



# High Performance Learning Journeys for Autonomous Language Learning

Henk J. Haarmann, Ph.D.

Strategies for Effective Independent  
Learning, LEARN Workshop

*The Catholic University of America  
Washington, DC*

June 5-6, 2019

# LEARNING JOURNEY







# 3 Perspectives: High Performance Learning Journeys for Autonomous Language Learning

1) Evidenced-based strategies

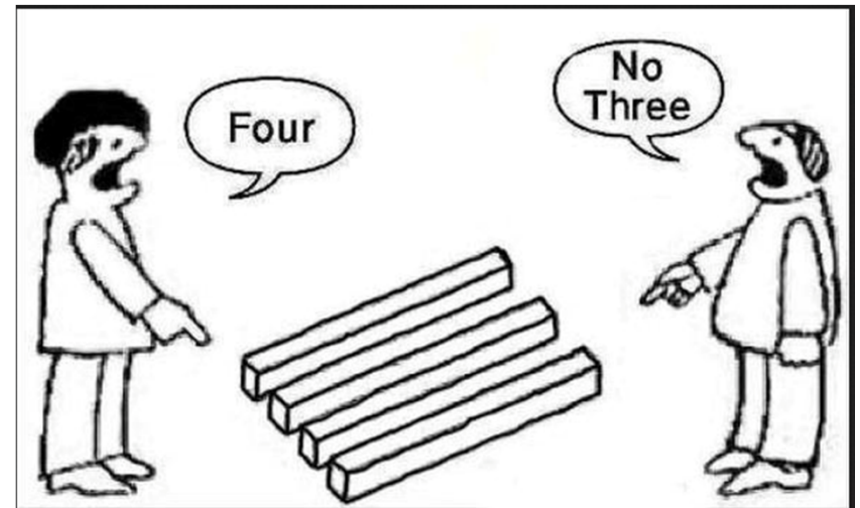
Cognitive, Emotion, Motivation, Social

2) Technology

Virtual Reality (VR)

3) Research & Development

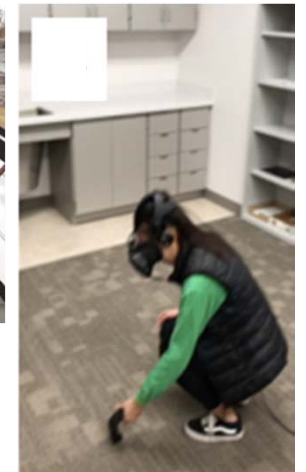
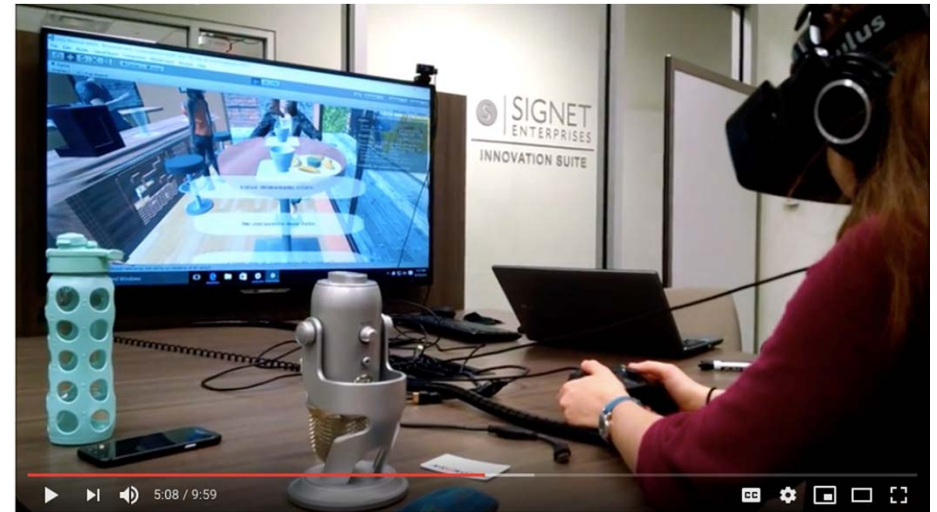
Controlled comparison testing





