```
R version 3.4.2 (2017-09-28) -- "Short Summer"
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Platform: x86_64-apple-darwin15.6.0 (64-bit)

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  Natural language support but running in an English locale

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'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

[R.app GUI 1.70 (7434) x86_64-apple-darwin15.6.0]

[Workspace restored from /Users/paulpartyka/.RData]
[History restored from /Users/paulpartyka/.Rapp.history]

> my_data <- read.csv(file.choose())
> my_data <- alignment
Error: object 'alignment' not found
> dplyr::sample_n(my_data,10)
    day alignment condition
52    4     33.91      flow
142   4     51.34    static
73    5     59.93      flow
157   5     65.45    static
166   5     83.02    static
8     3     58.34      flow
92    3     29.29    static
155   5     58.24    static
95    3     54.16    static
79    5     47.07      flow
> alignment
Error: object 'alignment' not found
> alignment
Error: object 'alignment' not found
> my_data
    day alignment condition
1     3      1.17      flow
2     3      7.70      flow
3     3      8.53      flow
4     3     15.04      flow
```

5	3	15.78	flow
6	3	50.11	flow
7	3	53.39	flow
8	3	58.34	flow
9	3	66.97	flow
10	3	75.53	flow
11	3	77.99	flow
12	3	82.57	flow
13	3	83.35	flow
14	3	86.01	flow
15	3	82.69	flow
16	3	82.61	flow
17	3	75.00	flow
18	3	72.53	flow
19	3	71.57	flow
20	3	52.13	flow
21	3	46.79	flow
22	3	45.00	flow
23	3	40.43	flow
24	3	30.78	flow
25	3	28.81	flow
26	3	25.02	flow
27	3	22.83	flow
28	3	21.54	flow
29	3	8.13	flow
30	3	7.59	flow
31	4	0.00	flow
32	4	1.26	flow
33	4	4.50	flow
34	4	6.84	flow
35	4	10.51	flow
36	4	12.76	flow
37	4	17.88	flow
38	4	18.14	flow
39	4	29.93	flow
40	4	65.73	flow
41	4	79.70	flow
42	4	71.82	flow
43	4	67.78	flow
44	4	65.48	flow
45	4	61.70	flow
46	4	58.24	flow
47	4	52.33	flow
48	4	50.06	flow
49	4	45.00	flow
50	4	42.77	flow
51	4	41.04	flow
52	4	33.91	flow
53	4	30.47	flow

54	4	30.33	flow
55	4	29.74	flow
56	4	23.63	flow
57	4	10.92	flow
58	4	10.68	flow
59	4	8.75	flow
60	4	6.79	flow
61	5	0.82	flow
62	5	2.42	flow
63	5	5.71	flow
64	5	7.80	flow
65	5	7.97	flow
66	5	11.31	flow
67	5	11.73	flow
68	5	12.84	flow
69	5	16.78	flow
70	5	28.07	flow
71	5	29.43	flow
72	5	41.47	flow
73	5	59.93	flow
74	5	60.72	flow
75	5	75.96	flow
76	5	66.12	flow
77	5	52.59	flow
78	5	47.49	flow
79	5	47.07	flow
80	5	31.48	flow
81	5	29.84	flow
82	5	29.45	flow
83	5	25.29	flow
84	5	18.65	flow
85	5	16.54	flow
86	5	10.81	flow
87	5	10.49	flow
88	5	10.48	flow
89	5	6.88	flow
90	5	1.19	flow
91	3	9.25	static
92	3	29.29	static
93	3	40.71	static
94	3	41.47	static
95	3	54.16	static
96	3	55.41	static
97	3	60.52	static
98	3	61.14	static
99	3	62.32	static
100	3	62.95	static
101	3	66.45	static
102	3	67.04	static

103	3	69.44	static
104	3	78.69	static
105	3	84.14	static
