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Mind Wandering, Self-Regulated Learning, and the Role of Goals in Relation to Thought Content

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Introduction

- Sustained attention is impossible (Sharpe and Tyndall, 2025)
- Mind wandering occurs ~30% of the time while learning (Wong et al., 2022)
- Mind wandering negatively impacts learning (Wong et al., 2022)
- Awareness of mind wandering is possible (Schooler et al., 2011)
- Adjusting the learning process after mind wandering is an act of self-regulation (Ebbert et al., 2026)

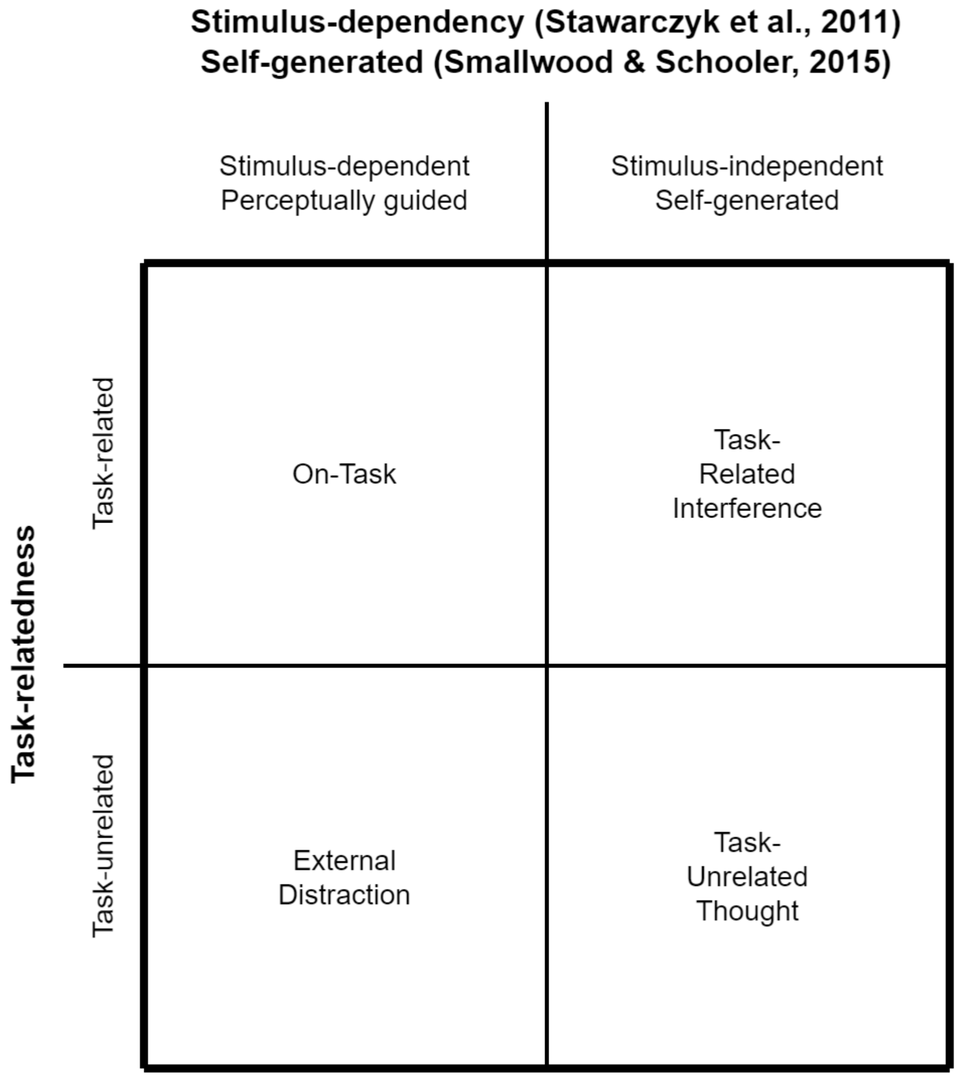
Outline

- Theoretical Framework
- Two studies
- Discussion
- Current Work
- Future Directions

Mind Wandering

Commonly conceptualised as task-unrelated thoughts …

… but it's not that simple.



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Meta-Awareness

- Capacity to explicitly recognize and reflect on one's mental state (Schooler et al., 2011)
- Meta-awareness is a form of metacognitive monitoring
- Metacognitive monitoring is part of self-regulated learning (Winne and Azevedo, 2022)

