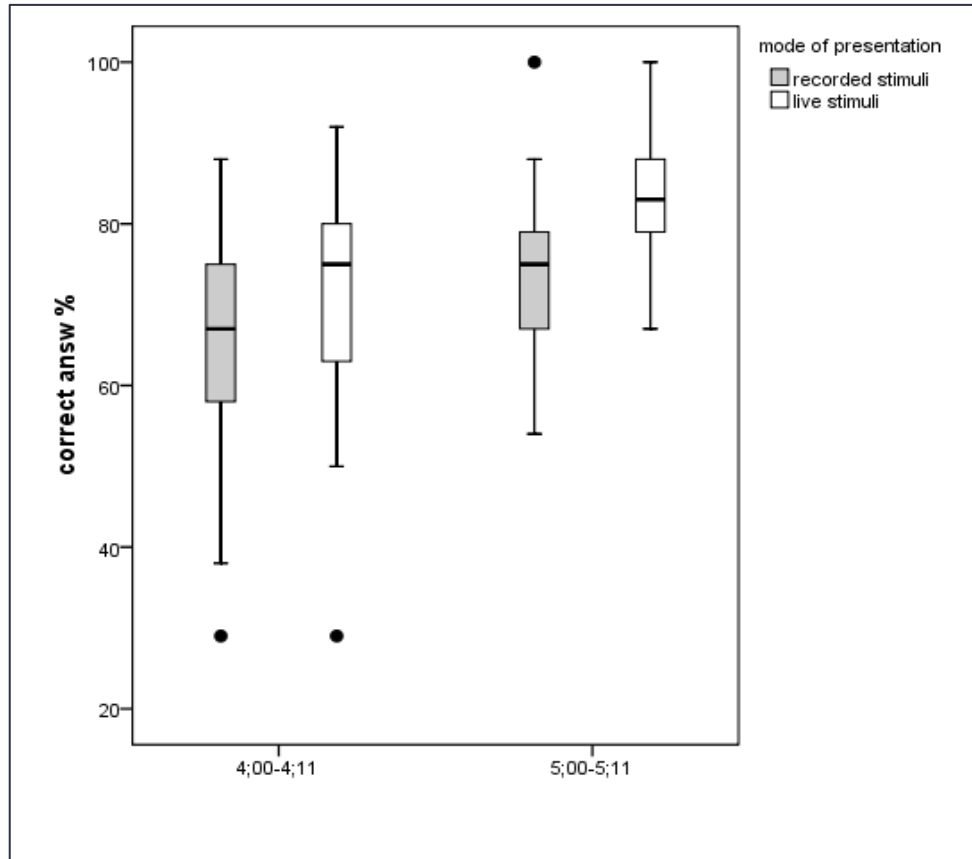
	Live stimuli		Recorded stimuli	
	4;00-4;11	5;00-5;11	4;00-4;11	5;00-5;11
N	25	25	25	25
Gender (F/M)	11/14	12/13	14/11	10/15

Results

Recorded stimuli vs live stimuli ($p=0.004$)