106	3	82.87	static
107	3	82.18	static
108	3	75.96	static
109	3	73.07	static
110	3	72.90	static
111	3	68.52	static
112	3	65.56	static
113	3	57.65	static
114	3	51.75	static
115	3	51.34	static
116	3	34.99	static
117	3	32.35	static
118	3	27.05	static
119	3	16.04	static
120	3	1.01	static
121	4	18.31	static
122	4	18.43	static
123	4	30.12	static
124	4	62.97	static
125	4	65.83	static
126	4	84.19	static
127	4	87.11	static
128	4	85.29	static
129	4	83.56	static
130	4	77.47	static
131	4	75.72	static
132	4	74.58	static
133	4	73.81	static
134	4	73.77	static
135	4	69.90	static
136	4	68.44	static
137	4	66.67	static
138	4	66.37	static
139	4	61.39	static
140	4	53.47	static
141	4	53.43	static
142	4	51.34	static
143	4	33.69	static
144	4	30.87	static
145	4	25.71	static
146	4	23.26	static
147	4	22.11	static
148	4	14.21	static
149	4	8.67	static
150	4	8.62	static
151	5	6.58	static

```
152   5     11.80    static
153   5     14.04    static
154   5     24.13    static
155   5     58.24    static
156   5     58.52    static
157   5     65.45    static
158   5     66.80    static
159   5     69.59    static
160   5     70.62    static
161   5     70.97    static
162   5     75.00    static
163   5     76.41    static
164   5     86.12    static
165   5     83.75    static
166   5     83.02    static
167   5     82.61    static
168   5     80.67    static
169   5     74.85    static
170   5     74.27    static
171   5     68.90    static
172   5     67.62    static
173   5     67.38    static
174   5     59.59    static
175   5     50.75    static
176   5     35.68    static
177   5     27.30    static
178   5     18.43    static
179   5      7.21    static
180   5      1.68    static
> install.packages("dplyr")
--- Please select a CRAN mirror for use in this session ---
trying URL 'https://cran.cnr.berkeley.edu/bin/macosx/el-capitan/contrib/3.4/
dplyr_0.7.4.tgz'
Content type 'application/x-gzip' length 5094432 bytes (4.9 MB)
==================================================
downloaded 4.9 MB


The downloaded binary packages are in
    /var/folders/y6/nsx85nws18q44txcqjq40bc80000gn/T//RtmpnZpI2f/
downloaded_packages
> str(my_data)
'data.frame':    180 obs. of  3 variables:
 $ day      : int  3 3 3 3 3 3 3 3 3 3 ...
 $ alignment: num  1.17 7.7 8.53 15.04 15.78 ...
 $ condition: Factor w/ 2 levels "flow","static": 1 1 1 1 1 1 1 1 1 1 ...
> res.aov2 <- aov(alignment ~ day + condition, daya = my_data)
Error in eval(predvars, data, env) : object 'alignment' not found
> my_data<-alignment
```

```
Error: object 'alignment' not found
> my_data <- alignment
Error: object 'alignment' not found
> res.aov2 <- aov(my_data ~ day + condition, daya = my_data)
Error in eval(predvars, data, env) : object 'day' not found
> res.aov2 <- aov(alignment ~ day + condition, data = my_data)
> summary(res.aov2)
             Df Sum Sq Mean Sq F value   Pr(>F)