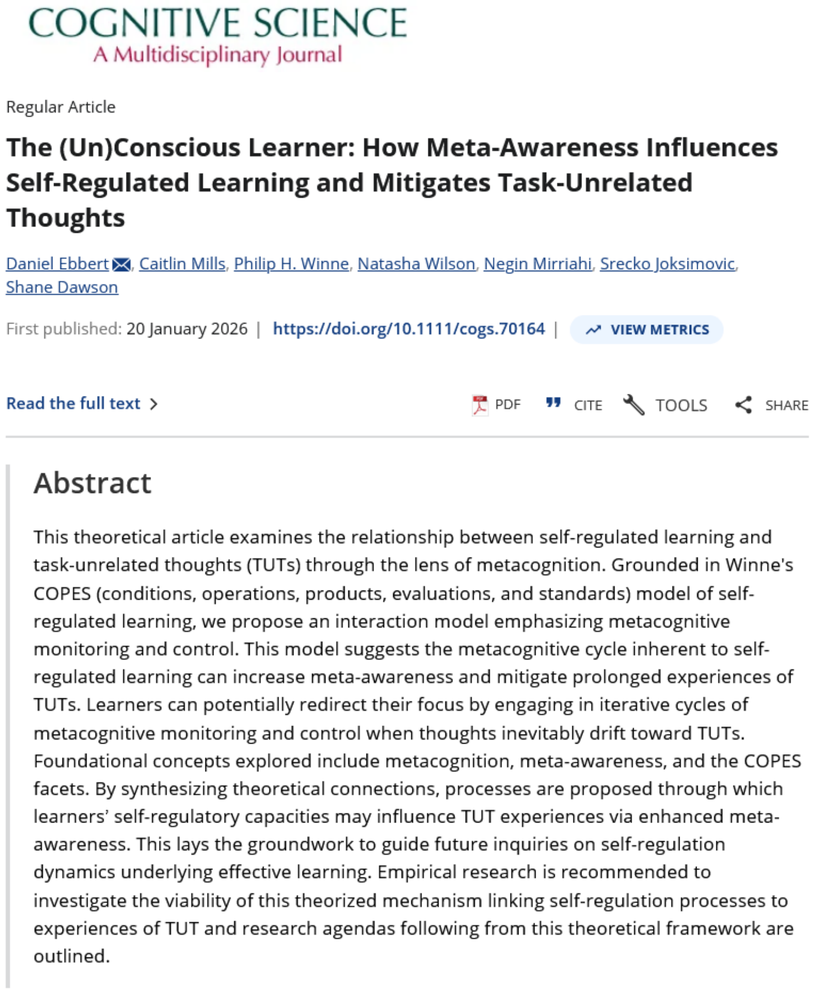
Self-Regulated Learning

- Based on COPES facets of tasks (Winne and Hadwin, 1998)
- COPES = **C**onditions, **O**perations, **P**roducts, **E**valuations, and **S**tandards
- Four cyclical phases:
  - Task definition
  - Goal setting and planning
  - Enacting study tactics and strategies
  - Metacognitively adaptive studying
- Intermittent metacognitive monitoring and control

Theoretical Framework

Integrated mind wandering, meta-awareness of mind wandering, and self-regulated learning (COPES facets) into one theoretical framework





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The (Un)Conscious Learner: How Meta-Awareness Influences Self-Regulated Learning and Mitigates Task-Unrelated Thoughts

Daniel Ebbert, Caitlin Mills, Philip H. Winne, Natasha Wilson, Negin Mirriahi, Srecko Joksimovic, Shane Dawson

First published: 20 January 2026 | https://doi.org/10.1111/cogs.70164 | VIEW METRICS

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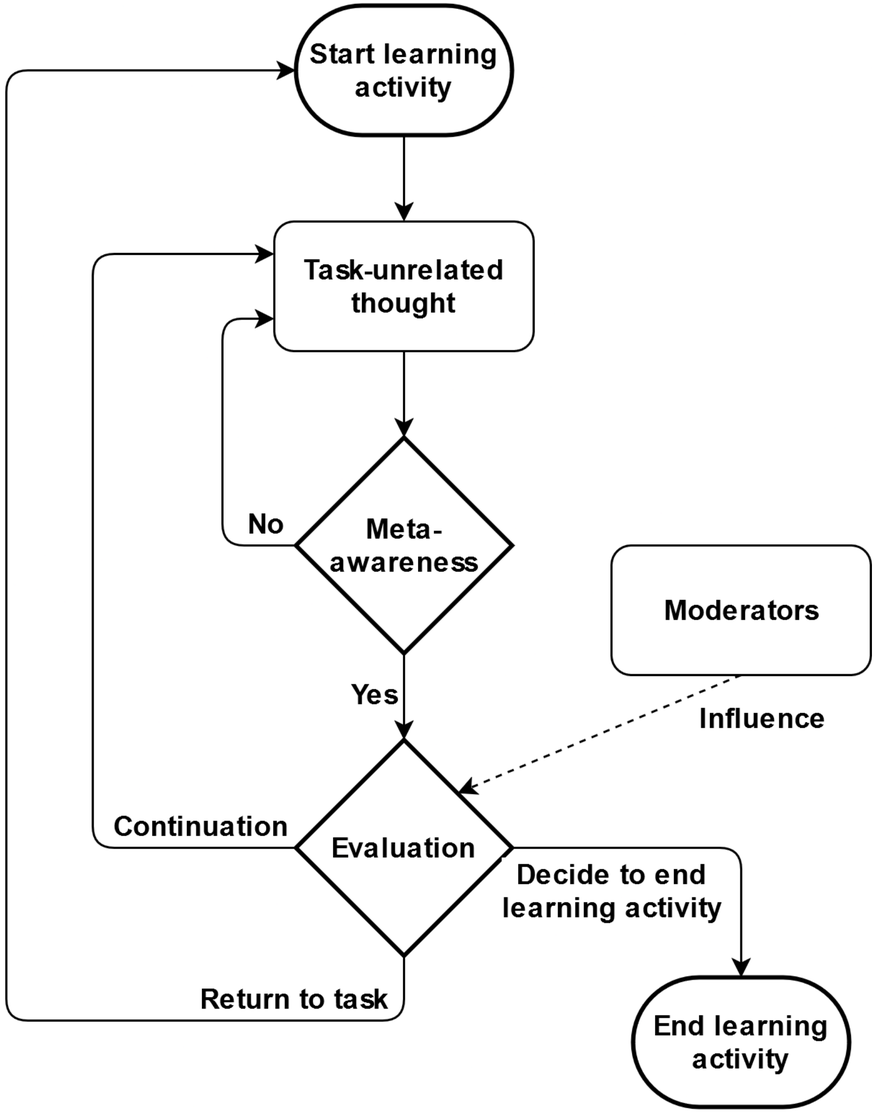
Abstract

This theoretical article examines the relationship between self-regulated learning and task-unrelated thoughts (TUTs) through the lens of metacognition. Grounded in Winne's COPES (conditions, operations, products, evaluations, and standards) model of self-regulated learning, we propose an interaction model emphasizing metacognitive monitoring and control. This model suggests the metacognitive cycle inherent to self-regulated learning can increase meta-awareness and mitigate prolonged experiences of TUTs. Learners can potentially redirect their focus by engaging in iterative cycles of metacognitive monitoring and control when thoughts inevitably drift toward TUTs. Foundational concepts explored include metacognition, meta-awareness, and the COPES facets. By synthesizing theoretical connections, processes are proposed through which learners' self-regulatory capacities may influence TUT experiences via enhanced meta-awareness. This lays the groundwork to guide future inquiries on self-regulation dynamics underlying effective learning. Empirical research is recommended to investigate the viability of this theorized mechanism linking self-regulation processes to experiences of TUT and research agendas following from this theoretical framework are outlined.

