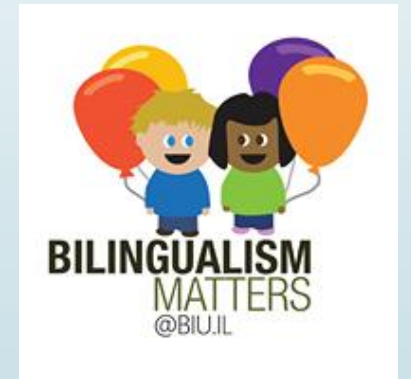# A longitudinal study of the contribution of a diglossia-centred Arabic literacy intervention in kindergarten to reading skills in the 3rd grade

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BILINGUALISM MATTERS @BIU.IL

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Earlier Research

- Literacy acquisition is grounded in early linguistic and meta-linguistic skills(Castels, Coltheart, Wilson, Valpied & Wedgwood, 2009, Jacobs ,2004).

- Early literacy intervention is thus needed in order to counteract the Mathew-effects of reading (Stanovich, 1986).

- Early Intervention is particularly needed in contexts that challenge literacy acquisition, such as in diglossic/dialectal contexts (Saiegh-Haddad, Laks, & McBride, 2022)

  - linguistic distance between the language of everyday speech and the language of literacy.

  - Limited exposure and active use of the language of literacy.

Arabic diglossia in a nutshell

Standard Arabic (StA)

Spoken Arabic (SpA)
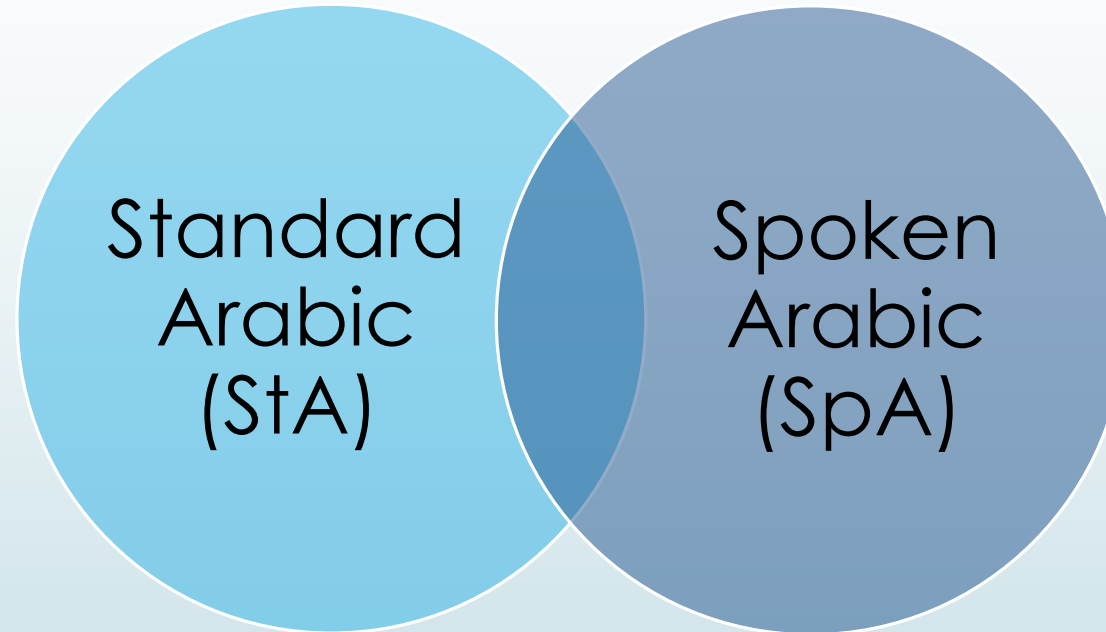
Linguistic distance across all language domains.
Socio-functional complementarity and rigid separation.
Limited exposure and active use of StA.
Dominance of SpA and poor linguistic proficiency in StA.

Earlier Research

➡ Notwithstanding a transparent Arabic orthography (vowelized-phonological, unvowelized-morphological), acquiring literacy in Arabic has been shown to challenge children because of linguistic distance between the spoken language/dialect (SpA) and the standard written language (MSA, StA) (for a review, Saiegh-Haddad, 2022a).

➡ Linguistic distance impacts the acquisition of:

   ➡ Lexical-phonological representations and processing in memory (Saiegh-Haddad & Ghawi-Dakwar, 2017; Saiegh-Haddad & Haj, 2018).

   ➡ Phonological awareness and phonological decoding (Saiegh-Haddad, 2003, 2004, 2007; Saiegh-Haddad et al., 2011, 2020).

   ➡ Morphological awareness (Schiff & Saiegh-Haddad, 2018; Saiegh-Haddad et al., submitted).

   ➡ Word reading accuracy and fluency (Saiegh-Haddad & Schiff, 2016).

   ➡ Word spelling (Saiegh-Haddad et al., 2023).

Earlier Research

- Intervention studies in Arabic are limited and they have not addressed diglossia.

- In a single published study (Saiegh-Haddad, 2022b) we showed that it is possible to enhance metalinguistic awareness (phonological awareness and morphological awareness) in StA among kindergarten children by training metalinguistic awareness in SpA.

- This finding aligns with earlier evidence showing cross-lectal transfer of linguistic (Jumaa, Armon-Lotem, & Saiegh-Haddad, submitted) and metalinguistic skills (Schiff & Saiegh-Haddad, 2018) between SpA and StA.

Earlier Research

In an earlier intervention study (Haj, Schiff & Saiegh-Haddad, submitted) we investigated the contribution of a diglossia-centred multi-domain intervention program to children's Language, Meta-linguistic, Cognitive, and Literacy skills.

- 20 weeks, 60 sessions (20 minutes each) implemented by the teacher.

- 1054 kindergarten children (Age M = 64.16 months, SD = 3.52; low SES).

  - 854 children: Experimental intervention group.

  - 200 children: Control group, Business-as-usual.

The intervention program

- diglossia-centered
  - Three-pronged approach:
    a) Developing children's linguistic, metalinguistic and literacy skills in SpA first and then in StA. Namely, leveraging SpA skills as a basis for StA skills.
    b) Taking linguistic distance into account in the content and procedures of activities.
    c) Embedding 'diglossic awareness' within all activities.
- Multi-domain
  - Combined language, literacy, metalinguistic and meta-cognitive skills (Van de Sande, Segers & Verhoeven ,2018)
   - PA, MA, Vocabulary, Lexical awareness, Narrative skills, Letter knowledge, decoding, encoding.

