IslandCompleteRMD

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Randomly Assign Treatment

```
getwd()
```

```
## [1] "/Users/larnylopez/Documents/UCLA/UCLA Spring 2018/STAT 101B/Project/STAT101B Project/Final"
```

```
islandSample <- read.csv("IslandSample.csv", header=TRUE)
islandSample
```

```
##    Sampler  Village HouseNumber    PersonSampled Gender Age
## 1     Chan   NELSON         222     Nicole Burke      F  27
## 2     Chan   NELSON          89  Hannah McCarthy      F  63
## 3     Chan   NELSON         234     Miki Edwards      F  19
## 4     Chan   NELSON          59 Raphael Erickson      M  22
## 5     Chan   HELVIG         273  Desmond Collins      M  36
## 6     Chan   HELVIG         727      Elias Ibsen      M  34
## 7     Chan   HELVIG         640    Olson Solberg      M  19
## 8     Chan   HELVIG         598  Henrik Sorensen      M  32
## 9  Valerie   RIROUA         266     Chelsea Sato      F  25
## 10 Valerie   RIROUA         520   Alicia Lavigne      F  54
## 11 Valerie   RIROUA           7    Kazuya Kimura      M  75
## 12 Valerie   RIROUA         531      Eva Edwards      F  60
## 13 Valerie     EDEN         300       Jacob Hall      M  26
## 14 Valerie     EDEN         425    Dane Blomgren      M  29
## 15 Valerie     EDEN         513     Naoki Morris      M  27
## 16 Valerie     EDEN         595    Kazuya Morris      M  38
## 17   Hyeon     HOFN          70  Juhani Sorensen      M  54
## 18   Hyeon     HOFN         908   Sonja Sorensen      F  52
## 19   Hyeon     HOFN          64    Agda Blomgren      F  25
## 20   Hyeon     HOFN         500    Kirk Blomgren      M  26
## 21   Hyeon KIYOBICO         651    Emma Blomgren      F  34
## 22   Hyeon KIYOBICO         242 Torsten Blomgren      M  19
## 23   Hyeon KIYOBICO         775   Daiki McCarthy      M  46
## 24   Hyeon KIYOBICO         220      Maya Morris      F  39
## 25   Larny    VAIKU         280  Haruka Watanabe      F  19
## 26   Larny    VAIKU          23      Alexia Page      F 134
## 27   Larny    VAIKU         337   Sarah Pallesen      F  48
## 28   Larny    VAIKU          37   Nicole Conolly      F  61
## 29   Larny  AKKESHI         152  Michelle Wilson      F  22
## 30   Larny  AKKESHI         255   Magdelena Lund      F  77
## 31   Larny  AKKESHI         640        Emma Lund      F  31
## 32   Larny  AKKESHI         435    Lars Sorensen      M  76
## 33      Go   NIDOMA          21    Leon Blomgren      M  94
## 34      Go   NIDOMA          13    Anna Erickson      F  36
## 35      Go   NIDOMA         673        Rose Page      F  24
## 36      Go   NIDOMA         146    Lamont Perrot      M  57
## 37      Go TAKAZAKI         129     Noah Collins      M  26
```

```
## 38      Go TAKAZAKI         141    Kalen Solberg      F  25
## 39      Go TAKAZAKI         301        Amy Moore      F  35
## 40      Go TAKAZAKI          29   Bronwyn Wilson      F  36
## 41   Julia  ARCADIA           4   Jessica Suzuki      F  84
## 42   Julia  ARCADIA         737      Sven Eklund      M  27
## 43   Julia  ARCADIA        1047     Harold Bager      M  41
## 44   Julia  ARCADIA         452    Nils Blomgren      M  27
## 45   Julia   GORDES          94      Julia Thorn      F  42
## 46   Julia   GORDES          86    Signe Solberg      F  58
## 47   Julia   GORDES         165   Gerda Sorensen      F  44
## 48   Julia   GORDES         398   Leonie Solberg      F  25
## 49 Justina BJURHOLM         678    Felix Calrsen      M  23
## 50 Justina BJURHOLM          28    Shauna Yamada      F  65
## 51 Justina BJURHOLM         151   Lucas Connolly      M  49
## 52 Justina BJURHOLM         288  Karina Svendsen      F  53
## 53 Justina     TALU         543         Yui Sato      F  31
## 54 Justina     TALU         468       Mia Eklund      F  53
## 55 Justina     TALU          42    Hallmar Bager      M  23
## 56 Justina     TALU         229   Gunnar Solberg      M  52
## 57  Justin HAYARANO         443       Dahl Olsen      F  65
## 58  Justin HAYARANO         614     Julia Kimura      F  27
## 59  Justin HAYARANO         230   Brigit Blogren      F  23
## 60  Justin HAYARANO         709     Mai Watanabe      F  45
## 61  Justin    MAEVA         796   Lucas Connolly      M  48
## 62  Justin    MAEVA         676    Valdemar Lund      M  43
## 63  Justin    MAEVA         573    David Solberg      M  44
## 64  Justin    MAEVA          16        Haru Hall      M  45
```

