

Can you tell a language disorder by its features?

Sentence and non-word repetition tasks for the differential diagnosis between developmental language disorder and speech sound disorders

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BACKGROUND

Developmental language disorder (DLD) and Speech sound disorders (SSD) are MOST COMMON PEDIATRIC DISORDERS IN THE SLP FIELD [1]

Some children face co-existing speech and language difficulties → **dual diagnosis (SSD+DLD)** [2]

Distinguishing between **SSD+DLD**, **SSD** and **DLD** children is a challenging task that is still largely unexplored in the literature. However, differences in the severity and type of errors do exist between the 3 profiles [3,4].

→ it is legitimate to question the existence of clinically relevant differential markers
→ recent studies have investigated the utility of sentence repetition (SR) and non-word repetition (NWR) tasks.

NWR and SR are considered valuable tools that are highly sensitive to pathology [5,6]. However :

- NWR would fail to differentiate **DLD** from **SSD** [7,8]
- SR seemed to be more promising than NWR in distinguishing **DLD** from **SSD** [7]
- SR and NWR have never been studied for the identification of **SSD+DLD**, among **SSD** and **DLD**.

More in-depth studies, especially in French, are needed to further understand the diagnostic utility of these two tests.

GOALS

Our study aims to determine the utility of SR and NWR tasks for the differential diagnosis of **SSD**, **DLD** and **SSD+DLD** in French-speaking preschoolers.

METHODS

143 monolingual French Speakers

48 to 67 months
μ = 56.3 ; SD = 6
70 ♀ & 73 ♂

→ Exclusion

- IQ ≤ P16, hearing loss ≥ 25dB,
- multilingualism, preterm birth (< 37 weeks)
- unwillingness to cooperate

Controlled on

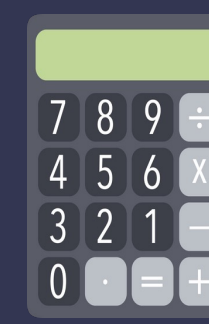
- Language
 - Expressive and receptive vocabulary skills
 - Expressive and receptive grammar skills
- Speech
 - Phonological production

Scores > -1SD on phonological production AND scores > -1.25 SD on language tests NT n=79

Scores < -1SD on phonological production BUT scores > -1.25 SD on language tests SSD n=27

Scores > -1SD on phonological production BUT scores < -1.25 SD on language tests DLD n=21

Scores < -1SD on phonological production AND scores < -1.25 SD on language tests SSD + DLD n=16

