UNIVERSITY OF MARYLAND

Practicing Russian Listening Comprehension Skills in Virtual Reality

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Virtual Reality at UMD

Home of the AUGMENTARIUM virtual and augmented reality laboratory and the OCULUS-CEO funded Brendan Iribe Center

VR for language training at UMD

UMIACS | University of Maryland Institute for Advanced Computer Studies

- Cutting-edge cyberinfrastructure
- 360˚ video / audio production
- Digital production and programming
- Applied VR/AR research

CENTER FOR ADVANCED STUDY OF LANGUAGE

- Second language and cultural acquisition
- Science-of-learning principles
- Assessment
- Technology in education

Language learning and immersion

- For advanced skills, learners need to practice in real-world contexts
- Immersive study abroad programs are beneficial (Davidson, 2010; Dewey, 2008; Linck et al., 2009; Segalowitz & Freed, 2004; Tare et al., *in press*)

- **Challenge:** Exposure to certain mission scenarios may be too costly, complex, rare, or dangerous to allow real-life practice before deployment
- **Solution:** Virtual training

Technology affords multiple options

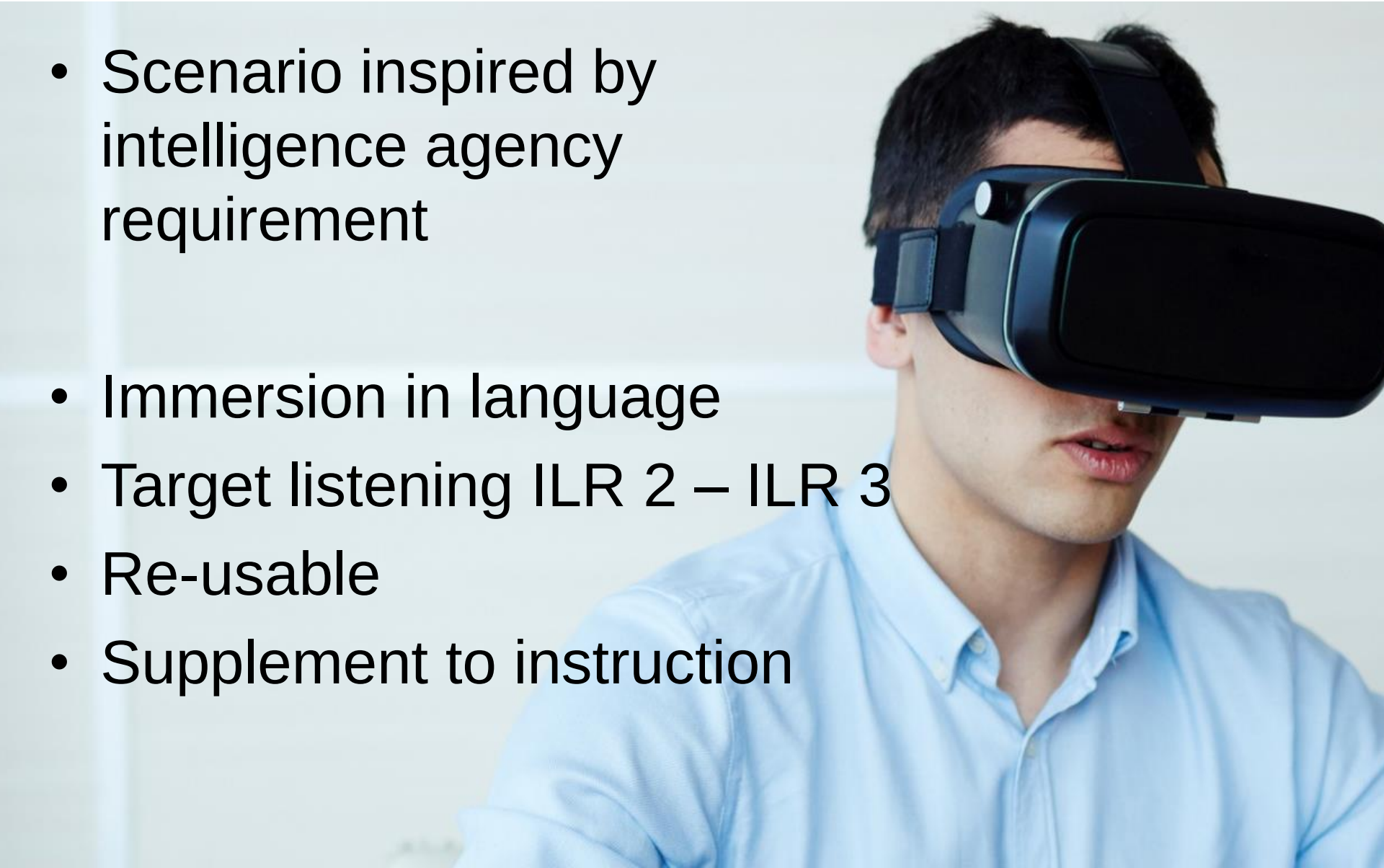
- Cinematic 360˚ film
- Digital virtual worlds

