

Supporting Attentional Control in XR Learning

External distraction, visual guidance, and support for return

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When should XR help learners stay focused—and how should it support their return?

01 UNDERSTAND EXTERNAL DISTRACTION

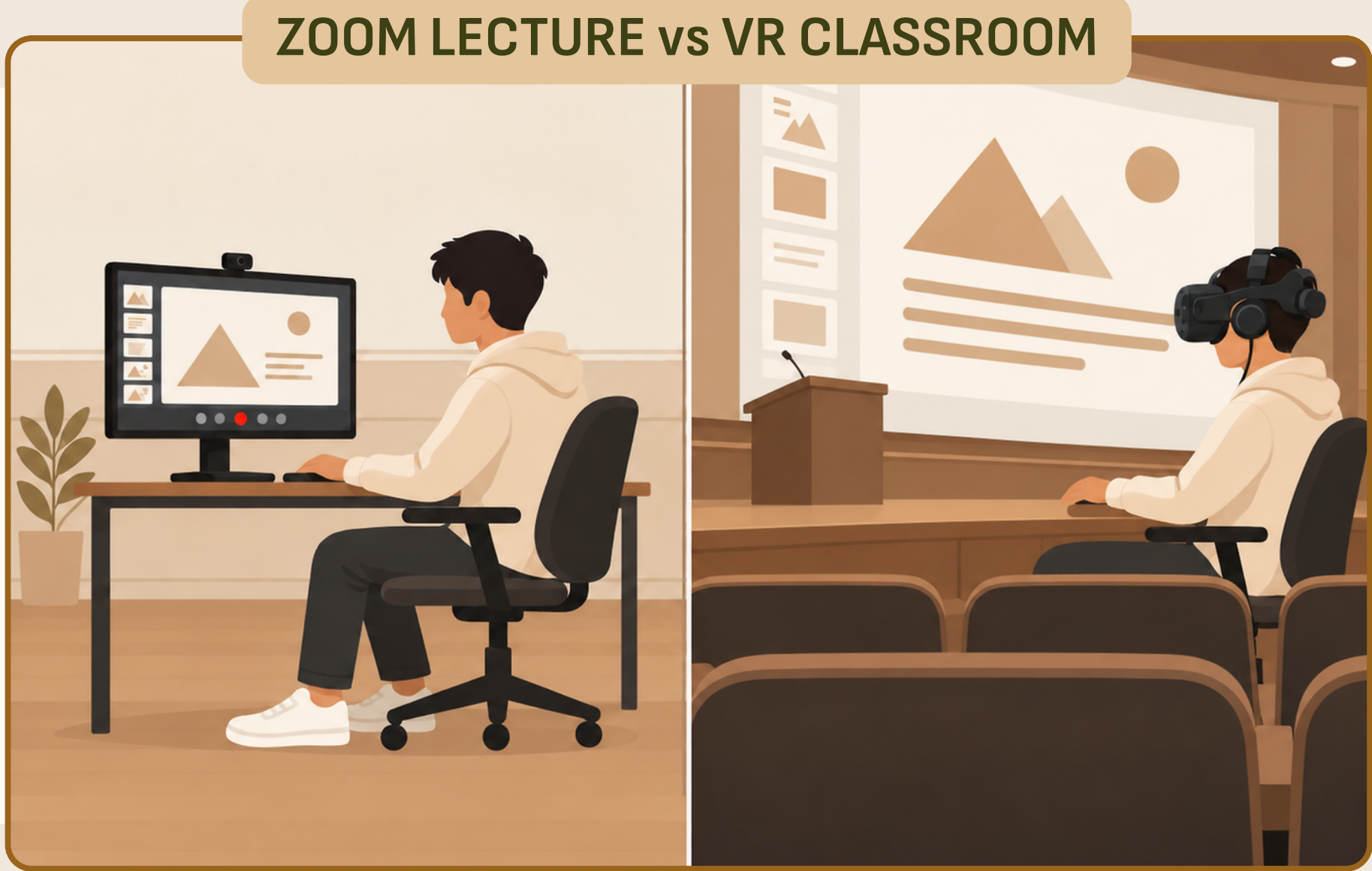
DATA COLLECTED · ANALYSIS ONGOING

We asked students **what pulls their focus away** during lectures. Based on their responses, we simulated the following **distractions**:

- Notification sounds
- Keyboard typing noise
- Scripted phone conversation
- Construction noise

A STUDY 1 · COMMUNITY SMELLS LECTURE (DESKTOP VS VR)

2 × 2 between participants:
Distraction (On / Off)
Platform (Zoom / VR)
Eye tracking data collected.
40 recruited participants
32 complete datasets (balanced core)



B STUDY 2 · IMMERSIVE DOCUMENTARIES (WITHIN ONE XR PLATFORM)

2 × 3 mixed design:
Distraction (within) × **Environment** (between)
2 Documentary shorts were played, one with distractions.
Playing order & distraction order counterbalanced
36 non-pilot participants



Shared measures: knowledge tests · self-report · GSR · webcam/audio records

02 UNDERSTAND ATTENTION GUIDANCE

ANALYSES AND MANUSCRIPT UNDER REVISION

How did researchers **direct focus** towards what matters?