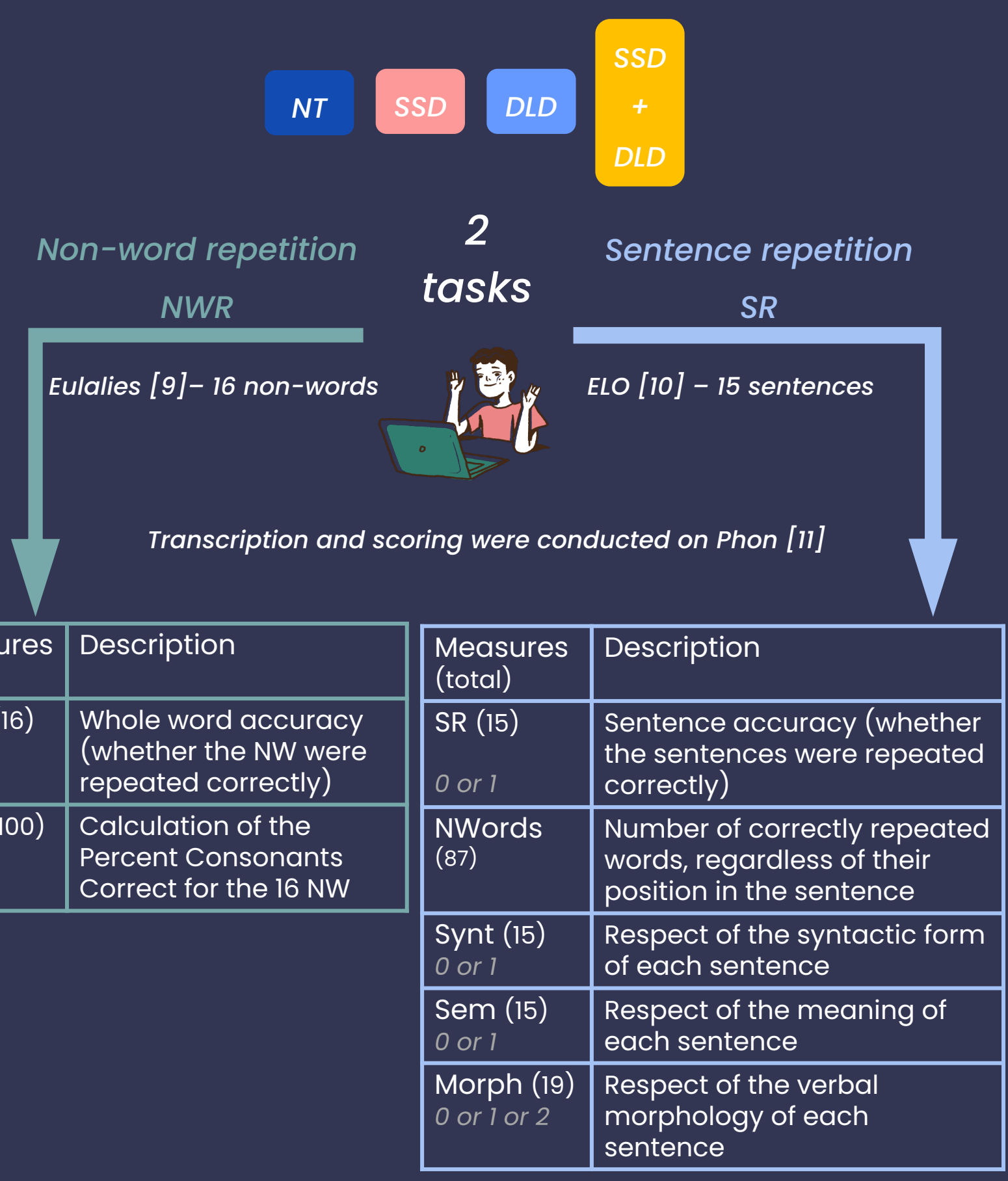


Group effect on SR and NWR measures

- 2 MANCOVA (Multivariate and univariate tests)

Utility/accuracy of SR and NWR for differential diagnosis

- Sidak Post-hoc analyses from Mancova
- Sensitivity-specificity analyses



Measures (total)	Description	Measures (total)	Description
NWR (16) 0 or 1	Whole word accuracy (whether the NW were repeated correctly)	SR (15) 0 or 1	Sentence accuracy (whether the sentences were repeated correctly)
PCC (100)	Calculation of the Percent Consonants Correct for the 16 NW	NWords (97)	Number of correctly repeated words, regardless of their position in the sentence
		Synt (15) 0 or 1	Respect of the syntactic form of each sentence
		Sem (15) 0 or 1	Respect of the meaning of each sentence
		Morph (19) 0 or 1 or 2	Respect of the verbal morphology of each sentence

Based on measures from Leclercq et al. (2013) [6]

Sensitivity = measure's ability to correctly identify a disorder in the children who have it.
= true positives / (true positives + false negatives) [12]

Specificity = measure's ability to correctly identify the children who do not have the disorder.
= true negatives / (true negatives + false positives) [12]

Efficacy = average of sensitivity and specificity

Threshold = 80% [12]

