



LoCoPD - A Framework for Longitudinal Conversational Modeling in Parkinson's Disease



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Introduction

Parkinson's disease is progressive neurodegenerative disease whose symptoms change over time. Motor symptoms such as tremor, rigidity, and bradykinesia, and non-motor symptoms spanning cognition, sleep, and mood, vary across patients and change within the same patient over hours, days, and months, driven by medication timing, disease progression, and changing daily conditions^[1]. Standard instruments such as the MDS-UPDRS and PDQ-39 are administered only at intermittent visits, yielding sparse snapshots of a continuously evolving trajectory and missing most of the fluctuation in between.

PD thus exemplifies a broader chronic-disease problem, in which a symptom is interpretable only against prior states, treatment history, and life circumstances. Increasingly, longitudinal support between visits relies on conversational agents, which must sustain temporal context across sessions, accumulate clinical evidence as it is disclosed, and infer an evolving, only partially observed patient state. The development and evaluation of such agents, however, assumes a realistic longitudinal patient dialogue paired with complete ground truth, a resource that remains absent.

Gap

No existing resource combines longitudinal, multi-session conversation reflecting an evolving, partially observed patient persona and state.^{[2][3]}

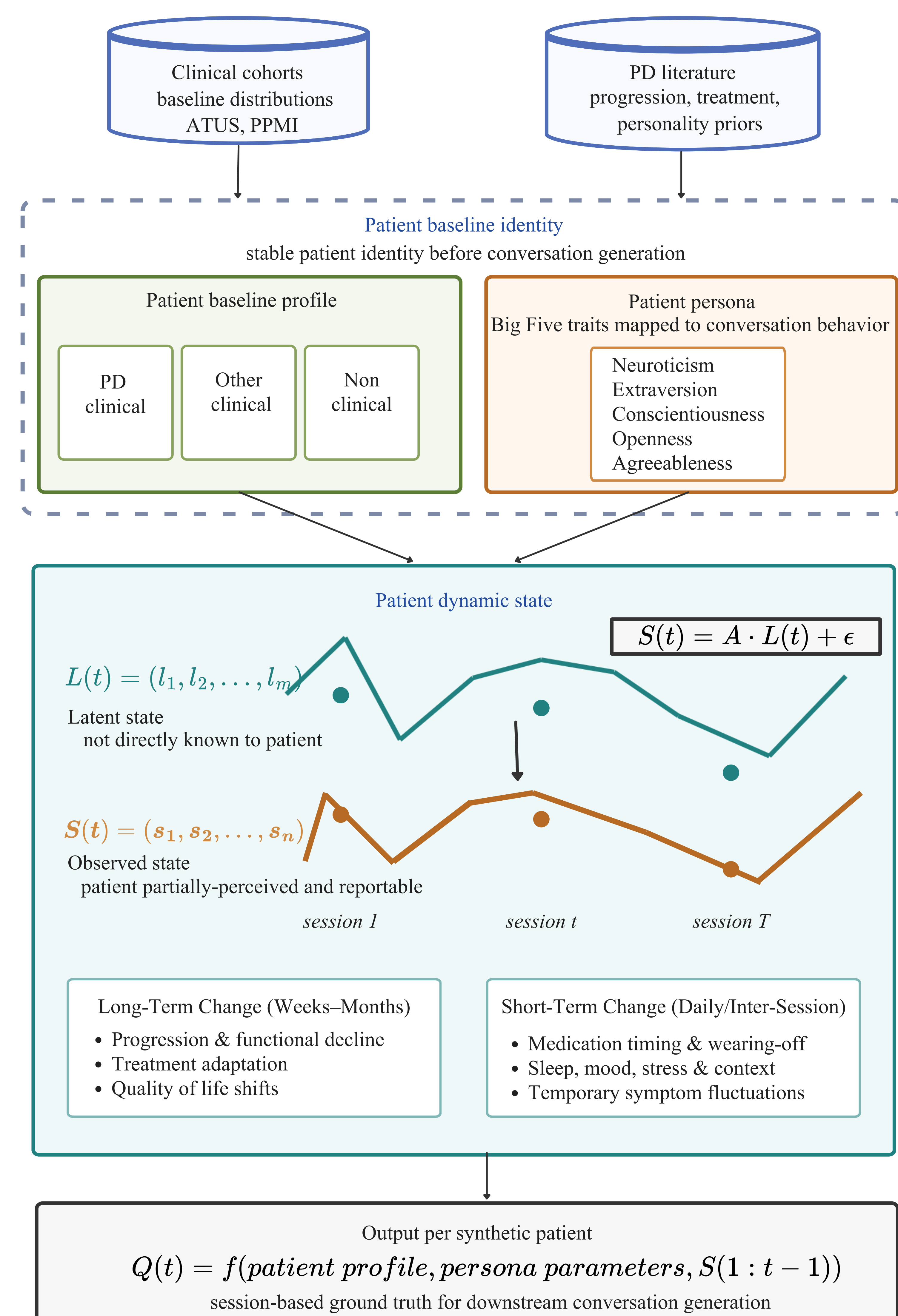
Goal

Building a realistic PD-grounded framework for studying conversational agents

Targets

- Dynamic generator
- Frozen evaluation dataset
- State and memory benchmark

Patient Representation

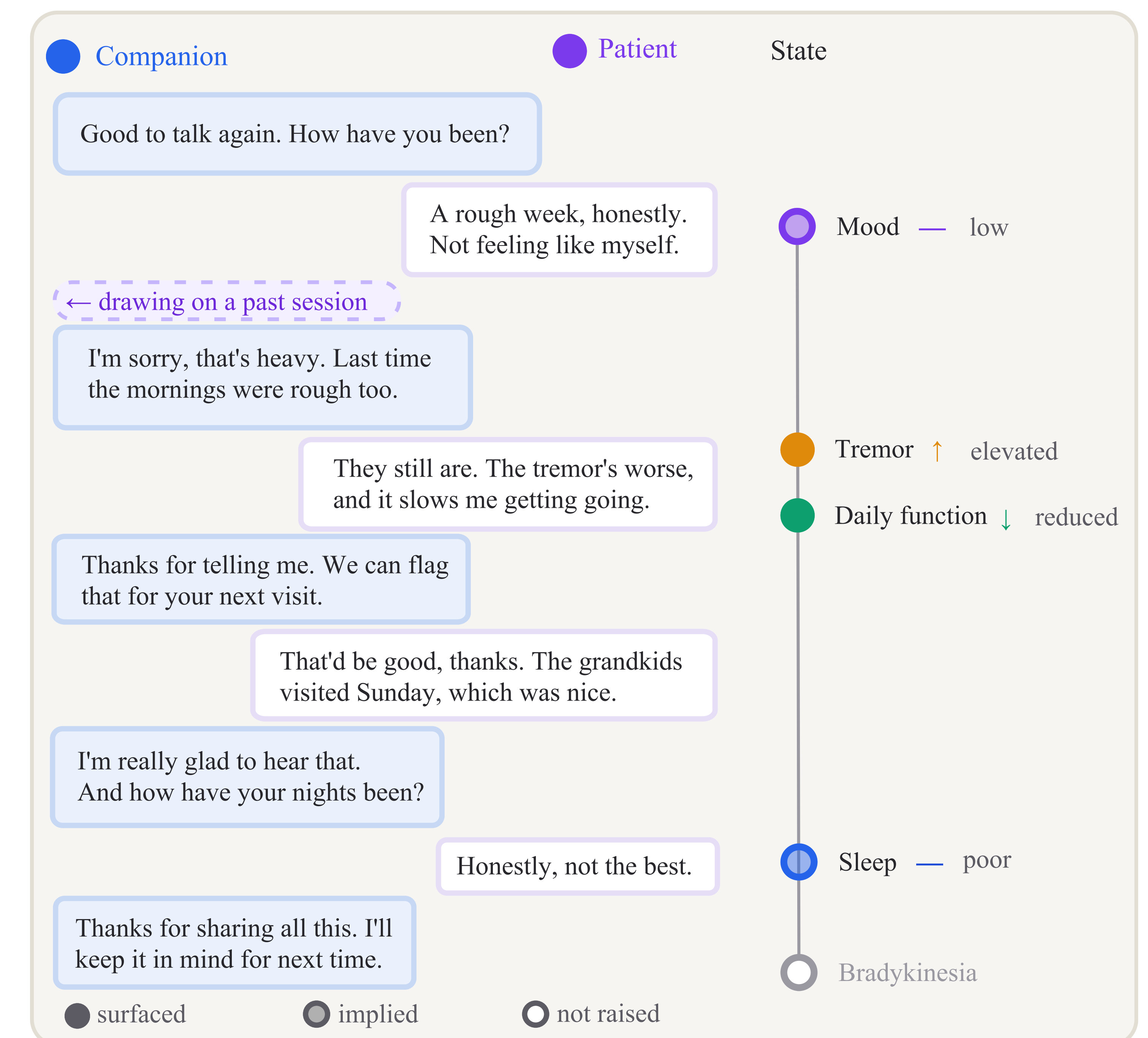


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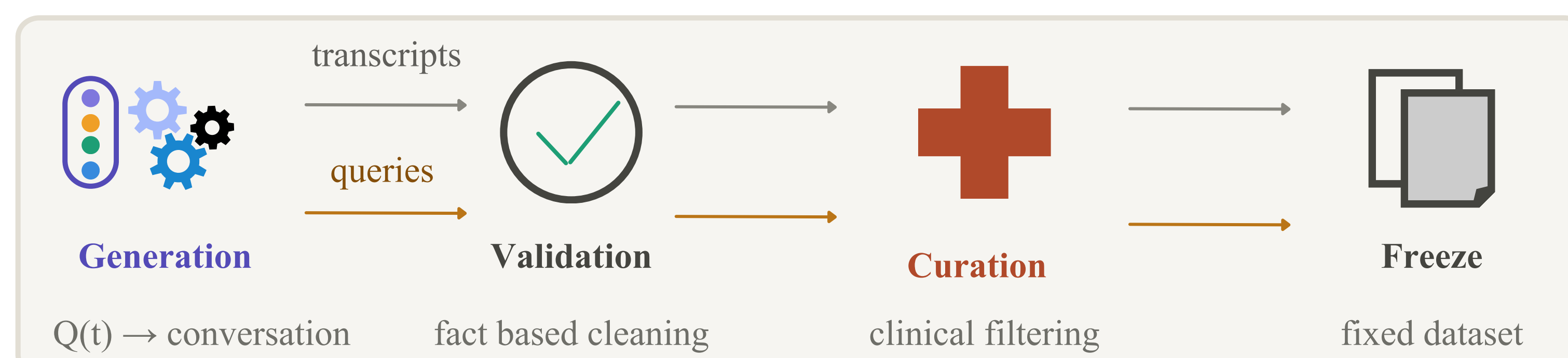
Conversation Generator

- Personas determine the patients' communication: verbosity, disclosure, recall^[4]
- Only a part of Q(t) surfaces during each conversation
- Interacts with a companion agent for generating the dialogue
- Pipeline:
sessions planning → per-session outline → context+memory initialization → conversation generation



