Temporal Reproduction Task

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Introduction

This task is based on the methodology described in the following article: DOI: 10.3389/fnins.2023.1249502. In this experiment, I, as the subject, performed the task three times, with each session consisting of 40 trials. The goal was to investigate the accuracy of my temporal reproduction, where I was asked to reproduce various time intervals presented during the task. This report provides a detailed analysis of the reproduced times in comparison to the sample times and discusses the trends, errors, and variability observed in my responses.

1 Results

1.1 Scatter Plot: Sample Time vs. Reproduced Time

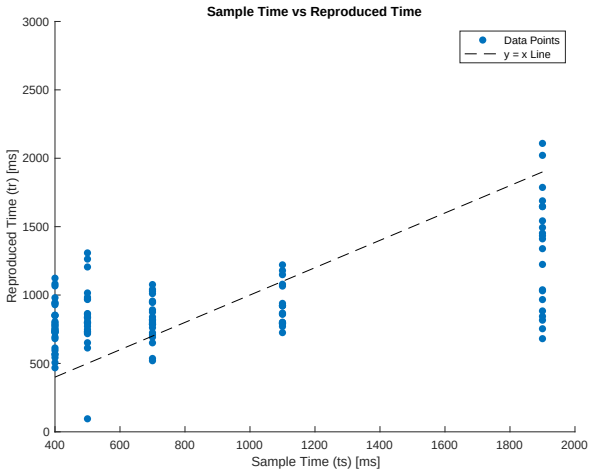

Figure 1: Scatter plot showing the relationship between sample time (ts) and reproduced time (tr). The diagonal line represents the ideal scenario where the reproduced time perfectly matches the sample time (y = x).

The scatter plot visualizes the relationship between the sample time (ts) and the reproduced time (tr). Points closer to the diagonal line indicate higher accuracy. However, as seen, many points deviate from this line, showing errors in reproduction. The variance also appears larger for longer sample times, indicating more difficulty in accurately reproducing longer intervals.

1.2 Linear Regression: Sample Time vs. Reproduced Time

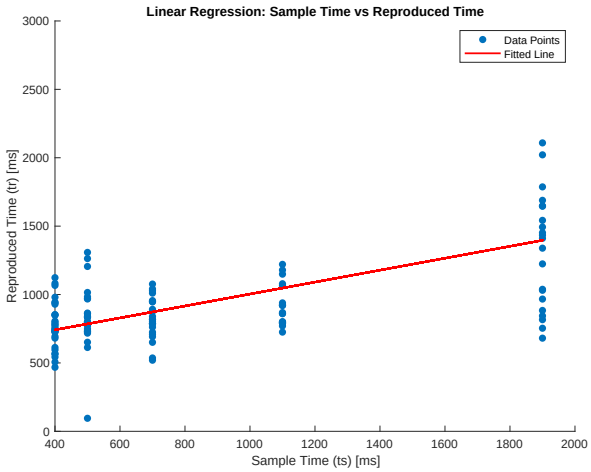

Figure 2: Linear regression analysis between sample time (ts) and reproduced time (tr). The fitted line indicates the general trend in reproduced times relative to sample times.

The linear regression plot shows a strong linear relationship between sample and reproduced times. The slope of the fitted line is less than 1, suggesting that participants tend to underestimate longer time intervals, consistently reproducing them as shorter durations.

1.3 Histogram of Error

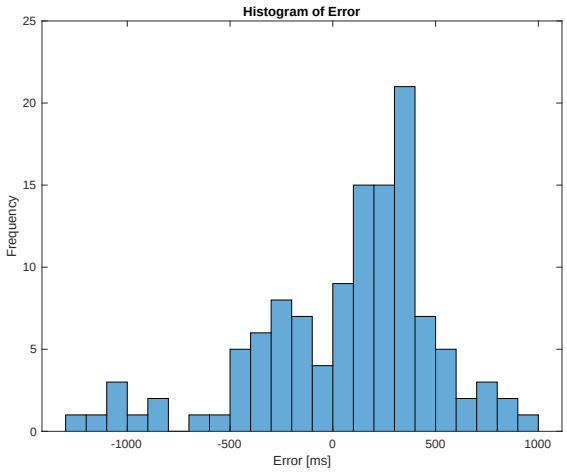

Figure 3: Histogram showing the distribution of errors between sample time and reproduced time. Negative errors indicate underestimation, while positive errors indicate overestimation.