RESULTS

MEAN SCORES FOR THE 4 GROUPS

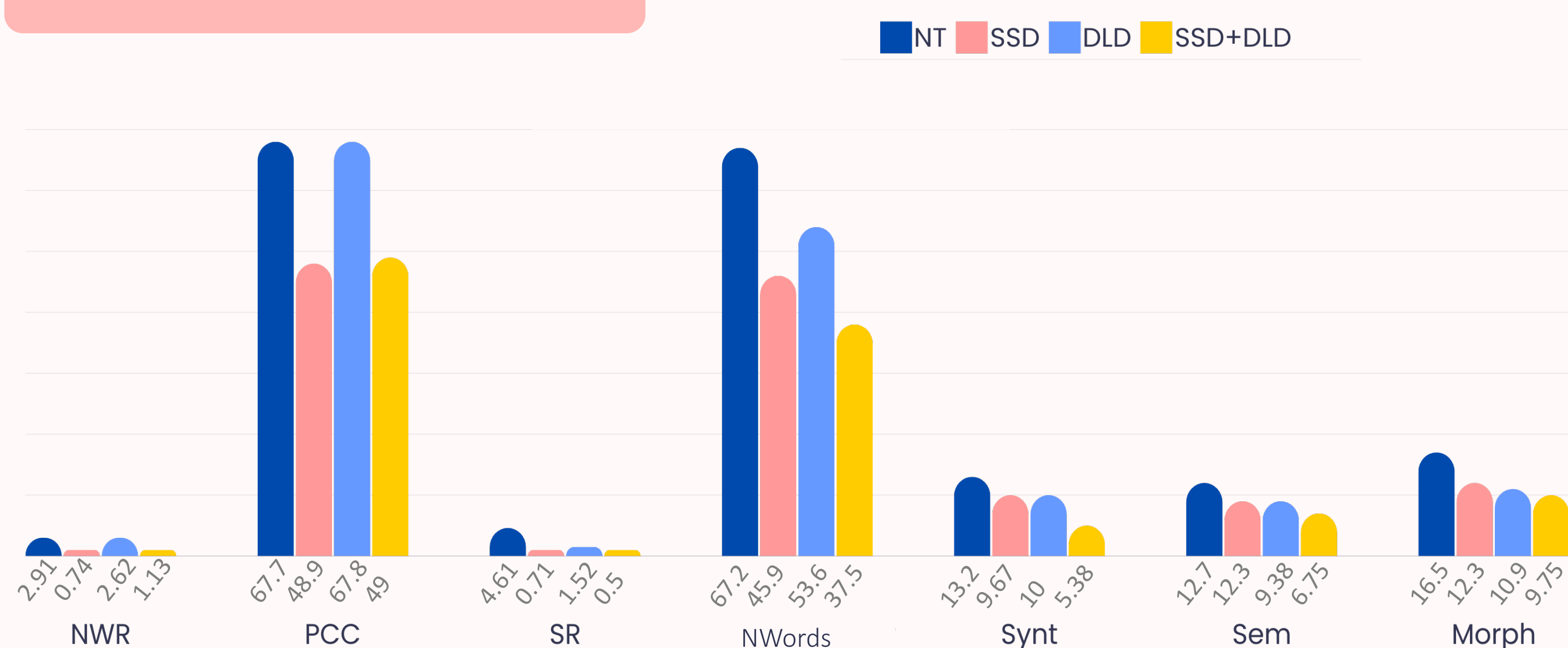


Figure 1. Mean scores on the different measures for the four groups of participants

DOES PERFORMANCE VARY WITH CLINICAL GROUPS?

MANCOVA

Multivariate tests → significant main effect of the groups on the NWR and SR variables, after controlling for age and socioeconomic status.

Group effect on NWR measures controlled by age and socioeconomic status

Measures	df	F	P-value	Partial η ²
NWR	3	10.14	<.001	.18
PCC	3	25.18	<.001	.36

Group effect on SR measures controlled by age and socioeconomic status

Measures	df	F	P-value	Partial η ²
SR	3	46.37	<.001	.5
NWords	3	51.58	<.001	.53
Synt	3	48.49	<.001	.52
Sem	3	34.43	<.001	.43
Morph	3	40.86	<.001	.47

Table 1&2. Univariate test results for the two Mancova

ARE NWR AND SR SENSITIVE TO LANGUAGE PATHOLOGY?

MANCOVA's Sidak post hoc + discriminant analyses

Measures	Mean difference	P-value	Se	Spe	Efficacy
NWR	2.04	<.001	92.6	44.3	56.6
PCC	19.07	<.001	81.5	82.3	82.1
SR	3.79	<.001	92.6	84.8	86.8
NWords	20.55	<.001	81.5	83.5	83
Synt	3.05	<.001	70.4	77.2	75.5
Sem	3.26	<.001	70.4	74.7	73.6
Morph	4.02	<.001	59.3	91.1	83

Measures	Mean difference	P-value	Se	Spe	Efficacy
NWR	.46	.924	23.8	72.2	62
PCC	1.01	1	9.5	81	66
SR	3.25	<.001	85.7	84.8	85
NWords	14.77	<.001	90.5	81	83
Synt	3.65	<.001	85.7	89.9	89
Sem	3.56	<.001	95.2	74.7	79
Morph	5.88	<.001	81	96.2	93