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Theoretical Framework

- Learners become aware of their mind wandering and can react
- Self-regulated learners will report more mind wandering
- Meta-awareness of mind wandering seen as a metacognitive trigger for self-regulation (Järvelä and Hadwin, 2024)



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Studies Overview

Study 1

- Naturalistic study in an authentic course setting to observe reactions following mind wandering

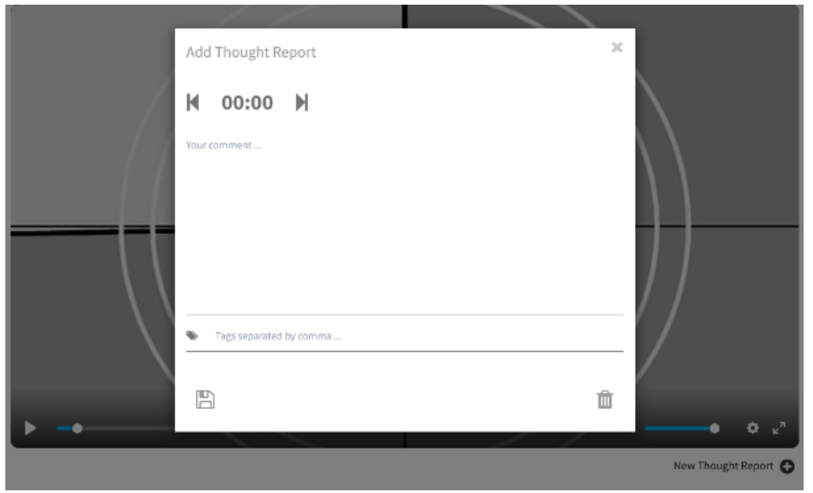
Study 2

- Experiment to test whether rewinding following mind wandering balances out the effect of frequent mind wandering

Common Elements

- Self-regulated learning aptitude measured using SRL-O (Broadbent et al., 2022)
  - Metacognition
  - Online Effort Regulation
  - Online Task Strategies
- Video-based learning
- Self-caught thought reports





Study 1

Naturalistic study in an authentic course setting to observe reactions following mind wandering



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Mind wandering in Video-Based learning: Self-Regulated learning and student responses in a naturalistic setting

Open access | Published: 12 March 2026
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Daniel Ebbert, Negin Mirriahi, Natasha Wilson, Malgorzata Korolkiewicz, Nicholas Fewster-Young, Anna Lloyd, Maurizio Costabile, Srecko Joksimovic & Shane Dawson

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Abstract

Video-based learning is a prevalent instructional method in higher education. Although video offers increased flexibility for learning, students face inherent challenges in maintaining attention and engagement. Mind wandering is a common challenge that can negatively impact learning outcomes. While prior research has examined the impact of mind wandering, less is known about how students respond when they become aware of mind wandering. This naturalistic case study explored how self-regulated learning relates to students' awareness of mind wandering. It also examined the temporal focus of these thoughts and whether students choose to rewind videos after noticing they were mind wandering. A total of 53 university students from eight courses participated, reporting instances of mind wandering while watching short (< 30 min) instructional videos and completing the self-regulation for learning online (SRL-O) questionnaire. Students with stronger effort regulation and planning and time management skills, reported less mind wandering. Analysis of video navigation revealed only 15 instances where students rewound the video after reporting mind wandering, representing less than 5% of the 317 total thought reports and involving only 10 of 53 participants. These findings raise questions about whether learners need explicit instruction on how to respond when they catch themselves mind wandering, or whether such reactive behaviours develop naturally as part of self-regulated learning skills.

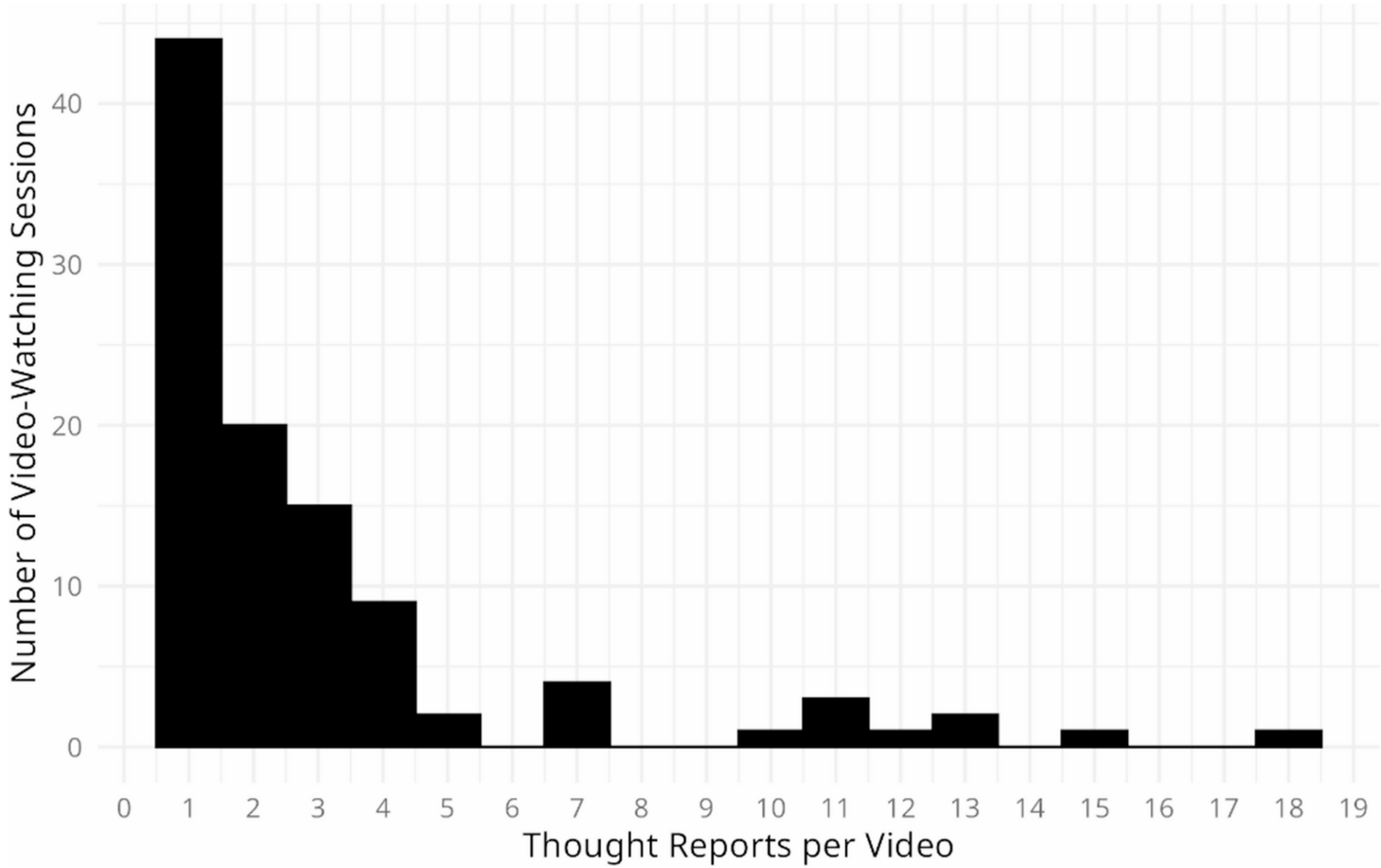
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Study 1 Overview

