

This validation study uses cognitive tasks and machine learning to identify individuals with early signs of dementia

Introduction

- By 2030, **1 in 6** people will be aged 60 or above¹.
- Mild cognitive impairment (MCI) is a critical transitional stage between normal aging and dementia, yet early detection remains challenging, partly due to the limitations of current screening tools.
- In this study we are testing the **feasibility and clinical validity** of a novel self-administered digital online cognitive screener based on 2 tasks from the Creyos assessment platform to improve the early detection of dementia across diverse populations of aging individuals.

CreyosPlatform

- Online neuropsychological battery of cognitive tasks.
- Normative database comprising ~85,000 participants.
- No manual administration required; practical and cost-effective for primary care.

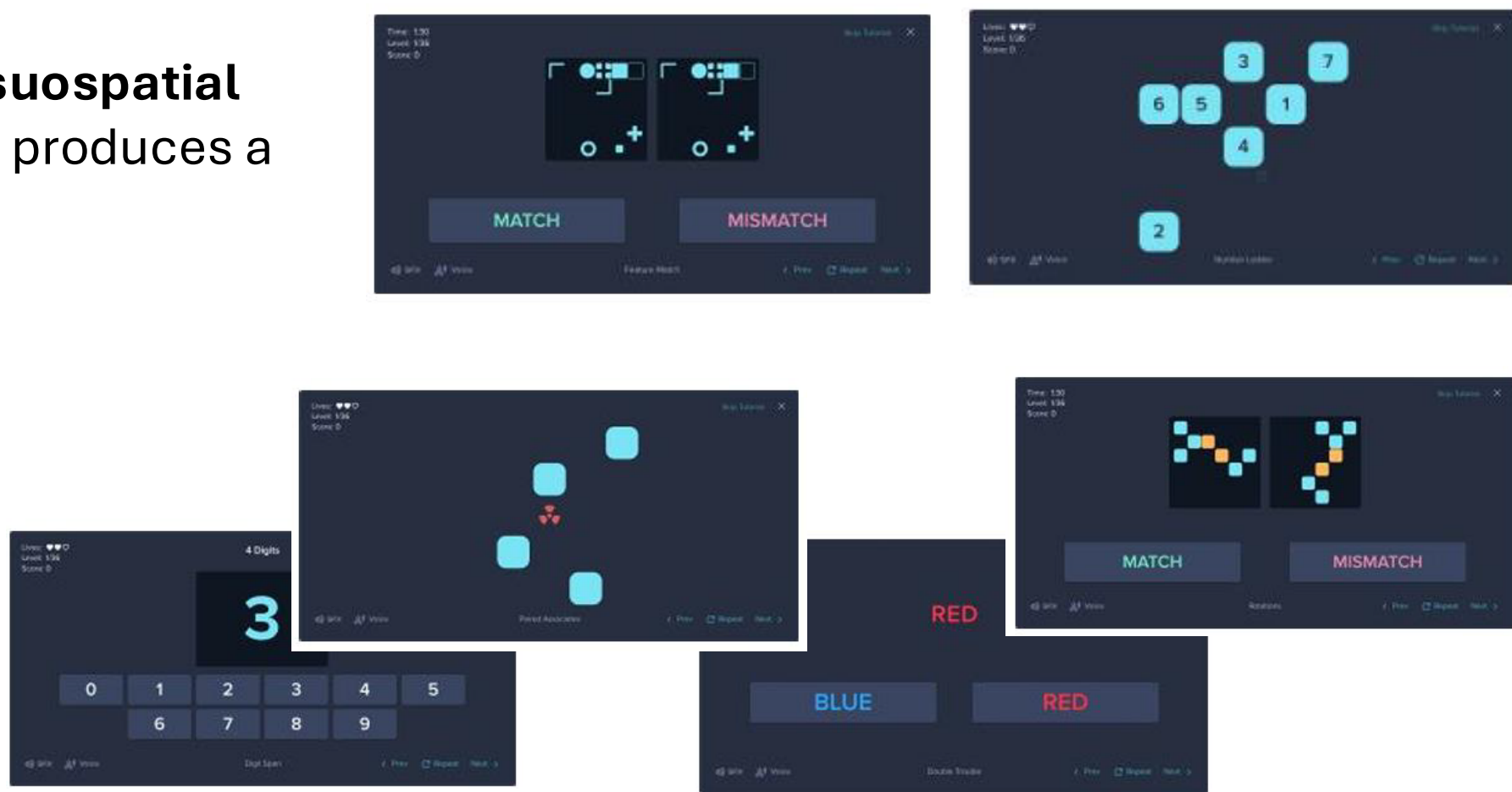
The Creyos Dementia Protocol (CDP)