A REVIEW AND TAXONOMY

40 reviewed papers → **107** technique entries

CLASSIFICATION DIMENSIONS

- Perceptibility
- Mechanism
- Platform
- Gestalt principles
- Visual variables

B RECREATE SELECT TECHNIQUES

18 techniques (including a no-guidance baseline)
recreated for a 2D visual search task

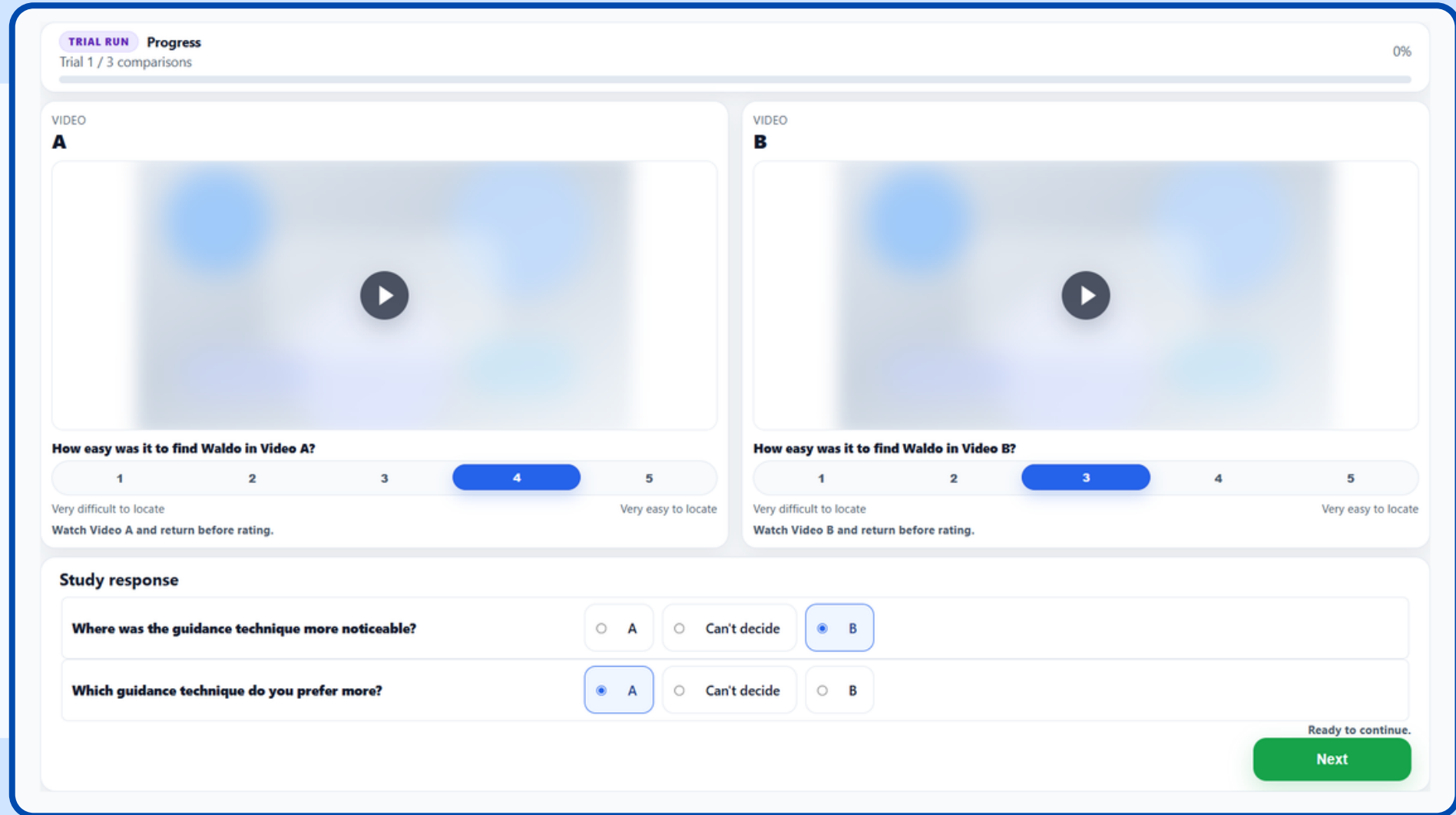


C COMPARE TECHNIQUES

12 participants in the study → **76** technique comparisons per participant

MEASUREMENTS

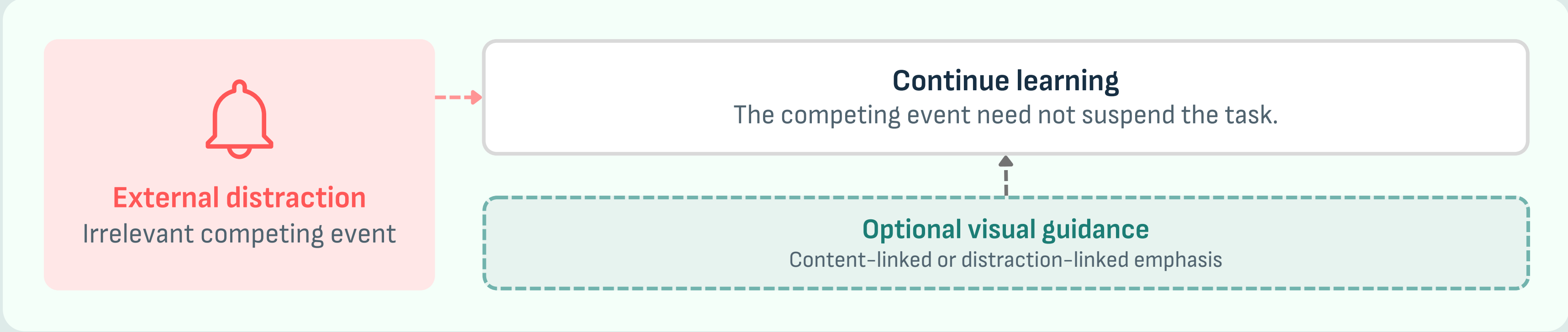
- Subjective
Cue noticeability
Technique preference
Perceived target findability
- Behavioural
Target-fixation success