- Research Questions:
  - Is there a relationship between self-regulated learning aptitude and the rate of self-caught thought reports during video watching?
  - To what extent do participants rewind videos following self-reported off-task thoughts?
- Setting: 8 courses at the University of South Australia across disciplines
- Task: Watch their course videos and report their mind wandering when aware
- Analysis:
  - RQ1: GLMs with negative binomial distribution
  - RQ2: Log analysis of video player logs

Study 1 Results

- Most participants (n = 53) only submitted few thought reports



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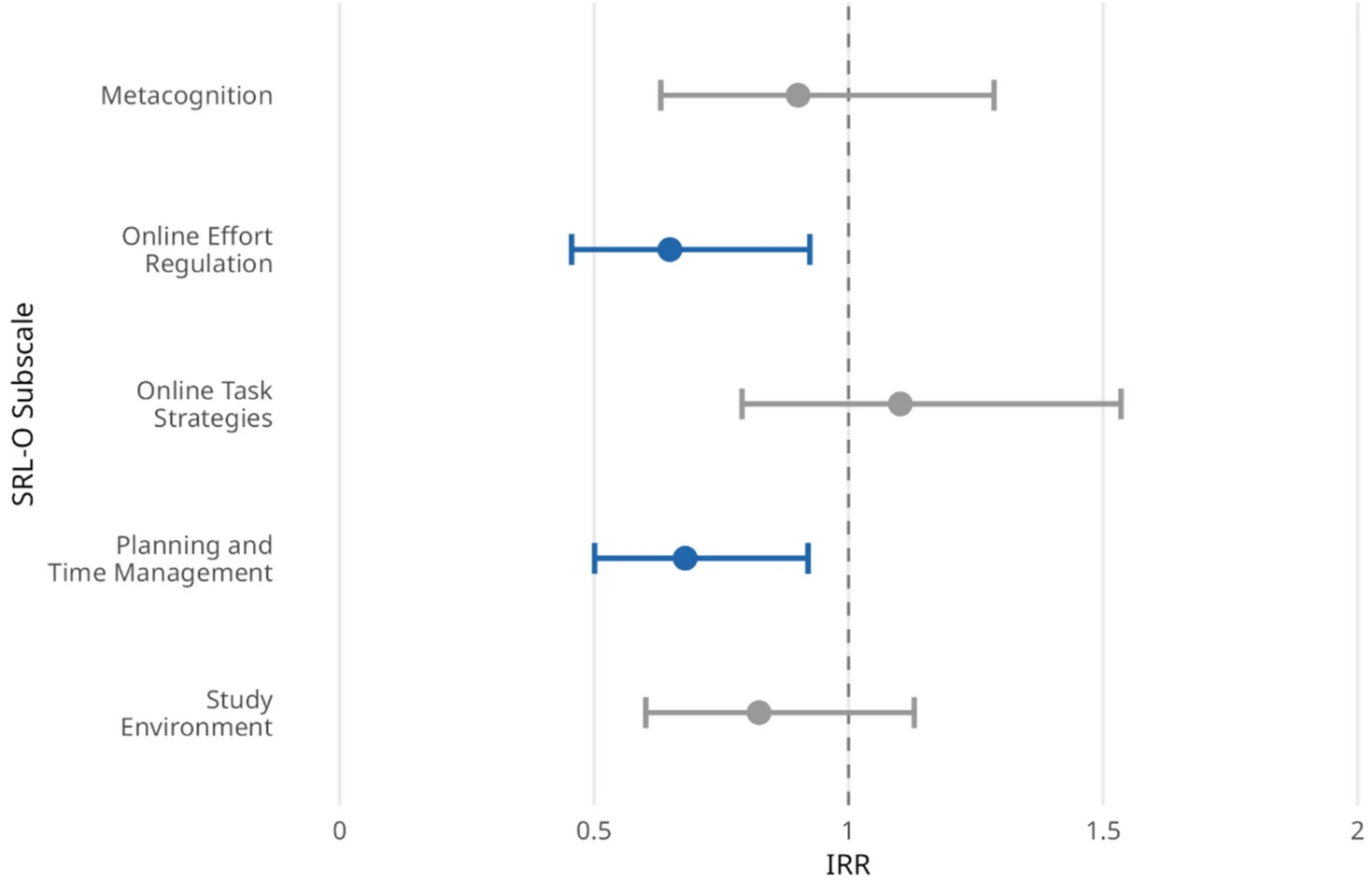
Study 1 Results

Task-related interference was the most frequent thought type.

