

Exploring the links between vocabulary learning, language aptitude and captioned TV series

A longitudinal study in high school and university

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Theoretical Background

Dual Coding Theory (Paivio, 1986, 2007)

- Verbal and non-verbal systems
- Independent functioning but interaction
- Activation of one system stimulates the other
- Greater depth of processing and better recall

Cognitive Load Theory (Chandler & Sweller, 1991; Sweller, 1994)

- Brain's limited cognitive capacity, should not be overloaded
- Multimodality may increase cognitive load (CL)
- Subtitles as a tool to reduce CL in language acquisition settings

Cognitive Theory of Multimedia Learning (Mayer, 2002, 2009)

“Students learn more deeply from a multimedia explanation than from a verbal explanation” (2002: 62)

Theoretical Background

Bimodal input (text and sound)

- **Better learning**

Holobow et al., 1984; Bird & Williams, 2002; Granena et al., 2015

Multimodal input (text and video)

- **Beneficial for SLA**

Price, 1983; Baltova, 1999; Markham et al., 2001; Danan, 2004

- **Listening comprehension and vocabulary acquisition**

Garza, 1991; Vanderplank, 2010, 2016; Rodgers, 2013; Montero Perez et al., 2013, 2014

Learners approach the task according to their **abilities** (Dörnyei, 2005)

Visual vs. Auditory learners

Theoretical Background

Subtitled TV series

- Simultaneous presentation of L1 / L2 text + L2 sound + video image
- Verbal and non-verbal information
- Real language input, authentic materials
- Fun activity, range of multimedia materials available



Theoretical Background

Most **vocabulary research** conducted so far:

- **Adult university learners**

Sydorenko, 2010; Etemadi, 2012

- **One-off studies**

Yuksel & Tanriverdi, 2009; Montero Perez et al., 2018

Few exceptions: Rodgers, 2013; Frumuselu, 2015

- **Combination of audio and on-screen text (standard, reversed, bimodal...)**

Stewart & Pertusa, 2004; Lavaur & Bairstow, 2011; Peters et al., 2016

Scarce research:

- Non-university learners (e.g. children or teenagers)
- Sustained exposure to multimodal input
- Classroom-based
- Video viewing vs. formal language instruction
- Connecting vocabulary learning from video viewing to IDs

Theoretical Background

Best **procedure** for class use?

- Good selection of videos and adequate captions / subtitles
- Adapted to learners' proficiency level
- Guided viewing

Necessary to enhance foreign language learning



Vanderplank, 2010
Webb, 2015

Theoretical Background

- Aptitude is **multicomponential** (MLAT, MLAT-E, MLAT-EC/ES, LLAMA).
- Little research on how each subtest (i.e. aptitude component tapped by the test) influences language learning rate.
- Good general **L2 proficiency predictor**, but low predictive validity for vocabulary and L2 writing. (Li, 2016)

Part	MLAT-EC (Grades 3-7)	Construct
1	Hidden Words	Vocabulary learning Sound-symbol association
2	Words in Sentences	Grammatical sensitivity
3	Rhyming Words	Hearing and distinguishing speech sounds
4	Number Learning	Vocabulary learning Rote learning memory Auditory comprehension

(Suárez, 2010)

Theoretical Background

Aptitude test - **LLAMA** (Meara, 2005)

Part	Construct	Explicit or implicit aptitude
LLAMA B	Vocabulary learning	Explicit learning aptitude
LLAMA D	Sound-pattern recognition Pronunciation	Implicit learning aptitude
LLAMA E	Sound-symbol association	Explicit learning aptitude
LLAMA F	Grammatical inferencing	Explicit learning aptitude

Theoretical Background

- Regarding **lexical variety**, using MLAT-EC/ES: inconsistent results.
Rosa & Muñoz, 2013; Muñoz, 2014; Suárez, 2014
- Positive significant correlations with **vocabulary recall** and **recognition**, using MLAT.
Dahlen & Caldwell-Harris, 2013
- Regarding **vocabulary** learning with **subtitles**, using MLAT-EC: only relevant for **word form** learning.
Suárez & Gesa, 2019

Theoretical Background

- Greater gains for higher aptitude (LLAMA B - vocabulary learning) in a **lexical test** of **formulaic sequences**.

Serrano & Llanes, 2012

- Positive significant correlations LLAMA F with **lexical diversity**, but not with lexical appropriateness.

Saito, 2017

- Positive significant correlations in highly advanced adult L2 learners in **lexis** and **collocations scores**.

