In order to test the influence of phase reversal and to establish the significant difference between the means of threshold recorder under inphase and antiphase condition we conduct statistical test.

To determine which inferential statistics can be performed we first tested the normality of data and equaline in varicne .Formar a was checked using the Shapiro-Wilks test with null hypothesis for this test assumes that the data are normally distributed, and the results (shown in TABLE III) indicate that most of the data rejects this null hypothesis, indicating that the data is not normally distributed. To check the equivlance of variance between threash holds of inphase and anti phase condition we perofmed Levene's Test and results suggest that that the variances are not equal between thresh hold reocdend under phasic and antiphasic condition.

On the bases of normality test, equivalence of variance and the sample size of 35, we narrow down out choises to non-parametric tests such as the Wilcoxon rank-sum test or Kruskal-Wallis test are more appropriate, as they are considered more robust to small sample sizes than parametric tests.

It is important to also consider whether the data is paired or non-paired. In this study, the same subjects were tested against different conditions, making the data paired. A Kruskal-Wallis test would assume independence between observations, whereas repeat observations on the same subjects are related. Therefore, the non-parametric Wilcoxon signed rank test, which accounts for the pairing of observations by making pairwise comparisons, is applied to determine statistical significance.

The test statistic calucted by Wilcoxon signed rank test is the sum of the signed ranks of the differences between the two samples i.e under inphase and antiphase condition , with positive ranks given to the sample with the larger value. In this case, a large absolute value of the test statistic indicates strong evidence against the null hypothesis, and a small absolute value indicates weak evidence against the null hypothesis. The sign of the test statistic indicates the direction of the difference between the medians of the two samples.

If the p-value returned by the Wilcoxon test is greater than the chosen significance level (p=0.05), and the test statistic (sum of the positive signed ranks of the differences between the two samples) is relatively high, it means that there is weak or no evidence against the null hypothesis which in our case is that mean of threshold recorded under inphase and antiphase conditions are significantly different. Table 6 shows the result of the Wilcoxon test performon threshold of 35 subjects in inphase condiontion vs anitphase for all 3 duration and all 5 frequencies.Statisitacl difference between SoNo and SpiNo condions are statistical different expect for the combination and where duration is 3 ms seconds and frequncey is 1000hz.

Table show that

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **duration\_ms** | **frequnecey** | **pvalue** | **Significance** | **STATS** |
| 3 | 125 | 0.038733527 | Significant | 189 |
| 250 | 0.007458371 | Significant | 141 |
| 500 | 0.004249469 | Significant | 120.5 |
| 750 | 4.22733E-05 | Significant | 58 |
| 1000 | 0.061864916 | Non-Significant | 176 |
| 18 | 125 | 0.000998038 | Significant | 105 |
| 250 | 1.53155E-05 | Significant | 38.5 |
| 500 | 0.000998038 | Significant | 105 |
| 750 | 0.000193637 | Significant | 79.5 |
| 1000 | 0.00912176 | Significant | 145 |
| 48 | 125 | 2.69236E-06 | Significant | 23 |
| 250 | 3.92225E-05 | Significant | 57 |
| 500 | 0.004419304 | Significant | 131 |
| 750 | 0.006227757 | Significant | 137.5 |
| 1000 | 0.007557149 | Significant | 131 |