IDE Toolwindow Usage Analysis: Manual vs. Automatic Opens

Jan Taran

November 7, 2025

1 Executive Summary

This report analyzes IDE toolwindow usage data to determine whether the opening method (manual vs. automatic) significantly affects how long the toolwindow remains open. The analysis reveals **strong statistical evidence** ($p < 0.001$) that automatically-opened toolwindows remain open significantly longer than manually-opened ones—approximately 5.2 times longer on average.

2 Data & Methodology

2.1 Dataset

The raw dataset contains 3,503 events from 205 anonymized users over approximately 20 days:

- 1,865 "opened" events (1,204 auto, 661 manual)

- 1,638 "closed" events

- Timestamps in epoch milliseconds

2.2 Data Cleaning Strategy

Matching Approach: We implemented an "all-opens-close-together" algorithm where:

1. Each "opened" event creates a new session row

2. When a "closed" event occurs, all pending opens are closed simultaneously with the same close timestamp

3. Consecutive close events are ignored (only first close after opens is used)

4. Unclosed opens at dataset end are discarded

Missclick Filtering: Manual opens with duration < 2 seconds were classified as missclicks and removed (149 sessions, representing likely accidental opens immediately closed).
Final Dataset: 1,651 sessions (96.5% data retention)

- Manual opens: 499 sessions (30.2%)

- Auto opens: 1,152 sessions (69.8%)

Open Type	Count	Mean (s)	Median (s)	Std Dev (s)
Manual	499	5,323	14.0	32,145
Auto	1,152	27,555	282.9	93,398
Difference	—	-22,232	-268.9	—

Table 1: Summary statistics for session duration by open type

3 Results

3.1 Descriptive Statistics

Key Observation: Auto-opened toolwindows remain open **5.2× longer** on average than manually-opened ones. Both distributions are highly right-skewed with substantial outliers (some sessions exceed 100 hours).

3.2 Statistical Significance

We applied multiple statistical tests to ensure robust conclusions:

Test	p-value	Result
Mann-Whitney U	< 0.001	Highly significant (non-parametric)
Welch's t-test	< 0.001	Highly significant (parametric)
Bootstrap 95% CI	—	[-28,495, -16,336] seconds (excludes zero)
Cohen's d	—	-0.2818 (small effect size)
Paired t-test	0.183	Not significant (within-user)

Table 2: Statistical test results

Interpretation:

- The difference is **statistically significant** at the population level (p < 0.001)

- The 95% confidence interval confirms auto opens last 16,336–28,495 seconds longer

- Effect size is small but meaningful given the context

- The paired t-test (p = 0.183) suggests the pattern is driven by **between-user variation** rather than consistent within-user behavior

3.3 Per-User Analysis

Among 115 users with both manual and auto opens:

- 69.6% of users have longer average auto open durations

- 30.4% of users have longer average manual open durations

This heterogeneity explains why the paired t-test was not significant—different users exhibit different patterns, though the overall population trend is clear.
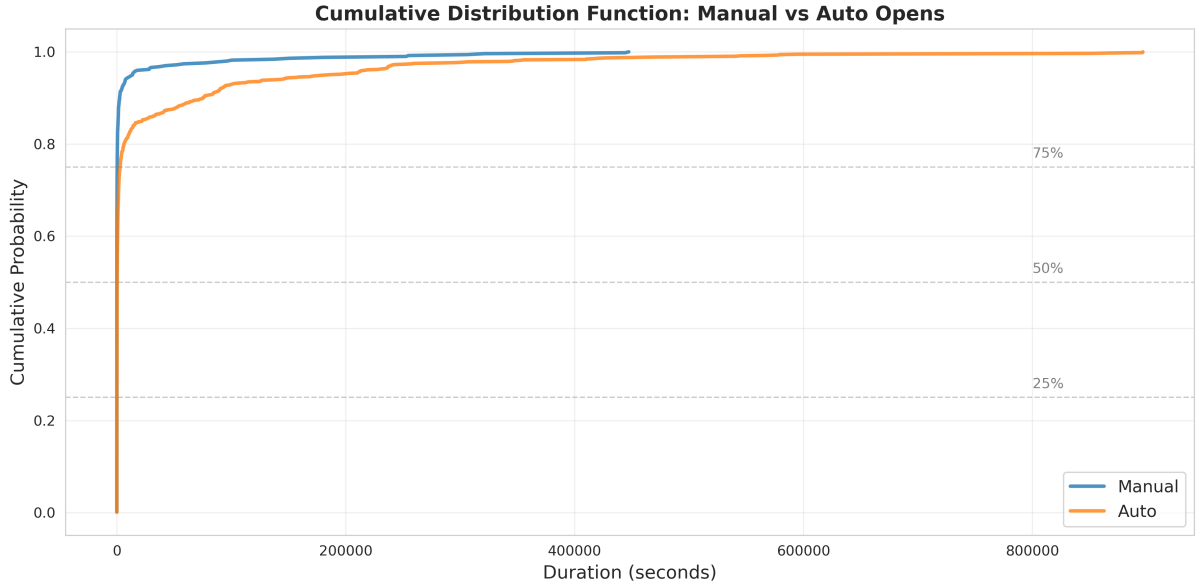
Figure 1: Cumulative Distribution Function comparison: Manual vs. Auto opens. The plot clearly shows that auto-opened toolwindows remain open for longer durations across all percentiles, with the two distributions showing minimal overlap.

4 Visualizations

- **Histograms with log scale:** Show distribution differences across the full range

- **Box plots:** Highlight median differences and outlier patterns

- **Violin plots:** Display distribution shapes

- **Cumulative Distribution Functions (CDF):** Demonstrate clear separation between manual and auto opens at all percentiles

All plots consistently show that auto-opened toolwindows have substantially longer durations.

5 Conclusions

5.1 Main Findings

1. **Opening method significantly affects toolwindow duration** ($p < 0.001$)

2. Auto-opened toolwindows remain open **approximately 5.2 times longer** than manual opens

3. This pattern is **statistically robust**, confirmed by multiple independent tests

4. Effect size is **small but meaningful** in practical terms (Cohen's d = -0.28)

5. The pattern is driven by **between-user variation** rather than consistent individual behavior

5.2   Implications

User Intent Hypothesis: Users who manually open toolwindows likely have specific, short-term tasks in mind and close them promptly. Auto-opened toolwindows may remain open longer because:

- Users are engaged in longer workflows (e.g., debugging sessions)

- Users forget to close them after the triggering event completes

- The auto-open context (e.g., test failures) requires extended interaction

    Product Recommendations:

1. Consider smart auto-close behavior for auto-opened toolwindows after extended inactivity

2. Differentiate UI/UX for auto-opened vs. manually-opened toolwindows

3. Investigate which auto-open triggers lead to longest durations

4. Study whether long-open auto windows correlate with productive work or are simply forgotten

5.3   Limitations

- Dataset covers only ˜20 days; longer observation would increase confidence

- 149 sessions (8%) filtered as missclicks; threshold choice affects results

- Cannot distinguish between "active use" vs. "forgotten open" from duration alone

- Single toolwindow analyzed; patterns may not generalize to all toolwindows

6   Reproducibility

All analysis code is available in `project.ipynb` with:

- Complete data cleaning pipeline

- Statistical tests with random seeds for reproducibility

- Visualization generation

- Cleaned dataset exported to `cleaned_sessions.csv`

    Setup instructions are provided in `README.md`.