Feasibility of Repeated Remote Memory Assessment with Mobile Devices to Detect Subtle Cognitive Decline
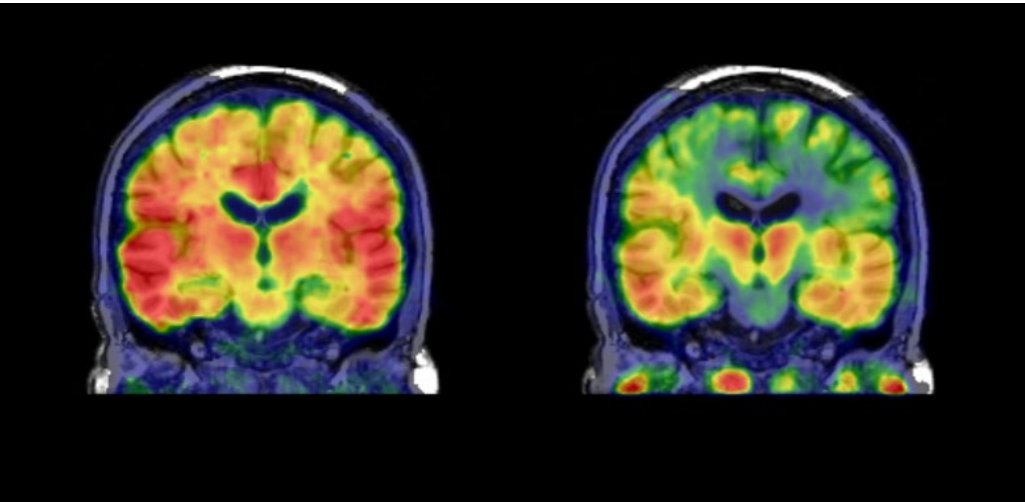
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**Advancements in biomarker testing allow earlier detection of Alzheimer's disease**

Neuropsychological evaluation important for characterizing severity of impairment and cognitive strengths/weaknesses

➢ Less sensitive to subtle cognitive decline during the preclinical stage
➢ Less accessible to older adults in rural or low-resource communities
    ➢ Impacts participation in research and access to diagnosis and care
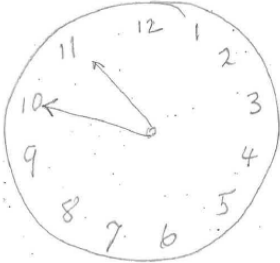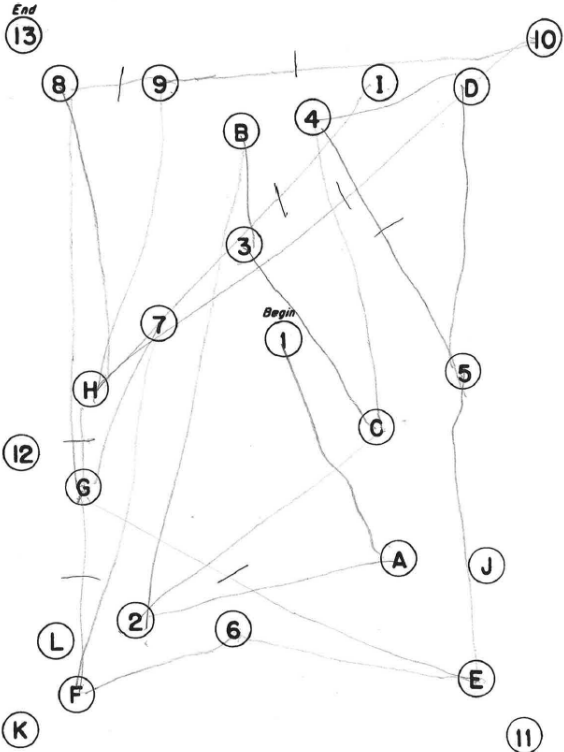
Objective: Evaluate the feasibility and acceptability of repeated remote memory assessment in late middle-aged and older adults

Participant-owned smartphone or tablet
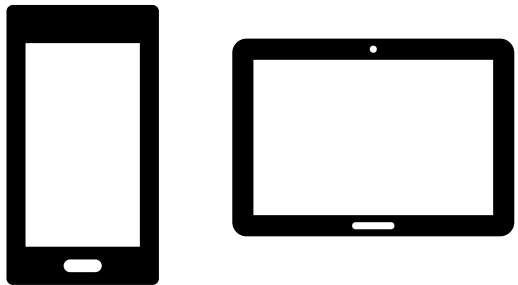
24 sessions over 1 year

Group 1	1 session every 2 weeks
Group 2	4 sessions every 2 months

3 medial temporal lobe-based memory paradigms

Memorize the objects and their locations in the room.

Which object was here?

What does this picture show?

Did you see this picture before?

