

The ANOVA tells us we have an effect somewhere of Condition, but we don't yet know which level of this factor differs from which other level(s).

We need to conduct post hoc tests to figure this out. We can conduct both Bonferroni and Tukey pairwise comparisons using the *emmeans* function - Bonferroni is slightly more conservative than Tukey.

```
> emmeans(model, pairwise ~ Condition, adjust = "Bonferroni")
```

```
$emmeans
```

Condition	emmean	SE	df	lower.CL	upper.CL
Water	5.165081	0.1079627	42	4.947204	5.382959
Single Espresso	6.985001	0.1079627	42	6.767124	7.202879
Double Espresso	8.886287	0.1079627	42	8.668409	9.104164

```
Confidence level used: 0.95
```

```
$contrasts
```

contrast	estimate	SE	df	t.ratio	p.value
Water - Single Espresso	-1.819920	0.1526824	42	-11.920	<.0001
Water - Double Espresso	-3.721205	0.1526824	42	-24.372	<.0001
Single Espresso - Double Espresso	-1.901285	0.1526824	42	-12.453	<.0001

```
P value adjustment: bonferroni method for 3 tests
```

```
> emmeans(model, pairwise ~ Condition, adjust = "Tukey")
$emmeans
  Condition      emmean      SE df lower.CL upper.CL
Water      5.165081 0.1079627 42  4.947204  5.382959
Single Espresso 6.985001 0.1079627 42  6.767124  7.202879
Double Espresso 8.886287 0.1079627 42  8.668409  9.104164
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$contrasts
  contrast      estimate      SE df t.ratio p.value
Water - Single Espresso -1.819920 0.1526824 42 -11.920 <.0001
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Single Espresso - Double Espresso -1.901285 0.1526824 42 -12.453 <.0001
```

P value adjustment: tukey method for comparing a family of 3 estimates

We could set `adjust = "none"` if we wanted uncorrected p -values. But in this case, both Bonferroni and Tukey comparisons tell us the same thing - each condition differs from each other condition (which fits with what we saw in the graph).