Results in kindergarten

- Two-way ANOVA with Group (Intervention, Control) as a between subject factor and Time (Before, After the intervention) as a within subject factor showed significantly larger gains in the intervention group across all domains compared to the control group.

Metalinguistic Awareness: Before and after the intervention
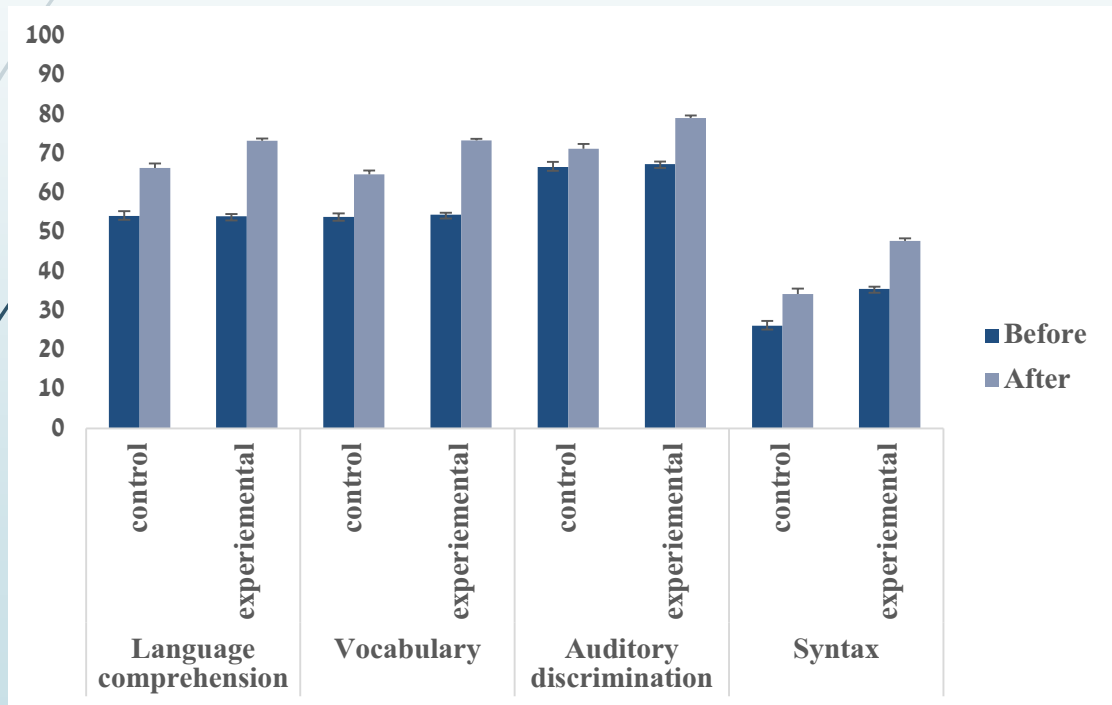
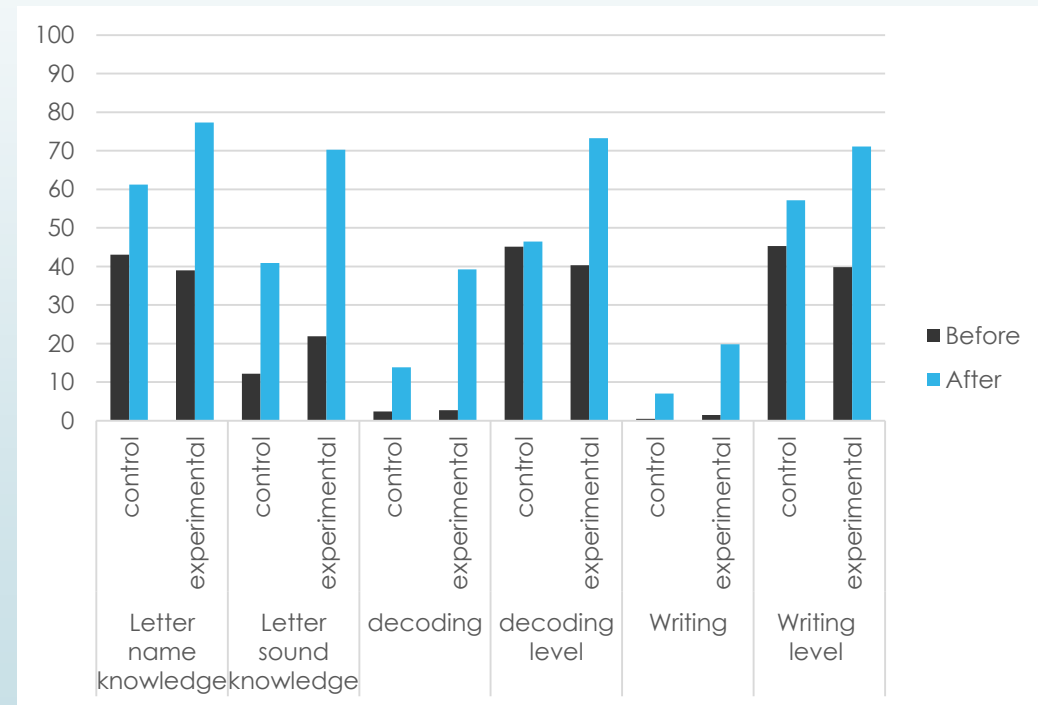## Phonological awareness
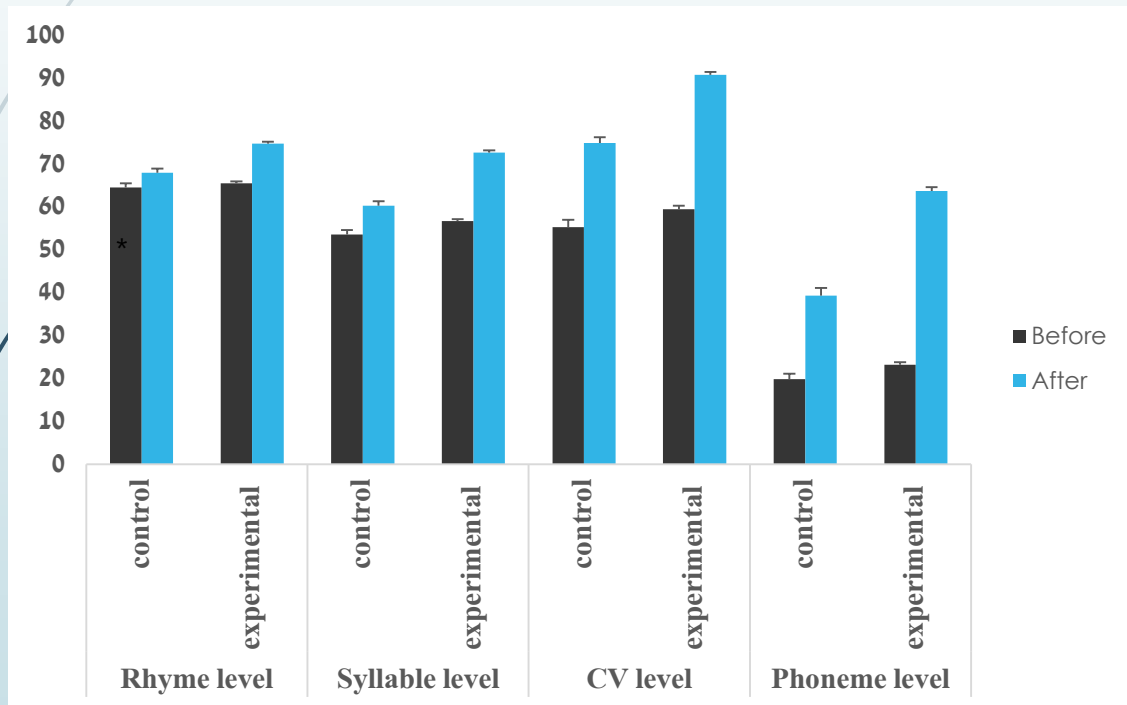
Morphological awareness
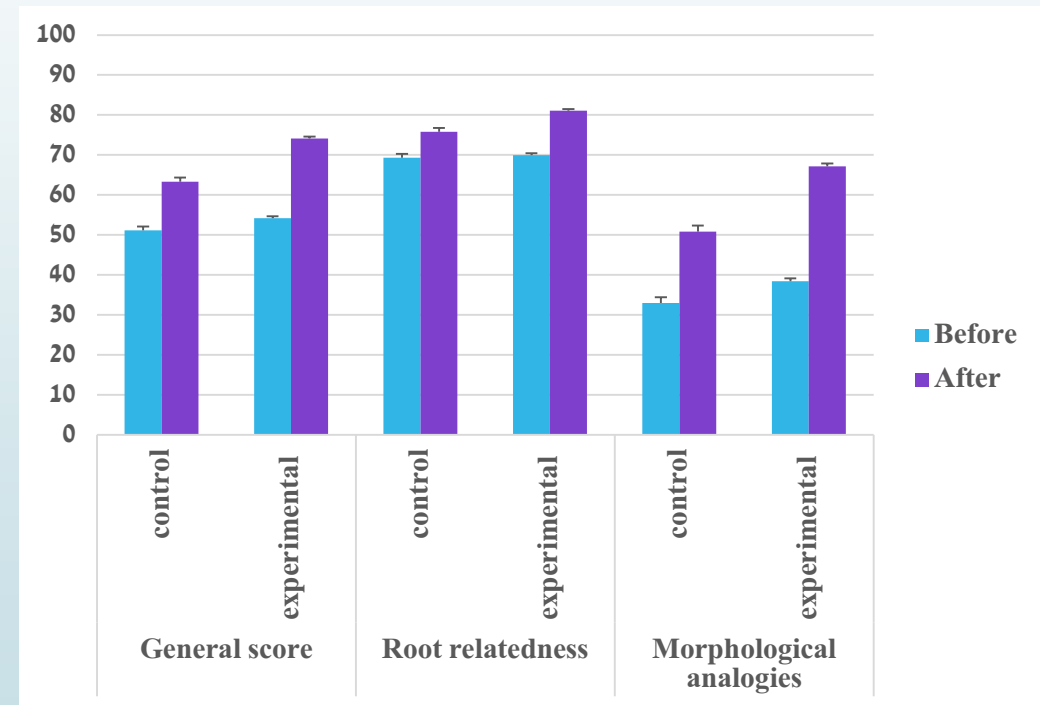
Language and Literacy: Before and after the intervention