Inside   Outside   No   Yes   Uncertain

Neotiv app – developed by collaborators at the German Center for Neurodegenerative Diseases (DZNE)

Objective: Evaluate the feasibility and acceptability of repeated remote memory assessment in late middle-aged and older adults

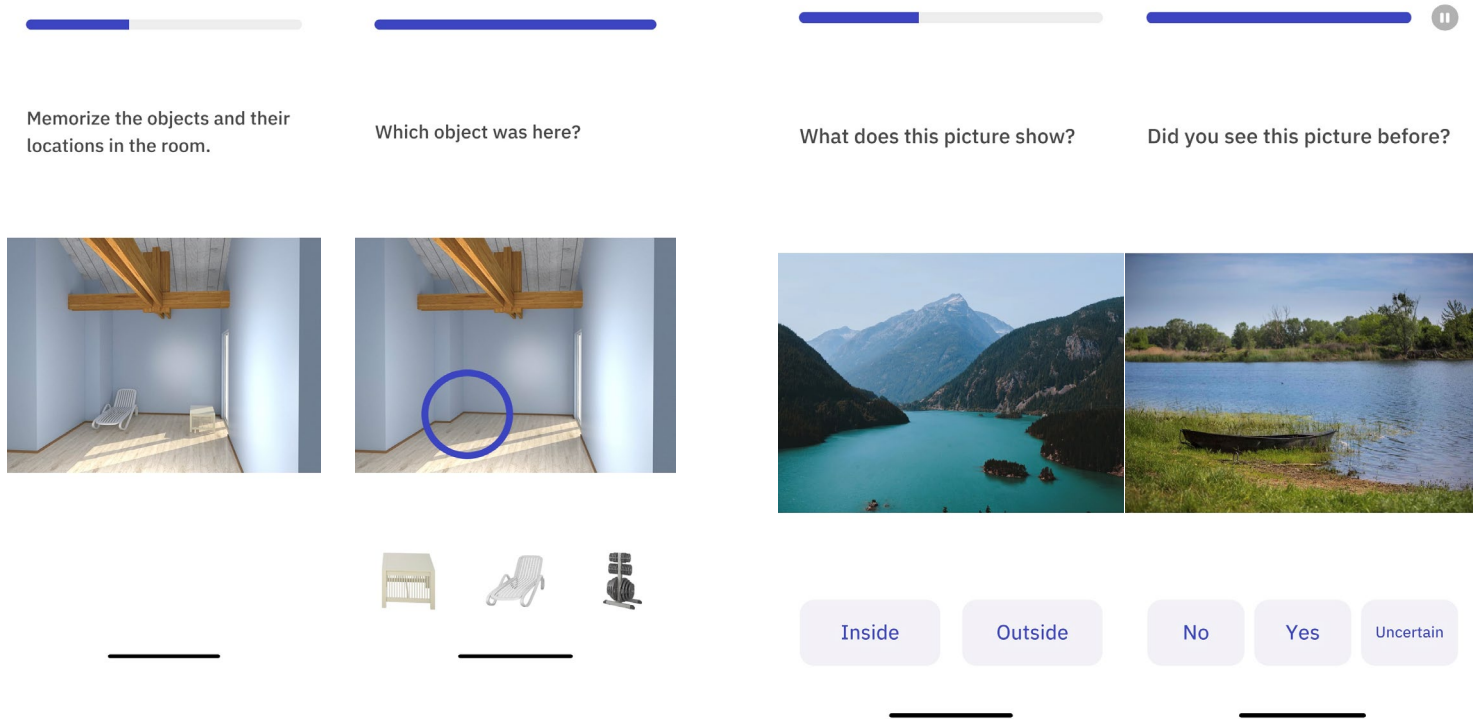**Participant-owned smartphone or tablet**

3 medial temporal lobe-based memory paradigms

Memorize this picture.   Where is the difference?

Nothing has changed
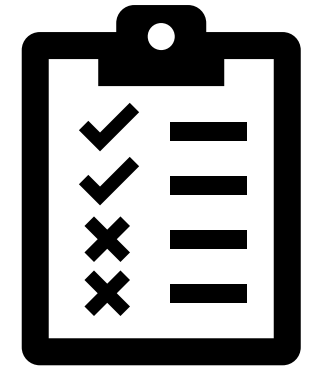
24 sessions over 1 year