Granena & Long, 2013

- Negative correlations: word-monitoring task tapping **automatic use** of L2 knowledge (except LLAMA D).

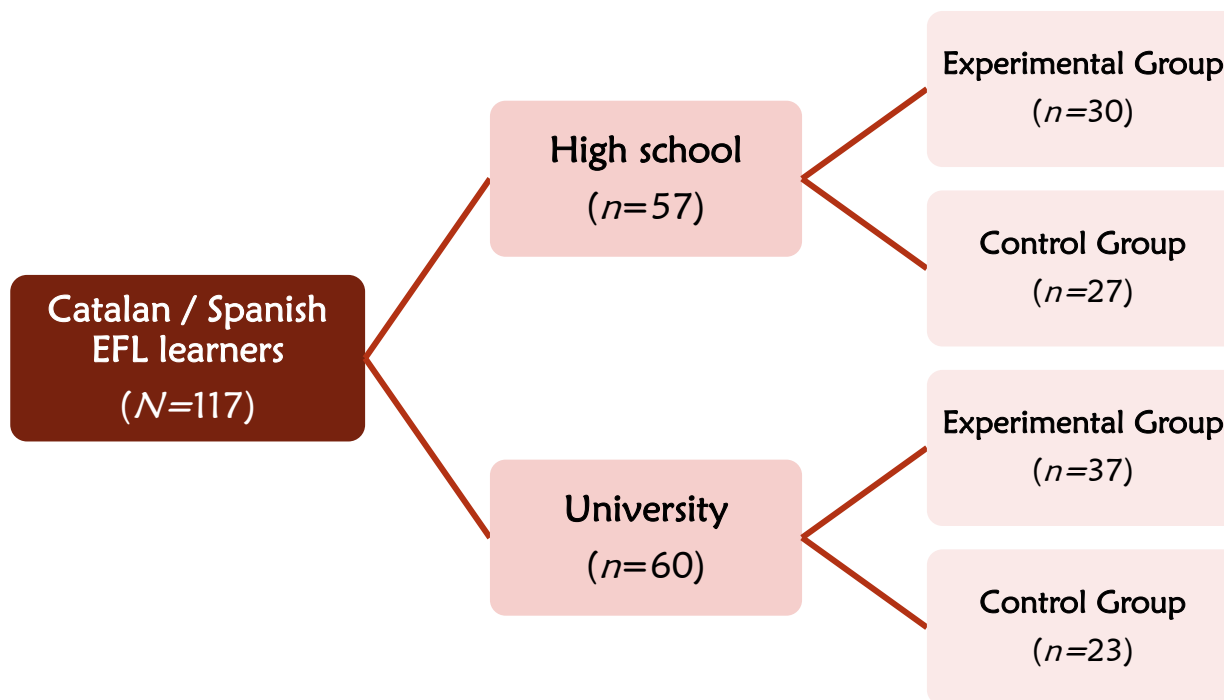
Granena, 2012

Research Questions

In high school and university EFL learners:

- 1) does sustained exposure to captioned episodes from a TV series in the context of formal language instruction lead to significant gains in vocabulary learning, compared to receiving formal language instruction only?
- 2) to what extent does language aptitude mediate any gains in vocabulary learning from viewing captioned episodes from a TV series in the context of formal language instruction?