- Trade-offs
  - Static vs. adjustable content
  - Ability to interact with characters and environment
  - Degree of realism (e.g., language, movement)

Why 360˚ cinematic film?

- Captures details:
  - nuanced language
  - nonverbal cues (e.g., micro-expressions, eye gaze, body language)
- 360˚ spatial audio
- Affords viewer a sense of *presence* (“being there”)

VR design goals for prototype



- Scenario inspired by intelligence agency requirement

- Immersion in language
- Target listening ILR 2 – ILR 3
- Re-usable
- Supplement to instruction

Embassy cocktail party prototype

- Needs-based content development:
  - Interviewed Subject Matter Expert
  - Contracted native-speaking Russian actors
  - Targeted, high-level content, loosely scripted
  - Encouraged improvisation that fit with characters
- Designed for pedagogical exploitation

2D video

360˚ video (flattened still)

Instructor focus group

Five instructors of college-level Russian

"impressive"
"completely blown away"

"would watch a million times, it is so rich"

"felt like a fly on the wall"

"overwhelmingly real"

The promise of VR technology

5 Reasons to Join the Virtual Reality Learning Revolution Right Now

VIRTUAL REALITY

Will Virtual Reality Drive Deeper Learning?

As an ever-growing array of virtual reality tools hits schools, educators wonder if the technology lives up to its hype.

CNN tech BUSI

Virtual Reality

The Impact of Virtual Reality on Learning

Innovate

VR gets closer to reality

Does VR technology enhance learning?

- Digital VR = mixed results
  - ✓ Physical movements (Bailenson et al., 2008)
  - ? Medical procedures (Sutherland et al., 2006):
    VR > no training, but = standard training
- 360˚ video = TBD (nothing published yet)
- Current study:
  - Compare 360˚ video with traditional 2D video
  - Outcome = L2 listening comprehension
  - Examine potential mediators

Experimental tasks

- 60-minute session:
  - Baseline proficiency test
  - Vocabulary test (pre and post)
  - 8 minute video, viewed in three parts
    - 2D condition
    - 360˚ condition
  - Listening comprehension (after each part)
  - Experience questionnaires
  - Language history questionnaire

Measures

- Baseline proficiency (cloze test)
  - 25 blanks in 222-word text
- Listening comprehension
  - 12 multiple-choice questions
    - Factual
    - Inferential
    - Opinion
    - Tone
- Experience questionnaires
    - Presence
    - Visual memory
    - Open-ended
- Language history questionnaire

Measures

- Vocabulary Knowledge Scale
  - 20 target words
  - Low frequency

(Wesche & Paribakht, 1996)

	Self-report categories
I	I don't remember having seen this word before.
II	I have seen this word before, but I don't know what it means.
III	I have seen this word before, and I think is means _____.
IV	I know this word. It means _____.

