

Scaffolding Metacognition with GenAI: Exploring Design Opportunities to Support Task Management for University Students With ADHD

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Individuals with ADHD Face Challenges in Daily Task Management



Unrealistic expectations about task completion

Difficulty prioritizing competing demands

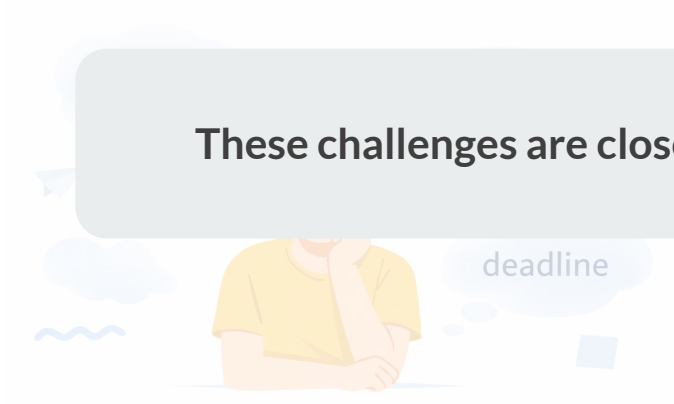
Challenges with task initiation and persistence

Individuals with ADHD Face Challenges in Daily Task Management

Unrealistic expectations about task completion

These challenges are closely related to limitations in metacognition

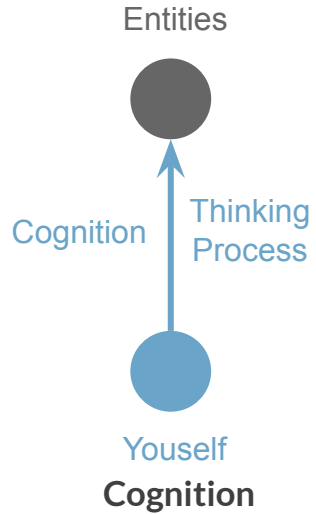
Challenges with task initiation and persistence



Barkley et al. (1997). Attention-deficit/hyperactivity disorder, self-regulation, and time: Toward a more comprehensive theory.

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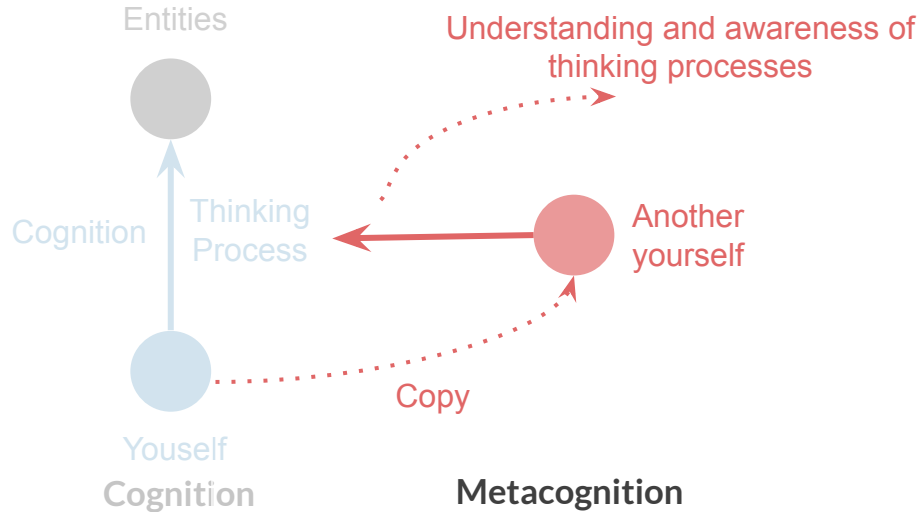
What is Metacognition?



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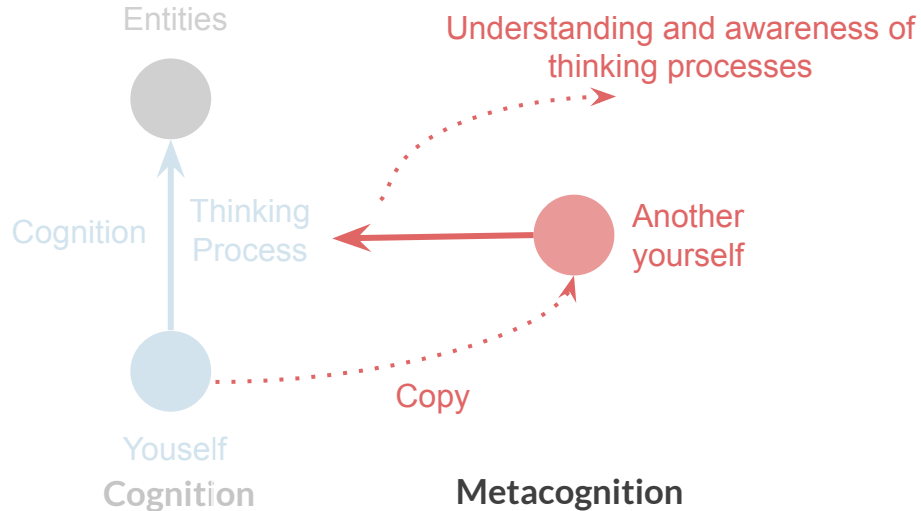
What is Metacognition?