Language skills

Literacy skills

Cognitive skills

Skill	test	group		Before		After		F (η_p^2)		
			N	M	SD	M	SD	time	group	interaction
RAN: shapes	speed	Control	200	92.61	33.41	95.27	34.52	*** 14.99 (.01)	0.45 (.00)	35.45 *** (.03)
		experimental	854	101.77	36.44	89.19	29.62			
RAN: objects	speed	Control	200	87.63	21.38	89.33	25.5	9.22** (.01)	0.06 (.00)	20.92*** (.02)
		experimental	854	92.3	26.81	83.89	23.38			
Semantic fluency		Control	200	20.92	6.18	20.64	6.92	37.71*** (.04)	13.59*** (.01)	49.88*** (.05)
		experimental	854	20.43	6.08	24.44	7.78			
Phonemic fluency		Control	200	6.65	4.76	6.75	4.63	112.87*** (.10)	29*** (.03)	106.34*** (.09)
		experimental	854	5.64	4.51	12.35	9.12			
digit span	Forward	Control	200	5.13	1.47	5.39	1.54	32.92*** (.03)	1.66 (.00)	3.17 (.00)
		experimental	854	5.14	1.52	5.65	1.64			
	Backward	Control	200	1.27	1.18	1.86	1.36	153.61*** (.13)	6.05* (.01)	6.86** (.01)
		experimental	854	1.31	1.18	2.21	1.3			

*$p < .05$, **$p < .01$, ***$p < .001$

The Current Study

- **<u>Aims:</u>**
- Test the long-term contribution of the kindergarten intervention to children's skills in the third grade.

- Test the contribution of the intervention to the prediction of reading skills in the third grade.

- Test the contribution of diachronic (kindergarten) and synchronic (third grade) measures to the prediction of reading in the third grade, beyond the contribution of the intervention.

The Current Study

- **<u>Participants:</u>**
  - 306 children were semi-randomly sampled from the 1054 children participating in the original intervention study in kindergarten, and followed in the third grade.
    - 194 children from the intervention group (64.1%)
    - 112 children from the control group (36.6%)
- **<u>Tasks:</u>**
  - Kindergarten measures: language, metalinguistic awareness and basic literacy tasks.
  - Third grade measures: language, metalinguistic awareness, word reading and reading comprehension.