```
library(dplyr)
```

```
## Warning: package 'dplyr' was built under R version 3.4.4
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
set.seed(101)

old <- islandSample[islandSample$Age >= 37,]
young <- islandSample[islandSample$Age < 37,]

treatment <- rep(c("1", "a", "b", "ab", "c", "ac", "bc", "abc"), 2)

sampler_young <- cbind(young[,c(1,4,6)], sample(treatment))
sampler_old <- cbind(old[,c(1,4,6)], sample(treatment))

block1 <- sampler_young
block2 <- sampler_old
block1
```

```
##    Sampler    PersonSampled Age sample(treatment)
## 1     Chan     Nicole Burke  27                ac
## 3     Chan     Miki Edwards  19                 1
## 4     Chan Raphael Erickson  22                 a
## 5     Chan  Desmond Collins  36                 1
## 6     Chan      Elias Ibsen  34                 b
## 7     Chan    Olson Solberg  19                ab
## 8     Chan  Henrik Sorensen  32               abc
## 9  Valerie     Chelsea Sato  25                 b
## 13 Valerie       Jacob Hall  26                 c
## 14 Valerie    Dane Blomgren  29                 c
## 15 Valerie     Naoki Morris  27                ac
## 19   Hyeon    Agda Blomgren  25                bc
## 20   Hyeon    Kirk Blomgren  26                ab
## 21   Hyeon    Emma Blomgren  34               abc
## 22   Hyeon Torsten Blomgren  19                bc
## 25   Larny  Haruka Watanabe  19                 a
## 29   Larny  Michelle Wilson  22                ac
## 31   Larny        Emma Lund  31                 1
## 34      Go    Anna Erickson  36                 a
## 35      Go        Rose Page  24                 1
## 37      Go     Noah Collins  26                 b
## 38      Go    Kalen Solberg  25                ab
## 39      Go        Amy Moore  35               abc
## 40      Go   Bronwyn Wilson  36                 b
## 42   Julia      Sven Eklund  27                 c
## 44   Julia    Nils Blomgren  27                 c
## 48   Julia   Leonie Solberg  25                ac
## 49 Justina    Felix Calrsen  23                bc
## 53 Justina         Yui Sato  31                ab
## 55 Justina    Hallmar Bager  23               abc
## 58  Justin     Julia Kimura  27                bc
## 59  Justin   Brigit Blogren  23                 a
```

```
block2
```

```
##    Sampler   PersonSampled Age sample(treatment)
## 2     Chan Hannah McCarthy  63                ac
## 10 Valerie  Alicia Lavigne  54                ab
## 11 Valerie   Kazuya Kimura  75                ac
## 12 Valerie     Eva Edwards  60                 1
## 16 Valerie   Kazuya Morris  38                 1
## 17   Hyeon Juhani Sorensen  54                 b
## 18   Hyeon  Sonja Sorensen  52                 b
## 23   Hyeon  Daiki McCarthy  46               abc
## 24   Hyeon     Maya Morris  39               abc
## 26   Larny     Alexia Page 134                ab
## 27   Larny  Sarah Pallesen  48                 c
## 28   Larny  Nicole Conolly  61                 a
## 30   Larny  Magdelena Lund  77                 c
## 32   Larny   Lars Sorensen  76                bc
## 33      Go   Leon Blomgren  94                bc
## 36      Go   Lamont Perrot  57                 a
## 41   Julia  Jessica Suzuki  84                ac
## 43   Julia    Harold Bager  41                ab
```

```
