

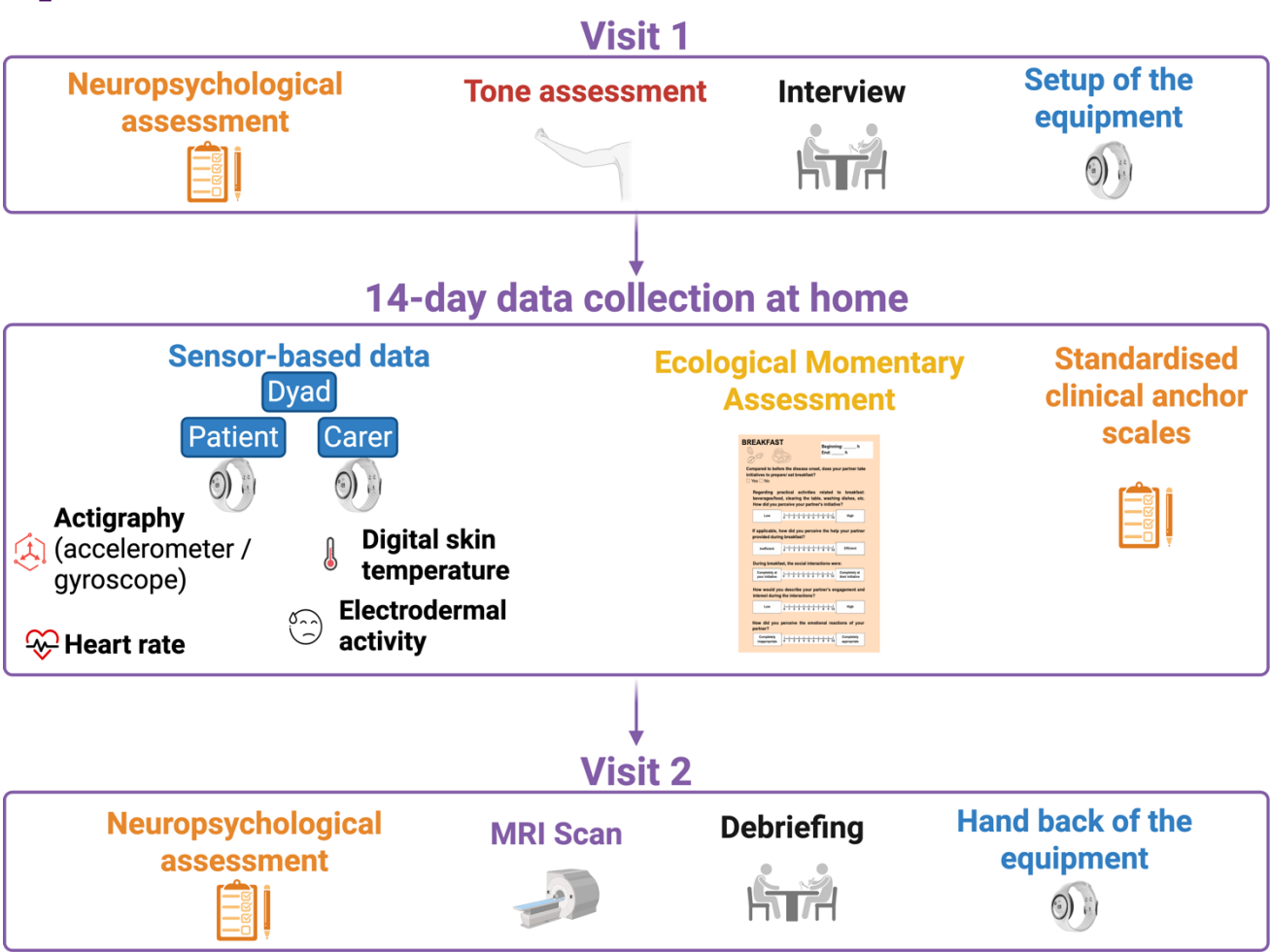
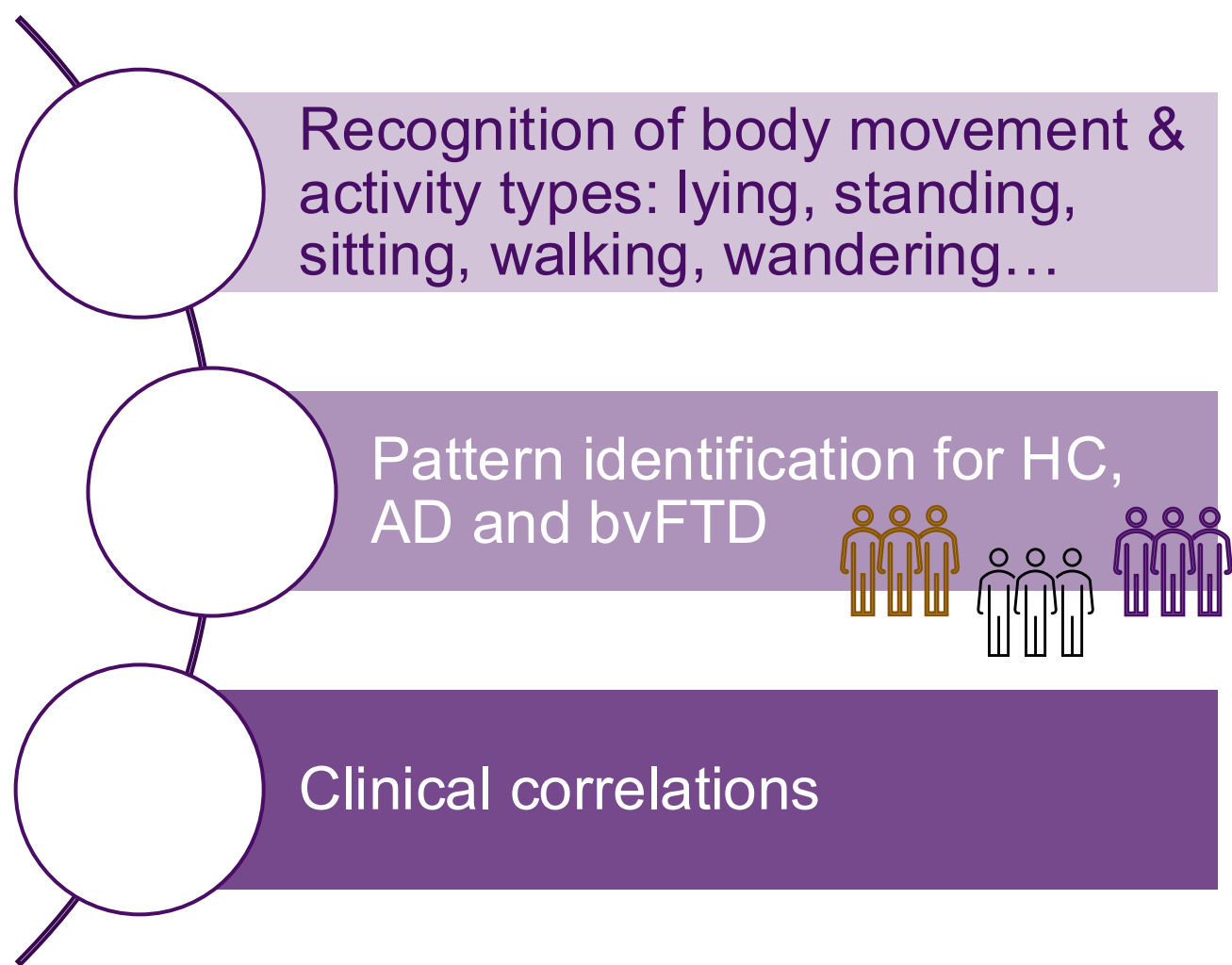
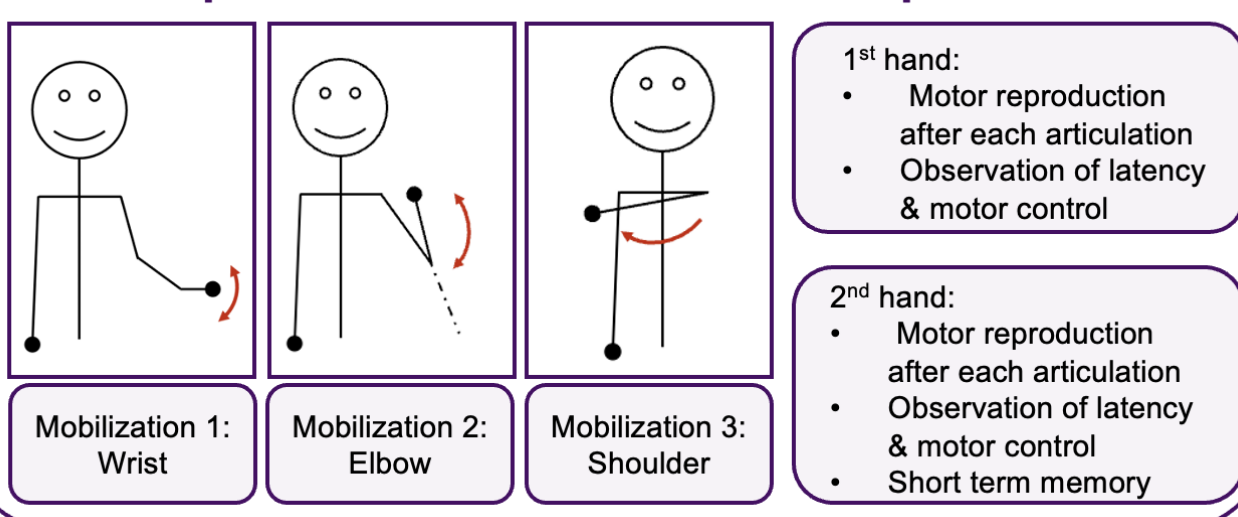
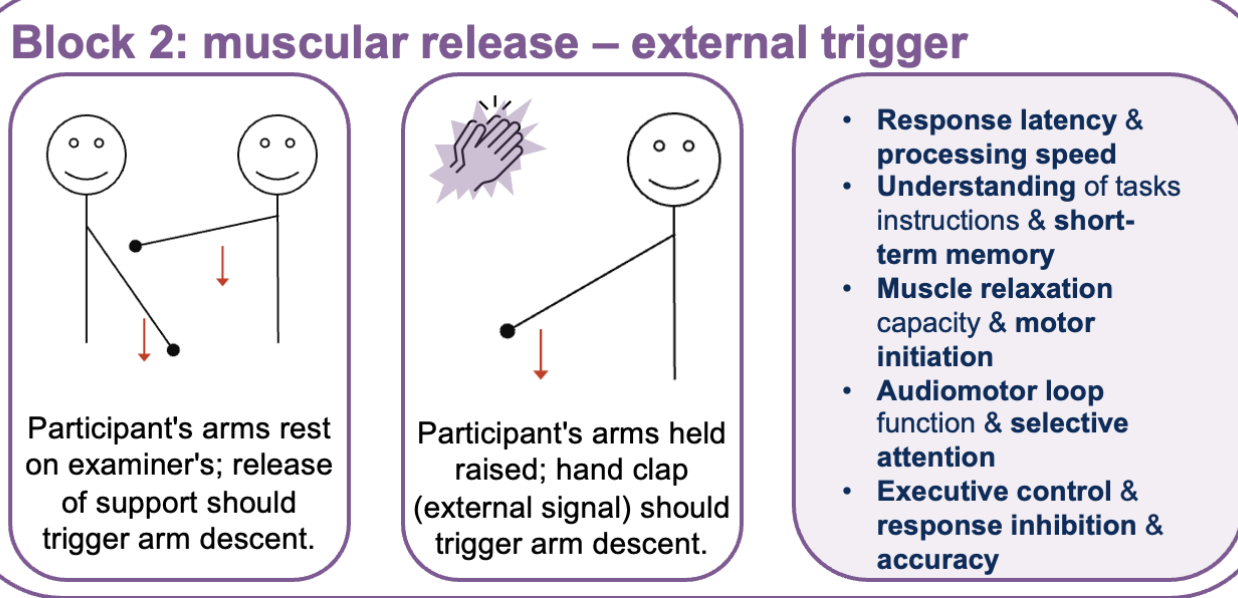
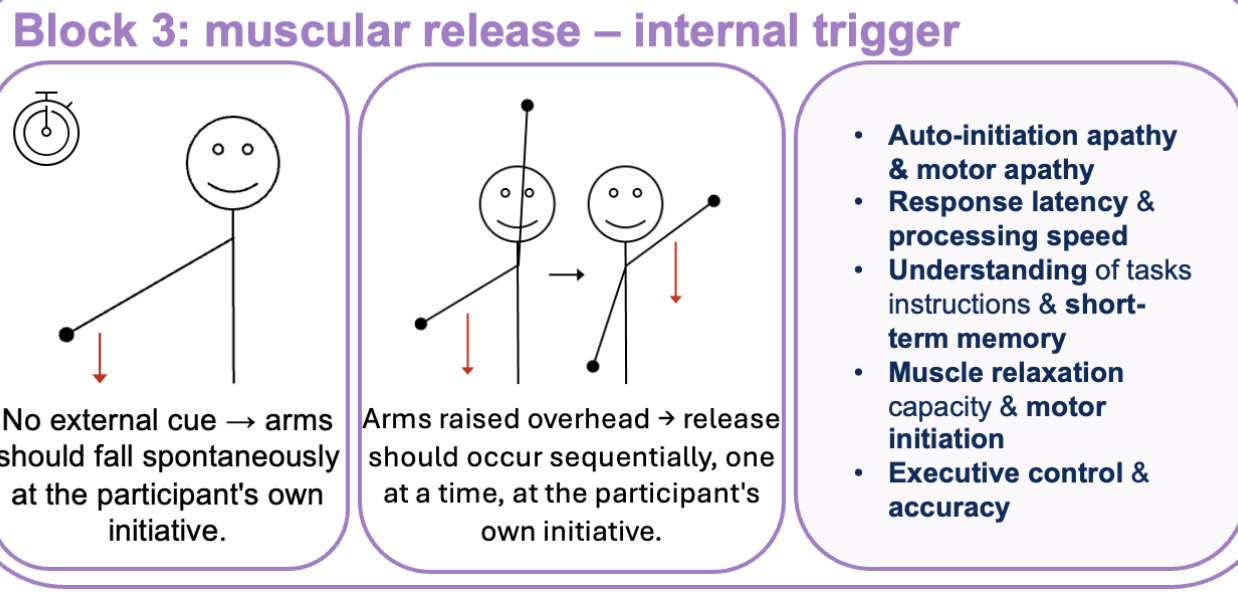
Body dynamics in ecological settings as biomarker for apathy in bvFTD and AD

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ECOCAPTURE@HOME: Improving the Characterization and Monitoring of Apathy Through Body Dynamics, Clinical Tone Assessment, Accelerometry, Human Activity Recognition, and Ecological Momentary Assessment

INTRODUCTION	METHODS	METHODS	CONCLUSIONS	REFERENCES
Background: apathy is one of the most disabling neuropsychiatric symptoms in Alzheimer’s diseases (AD) and behavioral variant frontotemporal dementia (bvFTD), associated to functional decline and reduced quality of life. Current evaluation rely on subjective scales, providing limited insight into the underlying neurobiological