

Lynch Lab MedPC Analyzer



Version 4.6 (Scalar-Priority Engine)

1. Overview

The **Lynch Lab MedPC Analyzer** is a custom software suite designed to automate the processing of behavioral data files (MedPC). It eliminates manual data extraction, prevents human error, and instantly generates publication-ready visualizations.

Key Capabilities

- **Hybrid Parsing Engine:** Automatically detects data whether stored as Scalars (single numbers like A: 15) or Arrays (time-series like A: 0: 10.2...), ensuring compatibility with both old and new MedPC protocols.
- **Strict Protocol Separation:** Automatically sorts data into separate Excel files based on the experiment type (e.g., "FR20" vs. "FR40").
- **Maximalist Visualization:** Generates 12 distinct chart types per experiment, including hourly "micro-analysis," daily learning trajectories, and gender-split comparisons.
- **Traceability:** Every data point is tagged with its original source filename for complete audit trails.

2. How to Access

Option A: The Web App (Recommended)

Best for: Mac users, mobile access, and quick checks in the colony room.

- **Link:** <https://lynch-lab-medpc.streamlit.app>
- **No Installation:** Works instantly in Chrome, Safari, or Edge on any device (iPhone, Android, iPad, PC, Mac).

Option B: Desktop App (Windows/Mac)

Best for: High-volume processing of large datasets on lab computers.

- **Windows:** Download Lynch Lab MedPC Analyzer.exe and double-click to run.
- **Mac:** Download Lynch_Lab_Analyzer.app.
 - Note: On first launch, right-click the icon and select **Open** to bypass the macOS security warning.

3. Step-by-Step Usage Guide

Step 1: Data Preparation

Before running the app, ensure your files are ready:

1. **Raw Files:** Ensure your raw MedPC files start with ! (e.g., !2025-06-20_RatData.txt).
2. **ID List:** Create a text file (ids.txt) containing the Subject IDs you want to analyze, one per line.
 - o Note: The app handles "O" vs "0" confusion automatically (e.g., O105 matches 0105).

Step 2: Running the Analysis

1. **Launch the App** (Web or Desktop).
2. **Select Data Folder:** Choose the folder containing your raw !*.txt files.
3. **Select ID List:** Upload your ids.txt file.
4. **Click "START PROCESSING".**

Step 3: Interpreting the Output

The app creates a new Excel file for **each protocol** found (e.g., RAT_FR20_Analysis.xlsx). Inside, you will find 7 sheets:

- **01_Session_Data:** Raw summary of every session.
- **02_Hourly_Data:** Hour-by-hour breakdown of infusions and presses.
- **03_Daily_Summaries:** Total intake aggregated by date.
- **04_Subject_Averages:** Mean performance per animal across all days.
- **05_Gender_Comparison:** Statistical summary split by Male/Female.
- **06_Sessions_Per_Subject:** Count of how many sessions each animal completed.
- **07_Data_Quality_Flags:** Warnings for suspicious data (e.g., 0 infusions in a 3-hour session).

Plus a Plots/ folder containing:

- **Daily Trajectories:** To spot learning curves (upward slope) or extinction (downward slope).
- **Hourly Histograms:** To identify "front-loading" or binging behavior (high bar at Hour 0).
- **Efficiency Scatter:** Active Presses vs. Infusions (to identify motivation vs. habit).

4. Technical Logic (How It Works)

The analyzer uses a **Scalar-Priority** logic engine to ensure accuracy across decades of data formats:

1. **Scan:** The script reads the raw text file line-by-line.

2. **Detect:** It looks for variables defined in the MSN protocol.
 3. **Priority Check:**
 - o **Step A (Scalar):** Does a single value exist? (e.g., A: 150). If yes, use 150.
 - o **Step B (Array):** If no Scalar, does an Array exist? (e.g., A: 0: 10.2 20.5). If yes, sum all values in the array.
 - o **Step C (Default):** If neither exists, the value is set to 0.
 4. **Normalize:** All durations are converted to seconds automatically based on the file's metadata tags.
-

5. Advanced Configuration

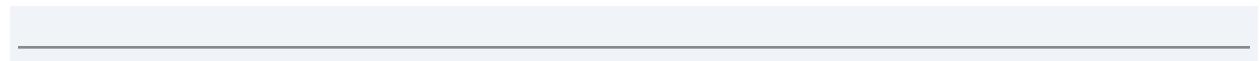
The app comes pre-loaded with standard Lynch Lab protocols (FR, PR, Extinction, Fentanyl, etc.). To analyze a **new or custom protocol** without waiting for a software update:

1. Create a file named Settings.json in your data folder.
2. Define your protocol structure (see example below).
3. Run the app. It will detect the file and log " Loaded Settings.json".

Example Settings.json:

JSON

```
{  
  "msn_patterns": {  
    "MY NEW EXPERIMENT": ["new_msn_code_v1"]  
  },  
  "variable_mappings": {  
    "MY NEW EXPERIMENT": {  
      "infusions": ["I"],  
      "active_presses": ["R"],  
      "duration": "Z",  
      "extra_vars": ["W"]  
    }  
  }  
}
```



6. Publication & Methods

How to Cite this Tool in Manuscripts:

"Raw behavioral data were processed using the **Lynch Lab MedPC Analyzer (v4.6)**, a custom Python-based software pipeline. The software utilizes a scalar-priority parsing engine to standardize data extraction across varying MedPC protocols. Event timestamps were aggregated into hourly bins for micro-structural analysis, and session totals were calculated to monitor daily trajectories. Visualizations were generated automatically using the Seaborn and Matplotlib libraries."

7. Troubleshooting

Issue	Probable Cause	Solution
"No data matched your ID list"	ID Mismatch or Wrong Folder	<ol style="list-style-type: none">1. Check that the IDs in ids.txt match the Subject: line in the raw files exactly.2. Ensure raw files start with !.
"Variable Mismatch" / Zeros	Parsing Error	The app might be looking for an Array when your data is a Scalar. The new v4.6 engine fixes this automatically. Update your app to the latest version.
"Mac App won't open"	Apple Security	Right-click the App icon -> Select Open -> Click Open in the popup.
Excel file won't save	File Open	Close the Excel file if you have it open in Microsoft Excel, then try running the app again.

8. Support & Contact

Report Issues:

If you encounter a bug or need a new protocol added permanently to the default list, please contact the developer.

- **Developer:** Greatness Olaitan
- **Email:** [Insert Email]
- **Lab Location:** [Insert Lab Location]

Demo Data:

A folder named Example_Data is included in the repository. Use this to test the app if you do not have your own files yet.

© 2026 Lynch Lab. Built with Python & Streamlit.