Kindergarten Measures

- **Oral Language:**
  - Phonological representations/auditory discrimination (a = .78)
  - Vocabulary: Receptive and Productive (a = .82)
- **Phonological awareness:**
  - Rhyming decision (a = .74).
  - Syllable awareness: blending, segmentation and deletion (a = .84)
  - CV awareness: blending, segmentation (a = .76)
  - Phoneme awareness: blending, segmentation, isolation, deletion (a = .86)
- **Morphological awareness:**
  - Root awareness/root relatedness (a = .84)
  - Morphological root and pattern analogies (a = .83)
- **Basic literacy skills:**
  - Letter name and Letter Sound
  - Simple CVC word decoding (a = .90)
- **Cognitive skills:**
- Rapid naming: RAN-objects, RAN-shapes
- Memory: Digit Span (forward STM, backward WM)

Third Grade Measures

- **Oral Language:**
  - Vocabulary: Receptive and Productive (a = .92)
  - Listening comprehension (a = .80)
- **Phonological awareness:**
  - Phoneme segmentation (a = .95)
  - Phoneme deletion (a = .81)
- **Morphological awareness:**
  - Sentence completion: derivation (a = .86)
  - Sentence completion: inflection (a = .89)
- **Literacy skills:**
  - Letter naming speed
  - Word reading accuracy: SpA (a = .92) and StA (a = .92)
  - Word reading fluency: SpA and StA
  - Reading Comprehension (a = .87)

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Results

# Group equivalence on kindergarten pre intervention measures

Groups were matched on kindergarten pre intervention measures

| Kindergarten measures	Control (n = 112)		Intervention (n = 194)			ANOVA		
	M	SD	M	SD		F	p	η_p^2
Vocabulary	56.22%	12.72	55.64%	12.21		.16	.691	.00
Auditory Discrimination	66.22%	17.85	66.84%	19.91		.07	.786	.00
PA-Rhyming	63.87%	11.45	65.33%	11.43		1.15	.284	.00
PA-Syllable	54.45%	16.87	56.66%	14.24		1.49	.224	.00
PA-Phoneme	24.26%	20.50	27.70%	14.85		2.87	.091	.01
MA	52.93%	13.67	54.00%	12.12		.50	.478	.00
RAN	90.68%	23.11	93.74%	21.12		1.39	.239	.00
Letter Name	46.09%	26.29	45.09%	25.91		.10	.748	.00
Letter Sound	17.86%	23.37	23.44%	25.42		3.64	.057	.01
Word decoding	33.45%	26.76	33.76%	22.38		.01	.914	.00

RQ#1:The long-term contribution of the kindergarten intervention to children's skills in the third grade

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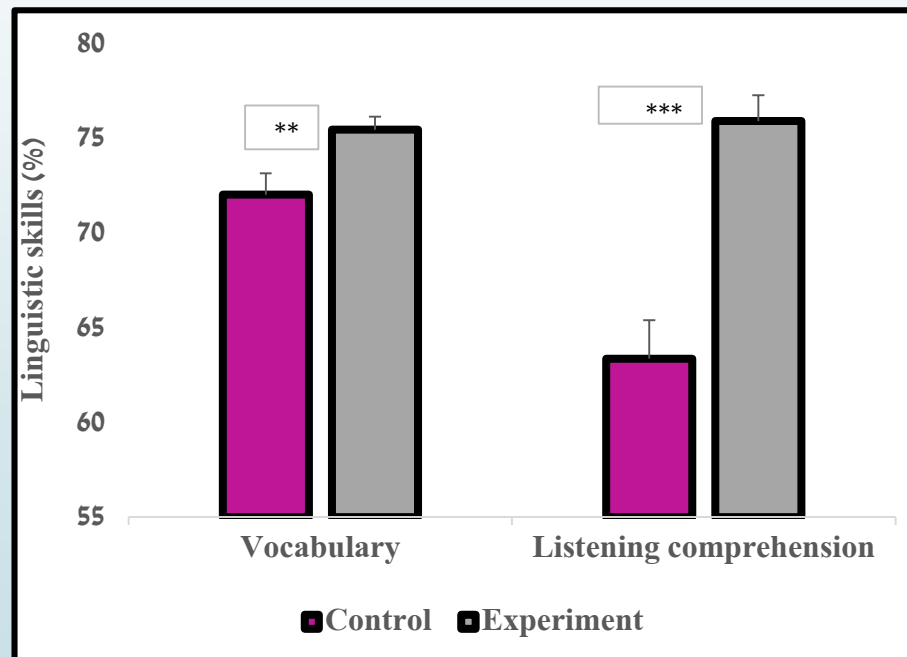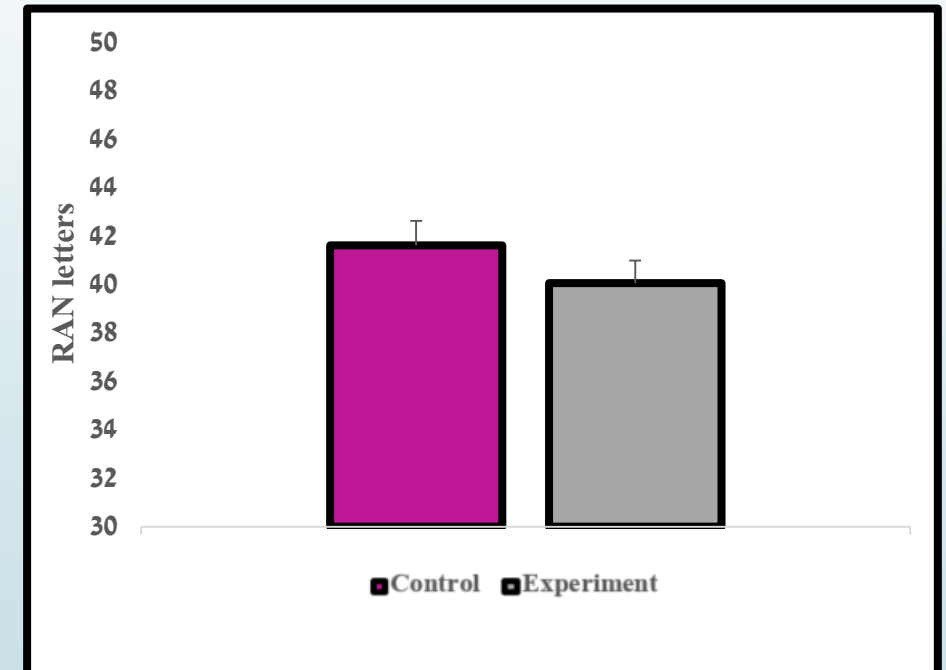