Participants



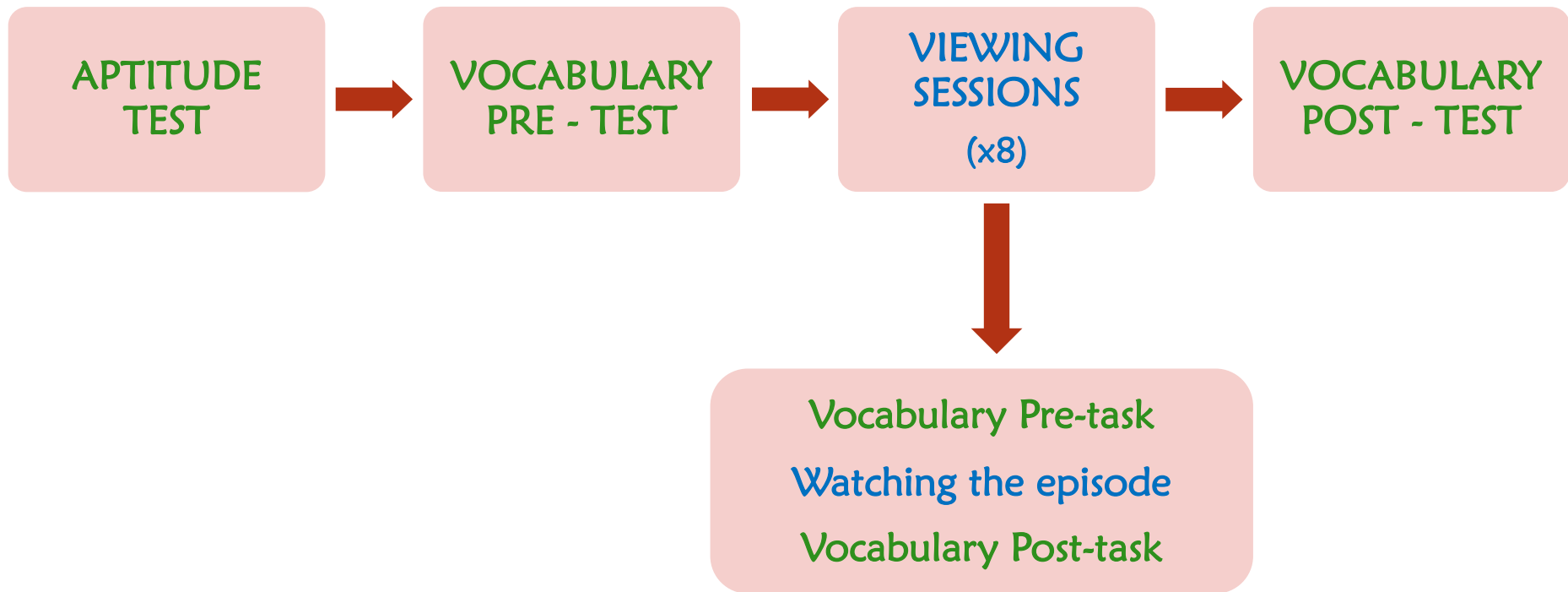
High school

- Grade 10 (last year of high school)
- Intermediate level
- 15-16 years old
- 1,100h of formal instruction
- 28 Males / 29 Females
- Public school in Catalonia

University

- First-year undergraduates
- Upper-intermediate level
- 18-26 years old
- 1,300h of formal instruction
- 21 Males / 39 Females
- Public institution in Catalonia

Procedure (one academic term)



■ Experimental Group ■ Experimental and Control Groups

Instruments

- *I Love Lucy* (Oppenheimer & Arnaz, 1951)
- **8 episodes** (24 min. 30 sec. each) → **3h 16 min.** of multimodal input
- English audio and English subtitles (captions)
- 95% coverage reached at the **2K** level and 98% at the **5K** level
- 5 TWs / episode → **40 TWs** throughout the term



Instruments

TESTS

VOCABULARY PRE- and POST-TEST

40 TWs

Beginning / end of the term

Productive knowledge of orthographic
form and meaning recall

1. A continuación escucharás veinte palabras. Escríbelas en inglés y tradúcelas al castellano o catalán. Si de alguna palabra conoces más de un significado, escríbelo. Escucharás cada palabra un total de dos veces.

Palabras

	Inglés	Castellano - Catalán
1		
2		
3		
4		
5		

Instruments

TASKS

VOCABULARY PRE-TASK

Pre-teaching of TW's
Focus-on-forms approach
Beginning of each session

VOCABULARY POST-TASK

5 TW's
Form recall and meaning recognition
End of each session

"Lucy Visits Grauman's"

1. Fill in the blanks with the appropriate words; the first letter is already given for you. Use the definitions to help you.

- A) My father tends to use a c _____ to open the door because it is always blocked.
B) If your partner s _____, it is really difficult to sleep with him / her! What a noise!
C) Please, give me a big h _____ of bread. I'm starving and I haven't eaten anything since yesterday.
D) I always like to t _____ i _____ the blankets before I go to bed.
E) The children were playing on the beach with their b _____ and spades.

Definitions

- A) A straight iron bar, usually with a curved end, used for forcing open boxes and moving heavy objects.
B) To breathe noisily through your nose and mouth while you are asleep.
C) A large piece of something that has been cut or broken from a larger piece.
D) To make somebody feel comfortable in bed by pulling the covers up around them.
E) An open container with a handle, used for carrying or holding liquids, sand, etc.