Metacognition is the mental process that one recognizing and controlling their own thoughts.



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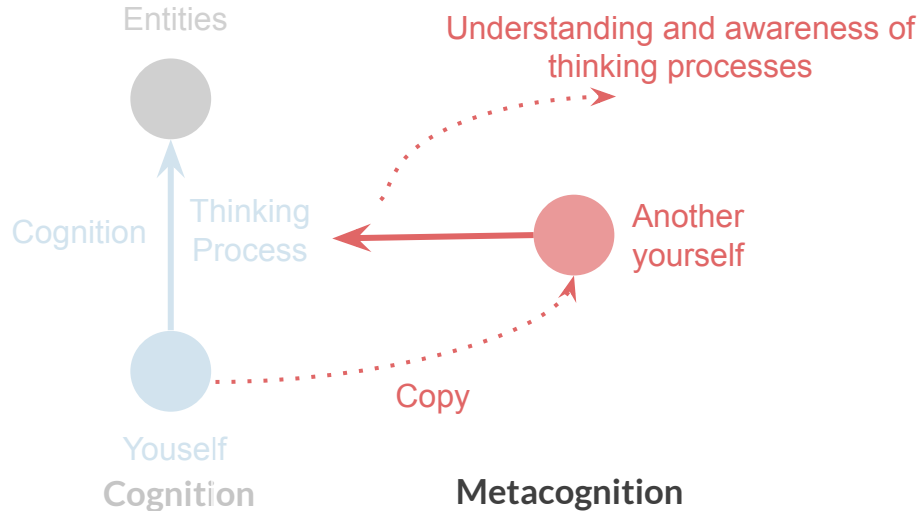
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Metacognitive Awareness
(task, self, strategy)

What is Metacognition?

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Metacognitive Awareness
(task, self, strategy)

Metacognitive Abilities
(monitor, control)

Existing Support Related to Metacognition for ADHD Populations



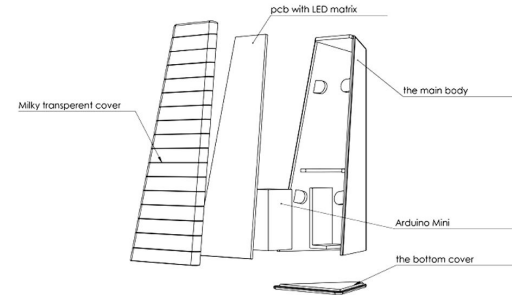
Self-Regulation Training

[Solanto et al., 2010; Tamm et al., 2014]



Co-Regulation


[Sonne et al., 2016]



Routine-Structuring Tools


[Weisberg et al., 2014]

However, the Emergence of GenAI May Change the Situation

 r/adhdwomen · 9个月前

I started using ChatGPT to help ADHD-ify my entire home and it is a game changer 🙌


It breaks my heart knowing that people spend their time and effort making ADHD blogs, and helpful videos. A lot of these are people with ADHD...

 r/ChatGPT · 8mo ago

AI has helped my ADHD more than I expected

Every time I need help with organization, it will tailor it to my personality, ADHD and break it down for me...

67 votes · 34 comments

 r/SideProject · 4mo ago

I built an ADHD support companion inside ChatGPT because my brain never worked like everyone else's. Would love feedback on clarity and direction.

TECHNOLOGY EXECUTIVE COUNCIL

People with ADHD, autism, dyslexia say AI agents are helping them succeed at work

PUBLISHED SAT, NOV 8 2025-9:00 AM EST

 Rachel Curry
@WRITINGSOFRACH


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KEY POINTS

- Neurodiverse professionals may see benefits from AI tools, giving people with conditions like ADHD, autism, and dyslexia a more level playing field in the workplace.
- A recent study from the UK Department for Business and Trade found that neurodiverse workers were 25% more satisfied with AI assistants and were more likely to recommend the tool than neurotypical respondents.
- "I've white-knuckled my way through the business world, but these tools help so much," said Tara DeZeo, senior director of product marketing at enterprise low-code platform provider Pega, who was diagnosed with ADHD as an adult.


RELATED



 YouTube · ADHDVision
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How AI Turns ADHD Into a Superpower in 2026

Subscribe. 2.8K. Share. Save. Report. Comments. 362. If you have ADHD... maybe that's why you're reading the comments while watching the video.