## 45   Julia     Julia Thorn  42                ac
## 46   Julia   Signe Solberg  58                 1
## 47   Julia  Gerda Sorensen  44                 1
## 50 Justina   Shauna Yamada  65                 b
## 51 Justina  Lucas Connolly  49                 b
## 52 Justina Karina Svendsen  53                abc
## 54 Justina      Mia Eklund  53                abc
## 56 Justina  Gunnar Solberg  52                ab
## 57  Justin      Dahl Olsen  65                 c
## 60  Justin    Mai Watanabe  45                 a
## 61  Justin  Lucas Connolly  48                 c
## 62  Justin   Valdemar Lund  43                bc
## 63  Justin   David Solberg  44                bc
## 64  Justin       Haru Hall  45                 a
```

```
# write.csv(block1,"Island Block1.csv")
# write.csv(block2, "Island Block2.csv")
```

Order the Island Sample in terms of Treatment

```
Island <- read.csv("IslandSampleWithTreatment.csv", header = TRUE, stringsAsFactors = FALSE)

Island[Island$Treatment=="ab", 7] <- "ba"
Island[Island$Treatment=="ac", 7] <- "ca"
Island[Island$Treatment=="bc", 7] <- "cb"
Island[Island$Treatment=="abc", 7] <- "cba"

library(dplyr)
FBlock1 <- Island %>% filter(Block == 1) %>% arrange(Treatment)
```

```
## Warning: package 'bindrcpp' was built under R version 3.4.4
```

```
FBlock2 <- Island %>%  filter(Block == 2) %>%  arrange(Treatment)

head(FBlock1); head(FBlock2)
```

```
##   Sampler  Village HouseNumber    PersonSampled Gender Age Treatment
## 1    Chan   NELSON          59 Raphael Erickson      M  22         1
## 2   Hyeon KIYOBICO         651    Emma Blomgren      F  34         1
## 3      Go   NIDOMA          13    Anna Erickson      F  36         1
## 4 Justina     TALU          42    Hallmar Bager      M  23         1
## 5    Chan   HELVIG         273  Desmond Collins      M  36         a
## 6   Larny    VAIKU         280  Haruka Watanabe      F  19         a
##   MemoryGameResult Block MemoryGameInitial MemoryGameFinal
## 1             60.4     1              72.3            96.0
## 2             52.4     1              68.1            78.5
## 3             45.0     1              61.1           102.0
## 4             60.0     1              64.6            90.0
## 5             58.5     1              56.4            87.4
## 6             56.7     1              65.5            76.4
##   MemoryGameDifference
## 1                 23.7
## 2                 10.4
## 3                 40.9
```

```
## 4                25.4
## 5                31.0
## 6                10.9
```

```
##   Sampler  Village HouseNumber  PersonSampled Gender Age Treatment
## 1   Hyeon KIYOBICO         220    Maya Morris      F  39         1
## 2   Larny  AKKESHI         435  Lars Sorensen      M  76         1
## 3 Justina     TALU         468     Mia Eklund      F  53         1
## 4  Justin    MAEVA         676  Valdemar Lund      M  43         1
## 5 Valerie   RIROUA           7  Kazuya Kimura      M  75         a
## 6   Larny    VAIKU          37 Nicole Conolly      F  61         a
##   MemoryGameResult Block MemoryGameInitial MemoryGameFinal
## 1             29.7     2              34.1            52.8
## 2             52.8     2              62.8            88.6
## 3             76.3     2              84.2           114.0
## 4            108.0     2             126.0           108.0
## 5             53.3     2              69.2            65.3
## 6             36.1     2              52.3            76.1
##   MemoryGameDifference
## 1                 18.7
## 2                 25.8
## 3                 29.8
## 4                -18.0
## 5                 -3.9
## 6                 23.8
```

```
FinalIsland <- rbind(FBlock1, FBlock2)

FinalIsland[FinalIsland$Treatment=="ba", 7] <- "ab"
FinalIsland[FinalIsland$Treatment=="ca", 7] <- "ac"
FinalIsland[FinalIsland$Treatment=="cb", 7] <- "bc"
FinalIsland[FinalIsland$Treatment=="cba", 7] <- "abc"

FinalIsland
```

```