mechanisms. Body dynamics, reflecting the integration and regulation of motor, cognitive and emotional systems, as well as human activity recognition (HAR), remain largely unexplored in apathy, despite their potential for improving diagnosis, monitoring and therapeutic targeting Pervious findings: the semi-ecological ECOCAPTURE@lab protocol revealed a specific bodily pattern in bvFTD characterized by reduced tone recruitment and increased tone instability. Goals: to improve the ecological characterization of apathy in bvFTD and AD by combining: • A clinical tone assessment • Accelerometer-based HAR • Qualitative information from Ecological Momentary Assessment (EMAs)	1/ ECOCAPTURE@home protocol  2/ Accelerometer & Human Activity Recognition 	3/ Clinical tone assessment Block 1: passive mobilization & motor reproduction  Block 2: muscular release – external trigger  Block 3: muscular release – internal trigger  4/ Qualitative data From EMAs: • Time & type of activities • Activity level & initiation capacity • Presence of physical tensions or pain	Based on clinical tone assessment, quantitative data (from sensors) and qualitative measures (from EMAs), we expect individuals with bvFTD and AD patients to exhibit: • Reduced motor activity & acceleration, • Lower tone recruitment, • Prolonged reaction times and psychomotor slowing, correlated with apathy and its sub-types (initiation, executive and motivation) • Bodily instability • Motor signatures collected with sensors (HAR) • Associations with neural correlates: links between tone alterations and structural or functional changes within cerebellar and frontal networks involved in motor, cognitive and motivational processes. Tone assessment represents a rapid and easy tool for clinicians, helping diagnosis or monitor neuropsychiatric symptoms and rehabilitation, by targeting physical activity, pain and anxiety.	