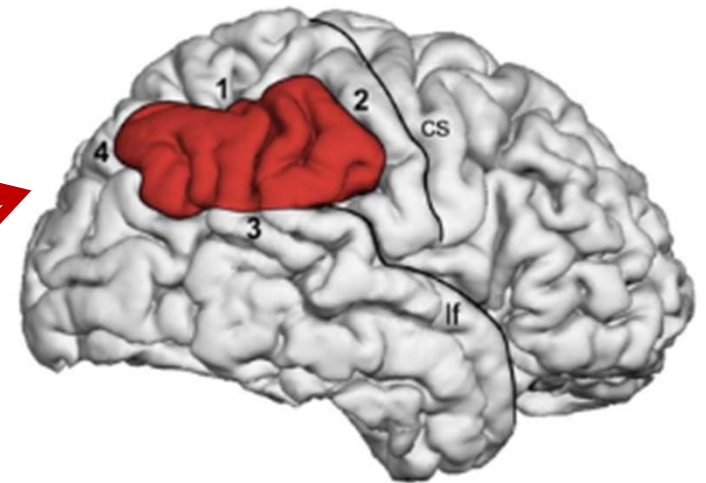
# Virtual Reality Language Learning: Technology

- **Environment** Computer-generated, 3D field view, HM/DT display
- **Sensory immersion** Visual, auditory, tactile
- **Motor immersion** Head/body movement, Actions (click, point, drag, type, speak)
- **Perspective taking** Motor immersion, avatar (self, other-players, non-players, animated)
- **Knowledge basis** Pronunciation, vocab, grammar, morphology, culture
- **Task-based learning** Interview, airport check-in, restaurant order, directions
- **Autonomy** Self-study, joint-study, instructor/coach-guided
- **Security** Simulated foreign immersion, safe risk-tasking/leveling up

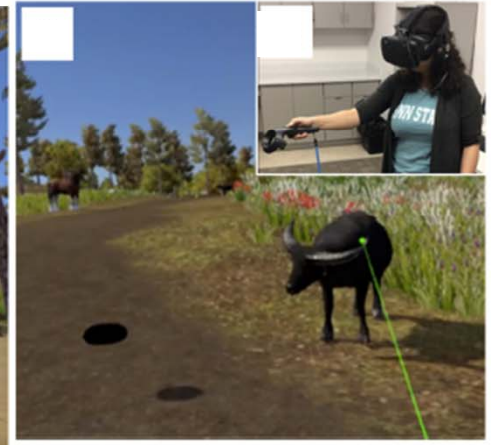
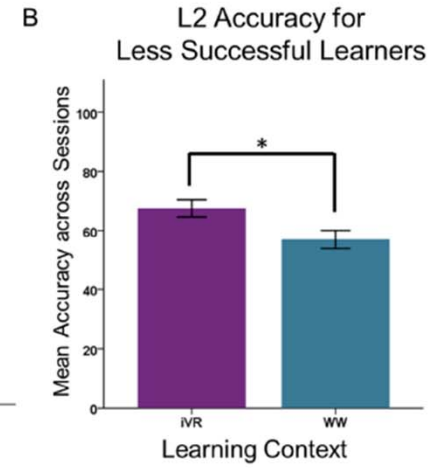
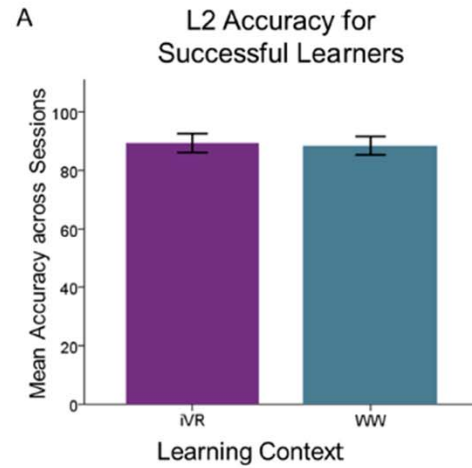
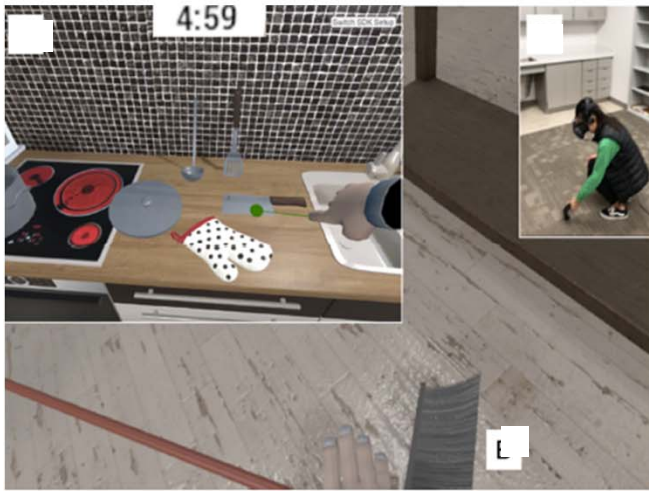