##    Sampler  Village HouseNumber    PersonSampled Gender Age Treatment
## 1     Chan   NELSON          59 Raphael Erickson      M  22         1
## 2    Hyeon KIYOBICO         651    Emma Blomgren      F  34         1
## 3       Go   NIDOMA          13    Anna Erickson      F  36         1
## 4  Justina     TALU          42    Hallmar Bager      M  23         1
## 5     Chan   HELVIG         273  Desmond Collins      M  36         a
## 6    Larny    VAIKU         280  Haruka Watanabe      F  19         a
## 7       Go   NIDOMA         673        Rose Page      F  24         a
## 8   Justin HAYARANO         230   Brigit Blogren      F  23         a
## 9     Chan   NELSON         234     Miki Edwards      F  19         b
## 10    Chan   HELVIG         727      Elias Ibsen      M  34         b
## 11   Larny  AKKESHI         640        Emma Lund      F  31         b
## 12      Go TAKAZAKI         129     Noah Collins      M  26         b
## 13 Valerie   RIROUA         266     Chelsea Sato      F  25        ab
## 14   Hyeon     HOFN          64    Agda Blomgren      F  25        ab
## 15      Go TAKAZAKI          29   Bronwyn Wilson      F  36        ab
## 16 Justina BJURHOLM         678    Felix Calrsen      M  23        ab
## 17    Chan   HELVIG         598  Henrik Sorensen      M  32         c
## 18 Valerie     EDEN         300       Jacob Hall      M  26         c
## 19      Go TAKAZAKI         301        Amy Moore      F  35         c
```

```
## 20   Julia  ARCADIA         737      Sven Eklund      M  27         c
## 21 Valerie     EDEN         513     Naoki Morris      M  27        ac
## 22   Hyeon KIYOBICO         242 Torsten Blomgren      M  19        ac
## 23   Julia   GORDES         398   Leonie Solberg      F  25        ac
## 24  Justin HAYARANO         614     Julia Kimura      F  27        ac
## 25    Chan   NELSON         222     Nicole Burke      F  27        bc
## 26 Valerie     EDEN         425    Dane Blomgren      M  29        bc
## 27   Larny  AKKESHI         152  Michelle Wilson      F  22        bc
## 28   Julia  ARCADIA         452    Nils Blomgren      M  27        bc
## 29    Chan   HELVIG         640    Olson Solberg      M  19       abc
## 30   Hyeon     HOFN         500    Kirk Blomgren      M  26       abc
## 31      Go TAKAZAKI         141    Karen Solberg      F  25       abc
## 32 Justina     TALU         543         Yui Sato      F  31       abc
## 33   Hyeon KIYOBICO         220      Maya Morris      F  39         1
## 34   Larny  AKKESHI         435    Lars Sorensen      M  76         1
## 35 Justina     TALU         468       Mia Eklund      F  53         1
## 36  Justin    MAEVA         676    Valdemar Lund      M  43         1
## 37 Valerie   RIROUA           7    Kazuya Kimura      M  75         a
## 38   Larny    VAIKU          37   Nicole Conolly      F  61         a
## 39   Julia   GORDES          94      Julia Thorn      F  42         a
## 40  Justin HAYARANO         709     Mai Watanabe      F  45         a
## 41   Hyeon     HOFN          70  Juhani Sorensen      M  54         b
## 42   Hyeon     HOFN         908   Sonja Sorensen      F  52         b
## 43 Justina BJURHOLM          28    Shauna Yamada      F  65         b
## 44 Justina BJURHOLM         151   Lucas Connolly      M  49         b
## 45 Valerie   RIROUA         531      Eva Edwards      F  60        ab
## 46      Go   NIDOMA          21    Leon Blomgren      M  94        ab
## 47   Julia   GORDES          86    Signe Solberg      F  58        ab
## 48  Justin    MAEVA         573    David Solberg      M  44        ab
## 49 Valerie   RIROUA         520   Alicia Lavigne      F  54         c
## 50   Larny    VAIKU         337   Sarah Pallesen      F  48         c
## 51   Julia  ARCADIA        1047     Harold Bager      M  41         c
## 52  Justin HAYARANO         443       Dahl Olsen      F  65         c
## 53   Larny    VAIKU          23      Alexia Page      F 134        ac
## 