

# ANOVA\_STUDY2

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## Load Data

```
df <- read_csv("data_out_2/df_rt_2.csv",show_col_types = FALSE)%>%
  mutate(id = as.factor(id),
         tran = as.factor(ifelse(task_transition_type == "task-repetition", "rep","swi")),
         cong = as.factor(ifelse(congruency_type == "congruent", "cong", "inc")),
         rew = as.factor(ifelse(reward == "no-reward", "no","yes")),
         resp_rep = as.factor(resp_rep),seq = as.factor(sequence),rt = rt/1000)%>%
  select(id, tran, cong, seq, rew,rt)
```

## Run ANOVA

```
anova_res <- afex::aov_ez(
  data = df,
  dv = "rt",
  id = "id",
  within = c("tran", "cong", "seq", "rew"),
  fun_aggregate = mean
)
anova_res
```

## Anova Table (Type 3 tests)

##

## Response: rt

##	Effect	df	MSE	F	ges	p.value
## 1	tran	1, 48	0.04 158.61 ***	.082	<.001	
## 2	cong	1, 48	0.03 182.01 ***	.068	<.001	
## 3	seq	3.25, 155.87	0.01 4.83 **	.003	.002	
## 4	rew	1, 48	0.20 21.87 ***	.066	<.001	
## 5	tran:cong	1, 48	0.01 3.30 +	<.001	.076	
## 6	tran:seq	3.34, 160.53	0.01 25.15 ***	.007	<.001	
## 7	cong:seq	3.46, 166.07	0.01 0.73	<.001	.554	
## 8	tran:rew	1, 48	0.01 8.34 **	<.001	.006	
## 9	cong:rew	1, 48	0.01 1.79	<.001	.187	
## 10	seq:rew	3.89, 186.59	0.01 0.81	<.001	.514	
## 11	tran:cong:seq	3.47, 166.35	0.01 1.85	<.001	.132	
## 12	tran:cong:rew	1, 48	0.01 0.10	<.001	.753	
## 13	tran:seq:rew	3.59, 172.56	0.01 0.77	<.001	.534	

```
## 14      cong:seq:rew 3.47, 166.49 0.01      2.44 + <.001      .058
## 15 tran:cong:seq:rew 3.23, 155.05 0.01      1.59 <.001      .192
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '+' 0.1 ' ' 1
##
## Sphericity correction method: GG
```

---

## Post

sequence : transition contrasts

```
emmeans::emmeans(anova_res, pairwise ~ seq)
```

```
## $emmeans
##      seq      emmean      SE df lower.CL upper.CL
## FakeFrequent  0.811 0.0215 48      0.768      0.854
## FakeRare      0.810 0.0215 48      0.766      0.853
## NoInstruction 0.811 0.0218 48      0.768      0.855
## RealFrequent  0.825 0.0212 48      0.782      0.868
## RealRare      0.794 0.0195 48      0.755      0.834
##
## Results are averaged over the levels of: rew, cong, tran
## Confidence level used: 0.95
##
## $contrasts
##      contrast      estimate      SE df t.ratio p.value
## FakeFrequent - FakeRare      0.001538 0.00608 48      0.253 0.9991
## FakeFrequent - NoInstruction -0.000345 0.00714 48     -0.048 1.0000
## FakeFrequent - RealFrequent -0.013905 0.00650 48     -2.140 0.2206
## FakeFrequent - RealRare      0.016740 0.00626 48      2.676 0.0727
## FakeRare - NoInstruction     -0.001883 0.00736 48     -0.256 0.9990
## FakeRare - RealFrequent     -0.015442 0.00753 48     -2.050 0.2586
## FakeRare - RealRare      0.015202 0.00555 48      2.738 0.0630
## NoInstruction - RealFrequent -0.013559 0.00895 48     -1.515 0.5582
## NoInstruction - RealRare      0.017085 0.00604 48      2.828 0.0507
## RealFrequent - RealRare      0.030644 0.00789 48      3.886 0.0028
##
## Results are averaged over the levels of: rew, cong, tran
## P value adjustment: tukey method for comparing a family of 5 estimates
```

---

sequence : transition contrasts

```
emmeans::emmeans(anova_res, pairwise ~ tran|seq)
```

```
## $emmeans
## seq = FakeFrequent:
##      tran emmean      SE df lower.CL upper.CL
```

```

## rep 0.762 0.0189 48 0.724 0.800
## swi 0.860 0.0247 48 0.810 0.910
##
## seq = FakeRare:
## tran emmean SE df lower.CL upper.CL
## rep 0.757 0.0196 48 0.718 0.796
## swi 0.862 0.0242 48 0.813 0.911
##
## seq = NoInstruction:
## tran emmean SE df lower.CL upper.CL
## rep 0.761 0.0200 48 0.721 0.802
## swi 0.861 0.0243 48 0.813 0.910
##
## seq = RealFrequent:
## tran emmean SE df lower.CL upper.CL
## rep 0.789 0.0208 48 0.747 0.831
## swi 0.861 0.0226 48 0.816 0.907
##
## seq = RealRare:
## tran emmean SE df lower.CL upper.CL
## rep 0.713 0.0175 48 0.678 0.748
## swi 0.876 0.0234 48 0.829 0.923
##
## Results are averaged over the levels of: rew, cong
## Confidence level used: 0.95
##
## $contrasts
## seq = FakeFrequent:
## contrast estimate SE df t.ratio p.value
## rep - swi -0.0979 0.00942 48 -10.392 <.0001
##
## seq = FakeRare:
## contrast estimate SE df t.ratio p.value
## rep - swi -0.1048 0.00978 48 -10.720 <.0001
##
## seq = NoInstruction:
## contrast estimate SE df t.ratio p.value
## rep - swi -0.0999 0.00876 48 -11.393 <.0001
##
## seq = RealFrequent:
## contrast estimate SE df t.ratio p.value
## rep - swi -0.0725 0.00965 48 -7.519 <.0001
##
## seq = RealRare:
## contrast estimate SE df t.ratio p.value
## rep - swi -0.1624 0.01359 48 -11.948 <.0001
##
## Results are averaged over the levels of: rew, cong

```