# Virtual Reality L2 Learning: Findings (Legault et al., 2019, review)

- Feeling of immersion
- Highly engaged learning
- Reduced foreign language anxiety (Melchor-Couto, 2017)
- Improved listening, reading, writing
- Better vocabulary learning
- Paralleled by structural neural plasticity – right-side brain region (**IPL, increased thickness**)
- Not (well) known
  - Comparative effects (grammar, morphology; static-dynamic images; longer-term use)
  - Changes in objective behavioral performance



# Study: VR Chinese Vocab Learning (Legault et al, 2019)



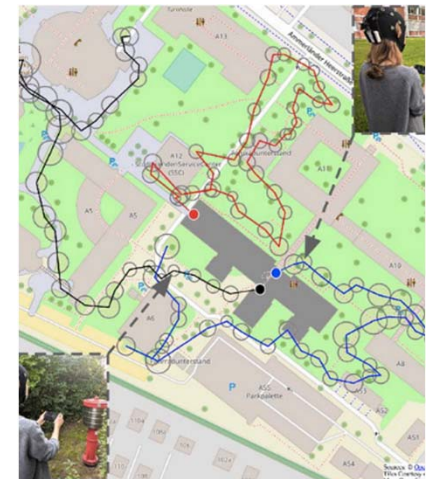
# R&D Needs: Retrieval Practice

**Finding:** testing of studied items improves long-term retention

**Explanations:** desirable difficulties, memory interference

**Predictions:** deadline, extra time, hints continued cognitive effort

**Experimentation:** VR /AR





# R&D Needs: Spaced Practice Effect

**Finding:** spaced practice improves long-term retention

**Explanation:** effortful retrieval practice, context variation, elaboration

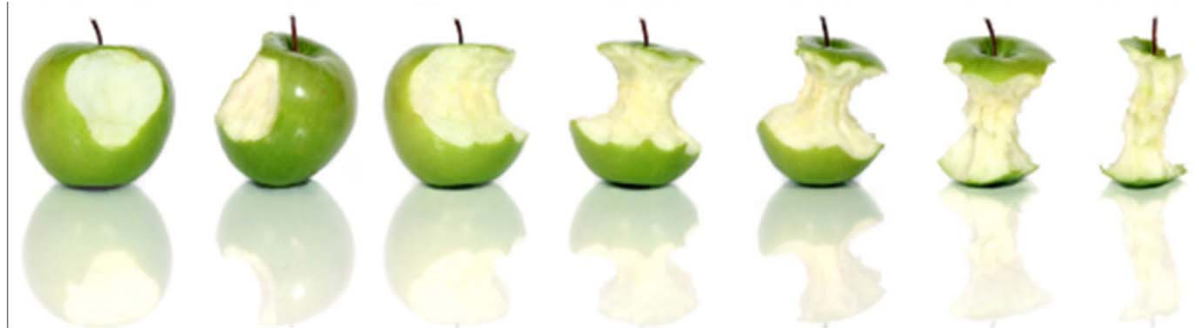
**Predictions:** graduated interval recall, tailoring by learner & item, optimal vocabulary size