By leveraging the Creyos platform's large normative database and internal datasets, we trained a machine learning (ML) model capable of distinguishing cognitively normal individuals from those with suspect cognitive impairments, including those resulting from MCI, Alzheimer's disease (AD), and age-related cognitive decline.

The two Creyos tasks included in the **screener** assess **visuospatial working memory** and **attention**. The **screener** algorithm produces a binary outcome (+ or -) to flag people for impairments.

The CDP further classifies cognitive impairment using tasks assessing:

- Verbal short-term memory
- Episodic working memory
- Response inhibition
- Mental rotation
- + GAD-7, PHQ-9, IADL, IQ-CODE



Preliminary Screener Results

Table 1. Classification of AD Patients Using the MMSE and Creyos Screener

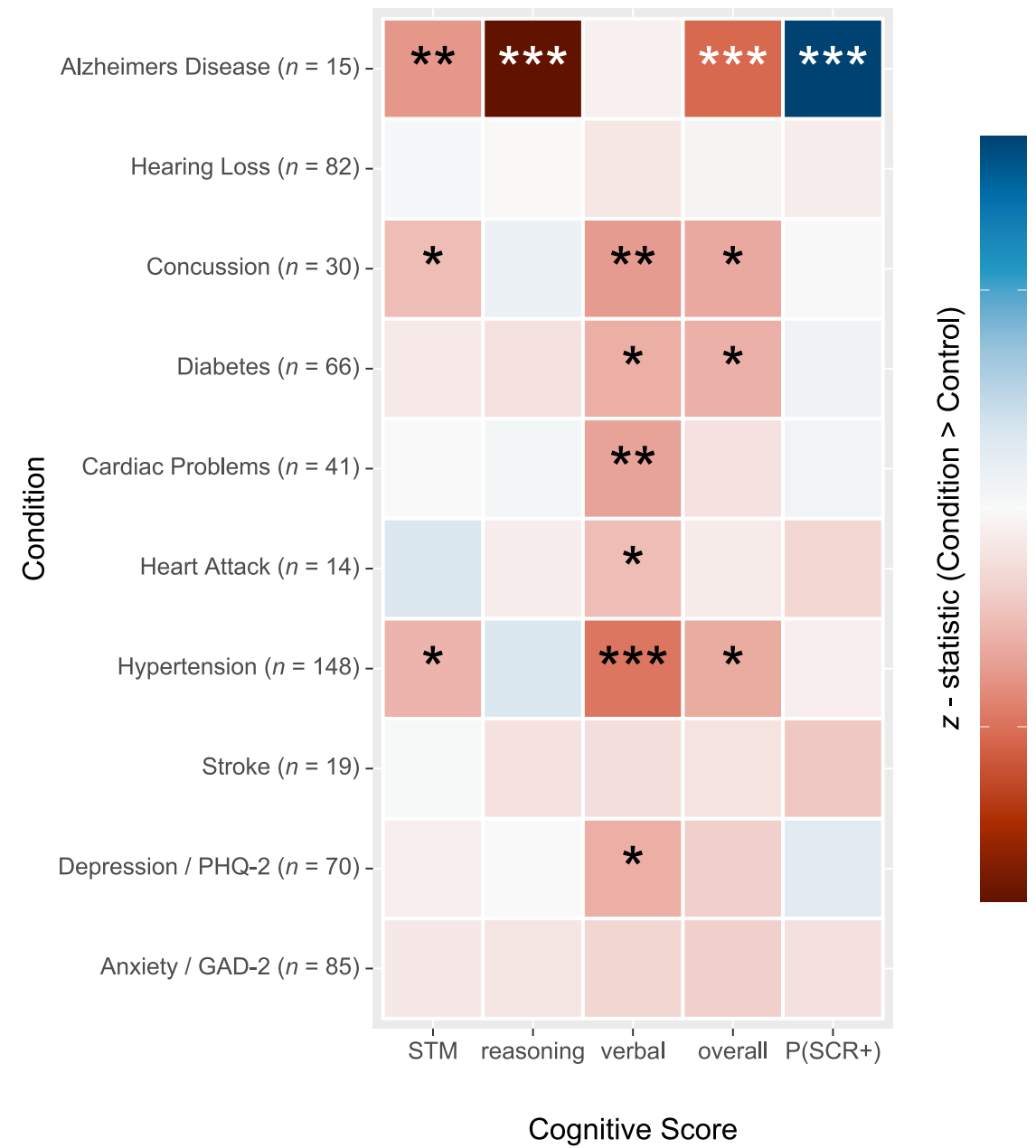
		Creyos Screener		Total
		SCR-	SCR+	
MMSE	SCR-	0	1	1
	SCR+	0	13	13
Total		0	14	