"Lucy Visits Grauman's"

1. Escucharás cinco palabras en inglés. Cada palabra se va a repetir dos veces. Di qué significan estas palabras (opción a, b, c...). Si no sabes qué quiere decir alguna palabra, elige la opción (f) 'No lo sé'.

- 1) _____
a) Pala
b) Palanca
c) Taberna
d) Guardián
e) Arrugar
f) No lo sé
- 2) _____
a) Traición
b) Implorar
c) Roncar
d) Resonar
e) Pasear
f) No lo sé
- 3) _____
a) Masivo
b) Oportunidad
c) Envase
d) Cubo
e) Bolsillo
f) No lo sé
- 4) _____
a) Enchufar
b) Arrojar
c) Cubrir
d) Estallar
e) Extraño
f) No lo sé
- 5) _____
a) Negar
b) Gracioso
c) Placa
d) Trozo
e) Bebido
f) No lo sé

Instruments

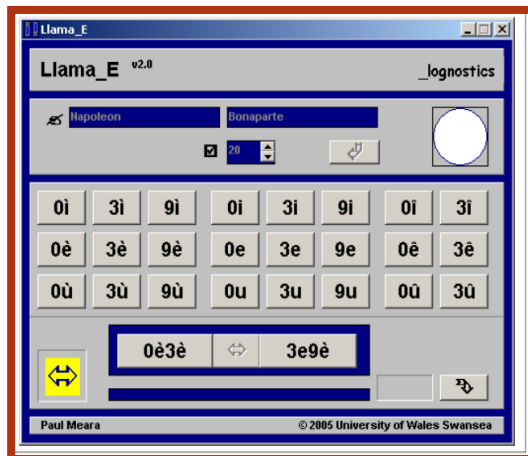
APTITUDE TEST - LLAMA (Meara, 2005)



LLAMA B
Vocabulary
learning



LLAMA D
Sound-pattern
recognition



LLAMA E
Sound-symbol
association



LLAMA F
Grammatical
inferencing

Scoring - Vocabulary gains

Relative gains formula applied (Horst et al., 1998; Rodgers, 2013):

$$\frac{N \text{ of forms or meanings learned}}{N \text{ of items} - N \text{ of forms or meanings known}} \times 100$$

- **Learned** → N of TW forms or meanings answered correctly on the post-test, but incorrectly on the pre-test.
- **Known** → N of TW forms or meanings answered correctly on both the pre- and the post-test.
- **Number of items** → N of TW forms or meanings on which participants were tested ($N=40$).

Analyses

RQ1

Generalised Linear Models (GLZs) (EGs and CGs - $N=117$ -)

- Targets: Relative gains for form
Relative gains for meaning
- Fixed effects: Level (high school vs. university)
Condition (EG vs. CG)

RQ2

General Linear Models (GLMs) (only EGs - $n=67$ -)

- Targets: Relative gains for form
Relative gains for meaning
- Fixed effects: Level (high school vs. university)
LLAMA total score

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Results - RQ1

Relative gains (EGs and CGs - $N=117$ -)

Level	Aspect	Experimental Group				Control Group			
		Mean	<i>SD</i>	Min	Max	Mean	<i>SD</i>	Min	Max
High school	Form	29.75	17.45	0	62.96	22.75	15.03	2.63	53.57
	Meaning	16.39	14	0	47.37	8.94	7.05	0	25
University	Form	36.17	17.07	0	68.18	33.14	12.69	12.82	58.62
	Meaning	23.36	12.01	2.50	55.17	19.52	10.63	7.50	43.59