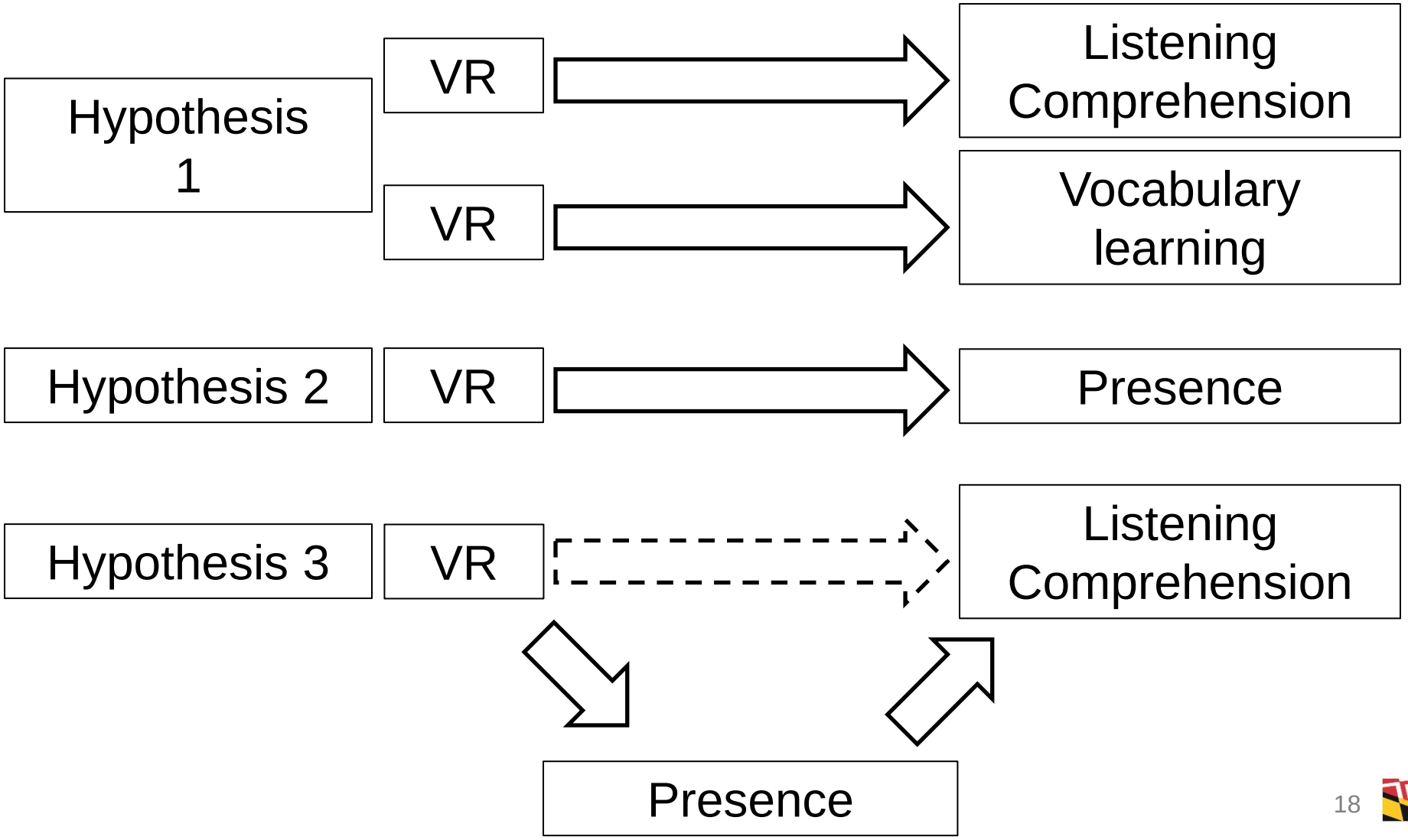
Participants

- 53 (28 female) native English speakers with advanced L2 proficiency in Russian
  - 360˚ VR condition: *N* = 27
  - 2D condition: *N* = 26

* Similar L2 proficiency
* Younger participants in 2D condition

	Condition			
	VR	2D		
L2 proficiency:				
Cloze (out of 25)	13.2 (5.6)	13.4 (5.0)	ns	*t* = -0.16
Vocabulary pre-test (out of 80)	57.2 (9.5)	56.4 (7.7)	ns	*t* = -0.32
Age (years)	***40.3 (9.5)***	***29.7 (8.8)***	***p < .001***	***t = 4.14***