**Experimentation:** VR / AR + cognitive model



# Micro- taught cognitive strategies

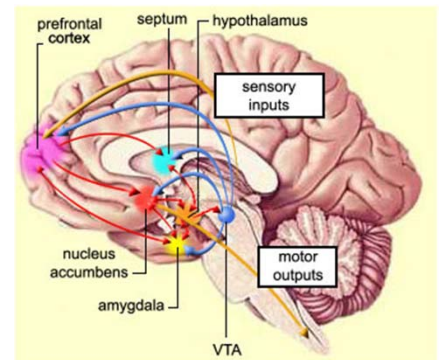
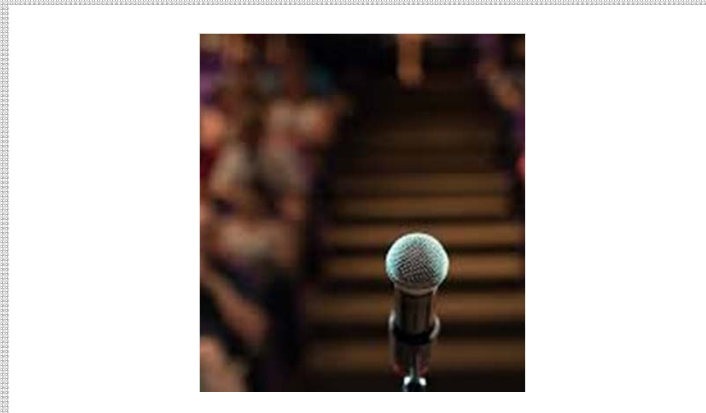
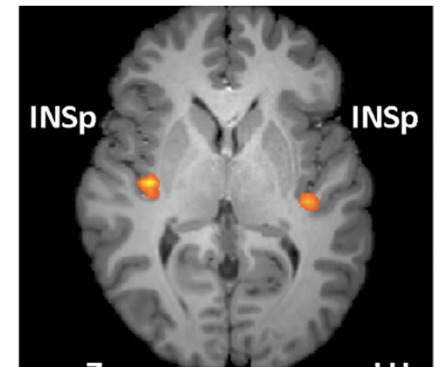
- **Goal:** Learning how to learn (meta-cognition)
- **Strategies:** retrieval, spacing, interleaving, elaboration, context, attention, chunking, deliberate practice, learning myths / barriers (procrastination, aptitude, styles, memory muscle),
- **Medium:** micro-videos, short, one per strategy, stand alone
- **Delivery:** Integrated into E-learning system (e.g., VR)
- **High performance learning journey:** bite-sized chunks spread across time





# Foreign Language Anxiety (FLA)

- Anxiety provoking situations:
  - testing
  - learning
  - real-life performance



# Mindfulness: what is it?

- **State / trait / training:** non-judgmental present-moment awareness
- **Cognitive:** attention focus, open monitoring
- **Emotional:** reduced emotional reactivity
- **Meditation:** breathing, body scan, gratitude, other activities
- **Delivery:** instructor-led, app-delivered
- **Enhancement:** brainwave & heart rate monitoring
- **Benefits:** stress-resilience → health, cognition, emotion, performance





# Mindfulness & Foreign Language Performance and Anxiety

---

- Mindfulness practice improves performance on language interpretation test (Ivars & Altayud, 2013)
- Higher levels of trait mindfulness associated with lower levels of foreign language anxiety (Fallah, 2017)
  - Partially mediated by emotional coping self-efficacy (CSE)