54      Go   NIDOMA         146    Lamont Perrot      M  57        ac
## 55 Justina     TALU         229   Gunnar Solberg      M  52        ac
## 56  Justin    MAEVA          16        Haru Hall      M  45        ac
## 57    Chan   NELSON          89  Hannah McCarthy      F  63        bc
## 58   Hyeon KIYOBICO         775   Daiki McCarthy      M  46        bc
## 59   Julia  ARCADIA           4   Jessica Suzuki      F  84        bc
## 60 Justina BJURHOLM         288  Karina Svendsen      F  53        bc
## 61 Valerie     EDEN         595    Kazuya Morris      M  38       abc
## 62   Larny  AKKESHI         255   Magdelena Lund      F  77       abc
## 63   Julia   GORDES         165   Gerda Sorensen      F  44       abc
## 64  Justin    MAEVA         796   Lucas Connolly      M  48       abc
##    MemoryGameResult Block MemoryGameInitial MemoryGameFinal
## 1              60.4     1              72.3            96.0
## 2              52.4     1              68.1            78.5
## 3              45.0     1              61.1           102.0
## 4              60.0     1              64.6            90.0
## 5              58.5     1              56.4            87.4
## 6              56.7     1              65.5            76.4
## 7              59.2     1              65.6            90.0
## 8              89.9     1              60.9            89.9
```

```
## 9             96.0     1            108.0          162.0
## 10            55.0     1             50.9           80.7
## 11            52.9     1             75.4          102.0
## 12            58.2     1             63.1           88.6
## 13            40.3     1             43.8           67.9
## 14            39.3     1             56.9           68.0
## 15            49.6     1             66.2           90.0
## 16            84.5     1             96.0          138.0
## 17            63.1     1             57.2           96.0
## 18            76.0     1             77.0          144.0
## 19            74.1     1             71.7          108.0
## 20            48.6     1             52.8           88.2
## 21            48.1     1             63.9           96.0
## 22            40.7     1             53.0           77.6
## 23            48.5     1             41.1           46.6
## 24            87.2     1             60.5           87.2
## 25            66.0     1             64.8           96.0
## 26            62.3     1             73.4          108.0
## 27            52.4     1             64.0           82.1
## 28            32.1     1             36.4          120.7
## 29            56.4     1             63.3          102.0
## 30            39.1     1             49.9           77.0
## 31            63.2     1             67.1          102.0
## 32            57.4     1             35.2           50.1
## 33            29.7     2             34.1           52.8
## 34            52.8     2             62.8           88.6
## 35            76.3     2             84.2          114.0
## 36           108.0     2            126.0          108.0
## 37            53.3     2             69.2           65.3
## 38            36.1     2             52.3           76.1
## 39            37.7     2            102.0          144.0
## 40            86.3     2             61.0           86.3
## 41            83.7     2             96.0          120.0
## 42            45.5     2             49.3           77.9
## 43            47.4     2             56.0           80.2
## 44            51.3     2             60.0           72.3
## 45            52.2     2             72.9          102.0
## 46            65.2     2             82.7          114.0
## 47            43.5     2             41.5           67.4
## 48           120.0     2             80.3          120.0
## 49            45.3     2             53.5           77.7
## 50            46.0     2             48.0           76.0