Hypotheses


Hypothesis 1
VR
Listening Comprehension
VR
Vocabulary learning
Hypothesis 2
VR
Presence
Hypothesis 3
VR
Listening Comprehension
Presence

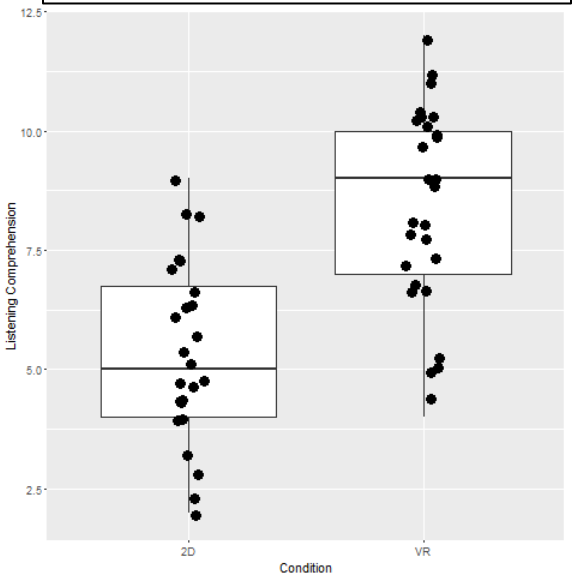
Analysis

- Series of regression models
  - “VR” dummy-coded factor: VR (1) vs. 2D (0)
  - Bootstrap analysis to test for mediation effect