# Mindful brain: stress buffer

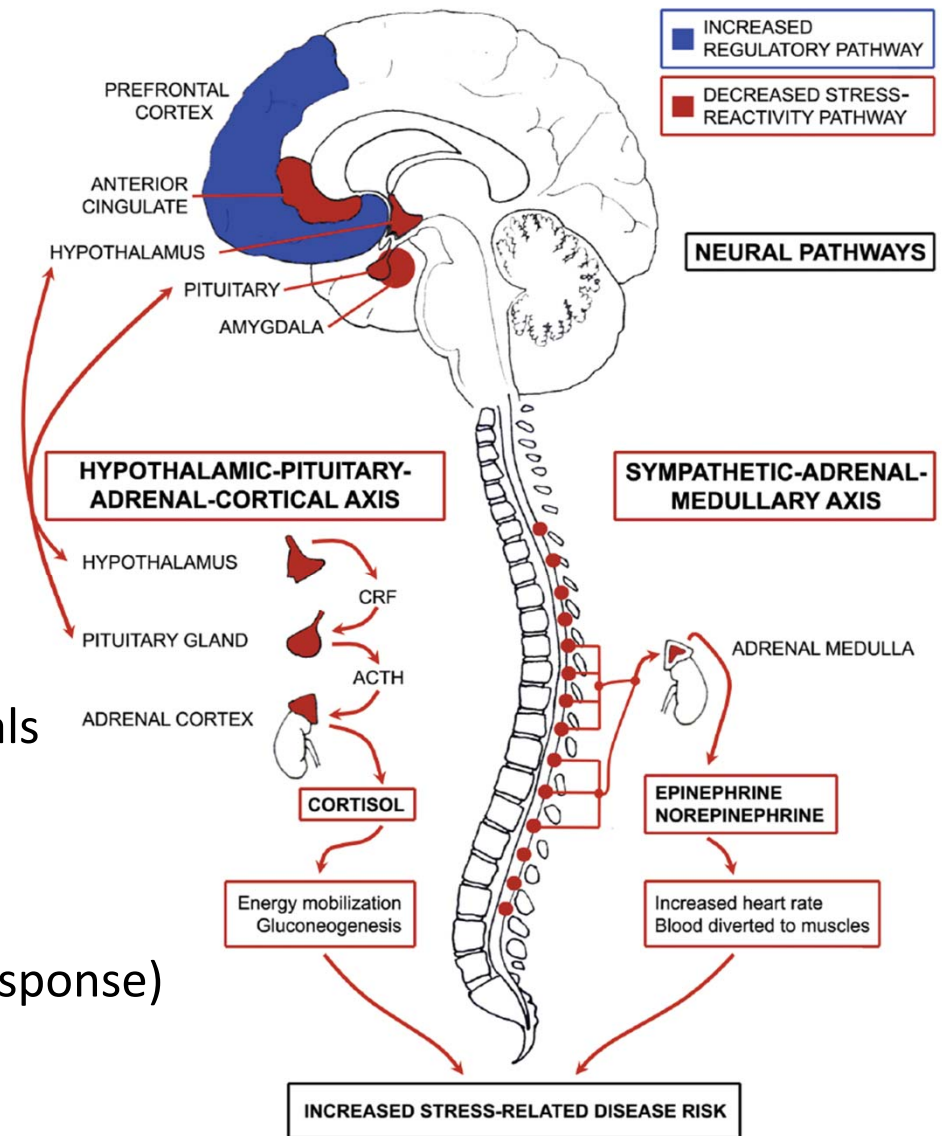
## Blue regions

- Regulatory pathways
- Activated in mindful (trained) individuals

## Red regions decreased

- Stress reactivity pathways
- Deactivated in mindful (trained) individuals
- Decreased release of cortisol & NE
- Decreased chronic stress (flight & fight response)

Creswell & Lindsay (2014)





# Mindfulness: R&D needs

- VR-delivered mindfulness training ([Tarrant, 2018](#))
- VR-integration of mindfulness training with language learning
  - Time pressure
  - High stakes
  - Cognitive difficulty:
    - Linguistic & non-linguistic working memory load
  - Physiological monitoring / biofeedback:
    - Heart Rate, Brain Waves, Breathing ([Tarrant, 2018](#); [Tromp, 2018](#); [Vesisenaho, 2019](#))




# Social strategies

- Supervisor support: before, during, after training
- Peer pair feedback
- Avatar anonymity
- Community of practice, learner community
- Teaching back (e.g., feedback, content curation)
- Extrinsic and intrinsic levers



