<center>**Results**</center>

Two-Tailed Mann-Whitney *U* Test

Introduction

A two-tailed Mann-Whitney two-sample rank-sum test was conducted to examine whether there were significant differences in weight between the levels of engine_type. The two-tailed Mann-Whitney two-sample rank-sum test is an alternative to the independent samples *t*-test, but does not share the same assumptions (Conover & Iman, 1981). There were 18 observations in group V-Shaped and 14 observations in group Straight.

Results

The result of the two-tailed Mann-Whitney *U* test was significant based on an alpha value of .05, $U = 212$, $z = -3.27$, $p = .001$. The mean rank for group V-Shaped was 21.28 and the mean rank for group Straight was 10.36. This suggests that the distribution of weight for group V-Shaped was significantly different from the distribution of weight for the Straight category. The median for V-Shaped (*Mdn* = 3.57) was significantly larger than the median for Straight (*Mdn* = 2.62). Table 1 presents the result of the two-tailed Mann-Whitney *U* test. Figure 1 presents a boxplot of the ranks of weight by engine_type.
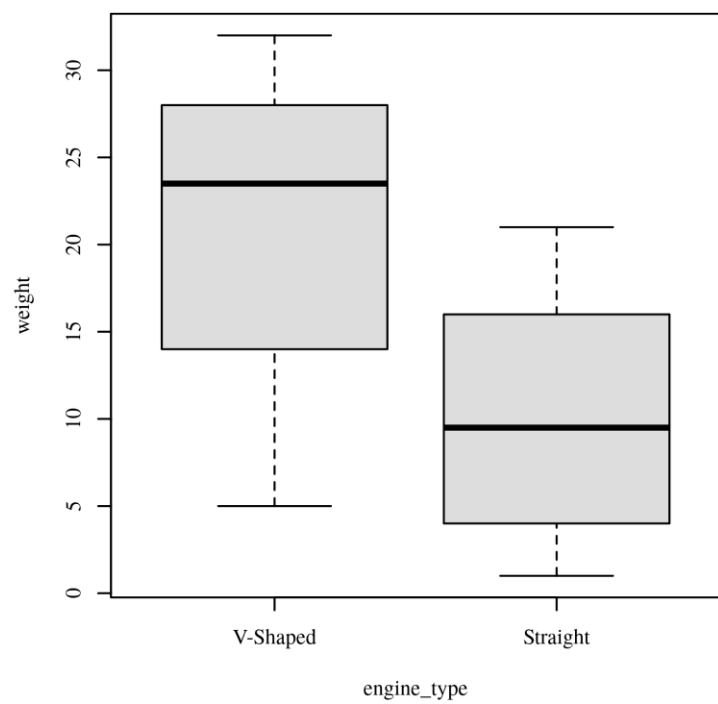
Table 1

Two-Tailed Mann-Whitney Test for weight by engine_type

	V-Shaped		Straight				
Variable	Mean Rank	*n*	Mean Rank	*n*	*U*	*z*	*p*
weight	21.28	18	10.36	14	212.00	-3.27	.001

Figure 1

Ranks of weight by engine_type

References

Conover, W. J., & Iman, R. L. (1981). Rank transformations as a bridge between parametric and

nonparametric statistics. *The American Statistician, 35*(3), 124-129.

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Glossaries

Mann Whitney *U*

The Mann-Whitney *U* is a non-parametric test used to assess for significant differences in a scale or ordinal dependent variable by a single dichotomous independent variable. It is the non-parametric equivalent of the independent sample *t* -test. The test uses the mean ranks of the scores in each group to compute the *U* statistic, which in turn is used to compute the *p* -value (i.e., significance level). A significant result for this test suggests that the two groups have reliably different scores on the dependent variable. The Mann-Whitney *U* test assumes that the observations are independent of each other and that the dependent variable has a scale or ordinal level of measurement.

Fun Fact! The Mann-Whitney U test is named after mathematician Henry Mann and his student Donald Whitney, who collaborated on the development of the test in the 1940s.

Mean Rank: The average rank of the data for that group once the data is sorted and ranked.

Non-Parametric Test: A type of statistical test that does not require the data to follow a particular distribution; typically used when assumptions of a parametric test are violated or when the data do not fit the level of measurement required by a parametric test.

***p*-value:** The probability of obtaining the observed results if the null hypothesis (no relationship between the independent variable(s) and dependent variable) is true; in most social science research, a result is considered statistically significant if this value is $\leq .05$.

***U*-Test Statistic (*U*):** Used to compute the *p* value.

Raw Output

Two-Tailed Mann Whitney U Test for weight by engine_type

Included Variables:
weight and engine_type

Sample Size (Complete Cases):
N = 32

Results:
$U = 212.000$, $z = -3.268$, $p = 0.00108$

Medians for weight by engine_type
V-Shaped (n = 18) = 3.570 and Straight (n = 14) = 2.622