The histogram illustrates the distribution of errors. The majority of errors are negative, which indicates a tendency to underestimate intervals, particularly for longer durations. The skew towards negative values further supports this observation.

1.4 Mean Error and Standard Deviation

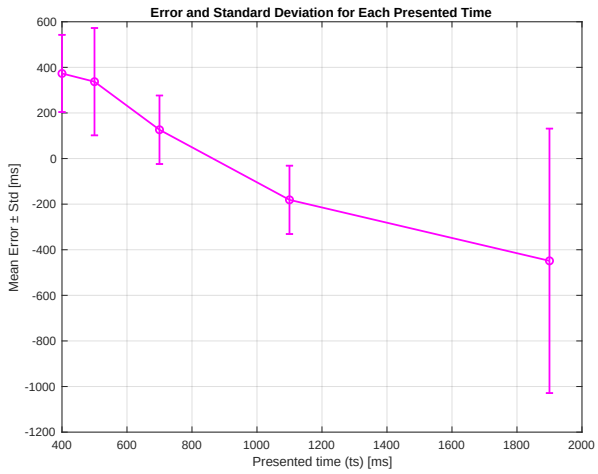

Figure 4: Mean error and standard deviation for each interval. Standard deviation increases with interval length.

The mean error analysis shows the bias in participants' reproduction of time intervals. Positive errors in shorter intervals suggest slight overestimation, while negative errors in longer intervals indicate consistent underestimation. The increase in standard deviation with interval length suggests higher variability in reproducing longer intervals, likely due to increased cognitive load.

1.5 Distribution of Reproduced Times Across All Sample Groups

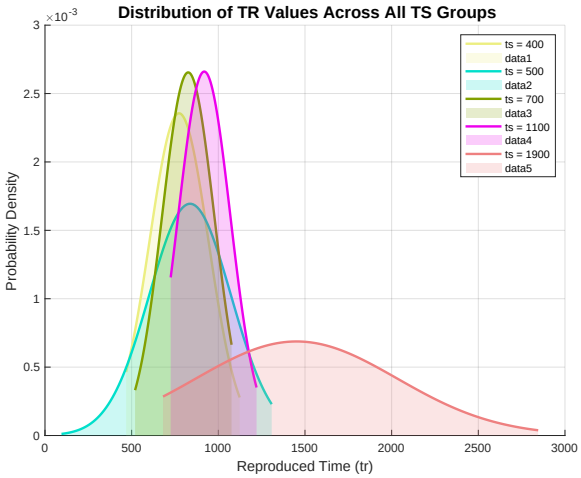

Figure 5: Probability density distribution of reproduced times (tr) across all sample time intervals (ts).

This plot illustrates the distribution of reproduced times (tr) for each sample time (ts). Due to the limited sample size, the distribution is not fully representative across all intervals. However, it reveals key insights: in the longest sample interval ($ts = 1900\ ms$), the reproduced times (tr) are more dispersed, indicating higher variability. Furthermore, most of the reproduced times for this interval are underestimated compared to the actual ts value, highlighting the challenge in accurately reproducing longer durations.

1.6 Summary Statistics

Interval (ms)	Mean ± Std (ms)	Min–Max (ms)
400	773.3 ± 169.35	468.06–1123.32
500	837.09 ± 235.42	95.28–1308.04
700	826.3 ± 150.28	519.81–1076.55
1100	918.87 ± 149.94	725.27–1220.64
1900	1451.33 ± 580.14	681.06–2845.49

Table 1: Summary statistics for each sample time interval, showing the mean ± standard deviation and range (Min–Max) of reproduced times.

The summary table provides key statistics for each interval. Shorter intervals have lower standard deviations, indicating more consistent reproduction, whereas longer intervals show greater variability. This suggests increased difficulty in reproducing longer intervals with precision.