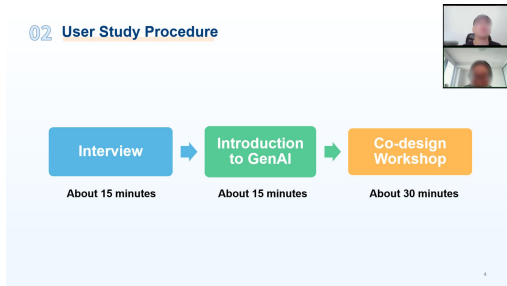
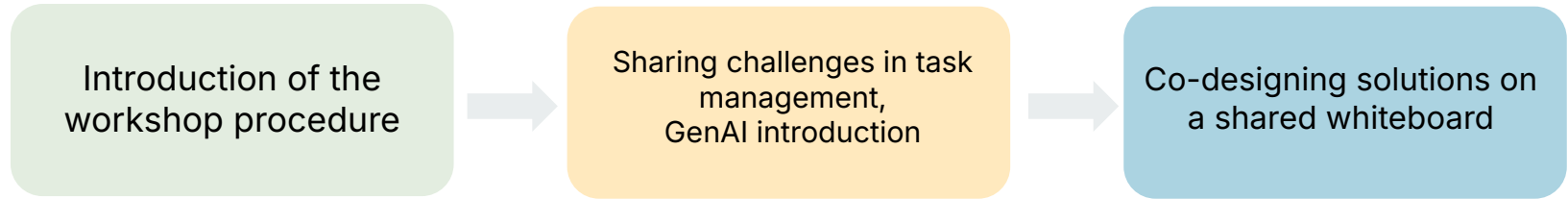
 12:02

Research Question

How GenAI can be utilized to support the **metacognitive process** of individuals with ADHD in task management?

Methods: Co-Design and Expert Evaluation

Phase 1: Co-Design Sessions with ADHD University Students (N=20)



03 Professional Domain – Generative Ideation and Writing

Notion AI — Writing assistant that helps users automatically generate, edit, and organize text and content.

Reference: <https://www.notion.so/product/ai>

Difficulty initiating / procrastination
Difficulty focusing / reading
Emotions

Up to 5 items
Avoid overwhelming the user

Maximum brightness
Haptic feedback

Methods: Co-Design and Expert Evaluation

Phase 2: Design Evaluation with ADHD Experts (N=5)

Introduction of the interview process

Sharing experience with ADHD populations and feedback on collected design ideas

Interview Information

- Participation in this study is entirely voluntary. Each interviewee has the right to withdraw from the study at any time without facing any negative consequences, penalties, or loss of entitled benefits.
- The information collected in this study will be used solely for research purposes. Unless we obtain prior consent from the interviewee or are required to do so by law, all identifiable information will be kept strictly confidential.
- If at any point during the interview you have any questions or find anything unclear, please feel free to interrupt us. We will provide clarification.

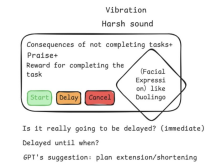


Task Initiation

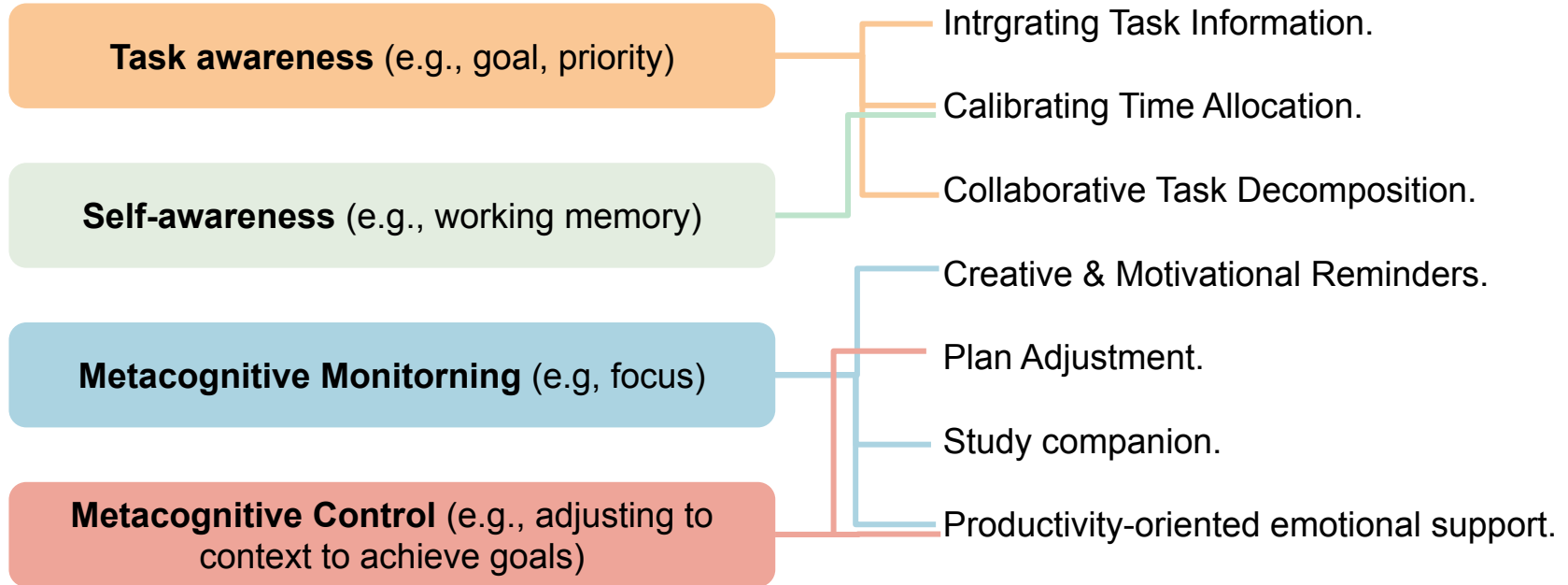
A senior student majoring in Medical Information Engineering proposed this idea. He hopes that GenAI could simulate different tones and character expressions in task reminders—such as using expressive facial animations inspired by Duo, the Duolingo owl—combined with vibrations and stimulating sound cues to spark his interest in initiating tasks.