Results - RQ1

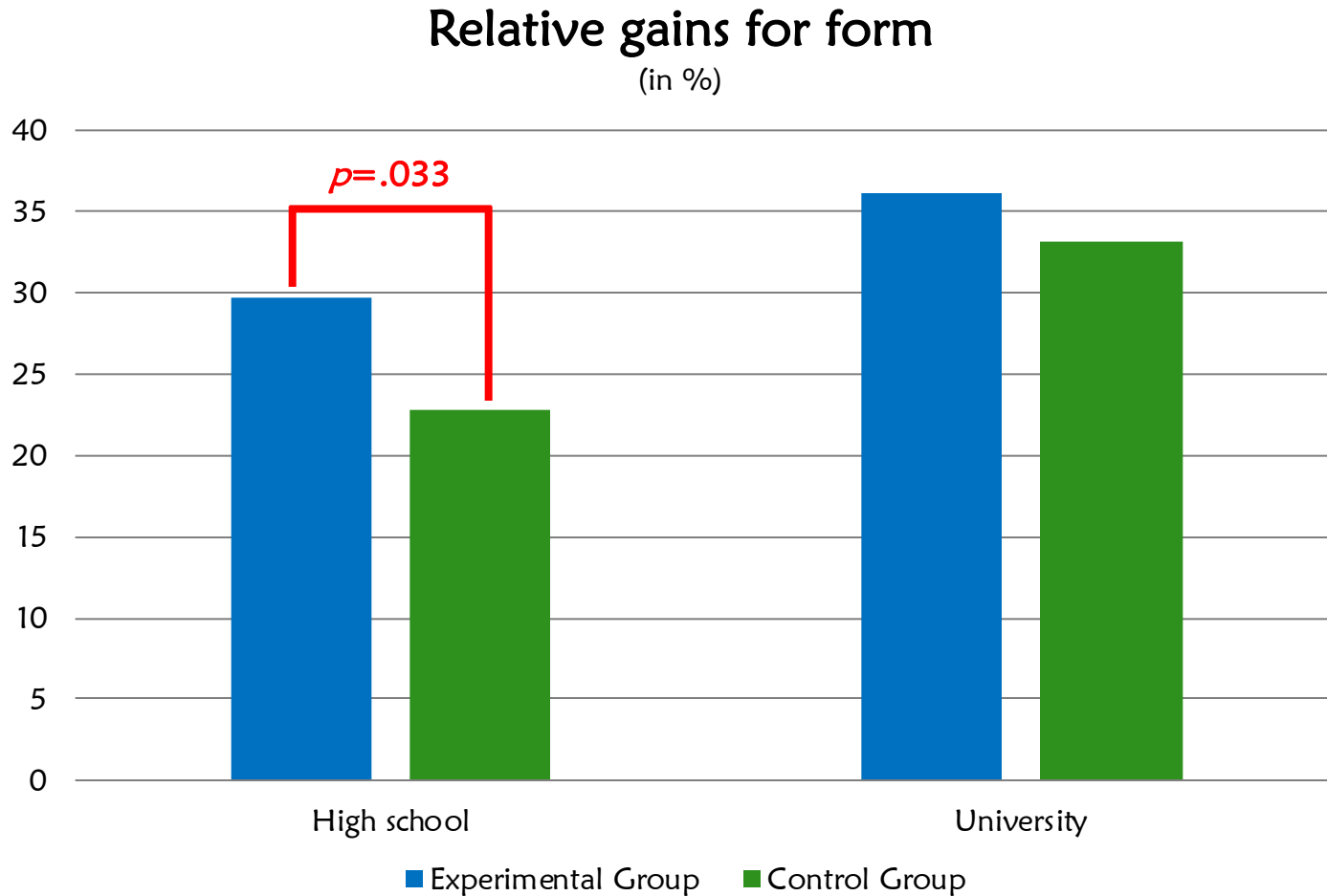
TW form

- Significant main effect for level $\rightarrow F(1, 111)=8.413, p=.004$
- Significant main effect for condition $\rightarrow F(1, 111)=4.575, p=.035$
- No significant interaction level*condition $\rightarrow F(1, 111)=.922, p=.339$

- Simple contrasts between EG and CG:
 - High school $\rightarrow \beta=8.023, p=.033$
 - University $\rightarrow \beta=4.035, p=.401$