## 51            46.0     2             48.8           79.2
## 52            77.8     2             96.0           77.8
## 53            78.8     2             90.0          120.0
## 54            76.4     2             81.2          114.0
## 55            48.9     2             44.5           70.2
## 56            69.9     2             45.3           69.9
## 57            39.1     2             44.2           69.0
## 58            66.2     2             77.0          108.0
## 59            60.1     2             53.9           71.3
## 60            40.2     2             46.4           71.5
## 61            58.9     2             58.3          102.0
## 62            48.9     2             44.8           76.0
```

```
## 63             50.7     2             50.6           57.2
## 64             90.0     2             55.1           90.0
##    MemoryGameDifference
## 1                  23.7
## 2                  10.4
## 3                  40.9
## 4                  25.4
## 5                  31.0
## 6                  10.9
## 7                  24.4
## 8                  29.0
## 9                  54.0
## 10                 29.8
## 11                 26.6
## 12                 25.5
## 13                 24.1
## 14                 11.1
## 15                 23.8
## 16                 42.0
## 17                 38.8
## 18                 67.0
## 19                 36.3
## 20                 35.4
## 21                 32.1
## 22                 24.6
## 23                  5.5
## 24                 26.7
## 25                 31.2
## 26                 34.6
## 27                 18.1
## 28                 84.3
## 29                 38.7
## 30                 27.1
## 31                 34.9
## 32                 14.9
## 33                 18.7
## 34                 25.8
## 35                 29.8
## 36                -18.0
## 37                 -3.9
## 38                 23.8
## 39                 42.0
## 40                 25.3
## 41                 24.0
## 42                 28.6
## 43                 24.2
## 44                 12.3
## 45                 29.1
## 46                 31.3
## 47                 25.9
## 48                 39.7
## 49                 24.2
## 50                 28.0
## 51                 30.4
```

```
## 52                -18.2
## 53                 30.0
## 54                 32.8
## 55                 25.7
## 56                 24.6
## 57                 24.8
## 58                 31.0
## 59                 17.4
## 60                 25.1
## 61                 43.7
## 62                 31.2
## 63                  6.6
## 64                 34.9
```

```
#write.csv(FinalIsland, "FinalIsland.csv")
```

Test the Factorial design

```
#Download the FinalIsland file and sure it is in the same workspace
FinalIsland <- read.csv("FinalIsland.csv", header = TRUE)

ResponseDifference <- FinalIsland$MemoryGameDifference

Vodka <- rep(rep(c(rep(-1, 4), rep(1, 4)), 4), 2)
Chocolate <- rep(rep(c(rep(-1, 8), rep(1, 8)), 2), 2)
Jog <- rep(c(rep(-1,16), rep(1, 16)), 2)
Block <-c(rep(1, 32 ), rep(2, 32))

Treatment <- FinalIsland$Treatment
Person <- FinalIsland$PersonSampled

#check the factorial design
data.frame(Person, Treatment, Vodka, Chocolate, Jog, Block, ResponseDifference)
```

```
##              Person Treatment Vodka Chocolate Jog Block ResponseDifference
## 1  Raphael Erickson         1    -1        -1  -1     1                23.7
## 2     Emma Blomgren         1    -1        -1  -1     1                10.4
## 3     Anna Erickson         1    -1        -1  -1     1                40.9
## 4     Hallmar Bager         1    -1        -1  -1     1                25.4
## 5   Desmond Collins         a     1        -1  -1     1                31.0
## 6   Haruka Watanabe         a     1        -1  -1     1                10.9
## 7         Rose Page         a     1        -1  -1     1                24.4
## 8    