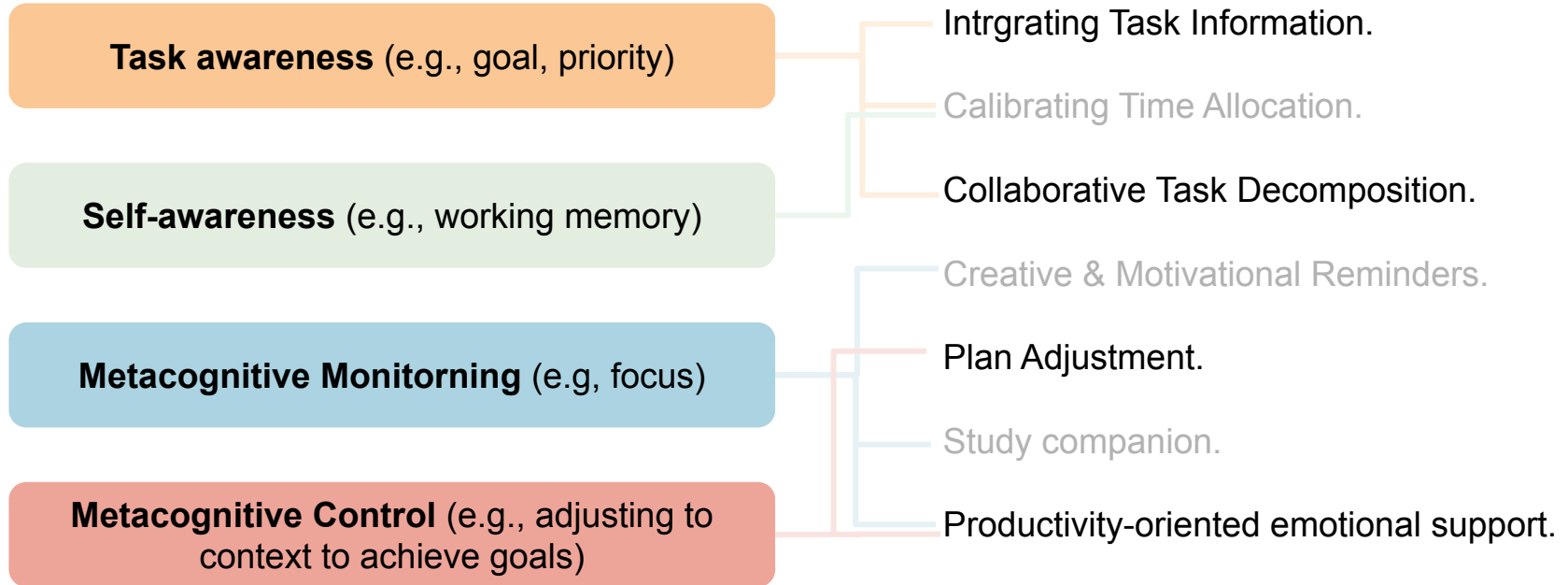
Duo



Design Opportunities for Supporting Metacognition in ADHD Task Management



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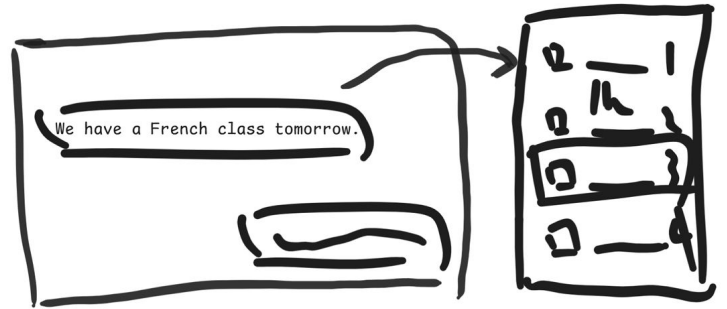


Foster **Task Awareness** by Integrating Fragmented Task Information

Task information is often **scattered across multiple sources**.

Participants envisioned GenAI as helping transform fragmented information into a **structured task list**.