Thought Type	Count
Task-unrelated thoughts	87
Task-related interference	146
External distractions	84
Total	317

Study 1 Results (RQ1)

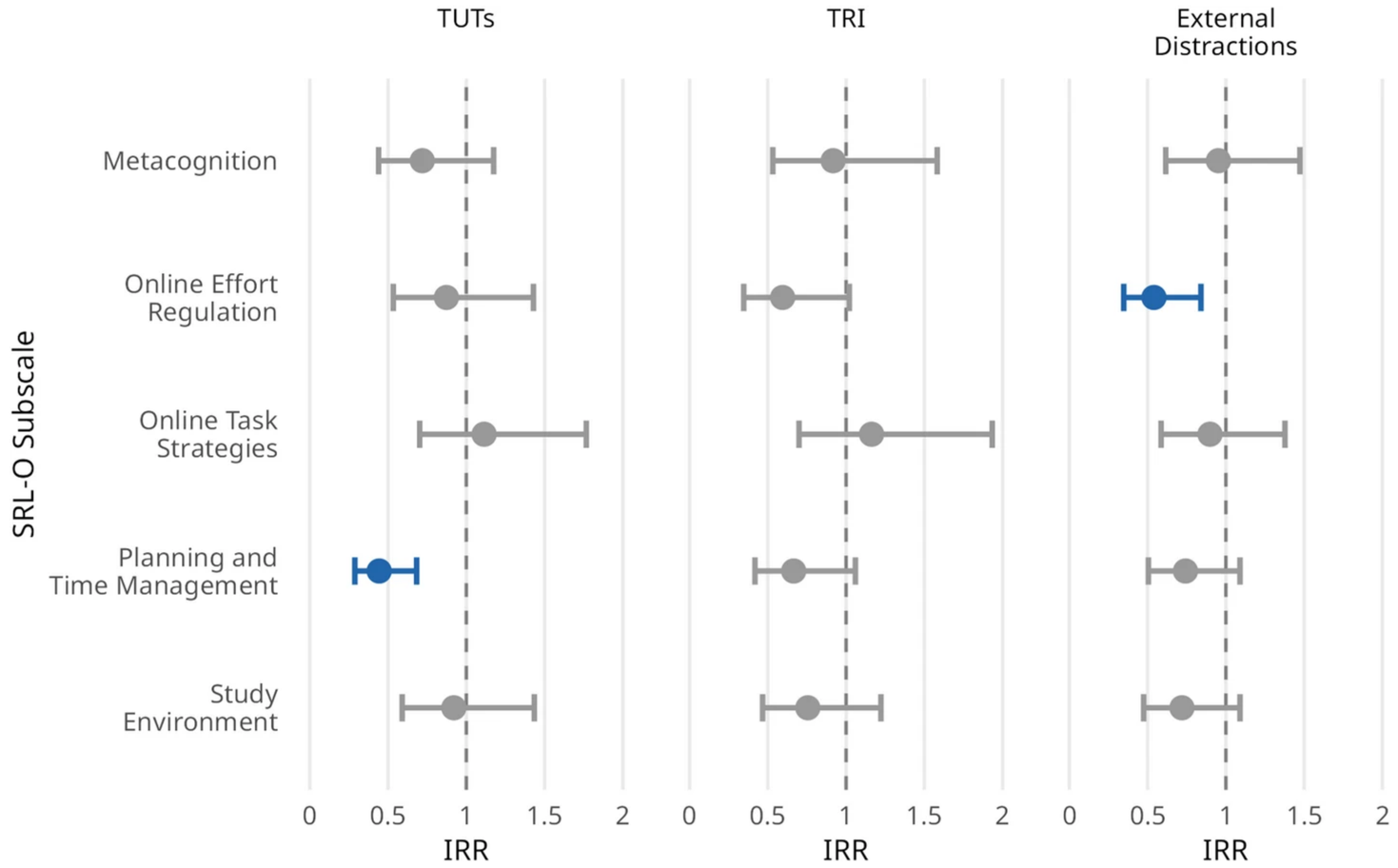
Relationship between SRL-O subscales and number of thought reports



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Study 1 Results (RQ1)

Relationship between SRL-O subscales and number of thought reports by thought type



Study 1 Results (RQ2)

Rewinding occurred in 15 cases (out of 317) by 10 participants (out of 53).

Study 1 Summary

- Few thought reports
- Composition by thought type is different to previous experimental work
- Higher Online Effort Regulation and Planning and Time Management relate to fewer thought reports
- Rewinding following mind wandering rarely occurs

Study 2

Experiment to test whether rewinding following mind wandering balances out the effect of frequent mind wandering

Preprint ->

Study 2 Overview

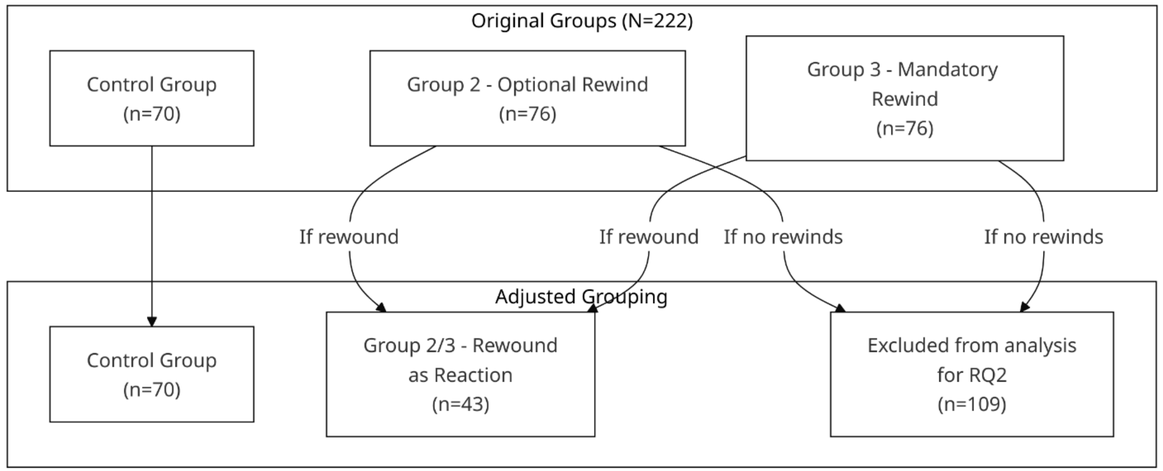
- Research Questions:
  - Does rewinding after off-task thoughts relate to knowledge test scores?
  - Is self-regulated learning aptitude predictive of thought report counts by thought type and, in turn, knowledge test score?
  - Is self-regulated learning aptitude predictive of rewinding behaviour, in terms of both the likelihood of rewinding and the frequency of rewinding?
- Setting: Online experiment with sample from Prolific
- Task: Watch a video, report mind wandering when aware, and rewind afterwards, followed by a knowledge test
- Analysis:
  - RQ1: Log analysis of video player logs
  - RQ2: pSEM with GLMs with negative binomial distribution
  - RQ3: Hurdle model