Phonological Awareness
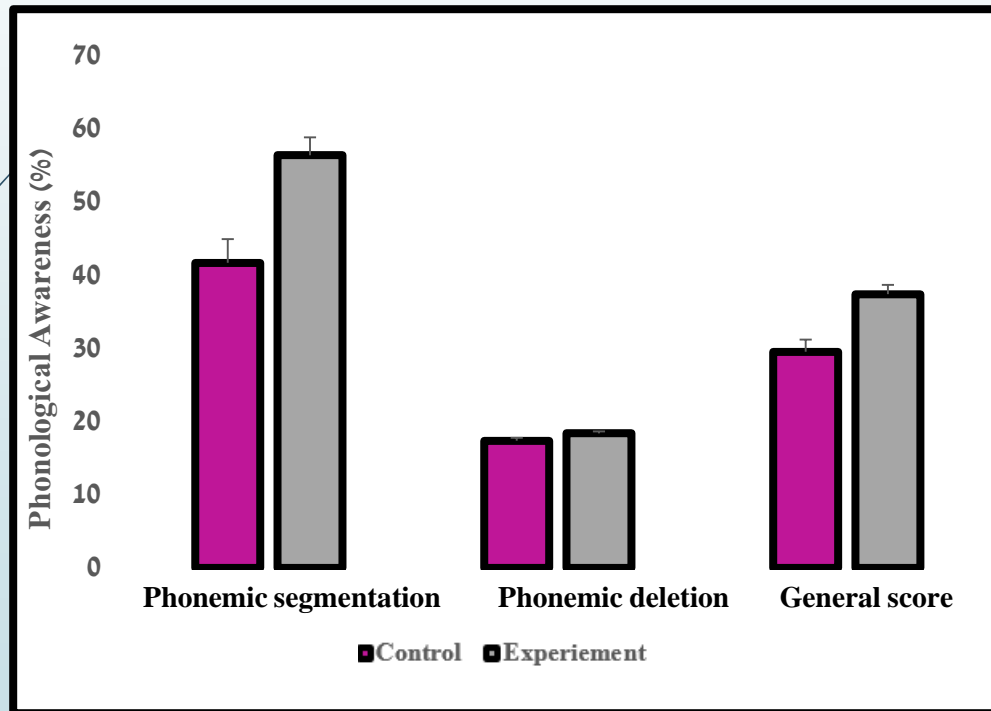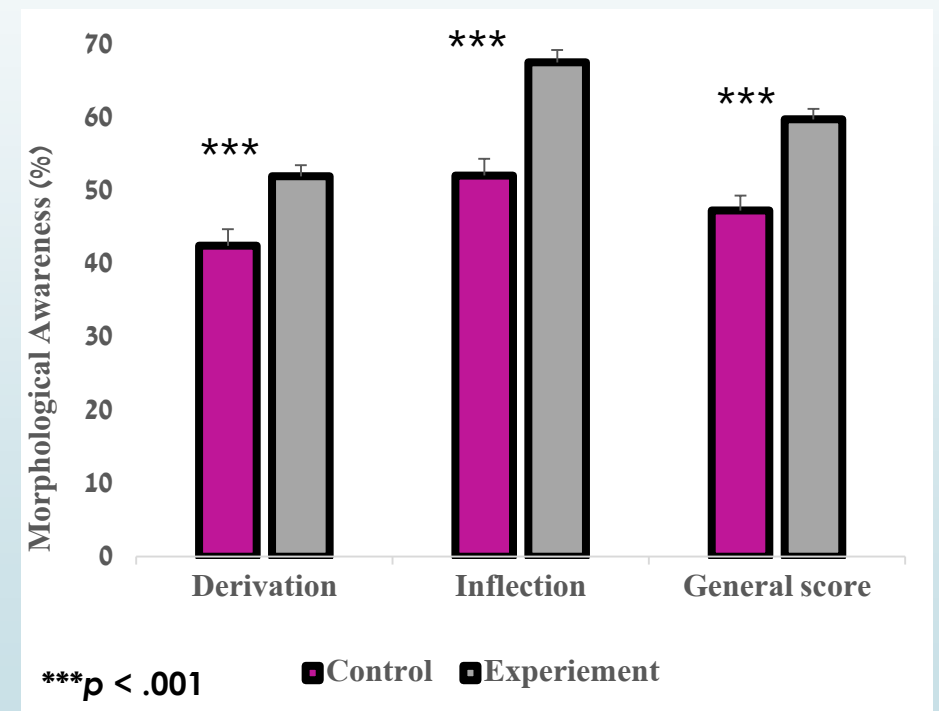
Morphological Awareness

***p < .001

RQ#1:The long-term contribution of the kindergarten intervention to children's skills in the third grade.