"GenAI can read my chat message and generate a to-do list displayed in the notification or on my desktop widget (...)" (P2)



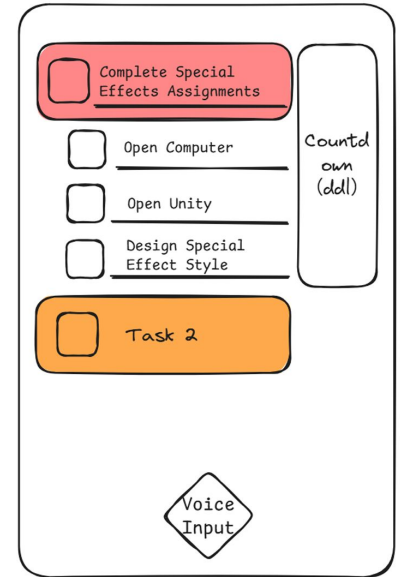
GenAI transform scattered messages to structured task list (P2)

Building **Metacognitive Abilities** by Collaborative Task Decomposition

Students often struggle with **task initiation** as they perceive them as overwhelming and lack clear structure.

- GenAI as a collaborative partner to break large tasks into **small, actionable** steps.
- **Experts' perspectives:** Providing time buffers and placing more engaging steps first to reduce the pressure of getting started.

"The required actions should be defined by the users themselves, (GenAI can) encourage them to clearly think through why each step matters." (P13)



Collaborative task decomposition with GenAI
(P15) 16

Building **Metacognitive Abilities** by Adaptive Plan Adjustment

When unexpected changes disrupt their plans, students often **do not know how to move forward**.

- GenAI offering alternative suggestions to help users stay on track when facing minor disruptions.
- **Experts' perspectives:** Urgent situations can trigger rigid thinking in individuals with ADHD, AI making timely suggestions is crucial for helping them maintain a sense of order.

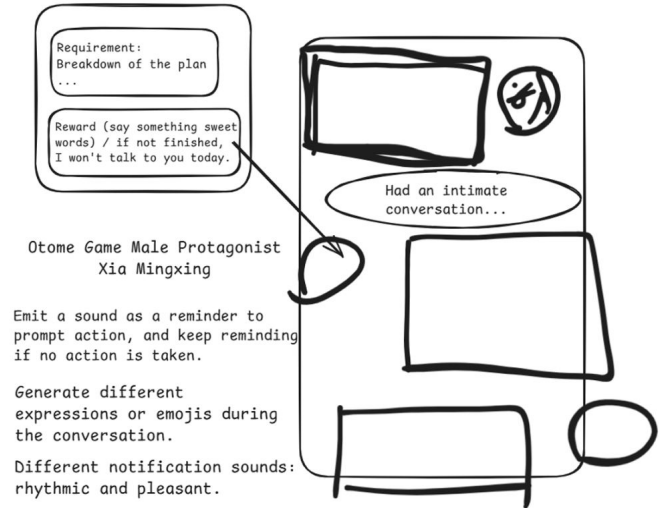
"Often, the issue isn't the task itself, but how they perceive it. AI suggestions can provide flexibility and help them realize their available options." (E2)



Facilitating Emotional Regulation (Monitoring & Control) to Sustain Task Engagement

Negative emotions such as anxiety and fear often lead to procrastination and distraction during tasks.

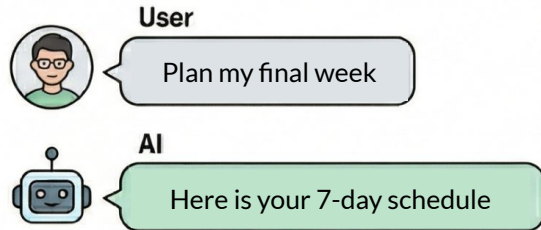
- Participants envisioned GenAI as providing **productivity-oriented emotional support**.
e.g., role-playing a favourite game character
- **Experts' perspectives:** Using GenAI to help users identify and reflect on **positive emotions**.



Participants envisioned GenAI role-playing their preferred game character to provide productivity-oriented emotional support, (e.g., rewarding task completion with sweet praise, P7).