day           1   3171    3171   4.988   0.0268 *
condition     1  15709   15709  24.711 1.56e-06 ***
Residuals   177 112523     636
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
> flow5=c(0.82,
+ 2.42,
+ 5.71,
+ 7.8,
+ 7.97,
+ 11.31,
+ 11.73,
+ 12.84,
+ 16.78,
+ 28.07,
+ 29.43,
+ 41.47,
+ 59.93,
+ 60.72,
+ 75.96,
+ 66.12,
+ 52.59,
+ 47.49,
+ 47.07,
+ 31.48,
+ 29.84,
+ 29.45,
+ 25.29,
+ 18.65,
+ 16.54,
+ 10.81,
+ 10.49,
+ 10.48,
+ 6.88,
+ 1.19);
> flow5
 [1]  0.82  2.42  5.71  7.80  7.97 11.31 11.73 12.84 16.78 28.07 29.43 41.47
[13] 59.93 60.72 75.96 66.12 52.59 47.49 47.07 31.48 29.84 29.45 25.29 18.65
[25] 16.54 10.81 10.49 10.48  6.88  1.19
> static5=c(6.58,
+ 11.8,
```

```
+ 14.04,
+ 24.13,
+ 58.24,
+ 58.52,
+ 65.45,
+ 66.8,
+ 69.59,
+ 70.62,
+ 70.97,
+ 75,
+ 76.41,
+ 86.12,
+ 83.75,
+ 83.02,
+ 82.61,
+ 80.67,
+ 74.85,
+ 74.27,
+ 68.9,
+ 67.62,
+ 67.38,
+ 59.59,
+ 50.75,
+ 35.68,
+ 27.3,
+ 18.43,
+ 7.21,
+ 1.68);
> t.test(flow5,static5)

    Welch Two Sample t-test

data:  flow5 and static5
t = -4.539, df = 54.774, p-value = 3.136e-05
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -41.35593 -16.02074
sample estimates:
mean of x mean of y
 25.91100  54.59933

> static4=c(18.31,
+ 18.43,
+ 30.12,
+ 62.97,
+ 65.83,
+ 84.19,
+ 87.11,
+ 85.29,
```

```
+ 83.56,
+ 77.47,
+ 75.72,
+ 74.58,
+ 73.81,
+ 73.77,
+ 69.9,
+ 68.44,
+ 66.67,
+ 66.37,
+ 61.39,
+ 53.47,
+ 53.43,
+ 51.34,
+ 33.69,
+ 30.87,
+ 25.71,
+ 23.26,
+ 22.11,
+ 14.21,
+ 8.67,
+ 8.62);
> flow4=c(0,
+ 1.26,
+ 4.5,
+ 6.84,
+ 10.51,
+ 12.76,
+ 17.88,
+ 18.14,
+ 29.93,
+ 65.73,
+ 79.7,
+ 71.82,
+ 67.78,
+ 65.48,
+ 61.7,
+ 58.24,
+ 52.33,
+ 50.06,
+ 45,
+ 42.77,
+ 41.04,
+ 33.91,
+ 30.47,
+ 30.33,
+ 29.74,
+ 23.63,
+ 10.92,
```

```
+ 10.68,
+ 8.75,
+ 6.79);
> t.test(flow4,static4)

    Welch Two Sample t-test

data:  flow4 and static4
t = -2.9933, df = 57.662, p-value = 0.004059
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -32.298437  -6.409563
sample estimates:
mean of x mean of y
 32.95633  52.31033

> flow3=c(1.17,
+ 7.7,
+ 8.53,
+ 15.04,
+ 15.78,
+ 50.11,
+ 53.39,
+ 58.34,
+ 66.97,
+ 75.53,
+ 77.99,
+ 82.57,
+ 83.35,
+ 86.01,
+ 82.69,
+ 82.61,
+ 75,
+ 72.53,
+ 71.57,
+ 52.13,
+ 46.79,
+ 45,
+ 40.43,
+ 30.78,
+ 28.81,
+ 25.02,
+ 22.83,
+ 21.54,
+ 8.13,
+ 7.59);
> static3=c(9.25,
+ 29.29,
+ 40.71,
```

```
+ 41.47,
+ 54.16,
+ 55.41,
+ 60.52,
+ 61.14,
+ 62.32,
+ 62.95,
+ 66.45,
+ 67.04,
+ 69.44,
+ 78.69,
+ 84.14,
+ 82.87,
+ 82.18,
+ 75.96,
+ 73.07,
+ 72.9,
+ 68.52,
+ 65.56,
+ 57.65,
+ 51.75,
+ 51.34,
+ 34.99,
+ 32.35,
+ 27.05,
+ 16.04,
+ 1.01);
> t.test(flow3,static3)

    Welch Two Sample t-test

data:  flow3 and static3
t = -1.214, df = 54.68, p-value = 0.23
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -21.233966   5.214633
sample estimates:
mean of x mean of y
 46.53100  54.54067

>
```