Oral Language
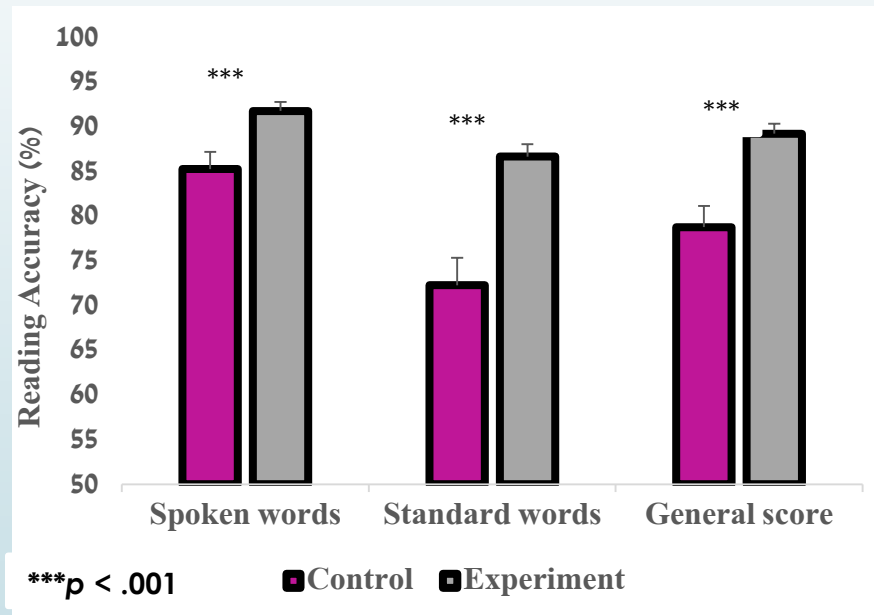
Letter Naming Speed
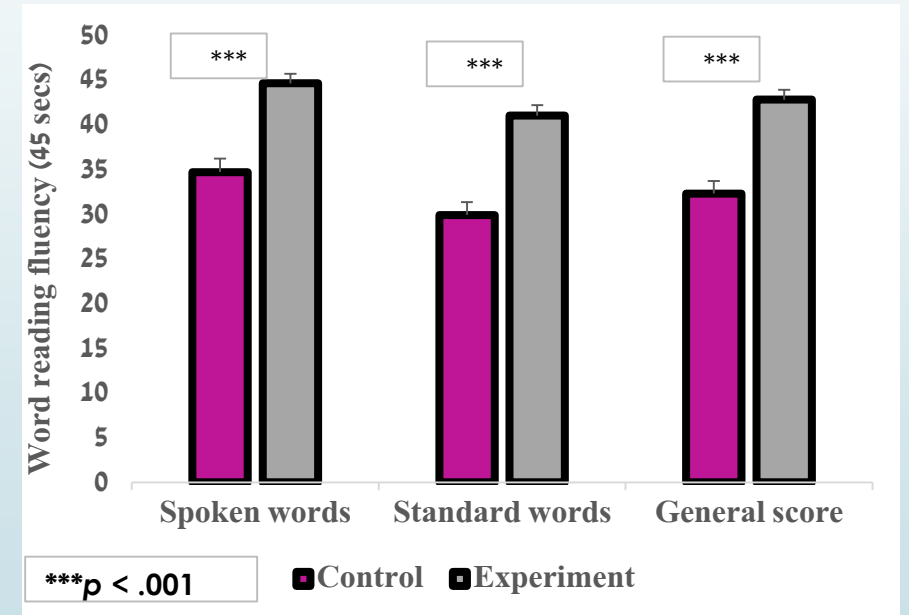
**p < .01, ***p < .001