Discussion: From Cognitive Outsourcing to Metacognitive Scaffolding

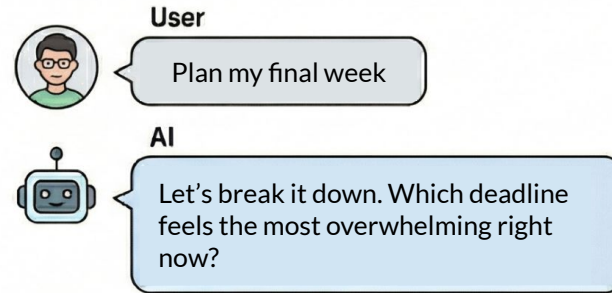
Cognitive Outsourcing



AI acts as a **Decision Maker**

Reduces user autonomy and self-regulation

Metacognitive Scaffolding



AI acts as a **Reflective Partner**

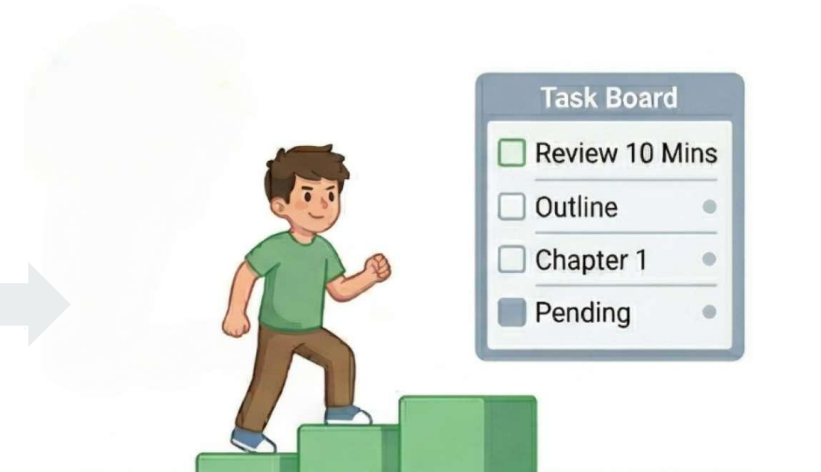
Supports metacognitive awareness and regulation

Discussion: Encourage Emotional Growth, Not Dependency



AI acts as a **Comfort Provider**

Prioritizes comfort over task progress

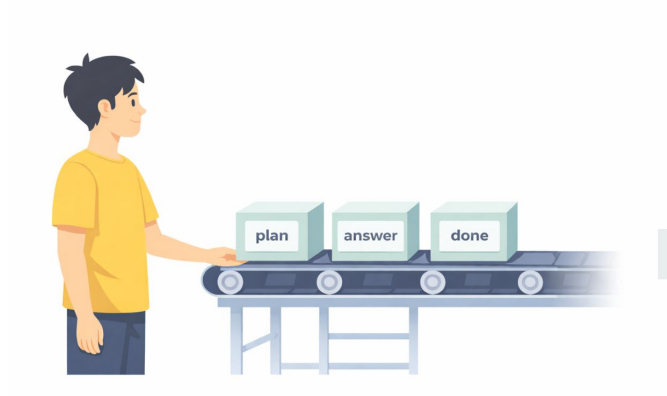


AI acts as a **Focus- and Reflection-oriented Partner**

Supports emotional regulation and task re-engagement

Future Work

Translate Our Design Insights into GenAI-Based Prototypes for Real-World Use.



Offloading cognition to AI



Leverage AI for metacognitive scaffolding

Acknowledgement

We Thank

Our participants for their time and contributions.

The reviewers for their valuable feedback.

The project is funded by **City University of Hong Kong #7020106**

Scan for the full paper

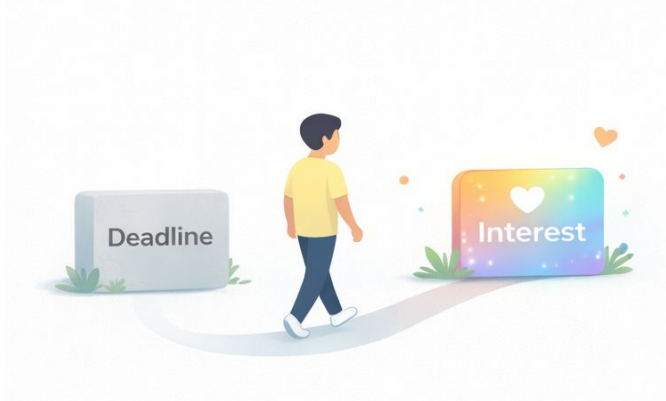


For more work from our lab:

<https://yuhanlolo.github.io/me/lab.html>



Discussion: Leverage Interests to Support Task Initiation, Not Avoidance



Interest becomes the **Destination**

Pulls users away from the task demands



Interest becomes the **Bridge**

Supports task initiation while keeping users on track

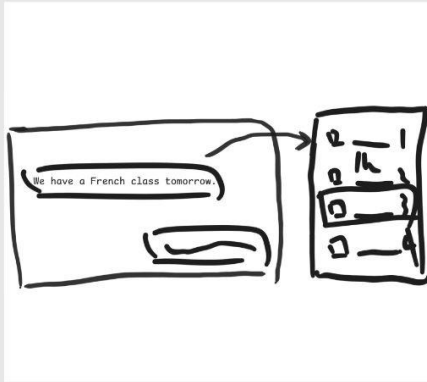
Future Work

Translate Our Design Insights into GenAI-Based **Prototypes for Real-World Use.**

- Exploring Metacognitive Support for Long-Term Behavioral Change.
- Integrate productivity data (e.g., computer activity, task progress).
- Visualizing data to inform reflection on behavior patterns and task strategies.

Exploring the **Boundaries of AI Assistance in Metacognitive Support.**

- Different roles of AI across initiation, execution, and reflection.
- Support ongoing tracking and reflection with long-term memory.