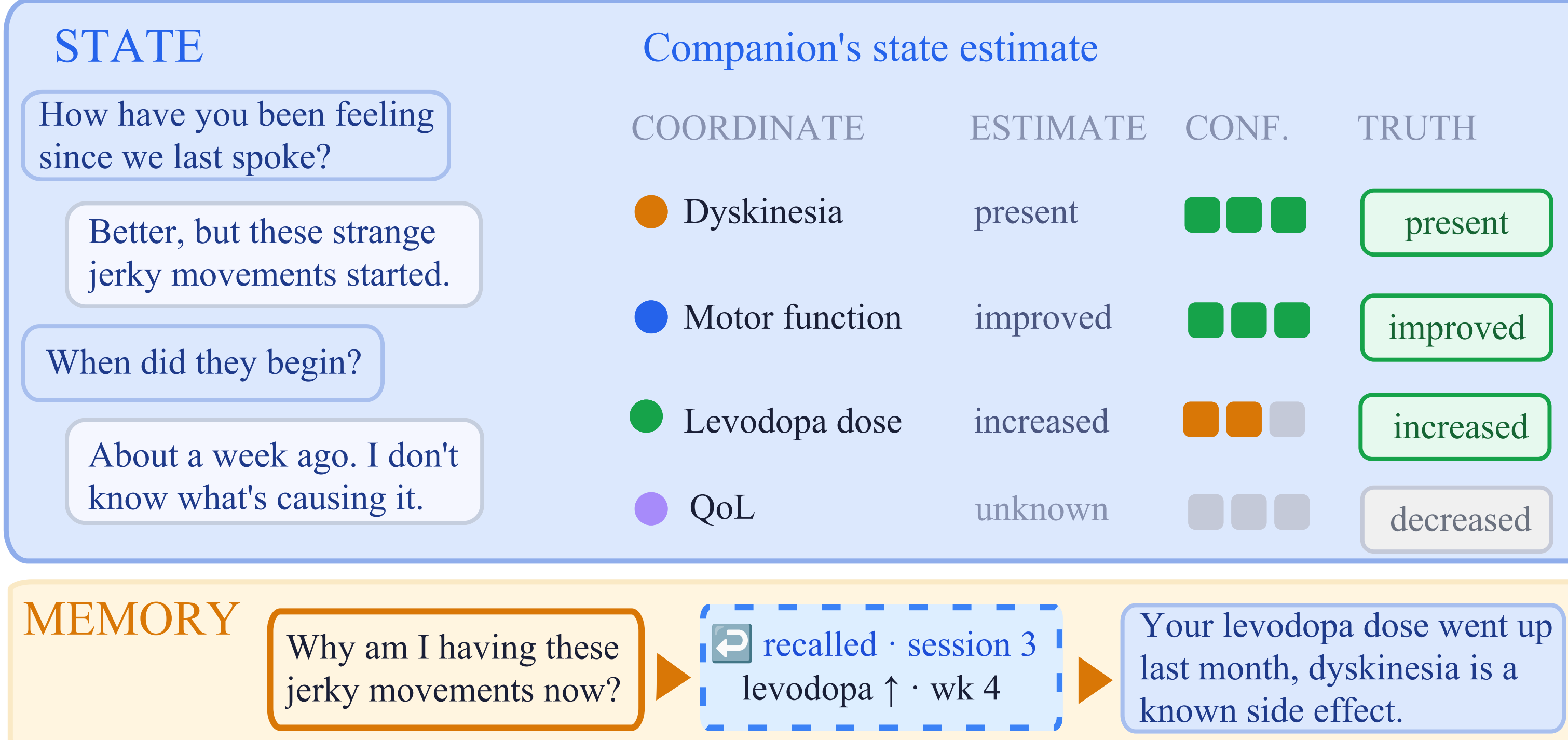
Frozen Dataset

A closed artifact derived from a single generator run enabling third-party evaluation



Benchmark

- Generator benchmark: tests the companion agent - active and passive abilities
- Dataset benchmark: isolates memory and inference; evidence identical across all systems.



Summary

LoCoPD is a framework consisting of a longitudinal generator, a frozen dataset, and benchmarks that uses Parkinson's disease as a model chronic disease for measuring agent abilities in tracking, recalling, and reasoning an evolving, partially observed patient state, both as a live companion and over frozen transcripts.

References

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