1. Levy R, Dubois B. Apathy and the functional anatomy of the prefrontal cortex-basal ganglia circuits. Cereb Cortex. 2006 2. Batrancourt B, Lecouturier K, Ferrand-Verdejo J, Guillemot V, Azuar C, Bendetowicz D, et al. Exploration Deficits Under Ecological Conditions as a Marker of Apathy in Frontotemporal Dementia. Front Neurol.2019. 3. Profeta VLS, Turvey MT. Bernstein's levels of movement construction: A contemporary perspective. Hum Mov Sci. 2018 4. Sawa M, Yamashita H, Fujimaki K, Okada G, Takahashi T, Yamawaki S. Depressive symptoms and apathy are associated with psychomotor slowness and frontal activation. Eur Arch Psychiatry Clin Neurosci. 2012 5. Boyle LD, Giritcka L, Marty B, Sandgathe L, Haugarvoll K, Steihaug OM, Husebo BS, Patrascu M. Activity and Behavioral Recognition Using Sensing Technology in Persons with Parkinson's Disease or Dementia: An Umbrella Review of the Literature. Sensors (Basel). 2025 6. Karpinski E, Berner CE, Behenská J, Martet G, Mastrotheodorou A, Prieur J, Robert G, Altmayer V, Garcin B, Toba M, Migliaccio R, Levy R, Chaumette B, Batrancourt B. Body Dynamics and Motor Patterns as Behavioral Markers of Apathy in bvFTD: Insights from Semi-Ecological Observation and Muscle Tone. Cortex (CORTEX-D-26-00506, Submitted 2026). Thank you Elena Karpinski is funded by GHU Paris, Psychiatrie & neurosciences. This work was partially funded by grants from the Malakoff Humanis Group (Support for research on apathy in neurological and neuropsychiatric disorders, 2018) and FRC (The Brain Protected By/From Its Environment, 2020). Additional funding was provided by BBT (Big Brain Theory 2024, ICM, Mission Lucidity). The funders played no role in the study design, data access, or report writing. Elena.karpinski@icm-institute.org  