Text Input Voice Input

Prioritized items appear at the top

Task: Book Report
ddl: 5.25
Plan Complete in: 5.23
Task Length: 5000 words
Estimated Duration: (AI-generated)
Priority/Importance:

Optional:
Remind/Don't Remind

Microphone

Printable to physical paper

DDL

1. !!!
2. ---
3. ---

1. !!!
2. ---

Complete Special Effects Assignments

Open Computer

Open Unity

Design Special Effect Style

Task 2

Counted own (ddl)

Voice Input

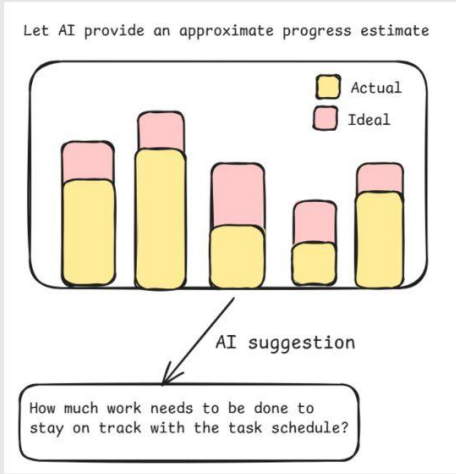
Vibration
Harsh sound

Consequences of not completing tasks+ Praise+ Reward for completing the task

(Facial Expression) like Duolingo

Start Delay Cancel

Is it really going to be delayed? (immediate)
Delayed until when?
GPT's suggestion: plan extension/shortening



Turn on/off white noise.
like the sound of writing

Similar to live study room in Bilibili
optional: voice/video

Myself

Emotional expression
Output positive quotes for ADHD.

Crazy input
-> Needs patience to listen
Show empathy and provide emotional value
At the same time, avoid letting the user dwell in their emotions
Guide the user on what they truly need to do to alleviate anxiety.

Learning Digital Human

Requirement:
Breakdown of the plan ...

Reward (say something sweet words) / if not finished, I won't talk to you today.

Had an intimate conversation...

Otome Game Male Protagonist Xia Mingxing

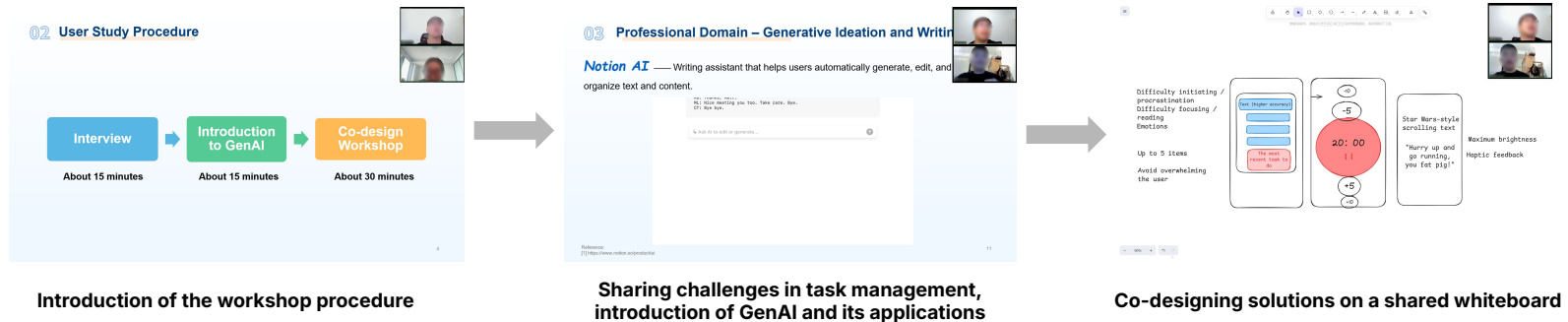
Emit a sound as a reminder to prompt action, and keep reminding if no action is taken.

Generate different expressions or emojis during the conversation.

Different notification sounds: rhythmic and pleasant.

Methodology: Co-Design and Expert Evaluation

Phase 1: Individual Co-Design Sessions with ADHD University Students (N=20)



Introduction of the workshop procedure

Sharing challenges in task management, introduction of GenAI and its applications

Co-designing solutions on a shared whiteboard

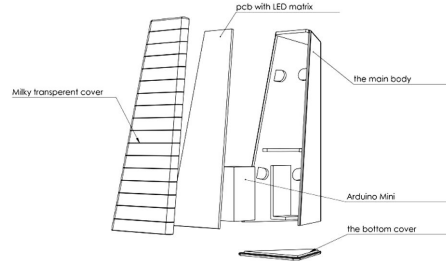
Phase 2: Design Evaluation with ADHD Experts (N=5)



Prior Work on Supporting Task Management for Individuals with ADHD



Wearable devices
[Moroyoqui et al. , 2022]