Results - RQ1

TW form



Results - RQ1

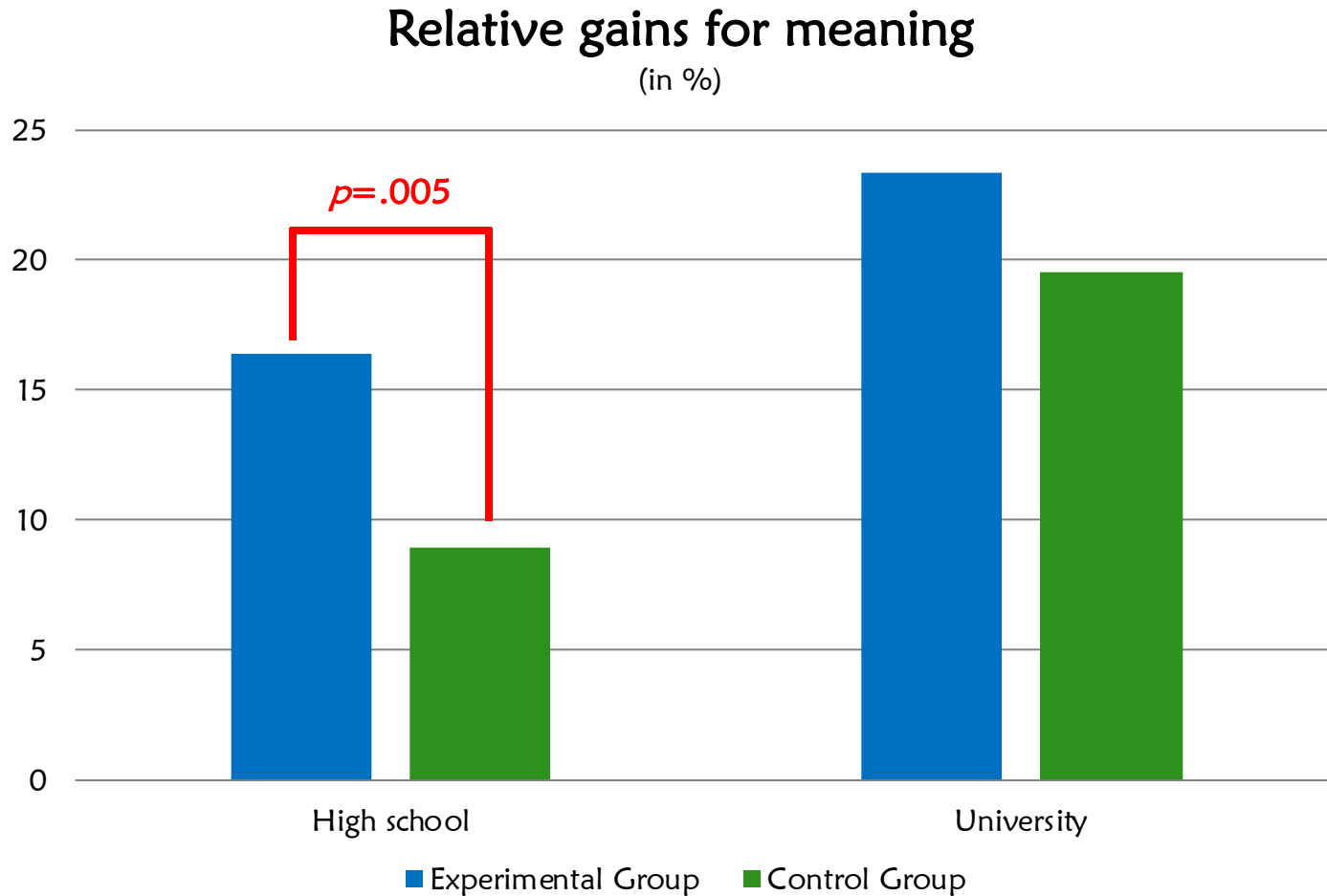
TW meaning

- Significant main effect for level $\rightarrow F(1, 109)=16.003, p=.000$
- Significant main effect for condition $\rightarrow F(1, 109)=8.154, p=.005$
- No significant interaction level*condition $\rightarrow F(1, 109)=1.946, p=.166$

- Simple contrasts between EG and CG:
 - High school $\rightarrow \beta=6.902, p=.005$
 - University $\rightarrow \beta=3.840, p=.288$

Results - RQ1

TW meaning



Research Questions

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Results - RQ2

LLAMA Aptitude Test (only EGs - $n=67$ -)

Level	LLAMA B		LLAMA D		LLAMA E		LLAMA F		LLAMA Total	
	Mean	<i>SD</i>	Mean	<i>SD</i>	Mean	<i>SD</i>	Mean	<i>SD</i>	Mean	<i>SD</i>
High school	61.07	24.55	35.48	19.96	76.07	23.15	49.64	25.31	55.57	14.74
University	54.86	21.62	39.82	23.86	70.81	27.53	49.05	23.45	53.64	16.52

Results - RQ2

TW form

- No significant main effect for level $\rightarrow F(1, 62)=2.608, p=.111$
- No significant main effect for language aptitude $\rightarrow F(1, 62)=1.676, p=.200$

TW meaning

- Significant main effect for level $\rightarrow F(1, 62)=9.914, p=.003$
- Significant main effect for language aptitude $\rightarrow F(1, 62)=7.625, p=.008$

Discussion - Vocabulary

- Dual Coding Theory and Cognitive Theory of Multimedia Learning applicable to **vocabulary acquisition**:
 - Experimental Groups → verbal and non-verbal information
 - Control Groups → verbal information

Paivio, 1986, 2007; Mayer, 2002, 2009

- Learners can benefit from different **modalities of input**:
 - Multimedia learning (EGs) → text + sound + video
 - Formal language instruction (CGs) → text + (sound)
- Even if multimodality may have increased cognitive load, that was **not detrimental** for the learning of vocabulary (EG > CG).