RQ#1:The long-term contribution of the kindergarten intervention to children's skills in the third grade
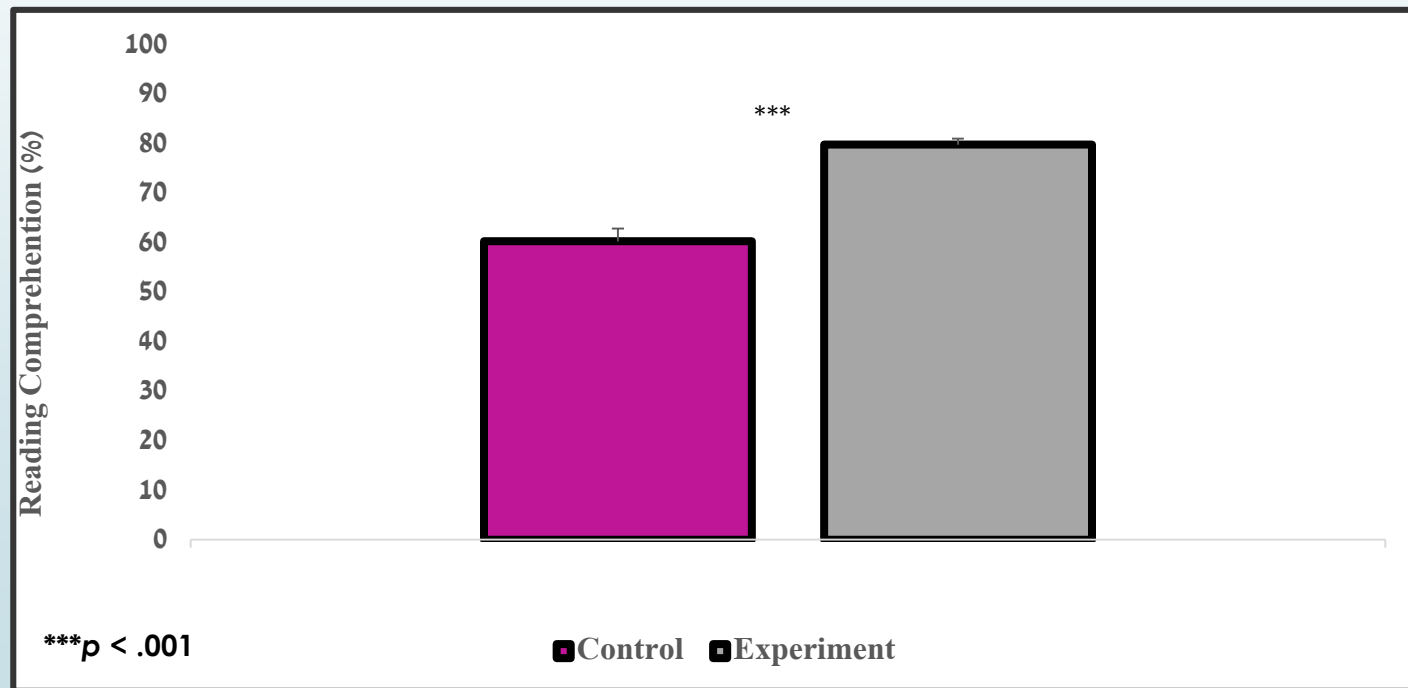
Word Reading Accuracy
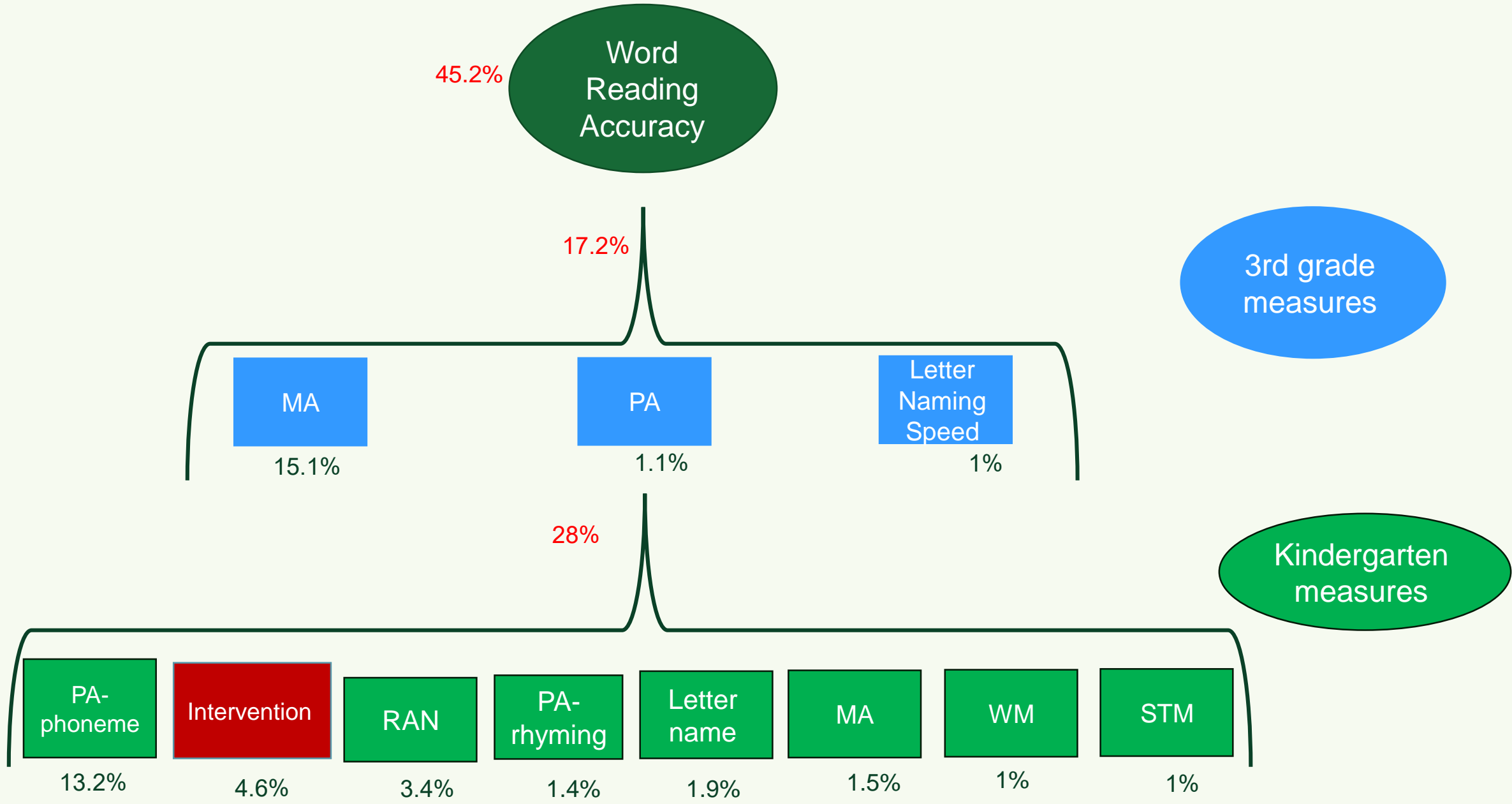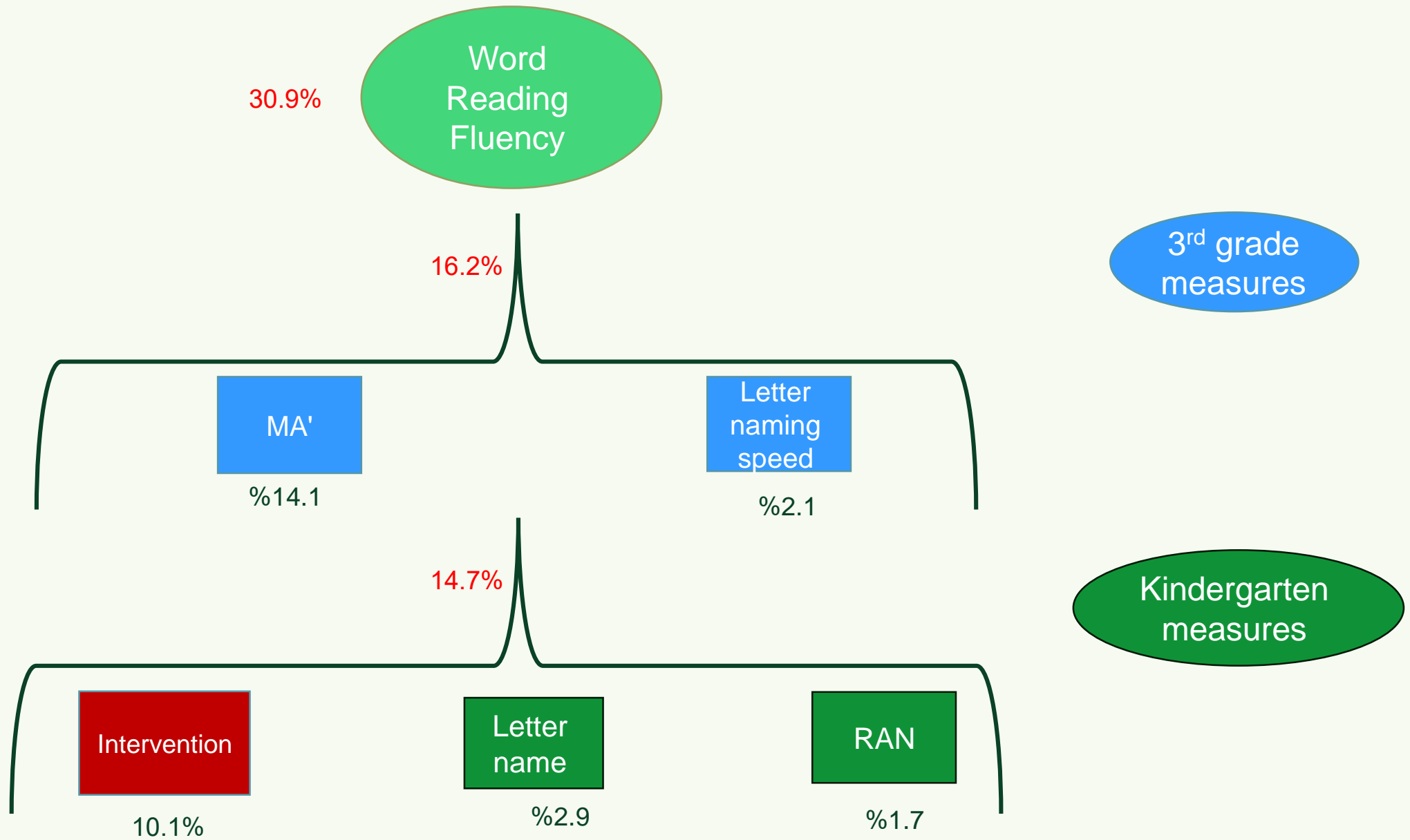