Brigit Blogren         a     1        -1  -1     1                29.0
## 9      Miki Edwards         b    -1         1  -1     1                54.0
## 10      Elias Ibsen         b    -1         1  -1     1                29.8
## 11        Emma Lund         b    -1         1  -1     1                26.6
## 12     Noah Collins         b    -1         1  -1     1                25.5
## 13     Chelsea Sato        ab     1         1  -1     1                24.1
## 14    Agda Blomgren        ab     1         1  -1     1                11.1
## 15   Bronwyn Wilson        ab     1         1  -1     1                23.8
## 16    Felix Calrsen        ab     1         1  -1     1                42.0
## 17  Henrik Sorensen         c    -1        -1   1     1                38.8
## 18       Jacob Hall         c    -1        -1   1     1                67.0
```

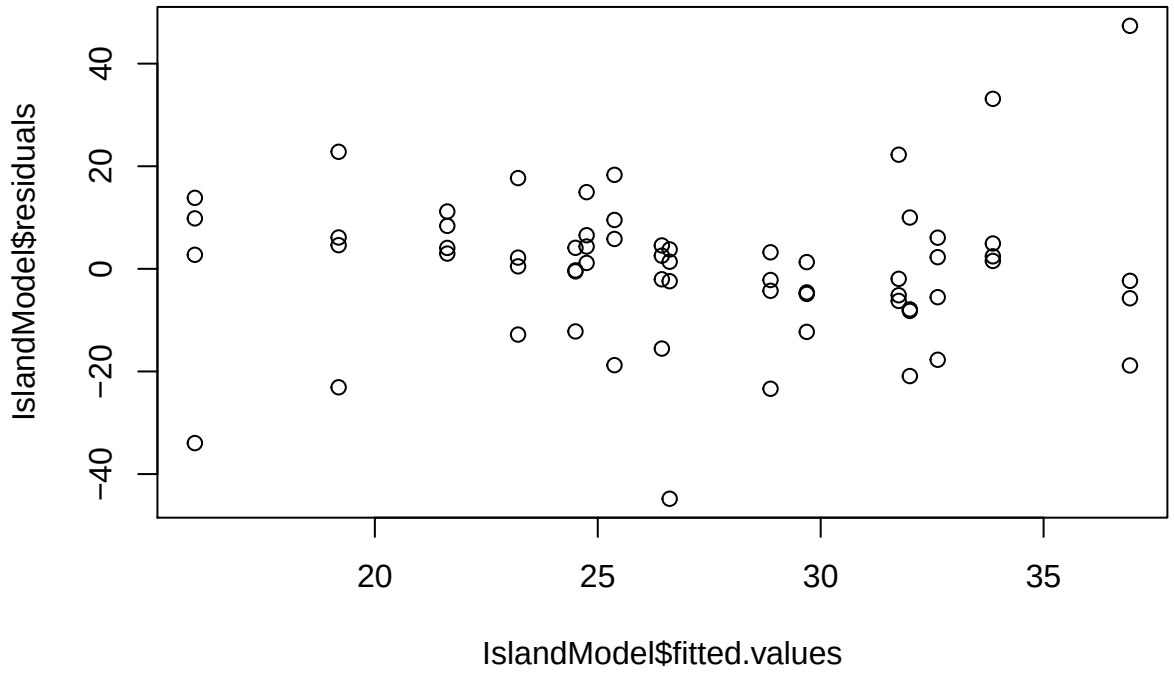
```
## 19        Amy Moore         c    -1        -1   1     1              36.3
## 20      Sven Eklund         c    -1        -1   1     1              35.4
## 21     Naoki Morris        ac     1        -1   1     1              32.1
## 22 Torsten Blomgren        ac     1        -1   1     1              24.6
## 23   Leonie Solberg        ac     1        -1   1     1               5.5
## 24     Julia Kimura        ac     1        -1   1     1              26.7
## 25     Nicole Burke        bc    -1         1   1     1              31.2
## 26    Dane Blomgren        bc    -1         1   1     1              34.6
## 27  Michelle Wilson        bc    -1         1   1     1              18.1
## 28    Nils Blomgren        bc    -1         1   1     1              84.3
## 29    Olson Solberg       abc     1         1   1     1              38.7
## 30    Kirk Blomgren       abc     1         1   1     1              27.1
## 31    Karen Solberg       abc     1         1   1     1              34.9
## 32         Yui Sato       abc     1         1   1     1              14.9
## 33      Maya Morris         1    -1        -1  -1     2              18.7
## 34    Lars Sorensen         1    -1        -1  -1     2              25.8
## 35       Mia Eklund         1    -1        -1  -1     2              29.8
## 36    Valdemar Lund         1    -1        -1  -1     2             -18.0
## 37    Kazuya Kimura         a     1        -1  -1     2              -3.9
## 38   Nicole Conolly         a     1        -1  -1     2              23.8
## 39      Julia Thorn         a     1        -1  -1     2              42.0
## 40     Mai Watanabe         a     1        -1  -1     2              25.3
## 41  Juhani Sorensen         b    -1         1  -1     2              24.0
## 42   Sonja Sorensen         b    -1         1  -1     2              28.6
## 43    Shauna Yamada         b    -1         1  -1     2              24.2
## 44   Lucas Connolly         b    -1         1  -1     2              12.3
## 45      Eva Edwards        ab     1         1  -1     2              29.1
## 46    Leon Blomgren        ab     1         1  -1     2              31.3
## 47    Signe Solberg        ab     1         1  -1     2              25.9
## 48    David Solberg        ab     1         1  -1     2              39.7
## 49   Alicia Lavigne         c    -1        -1   1     2              24.2
## 50   Sarah Pallesen         c    -1        -1   1     2              28.0
## 51     Harold Bager         c    -1        -1   1     2              30.4
## 52       Dahl Olsen         c    -1        -1   1     2             -18.2
## 53      Alexia Page        ac     1        -1   1     2              30.0
## 54    Lamont Perrot        ac     1        -1   1     2              32.8
## 55   Gunnar Solberg        ac     1        -1   1     2              25.7
## 56        Haru Hall        ac     1        -1   1     2              24.6
## 57  Hannah McCarthy        bc    -1         1   1     2              24.8
## 58   Daiki McCarthy        bc    -1         1   1     2              31.0
## 59   Jessica Suzuki        bc    -1         1   1     2              17.4
## 60  Karina Svendsen        bc    -1         1   1     2              25.1
## 61    Kazuya Morris       abc     1         1   1     2              43.7
## 62   Magdelena Lund       abc     1         1   1     2              31.2
## 63   Gerda Sorensen       abc     1         1   1     2               6.6
## 64   Lucas Connolly       abc     1         1   1     2              34.9
```