Study 2 Groups

Control	Optional Rewinding	Mandatory Rewinding

Study 2 Challenge

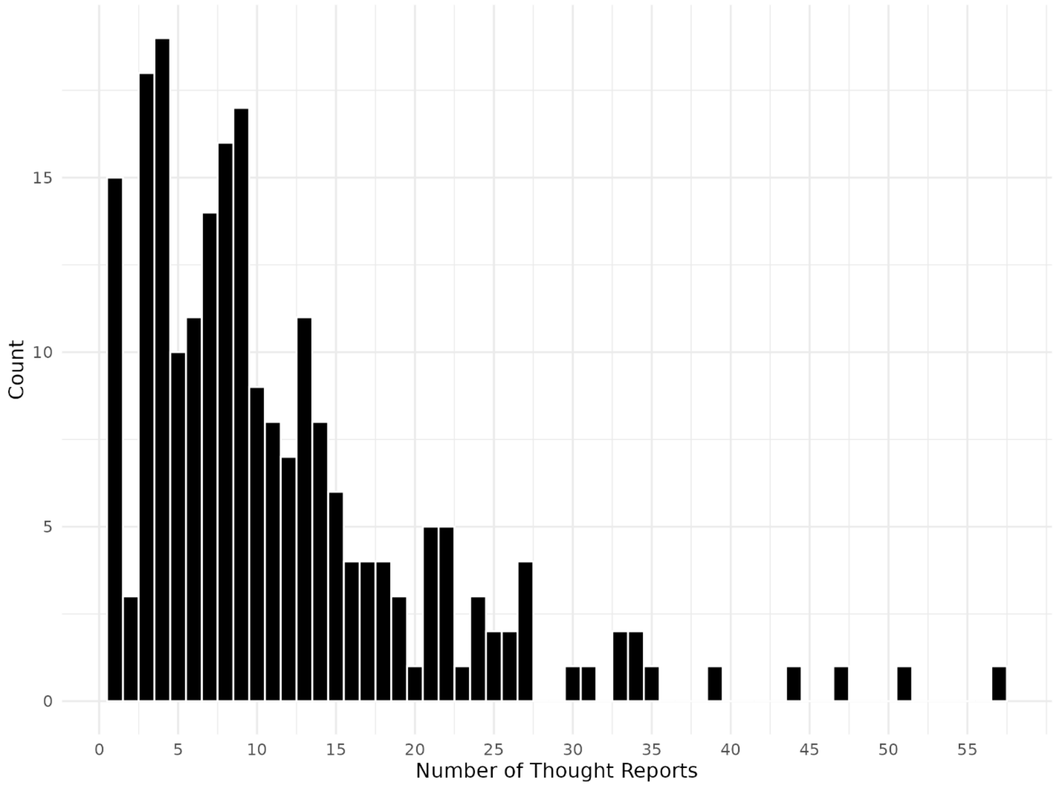
Most participants did not rewind following mind wandering, despite being instructed to



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Study 2 Results

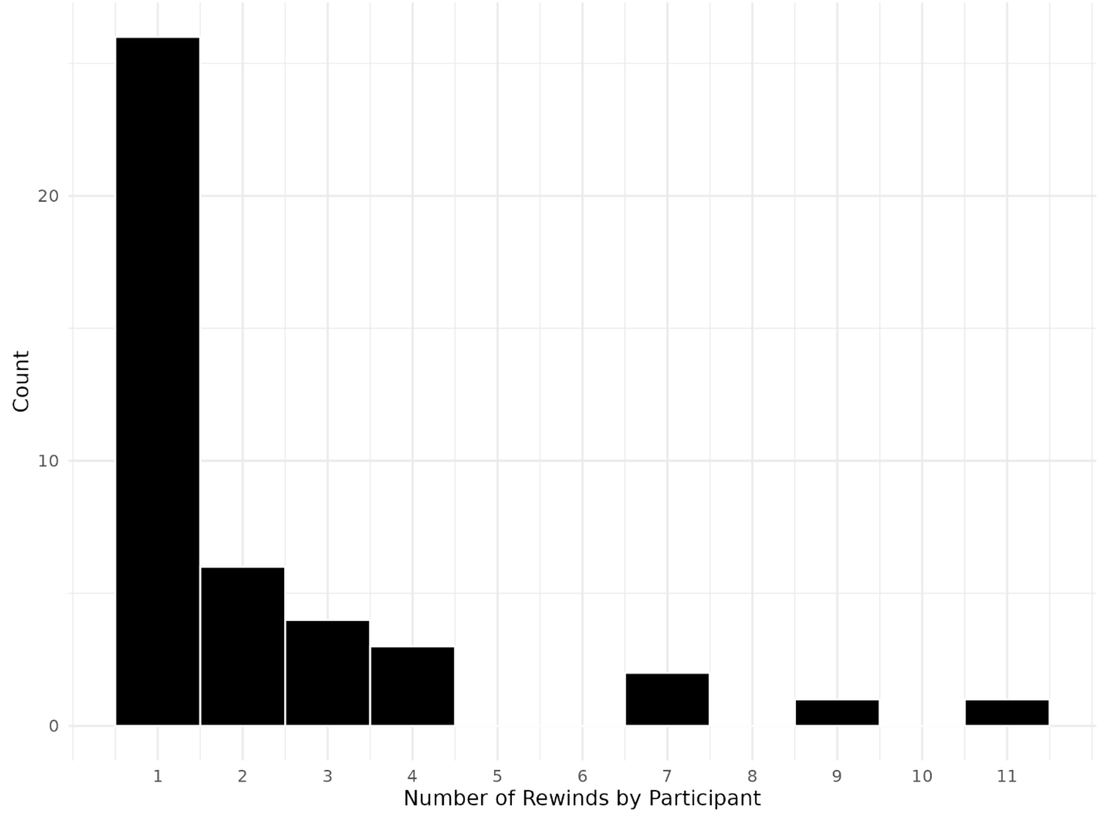
Number of thought reports by participant



