

ECOCAPTURE@HOME(EYE): Multimodal Eye-tracking Biomarkers of Apathy in bvFTD and Alzheimer’s Disease



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ECOCAPTURE@HOME(EYE) combines laboratory and real-world measures to identify objective, clinically meaningful, and ecologically valid biomarkers of apathy in bvFTD and Alzheimer’s Disease.

INTRODUCTION

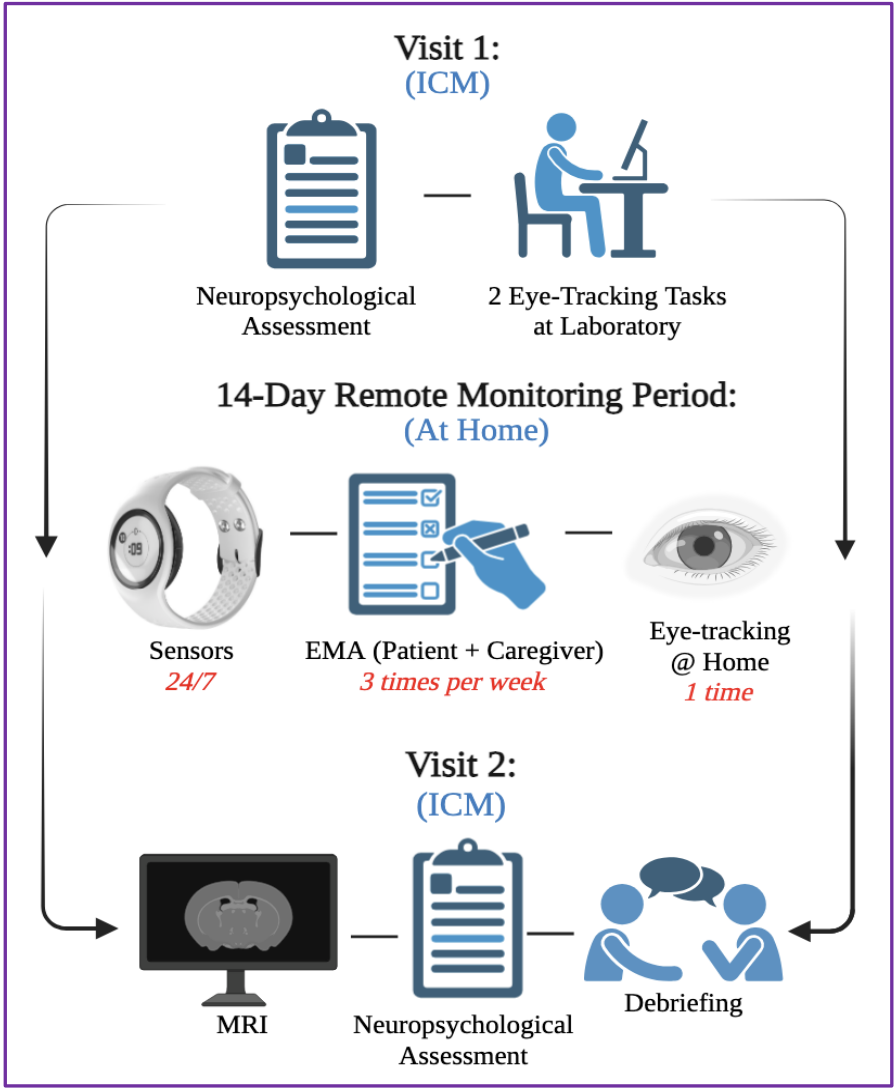
Apathy is one of the most disabling symptoms in bvFTD and Alzheimer’s Disease, yet its objective assessment remains challenging as current evaluations rely primarily on clinical questionnaires, which may not fully capture everyday behavioral functioning. Previous findings from ECOCAPTURE@LAB demonstrated that apathy in bvFTD is associated with **altered** visual and motor exploration in ecological settings (Batrancourt et al., 2019).

Our goal is to go a step further and use a multimodal **framework to derive and establish digital biomarkers of apathy that are ecologically valid.**

Behavioral, physiological, eye-tracking, and clinical data are integrated into this digital phenotype framework.

Features extracted from wearable sensors, ecological momentary assessment (EMA), eye-tracking tasks, and neuropsychological assessments are combined to generate contextualized metrics and digital biomarkers of apathy. A two-step validation strategy includes ecological validation using real-world measures and clinical validation using standardized assessments and neuroimaging.

METHODS- OVERVIEW



ECOCAPTURE@HOME(EYE) combines laboratory-based assessments with 14 days of real-world monitoring.