Time to first target fixation
Video replays



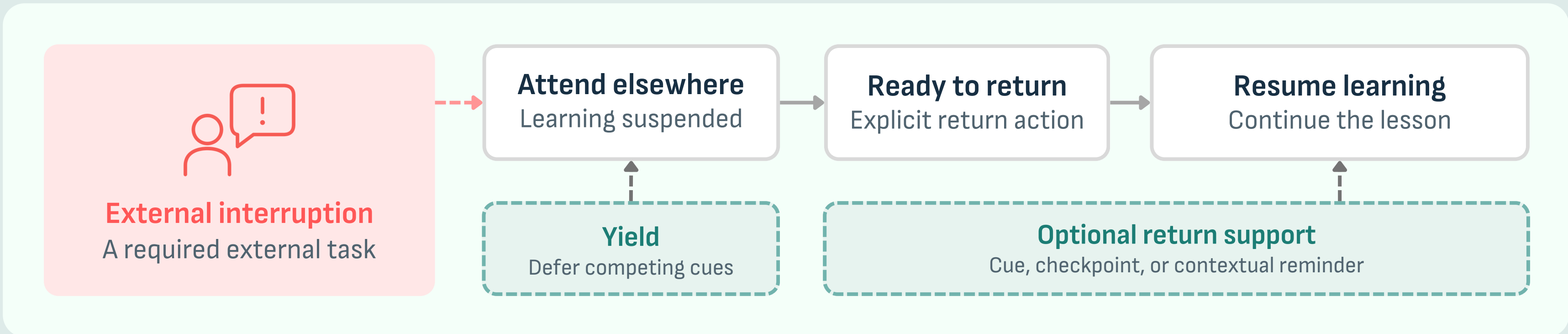
03 EVALUATE ATTENTIONAL SUPPORT

PLANNED · DIRECTION AND PLATFORM OPEN

A MAINTAIN FOCUS · LEARNER WILL NOT INTERRUPT LEARNING



B YIELD AND RESUME · LEARNER WILL INTERRUPT LEARNING



PROPOSED DIRECTIONS

- Distraction-linked**
Cues timed to competing events
- Content-linked**
Cues timed to essential information
- Coordinated support**
A combination of both

Which direction next? · Learning benefits beyond gaze return? · Which assistance costs matter most?



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