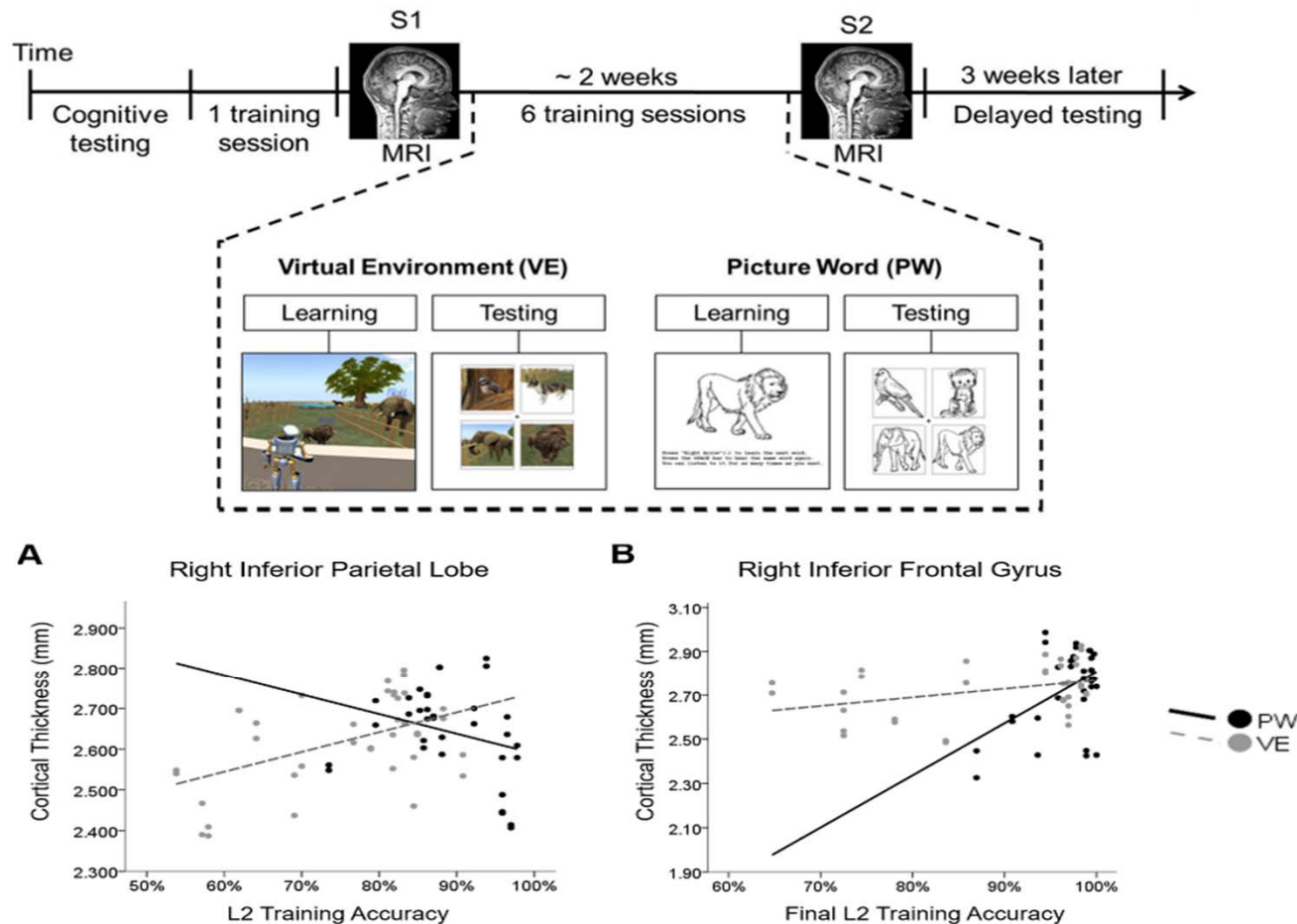


# Summary – major take away: High Performance Learning Journeys for Autonomous Language Learning

- 
- 1) Evidence-based strategies      Cognitive, Emotion, Motivation, Social
  - 2) Technology      Virtual Reality (VR)
  - 3) Research & Development      Controlled comparison testing

Q&A back-up slide(s)

# VR vs WW vocabulary learning & brain (Legault et al. 2018)



**Fig. 5.** CT relationship with L2 accuracy varies by L2 training group. (A) CT in the right IPL correlated positively with average accuracy for the VE group and negatively for the PW group. (B) CT in the right IFG was positively correlated with late learning accuracy only for the PW group ( $p < .05$ ).