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Study 2 Results (RQ1)

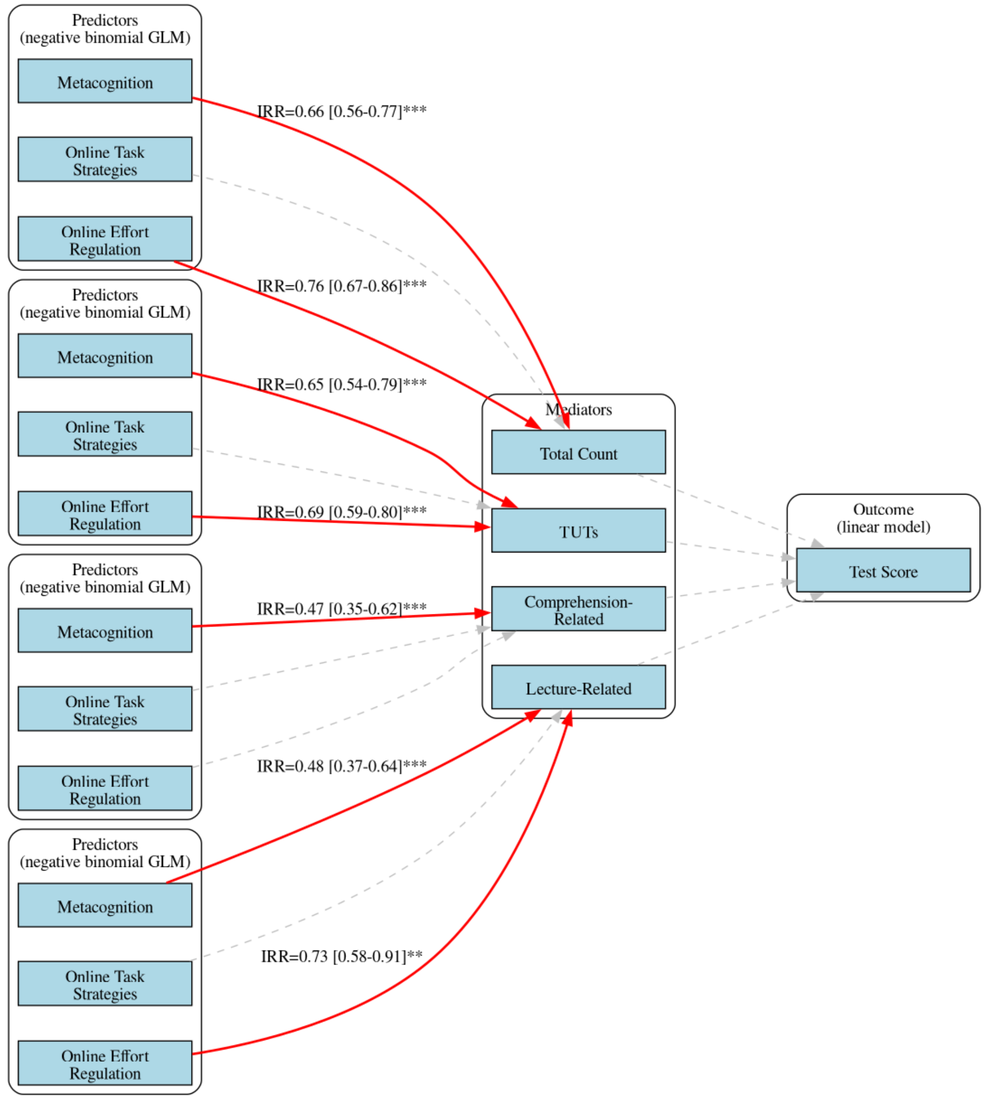
Welch's t-test on knowledge test score between the control group (M = 0.62, SD = 0.25, n = 70) and the adjusted rewinding group (M = 0.67, SD = 0.22, n = 43), t(97.34) = -1.27, p = .206 showed no significant difference between the groups



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Study 2 Results (RQ2)

- Higher scores on Metacognition relate to fewer thought reports in total and by type
- Higher scores on Online Effort Regulation relate to fewer thought reports in total and for TUTs and lecture-related off-task thoughts
- Neither relationship mediated the relationship with test score



Study 2 Results (RQ3)

- Higher scores on Online Effort Regulation increase probability of any rewinding
- Neither scale is predictive of rewinding frequency

Hurdle Model Results: Probability of Any Rewinding (Zero-Inflation Component)

Predictor	OR	95% CI	p
Metacognition	1.148	[0.674, 1.957]	.611
Online Task Strategies	1.190	[0.791, 1.789]	.404
Online Effort Regulation	0.643	[0.435, 0.952]	.028

Note. OR = odds ratio. Values > 1 indicate higher odds of NOT rewinding; values < 1 indicate higher odds of rewinding. Model includes offset(log(duration)).

Hurdle Model Results: Rewind Frequency Among Those Who Rewound (Count Component)

Predictor	IRR	95% CI	p
Metacognition	0.684	[0.223, 2.095]	.506
Online Task Strategies	1.094	[0.487, 2.458]	.828
Online Effort Regulation	0.590	[0.265, 1.314]	.197

Note. IRR = incidence rate ratio. The model includes an offset (log(duration)) and is conditional on the rewinding count > 0.