***Similar results when controlling for L2 proficiency; not reported here*

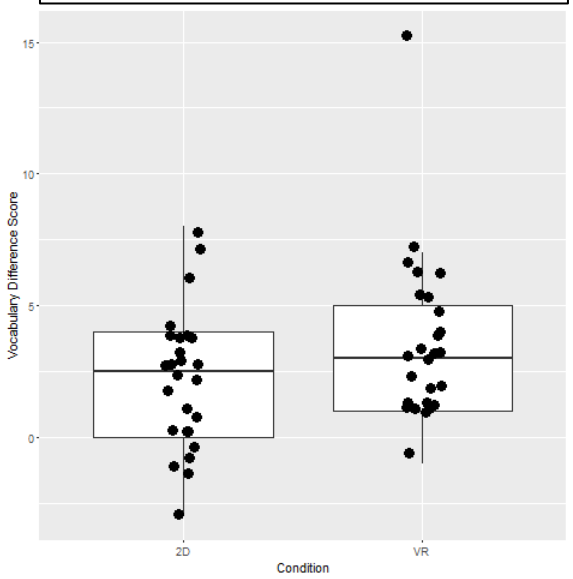
Distributions of outcomes

Listening Comprehension



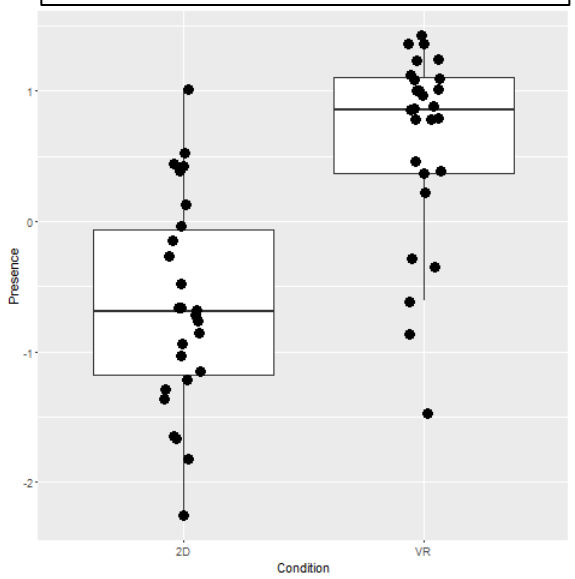
2D VR

Vocabulary Learning



2D VR

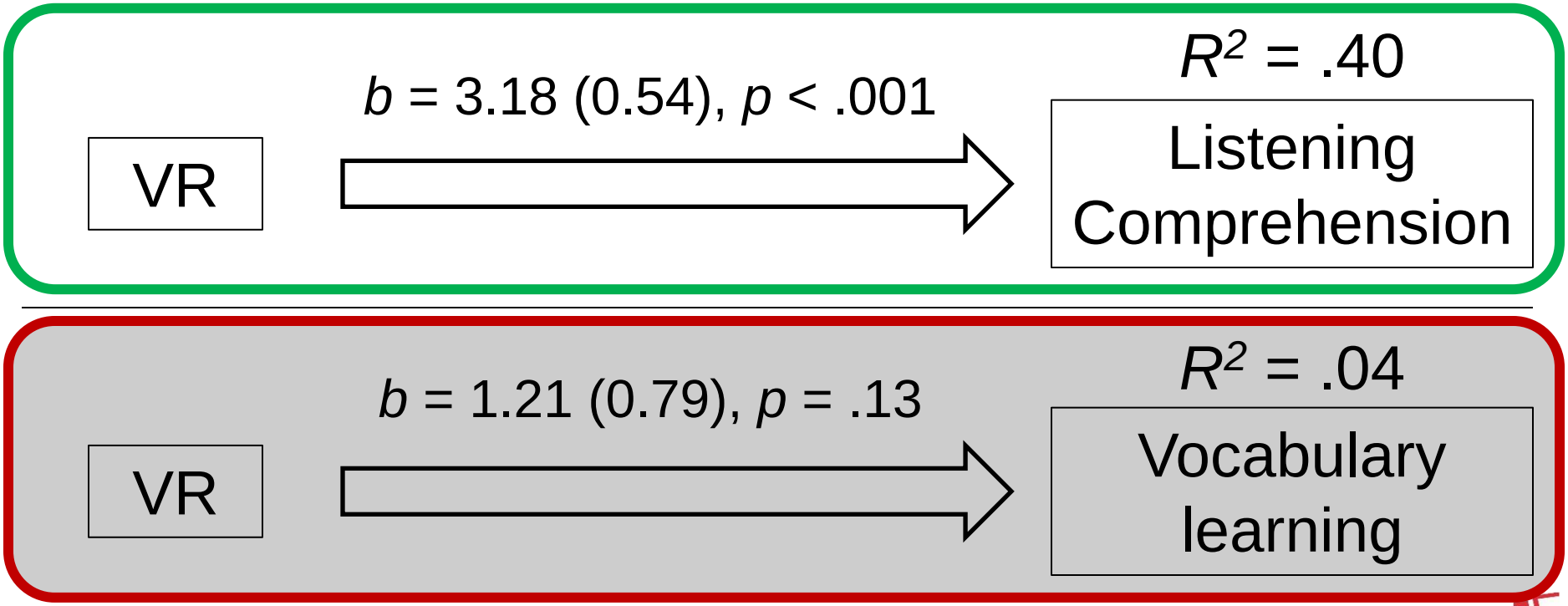
Presence



2D VR

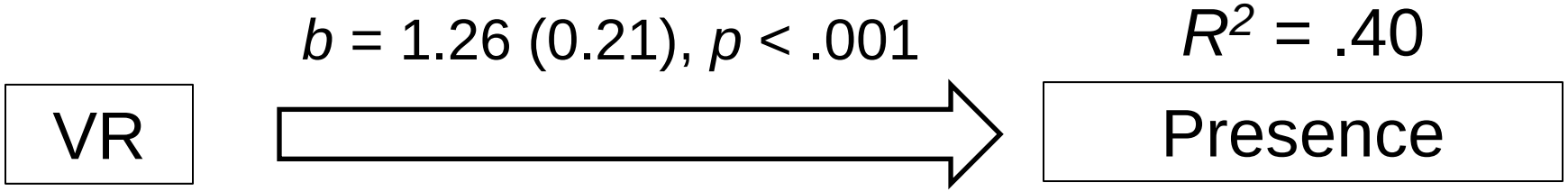
Hypothesis 1 results: Training condition on Outcomes

Virtual Reality training condition improved listening comprehension but not incidental vocabulary acquisition