Measures	Mean difference	P-value	Se	Spe	Efficacy
NWR	2.09	.002	93.8	44.3	52.6
PCC	21.45	<.001	81.3	82.3	82.1
SR	4.55	<.001	93.8	84.8	86.3
NWords	32.63	<.001	93.8	93.7	93.7
Synt	8.18	<.001	81.3	94.9	92.6
Sem	6.55	<.001	75	88.6	86.3
Morph	7.39	<.001	87.5	79.7	81.1

Table 3,4&5. Post hoc test results for the two Mancova and discriminant analyses
Notes. Se = sensitivity ; Spe = Specificity

ARE NWR AND SR USEFUL FOR DIFFERENTIAL DIAGNOSIS?

MANCOVA's Sidak post hoc + discriminant analyses

Measures	Mean difference	P-value	Se	Spe	Efficacy
NWR	1.58	.042	92.6	38.1	68.8
PCC	18.06	<.001	81.5	90.5	85.4
SR	.54	.921	47.6	18.5	31.1
NWords	5.78	.390	38.1	33.3	35.4
Synt	-.6	.965	9.5	85.2	52.1
Sem	-.29	.999	28.6	66.7	50
Morph	-1.86	.220	61.9	66.7	64.6

Measures	Mean difference	P-value	Se	Spe	Efficacy
NWR	.06	1	96.3	6.3	62.8
PCC	2.39	.992	77.8	18.8	55.8
SR	.76	.788	93.8	7.4	39.5
NWords	12.08	.006	93.8	44.4	62.8
Synt	5.13	<.001	81.3	77.8	81.4
Sem	3.28	.001	75	66	69.8
Morph	3.37	.005	68.8	55.6	60.5

Measures	Mean difference	P-value	Se	Spe	Efficacy
NWR	1.64	.085	81.3	90.5	86.5
PCC	20.44	<.001	93.8	38.1	62.2
SR	1.03	.249	87.5	52.4	67.6
NWords	17.86	<.001	93.8	71.4	81.1
Synt	4.53	<.001	81.3	76.2	78.4
Sem	2.99	.005	75	81	78.4
Morph	1.51	.6	56.3	81	70.3

Table 6,7&8. Post hoc test results for the two Mancova and discriminant analyses
Notes. Se = sensitivity ; Spe = Specificity

DISCUSSION POINTS AND PERSPECTIVES

NWR task is sensitive to **SSD** and **SSD+DLD**, but are not sensitive to **DLD without SSD**
SR task is sensitive to the three profiles

SR is more sensitive to pathology than NWR = consistent with [7]

On **NWR**, the performances of the groups can be summarized as **NT = DLD > SSD = SSD+DLD**
On **SR**, the performances of the groups can be summarized as **NT > DLD = SSD > SSD+DLD**

In our results, **SR** measures failed to discriminate **SSD** from **DLD** but **NWR** measures, especially **PCC**, showed good discriminant accuracy

→ hypotheses and findings in similar works [7,8]

- We have separated SSD+DLD profiles from DLD profiles. In other works, SSD+DLD & DLD = 1 same group
- Differences between DLD and SSD+DLD also include severity. Children included in our DLD group may have a less severe profile than children with SSD+DLD → Our DLD children performed better than expected on SR.
- Our study included more and different SR measures than similar papers.

NWR could not distinguish **SSD** from **SSD+DLD** but could distinguish **DLD** from **SSD+DLD**.

- The lack of distinction between SSD and SSD+DLD suggests that speech impairment are = between the 2 profiles
- confirms to the need to name the dual diagnosis with an 'SSD' label and not 'DLD (phonology)' or 'DLD' [2]

SR could accurately distinguish **SSD** from **SSD+DLD** and **DLD** from **SSD+DLD**

- This result was expected, as the SSD+DLD group has a more severe profile. It confirms our hypotheses that **SR** is a promising tool for the differential diagnosis between closely related disorders.

In a nutshell :



Sentence and non-word repetition tasks are very useful and accurate tools for the differential diagnosis of **SSD**, **DLD** and **SSD+DLD** in preschool children. Sentence and non-word repetition tasks should be used together for more accurate profile identification.