**Motivation**

Help researchers to analyze longitudinal multimodality data (e.g., video, human-annotated behavioral data, physiological measures etc.) in a study exploring relationship between behavioral and physiological changes. (e.g., efficacy of sensory integration therapy).

**Challenges**

1. Researchers use multiple software programs to analyze longitudinal multimodality data.

   - Visualize and synchronize different data streams using ELAN
   - Process and analyze data streams using Matlab
   - Analyze and visualize analysis results using Excel

2. It is difficult to manually manage a lot of data collected during longitudinal studies.

3. With data streams residing in different software environments, it can be cumbersome to move between analysis results and actual data streams.

**BEDA** Unified environment for visualizing, processing, and analyzing longitudinal multimodality data

**Main view for visualization, synchronization, and annotation**

- View video, data streams, and annotated behaviors (b and c).
- One-click synchronization for video and multiple data streams (a).
- Allow users to define name, color, and hotkey for targeted behaviors (e) for video (behavior) annotation. Users can annotate behaviors on timeline by pressing a corresponding hotkey (c).
- Allow interval play mode for behavior annotation, which plays a video for x seconds in fast speed and y seconds in normal speed (d). Users can annotate behaviors if the specified behavior occurred anywhere in the past y seconds.

**Overview for visualizing analysis results**

- Visualize results of multiple sessions across time in a longitudinal study (b and c).
- Clicking names of sessions in the list box (a) opens them in the multi-sessions view.

**Multi-sessions view for comparing multiple sessions’ data**

- Compare and contrast multiple sessions’ actual data streams. (e.g., If users drag one of the orange playheads (a-2), all the data related to this session (a-1 and a-2) move together while other data (b-1, b-2, c-1, c-2) stay.)

**Analysis window for processing and analyzing data streams**

- Process and analyze data streams (e.g., physiological data, audio, or any type of time series data etc.) (a) by selecting a pre-programmed analysis script (b).
- Allow for writing own scripts using MATLAB and R and importing into BEDA.