Brünken et al., 2002

- More cognitive capacity if information gets to the learner through **two channels** (verbal and visual) → Less chances of **cognitive overload**

Discussion - Vocabulary

- TV viewing **benefits not exclusive to adult university learners.**
Rice et al. 1990; Koolstra & Beentjes, 1999; Kuppens, 2010
- Vocabulary learning closely linked to students' proficiency level. More advanced students did not benefit from the intervention, **less skilled learners** did.
- Participants in high school benefitted from hearing and 'seeing' vocabulary in context: **additional input** for language learning.
- **Formal language instruction** was sufficient to trigger TW learning at university.
- 'Ideal' proficiency level to benefit from video viewing? Set at **intermediate proficiency?**
Vanderplank, 1988

Discussion - Vocabulary

- Captions could have benefitted the learning of TW forms: helped students **match aural and written forms** of words.

Borrás & Lafayette, 1994; Mitterer & McQueen, 2009; Birulés-Muntané & Soto-Faraco, 2016; Peters et al., 2016

- Seeing a **visual representation** of the concept while being exposed to the aural and written forms of the TWs could be supportive for word meaning learning.



Co-occurrence of vocabulary with **on-screen imagery** beneficial for lexical development (Rodgers, 2018)

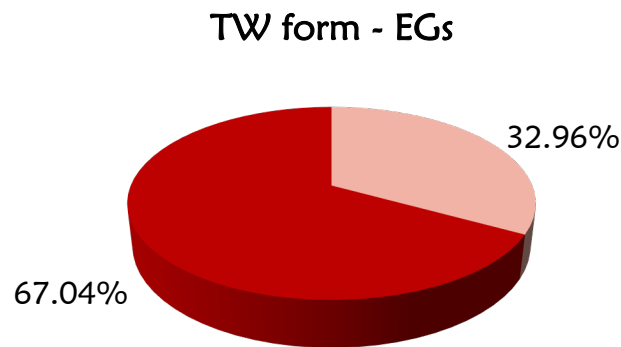
- Meaningful learning: learners from the EG were able to build verbal and visual representations of the TWs and establish referential connections between the two.



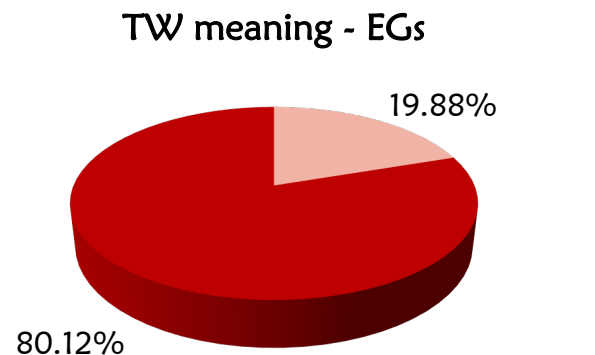
Multimedia principle; especially relevant for low-knowledge learners (Mayer, 2009)

Discussion - Vocabulary

- Increase was **not significant in size**:
 - Possible differences at the recognition level and with a different test modality?
Mohd Jelani & Boers, 2018
 - Gains in **partially-known** non-tested **vocabulary**?
 - More **encounters** with the TWs needed.
Rott, 1999; Pigada & Schmitt, 2006; Pellicer-Sánchez & Schmitt, 2010
 - **Factors** affecting TW learning (Gesa & Miralpeix, 2017):
 - Frequency in the episode
 - Concreteness
 - Cognateness
 - Context and imaginability
- Worthwhile vocabulary learning is a **slow process** (however, only 25 min./week).



■ Forms learned ■ Forms to be learned



■ Meanings learned ■ Meanings to be learned

Discussion - Language aptitude

- Aptitude was not significant for form learning, but it was for meaning learning (\neq low-level learners).
- Learners may have approached the learning task in a rather **explicit** way: probably drew on **superficial learning mechanisms** and **strategies** (e.g. note-taking, memorisation or selective attention), diminishing the power of language aptitude when learning word forms.
- If the learning task had been more challenging (e.g. higher number of TWs), learners would have needed to draw on their language aptitude.