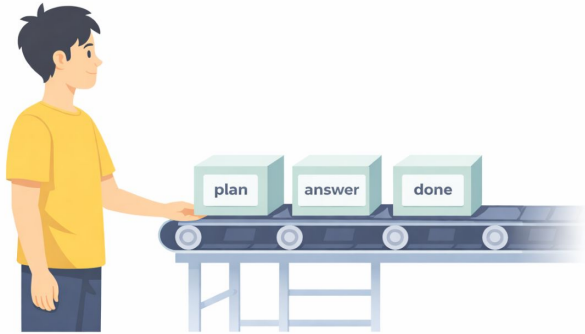
Tangible objects
[Weisberg et al. , 2014]



Parent-Child Co-Regulation
[Sonne et al. , 2016]

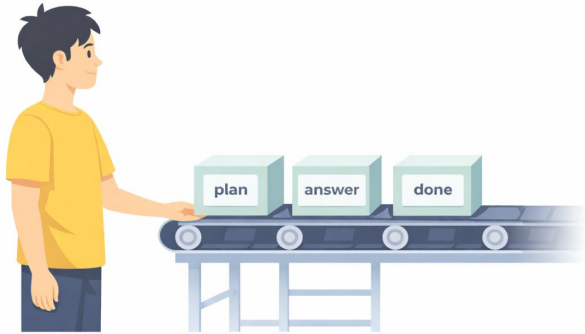
Can GenAI help with task management?

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Offloading cognition to AI?

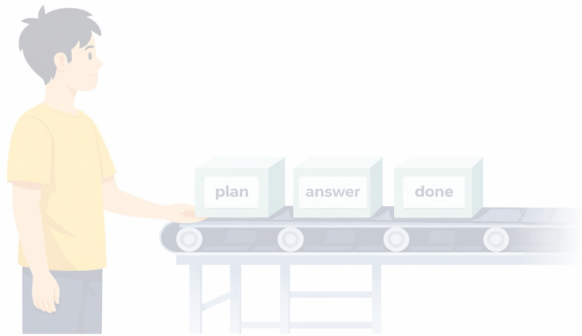
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Offloading cognition to AI?

Undermining cognitive growth
and self-regulation ability

Can GenAI help with task management?



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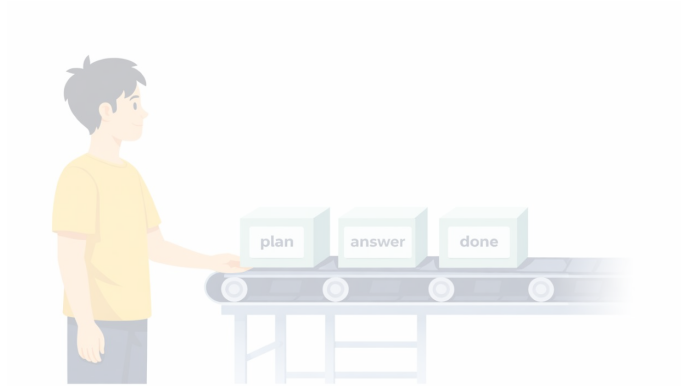
Undermining cognitive growth
and self-regulation ability

The key to cognitive growth:

Metacognition

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Leverage AI for metacognitive scaffolding

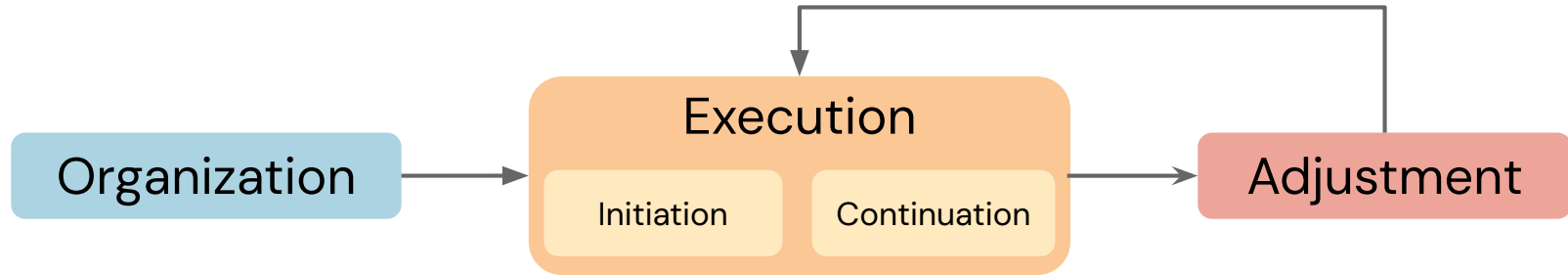
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- **Providing Cognitive Scaffolding to Enhance Task and Self-Awareness.**
 - Integrating Task Information.
 - Calibrating Time Allocation.
- **Promoting Reflective Task Execution for Building Metacognitive Abilities.**
 - Collaborative Task Decomposition.
 - Creative & Motivational Reminders.
 - Plan Adjustment.
- **Facilitating Emotional Regulation to Sustain Task Engagement.**
 - Study companion.
 - Productivity-oriented emotional support.

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Metacognitive Challenges in Task Management Among University Students with ADHD



Findings: Metacognitive Challenges in Task Management Among University Students with ADHD