Hypothesis 2 results: Training condition on Presence

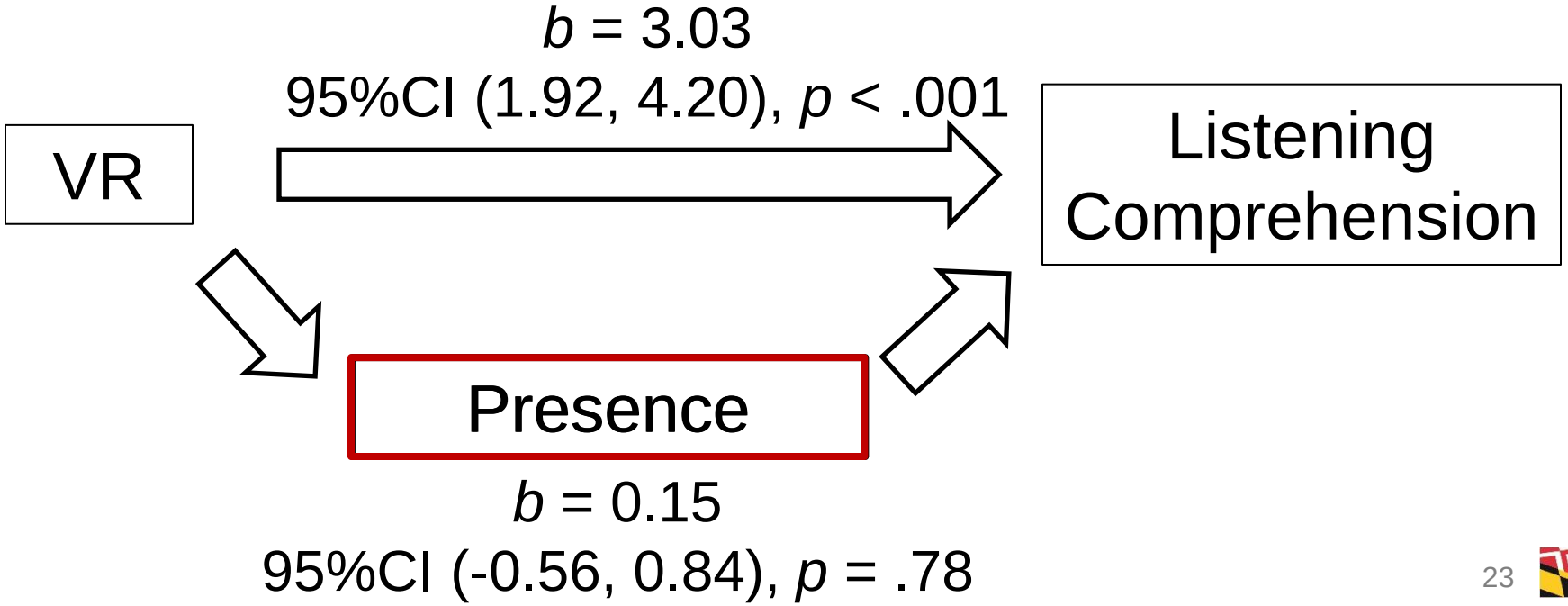
Virtual Reality condition associated with increased sense of *Presence*



Hypothesis 3 results: Training condition and Presence

Bootstrap test of mediation effect indicates:

- Direct effect of VR on listening comprehension
- No indirect (mediated) effect via presence



Discussion

- Better listening comprehension found in Virtual Reality (VR) training condition
- VR produced greater sense of *presence* among participants

  “I felt like I was there - in same room”

  “I found this to be surprisingly immersive, and it mirrored a real-life situation very well.”

  “It was like being in the room and being an active participant in the environment”

Discussion

- Even though presence did not directly benefit L2 listening comprehension, the increased sense of presence in VR is itself a positive outcome:
  - Increased realism
  - Greater engagement
  - Higher satisfaction with training

Study conclusions

- Virtual training *can* enhance L2 listening comprehension
- Cognitive mechanisms driving the benefits of VR remain to be determined

Other uses

- Integration of speaking prompts
- Real-time assessment for listening
- Interpretation training

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