What happened with meaning learning: there was **more cognitive involvement** (i.e. tougher recall test, initial vs. final stage of learning) and language aptitude came into play

Pedagogical implications

- In EFL learners from different proficiencies, authentic videos can promote **vocabulary learning**.
- Videos need to be accompanied by a set of focused and active learning **tasks** (unguided viewing).
- Need to **adapt the materials** to learners' proficiency level: if challenging, they may draw on their language aptitude.
- **Six principles** so as to use videos in the EFL classroom (Webb, 2015):
 - 1) Language learning benefits must be clear to everyone involved
 - 2) Learners should be at the appropriate level
 - 3) Listening comprehension needs to be supported
 - 4) Precise comprehension should be a goal, not a requirement
 - 5) Classroom-based viewing as a guide for out-of-class viewing
 - 6) L2 video viewing should be fostered as much as possible

Limitations

- **Post-task effect**: drawing learners' attention to the TWs and affecting their processing
- The TV series may have been more suitable for university learners (e.g. black and white, 1950s, etc.)
- **No control groups** watching videos without subtitles
- Some TW properties could not be totally controlled for
- **Classroom environment** (e.g. different teachers, compulsory attendance, no online measuring, etc.)

However... the study

- Puts theoretical principles to the test (DCT, CTML and CLT)
- Includes ‘large quantities’ of multimodal input (**longitudinal study**)
- Connects vocabulary learning from video viewing to IDs
- Uses a **pedagogical intervention** (specially-tailored materials)
- Non-adults EFL learners (under-researched population)
 - New data on: vocabulary learning and language aptitude
- **Positive** preliminary **results**:
 - ‘Fun’ experience, not detrimental to learning (~~EGs~~ → EGs)
 - In-class deliberate learning from video viewing as the starting point for more out-of-class incidental vocabulary acquisition

Further research

- Effects of **TL proficiency**:
 - Beginner learners (Gesa & Suárez, 2018)
- Other **language skills**:
 - Syntax and grammar, segmentation abilities, pronunciation, etc.
- Within-group **variability** (e.g. role of vocabulary size)
- Effects of other **IDs** (e.g. working memory)
- Delayed testing to analyse **retention effects** (Gesa & Miralpeix, 2018)
- Other **types of captioning** (e.g. standard subtitling, keyword captioning)
- **Focused** vs. **non-focused** learning

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Instruments - TV series

I Love Lucy (8 episodes)

Frequency band	Tokens		Types		Word families		Cumulative coverage (in %)
	Raw	%	Raw	%	Raw	%	
1K	25,145	94.24	1,401	63.19	938	59.07	94.24
2K	696	2.61	359	16.19	301	18.95	96.85
3K	137	0.51	78	3.52	69	4.35	97.36
4K	149	0.56	73	3.29	67	4.22	97.92
5K	112	0.42	57	2.57	50	3.15	98.34
6K	80	0.30	44	1.98	40	2.52	98.64
7K	58	0.22	28	1.26	23	1.45	98.86
8K	26	0.10	16	0.72	15	0.94	98.96
9K	24	0.09	17	0.77	16	1.01	99.05
10K	27	0.10	17	0.77	15	0.94	99.15
11-25K	92	0.34	56	2.56	54	3.49	99.49
Off-list	137	0.51	70	3.16	???		100
Total	26,683	100	2,217	100	≈ 1,588	???	≈ 100

TW properties

Word frequency (according to COCA)	<i>N</i>
1K	1
2K	4
3K	1
4K	4
5K	3
6K	5
7K	4
8K	1
9K	2
10K	3
+10K	8
Off-list	4
TOTAL	40

Word frequency (<i>N</i> repetitions term)	<i>N</i>
2	10
3	9
4	10
5	6
6	3
7	2
TOTAL	40

Word frequency (according to SUBTLEX _{US} ; in %)	<i>N</i>
0 - 5	36
5.01 - 10	2
10.01 - 20	-
20.01 - 25	1
25.01 - 30	1
30.01 - 100	-
TOTAL	40

Concreteness (Mean)	<i>N</i>
1 - 2	1
2.01 - 3	3
3.01 - 4	12
4.01 - 5	20
Not in the list	4
TOTAL	40

Word class	<i>N</i>
Adjectives	6
Nouns	24
Verbs	10
TOTAL	40

Cognateness	<i>N</i>
Cognates	2
Non-cognates	38
TOTAL	40