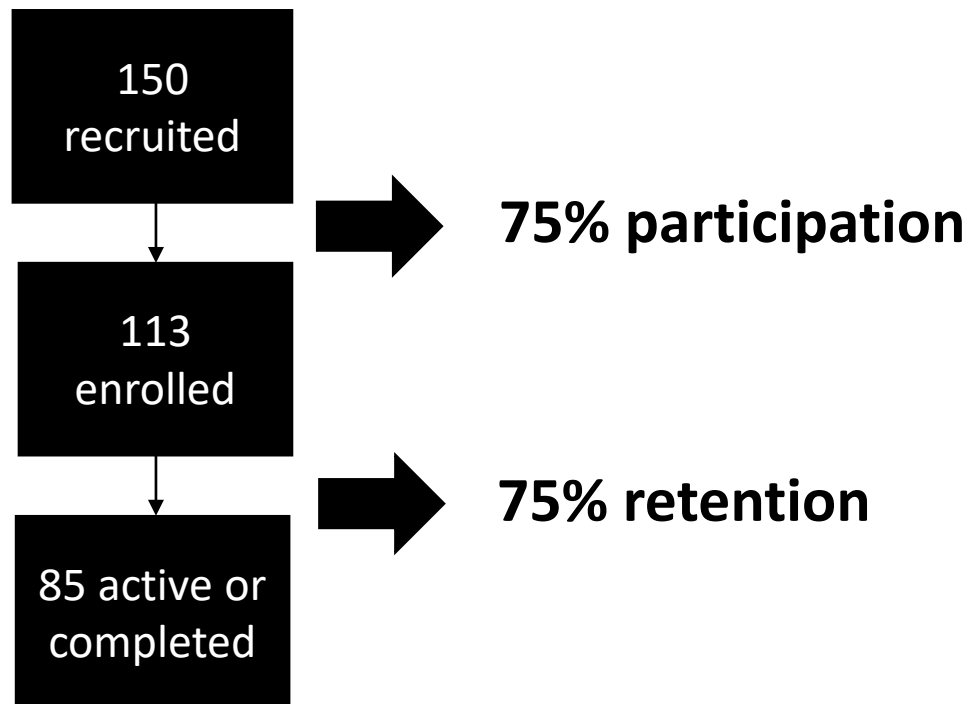| Group 1 | 1 session every 2 weeks |
| Group 2 | 4 sessions every 2 months |

Neotiv app – developed by collaborators at the German Center for Neurodegenerative Diseases (DZNE)

RESULTS – FEASIBILITY

Participation & Retention

150 recruited

↓

113 enrolled

↓

85 active or completed

75% participation

75% retention

Primary reason for attrition was due to participants never logging in to the app or completing their first scheduled task

| Sample characteristics (*n*=85 active or complete)	
Age	68.7 (SD=6.39, range=48-82)
Gender	64% (n=54) women
Race	93% (n=79) White 2% (n=2) Black or African American 2% (n=2) American Indian or Alaska Native 2% (n=2) Other
Ethnicity	98% (n=83) Non-Hispanic 2% (n=2) Hispanic
Years of education	16.9 (SD=2.7)
Diagnosis	84 cognitively unimpaired 1 mild cognitive impairment
Device type	70% smartphone 30% tablet

RESULTS – FEASIBILITY

Compliance

130 telephone calls made by study team to facilitate app login or to remind participants to complete tasks
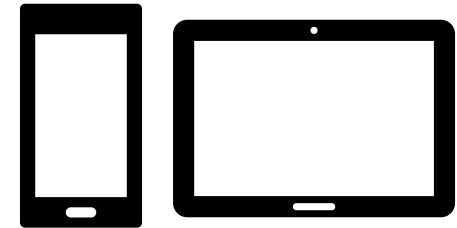
74-80% of participants completed 90-minute delayed memory task within expected timeframe

RESULTS – ACCEPTABILITY

Question	Disagree or Strongly Disagree	Neither Agree nor Disagree	Agree or Strongly Agree
It was easy to use the application	2 (2%)	2 (3%)	66 (94%)
I enjoyed completing the cognitive tests using the application	6 (8%)	25 (36%)	39 (56%)
I would prefer to do these tests rather than complete the standard in-person paper and pencil tests	13 (19%)	29 (41%)	28 (40%)
I understood the instructions for the cognitive tests	34 (49%)	1 (1%)	35 (50%)

Question	Too long	Just Right	Too Short
The amount of time it took to complete the tests was	2 (3%)	63 (90%)	5 (7%)

Question	Too often	Just Right	Not often enough
The number of times I was asked to complete the tests was	9 (13%)	61 (87%)	0 (0%)

RESULTS – ACCEPTABILITY

Participants who completed study (n=12 to date) all endorsed being "satisfied" or "very satisfied" with the platform and visit schedule and all recommended continued use of remote cognitive testing in the future

Common feedback from *n*=12 completers

Recommendations for mobile app testing improvement	• More clear instructions/warning of 90-minute delayed memory task • More specific information about when next task is scheduled and how many more tasks
Reasons to continue to include remote cognitive testing in future studies	• Convenient, flexibility of when tasks can be completed • Like being able to do at home versus a hospital study room and not having to travel • Eliminates stress related with in-person testing • Interesting/enjoyable, good way to keep brain sharp

PRELIMINARY CONCLUSIONS

NEXT STEPS

- Remote memory assessment is feasible and acceptable for our participants
- Issues that arose:
  - Comprehension of instructions lower than expected
  - Compliance with completing delayed retrieval tasks within expected timeframe lower than expected
  - Follow-up by staff needed to ensure adequate retention
- This feedback was incorporated into an updated version of the neotiv app to improve compliance and retention

- Enroll additional participants and update feasibility and acceptability results

- Evaluate reliability (internal consistency, test-retest) and validity (convergent, criterion) of mobile memory tests

- Investigate if feasibility, acceptability, reliability, or validity vary depending on task frequency schedule or participant characteristics

Thank you!

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[*Co-founders of neotiv]

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