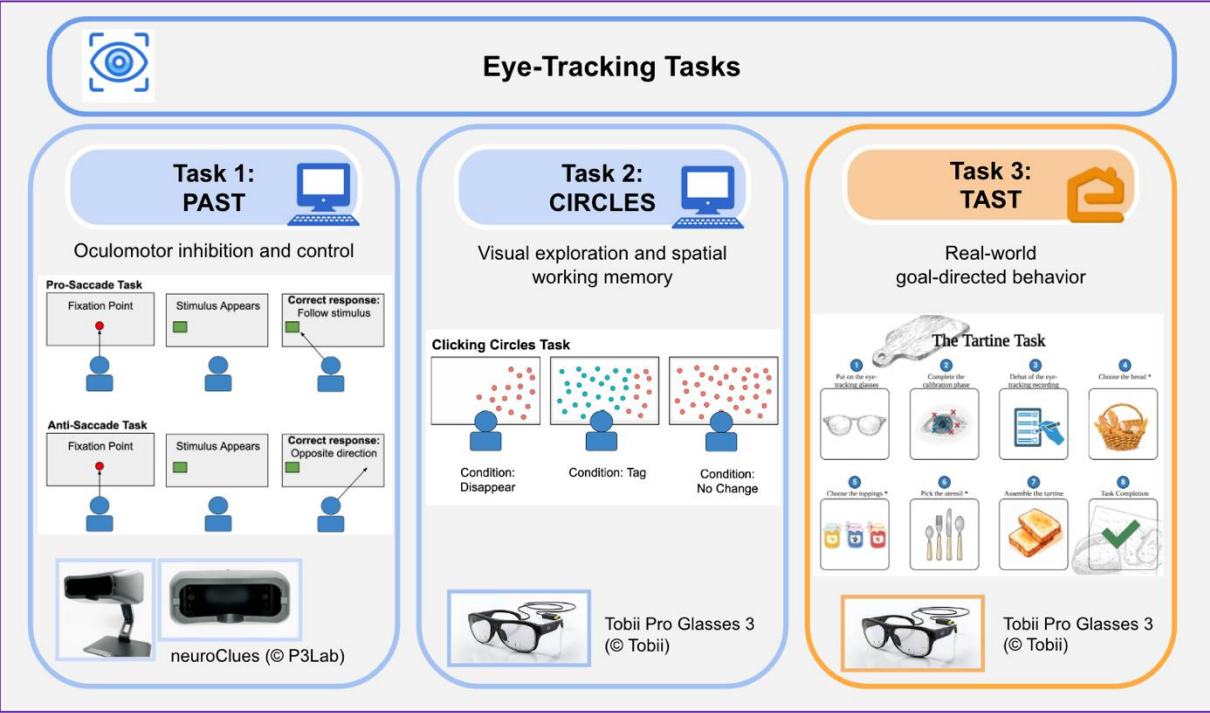
Visit 1 - Neuropsychological assessment and laboratory-based eye-tracking tasks.

14-day remote monitoring period - Wearable sensors, EMA completed by both participants and informants, at-home eye-tracking experimental task.

Visit 2 - MRI acquisition, neuropsychological assessment, study debriefing.

The study aims to recruit 72 participant-informant dyads across three groups: Healthy Controls (n=24), bvFTD (n=24), and Alzheimer’s Disease (n=24)

METHODS-TASKS



Overview of the eye-tracking tasks included in the ECOCAPTURE@HOME(EYE) protocol.

Three complementary eye-tracking tasks: two laboratory-based tasks (Visit 1) and one ecological task performed at home.

Task 1 - Pro/ Anti-Saccade Task (PAST): assess oculomotor control, inhibitory processes, and goal-directed behavior through pro-saccade and anti-saccade conditions using the neuroClues eye-tracker™ by P3 Lab (Munoz et al., 2003).

Task 2 - Clicking Circles Task (CIRCLES): evaluate visual exploration, attentional control, and gaze-cursor coupling during a computer-based goal-directed task using the Tobii Pro Glasses 3™ (Toba et al., 2018).

Task 3 - Tartine Task (TAST): an ecological at-home task designed to measure visual exploration and goal-directed behavior during the naturalistic daily-life activity of preparing a piece of toast using the Tobii Pro Glasses 3 (© Tobii). Contribution to the characterization of real-world digital phenotypes of apathy and executive dysfunction in bvFTD and AD (Land et al., 1999).

CONCLUSIONS

ECOCAPTURE@HOME(EYE) represents a shift from laboratory-based assessment toward continuous real-world characterization of behavior in neurodegenerative disorders.

Using a multimodal framework combining eye-tracking, wearable sensing, ecological assessment, clinical evaluation, and neuroimaging, the project aims to provide a more comprehensive understanding of apathy and its underlying mechanisms in bvFTD and Alzheimer’s Disease.

The study examines multiple behavioral dimensions, including inhibitory oculomotor control, visual attention and exploration, and spatial working memory.

By extending assessment beyond the laboratory into participants’ everyday environments, ECOCAPTURE@HOME(EYE) may enhance the measurement, monitoring, and characterization of apathy in both conditions.

To our knowledge, this will be the first study to deploy eye-tracking in the home environment of individuals living with Alzheimer’s disease or bvFTD.

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THANK YOU

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