Study 2 Summary

- Rewinding instructions were not followed
- Rewinding was not associated with higher test scores
- Higher Metacognition and Online Effort Regulation relate to fewer thought reports but not, in turn, higher test scores
- Higher scores on Online Effort Regulation increased the likelihood of rewinding, but not the frequency

Summary

- Higher scores on Online Effort Regulation related to mind wandering frequency in both studies
- Results on Metacognition are inconclusive
- All relationships in opposite direction

- Rewinding rarely occurs but higher scores on Online Effort Regulation are predictive of any rewinding occurring

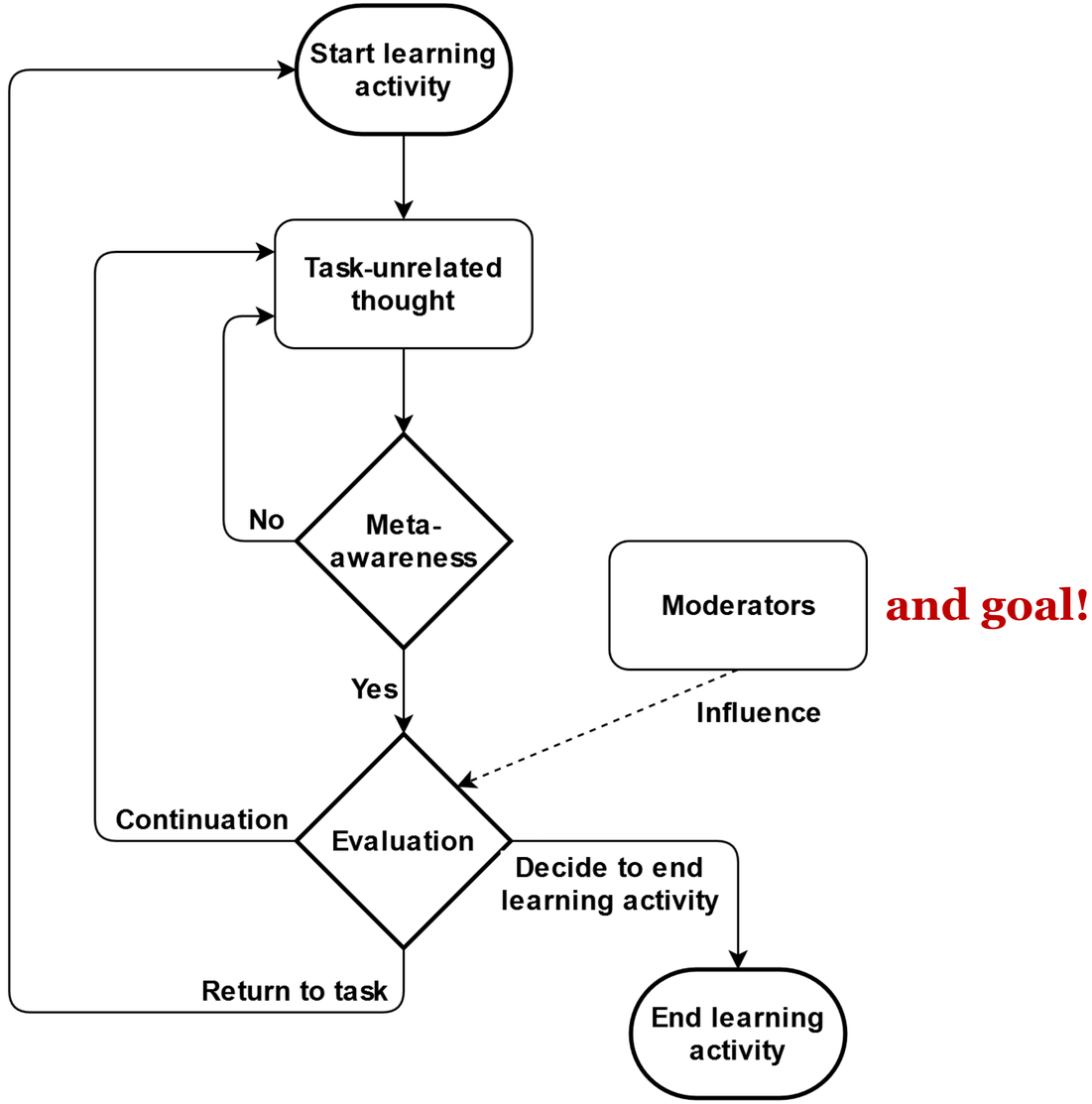
Discussion

- Regulation of learning in reaction to mind wandering might be automated/habituated
- Thus, explicit meta-awareness is not reached, and the opposite direction of results can be explained

- Why did rewinding rarely occur? -> Remember the phases of the learning process?
  - (1) Task definition; **(2) Goal setting and planning;** (3) Enacting study tactics and strategies; (4) Metacognitively adaptive studying

Proposition

- What were the participants' goals?
  - Study 1: Unknown, videos were watched during the semester and before class.
  - Study 2: Money for study participation.
- Ad-hoc regulation following mind wandering only occurs if the mind wandering is seen as a threat to goal achieving.



Back to the Beginning

If mind wandering during self-regulated learning should be studied in relation to goals set by learners.



then …

Does the often-used statement “mind wandering negatively impacts learning” still apply?

Current Work

Scoping Review

- Has mind wandering been studied in relation to goals set by learners and did those learners have agency to regulate their own learning?
- Preliminary result: Mind wandering has predominantly been studied relative to goals set by researchers using a performance measures such as a multiple-choice quiz

Observational Study

- Exploratory study to identify reaction tactics following mind wandering
- Learners are observed studying their regular course materials and asked to report their mind wandering
- Video observations followed by video-stimulated recall

Planned Work

Experiment to test effect of mind wandering on learning relative to learner set goals

- If we study the effect of mind wandering on learning relative to a performance goal a learner has set (e.g. to achieve 85%) can we still observe the “negative effect of mind wandering on learning”?
- Looking for collaborators

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Widening the Scope

- Seeing triggers for self-regulation as the starting point for my future work, beyond mind wandering

- **Fundamental Question:** How do students adjust their learning process ad hoc (small-scale adaptation), and how do their session goals inform those adjustments?

Thank you!

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