In a sample of **14 patients with AD**:

Sensitivity: all 14 patients were identified as impaired by the Creyos screener (100% sensitivity). 13/14 of these patients had an MMSE score below the threshold of 25.

Specificity: In a case-matched sample of control subjects, randomly drawn from a normative database of 9,350 individuals and matched for age, gender, and level of education, 2 of 14 had a SCR+ result (86% specificity).²

Figure 1. Cognitive Outcomes and Screener Flags for Various Health Conditions



Discriminant validity: when comparing groups of people with pre-existing health conditions to case-matched healthy controls, we observed:

- Significantly lower scores in one or more cognitive domains (reddish cells with asterisks) for other conditions.
- No difference in screener flag rates P(SCR+)—i.e., no asterisks in the rightmost column.
- Only the AD patients (top row) had a significantly higher probability of positive screener results P(SCR+) than their matched controls – indicating that the screener can effectively discriminate between signs of dementia and other health conditions.²

NEXT STEP: Large-Scale, Longitudinal Validation Study

Objectives

- Assess the **feasibility** and **validity** of the CDP in distinguishing healthy aging from early signs of pathological cognitive decline.
- Evaluate **risk and protective factors** associated with increased risk of cognitive decline over 12 months.

Methods



N = 400

Cognitively normal

Subjective Cognitive Decline

MCI

Dementia

Baseline Testing Session (35 minutes)

- CDP Creyos tasks (screener + 4 tasks)
- Comprehensive Demographics Questionnaire
- Functional and Mental Health Scales
- System Usability Scale

6-month Testing Session (30 minutes)

- CDP Creyos tasks (screener + 4 tasks)
- Comprehensive Demographics Questionnaire
- Functional and Mental Health Scales

12-month Testing Session (30 minutes)

- CDP Creyos tasks (screener + 4 tasks)
- Comprehensive Demographics Questionnaire
- Functional and Mental Health Scales

Demographic Variables:

- Sex
- Ethnicity
- Menopause status
- Education level and occupation
- Medical comorbidities
- Socialization
- Exercise
- Substance abuse (alcohol, cannabis, cigarettes)

Project Progress

- Recruitment began:** 09/06/2026
- 51 participants recruited, 28 baseline datasets collected

Predicted Results

- Screener tool will be **usable** by older adults and feasible for remote administration given the successful use of Creyos by older adults (>3000) and previous reports of online cognitive tests in older adults³.
- Following preliminary validation analysis in AD patients,² we expect the screener and full CDP assessment to demonstrate **high accuracy** in identifying individuals on the dementia continuum.
- Cognitive **trajectories will vary with risk/protective factors** such as education level, socialization, and exercise.

Conclusion



Novel, scalable solutions for the early detection of dementia are crucial to transition from a reactive, treatment-based model to a proactive, prevention-focused approach.



This approach can **facilitate timely pharmacological and lifestyle interventions**, improving patient outcomes and optimizing healthcare resources.



Preliminary validation analyses demonstrate that the Creyos MCI screener has high accuracy in identifying cognitive markers of AD. **This longitudinal, large-scale study will assess the screener as a scalable and effective solution to triaging older adults.**

References

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- Rentz Et Al. (2016). The Feasibility Of At-home iPad Cognitive Testing For Use In Clinical Trials. *The Journal of Prevention of Alzheimer's Disease*.

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