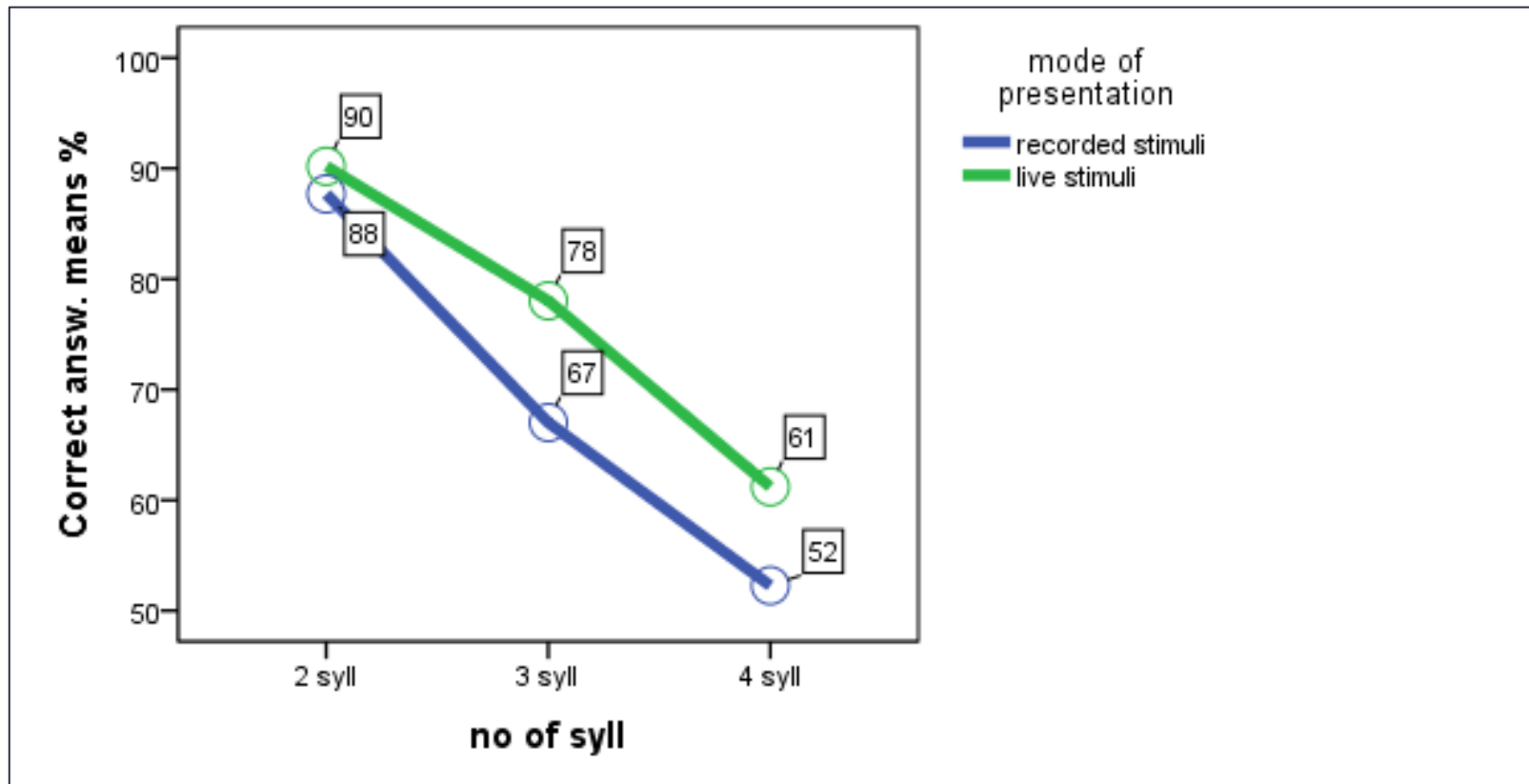


Age factor ($p=0.000$)



recorded stimuli ($p=0.039$)
live stimuli ($p=0.001$)

Length of the word ($p=0.000$)



Syllable complex structure – consonant clusters

($p=0.047$)

	2 syllable	3 syllable	4 syllable
Recorded stimuli	91 %	77 %	71 %
Live stimuli	96 %	84 %	75 %

Position of the cluster in the non-words: initial (p=0.510) vs. medial (p=0.031)

	2 syllable		3 syllable		4 syllable	
stimuli	live	recorded	live	recorded	live	recorded
initial						
Mean	95%	91 %	88%	86%	80%	81%
medial						
Mean	94%	92%	79%	68%	70%	62%

Conclusion and discussion

- The comparison of the methodologies of the Non-word repetition test indicates that methodology has influence on accuracy of the test results.
- Visual information helps easier to decode auditory information.
- Children were more interested in recorded stimuli.
- Because of children's concentration on the test as a game on a laptop screen, the non-words were listened not so carefully comparing to those non-words presented by experimenter live voice.

- Visual influence has increase with age. Age was a significant factor for the live stimuli, but not for recorded stimuli.
- The longer the word is, the worse the stimuli are repeated. Statistically significant differences were found.
- The analysis of complexity has shown that both the live and the recorded stimuli consonant clusters in two- and three- syllable non-words were repeated similarly; only consonant clusters in four syllable non-words presented by live voice were repeated significantly better then consonant clusters in four syllable non-words presented by audio-taped recording.
- The position of the consonant cluster was found to be important factor only in medial position of three syllable non-words: live stimuli statistically were repeated significant better than recorded stimuli.

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