Word Reading Fluency

RQ#1:The long-term contribution of the kindergarten intervention to children's skills in the third grade

Reading Comprehension

***$p < .001$ ■Control ■Experiment
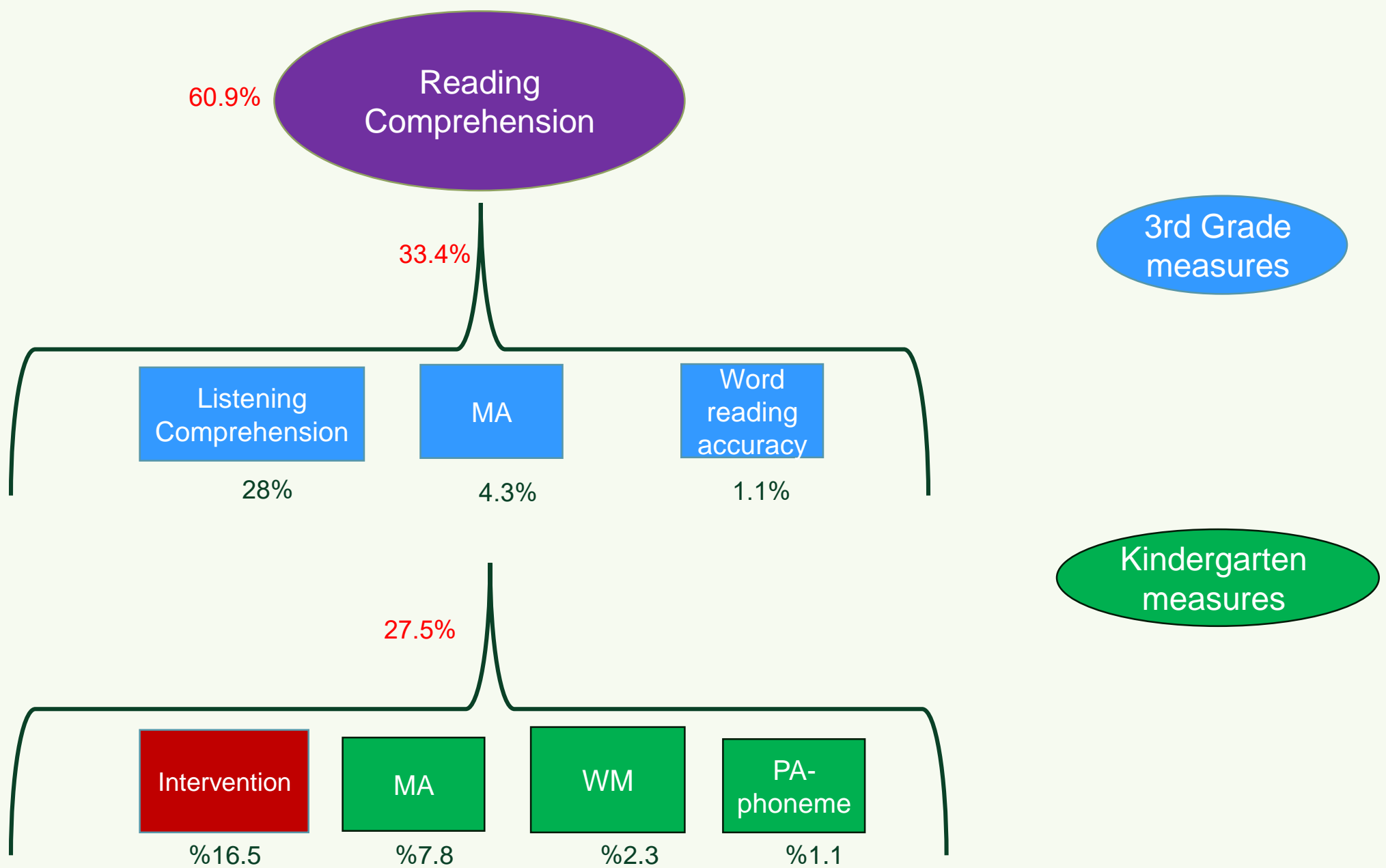
- RQ2: Test the contribution of the intervention to the prediction of reading skills in the third grade.
- RQ3: Test the contribution of diachronic (kindergarten) and synchronic (third grade) measures to the prediction of reading in the third grade, beyond the contribution of the intervention.
  - Hierarchical Regression (Stepwise)
  - First step: Group Affiliation (Intervention, Control) AND Kindergarten measures
  - Second step: Third grade measures
- Three outcome measures:
  - Word reading accuracy
  - Word reading fluency
  - Reading comprehension

Reading Comprehension — 60.9%

33.4%

3rd Grade measures

Listening Comprehension	MA	Word reading accuracy
28%	4.3%	1.1%

27.5%

Kindergarten measures

Intervention	MA	WM	PA-phoneme
%16.5	%7.8	%2.3	%1.1

Discussion

- **<u>Intervention in kindergarten</u>** is effective in enhancing literacy in Arabic even three years after the end of the intervention (even when teaching is interrupted due to COVID19, and even in low SES children).

- **<u>A diglossia-centered</u>** and **<u>multi-domain</u>** Arabic literacy intervention appears to help **<u>mitigate the effect of diglossia</u>** and produces particularly strong gains in exclusively StA measures: StA word reading, RC and LC.

- The results support **<u>universal theories</u>** of reading:
  - Metalinguistic awareness skills both in kindergarten and in third grade are critical in enabling children to develop word reading and reading comprehension.
  - Listening comprehension is key to reading comprehension in Arabic (stronger than word reading):
    - SVR, transparent orthography, diglossia.

- The results also support **<u>language-specific</u>** patterns:
  - Morphological awareness in kindergarten and in third grade predicts word reading and RC.
    - Centrality of morphology in the Arabic word.
    - Transparency of morphology in the Arabic orthography.

Thank You
شُكرًا جَزيلاً