```
IslandModel <- lm(ResponseDifference ~ Block + Vodka * Chocolate * Jog)
anova(IslandModel)
```

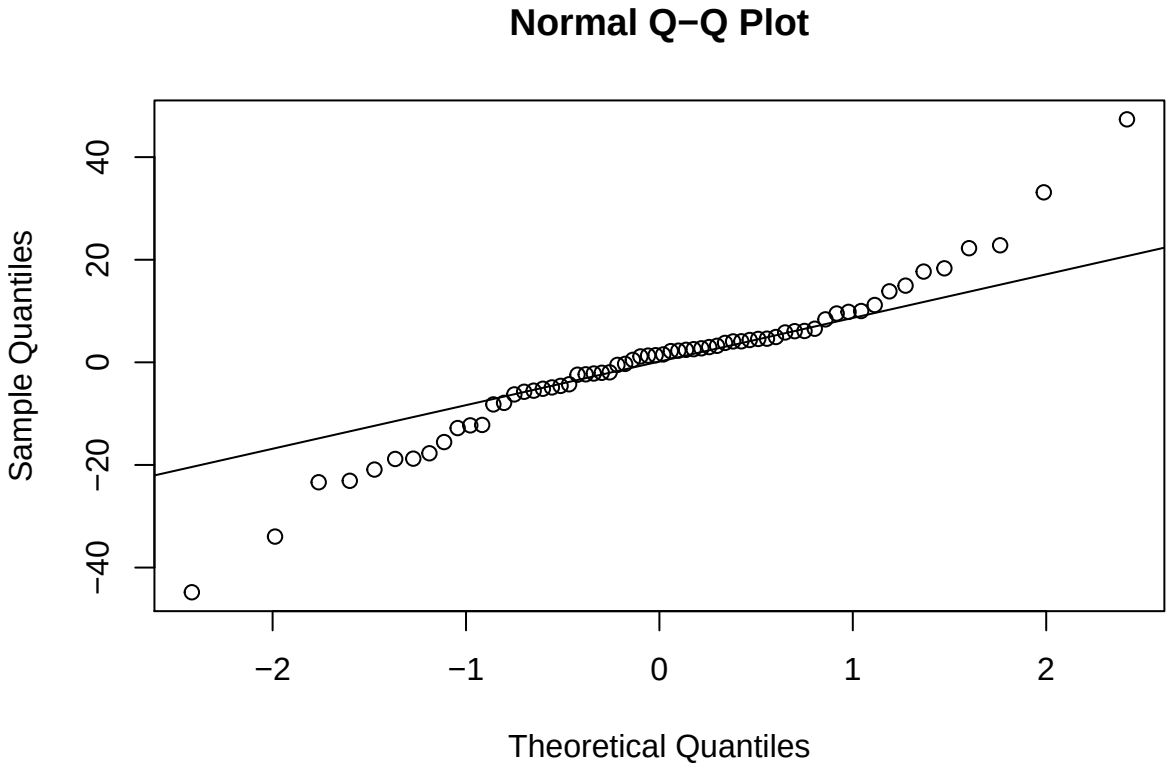
```
## Analysis of Variance Table
##
## Response: ResponseDifference
##                     Df  Sum Sq Mean Sq F value  Pr(>F)
## Block                1   841.0  841.00  3.5595 0.06449 .
```

```
## Vodka                1    33.9   33.93  0.1436 0.70618
## Chocolate            1   437.9  437.86  1.8532 0.17896
## Jog                  1   357.2  357.21  1.5119 0.22409
## Vodka:Chocolate      1     5.3    5.29  0.0224 0.88160
## Vodka:Jog            1   163.2  163.20  0.6907 0.40951
## Chocolate:Jog        1    52.9   52.93  0.2240 0.63788
## Vodka:Chocolate:Jog  1    13.3   13.32  0.0564 0.81318
## Residuals           55 12994.9  236.27
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
plot(IslandModel$fitted.values, IslandModel$residuals)
```




```
qqnorm(IslandModel$residuals); qqline(IslandModel$residuals)
```




```
#check for influential points
p <- 3 #number of predictors
n <- 64
hats <- hatvalues(IslandModel)
std_residuals <- rstandard(IslandModel)

leverages <- which(hats > (2 * ((p + 1)/n) ) )
outliers <- which(abs(std_residuals) > 2)
bad_leverages <- which(abs(std_residuals) > 2 & hats > (2 * ((p + 1)/n) ) )
bad_leverages
```

```
## 18 28 36 52
## 18 28 36 52
```

```
#Investigate Bad Leverages
FinalIsland[bad_leverages,]
```

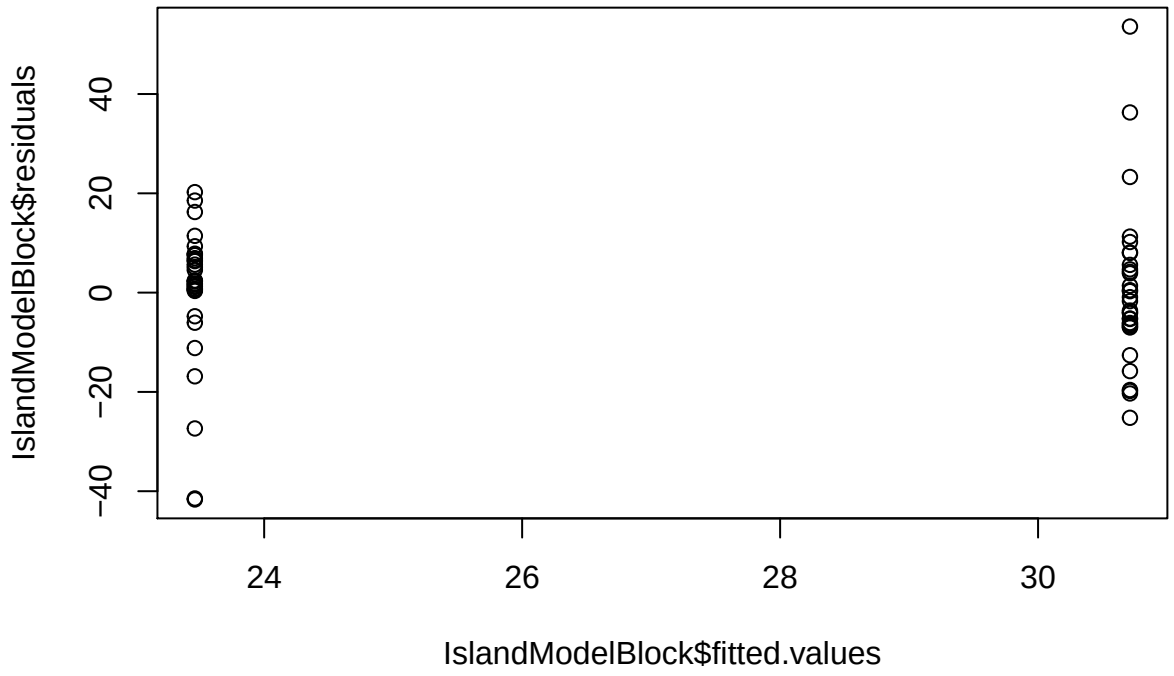
```
##     X Sampler  Village HouseNumber PersonSampled Gender Age Treatment
## 18 18 Valerie     EDEN         300    Jacob Hall      M  26         c
## 28 28   Julia  ARCADIA         452 Nils Blomgren      M  27        bc
## 36 36  Justin    MAEVA         676 Valdemar Lund      M  43         1
## 52 52  Justin HAYARANO         443    Dahl Olsen      F  65         c
##    MemoryGameResult Block MemoryGameInitial MemoryGameFinal
## 18             76.0     1              77.0           144.0
## 28             32.1     1              36.4           120.7
## 36            108.0     2             126.0           108.0
## 52             77.8     2              96.0            77.8
##    MemoryGameDifference
## 18                 67.0
## 28                 84.3
```

```
## 36                -18.0
## 52                -18.2
```

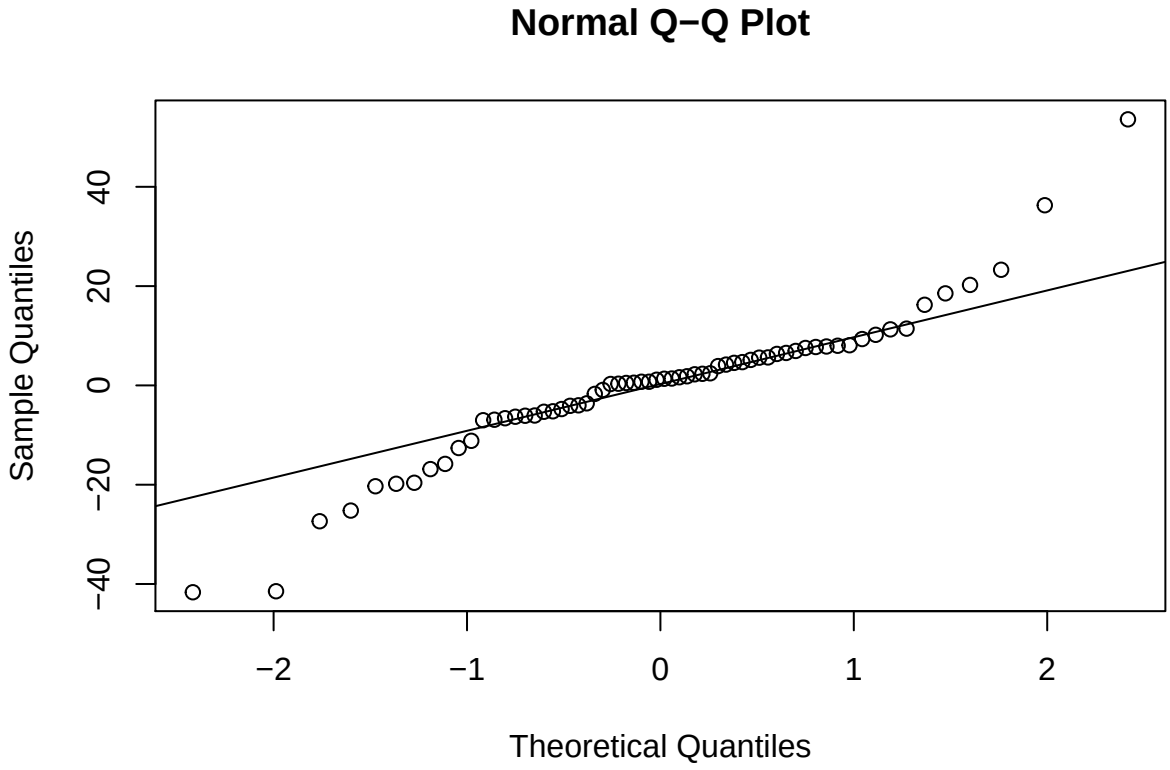
```
#Block only model
IslandModelBlock <- lm(ResponseDifference ~ Block)
anova(IslandModelBlock)
```

```
## Analysis of Variance Table
##
## Response: ResponseDifference
##           Df Sum Sq Mean Sq F value  Pr(>F)
## Block      1    841  841.00  3.7089 0.05871 .
## Residuals 62  14059  226.75
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
plot(IslandModelBlock$fitted.values, IslandModelBlock$residuals)
```




```
qqnorm(IslandModelBlock$residuals); qqline(IslandModelBlock$residuals)
```




```
#Main effects
library(gplots)
```

```
##
## Attaching package: 'gplots'
```

```
## The following object is masked from 'package:stats':
##
##     lowess
```

```
par(mfrow=c(1,3))
plotmeans(ResponseDifference ~ Vodka)
plotmeans(ResponseDifference ~ Chocolate)
plotmeans(ResponseDifference ~ Jog)

library(alr3)
```

```
## Warning: package 'alr3' was built under R version 3.4.4
```

```
## Loading required package: car
```

```
## Warning: package 'car' was built under R version 3.4.4
```

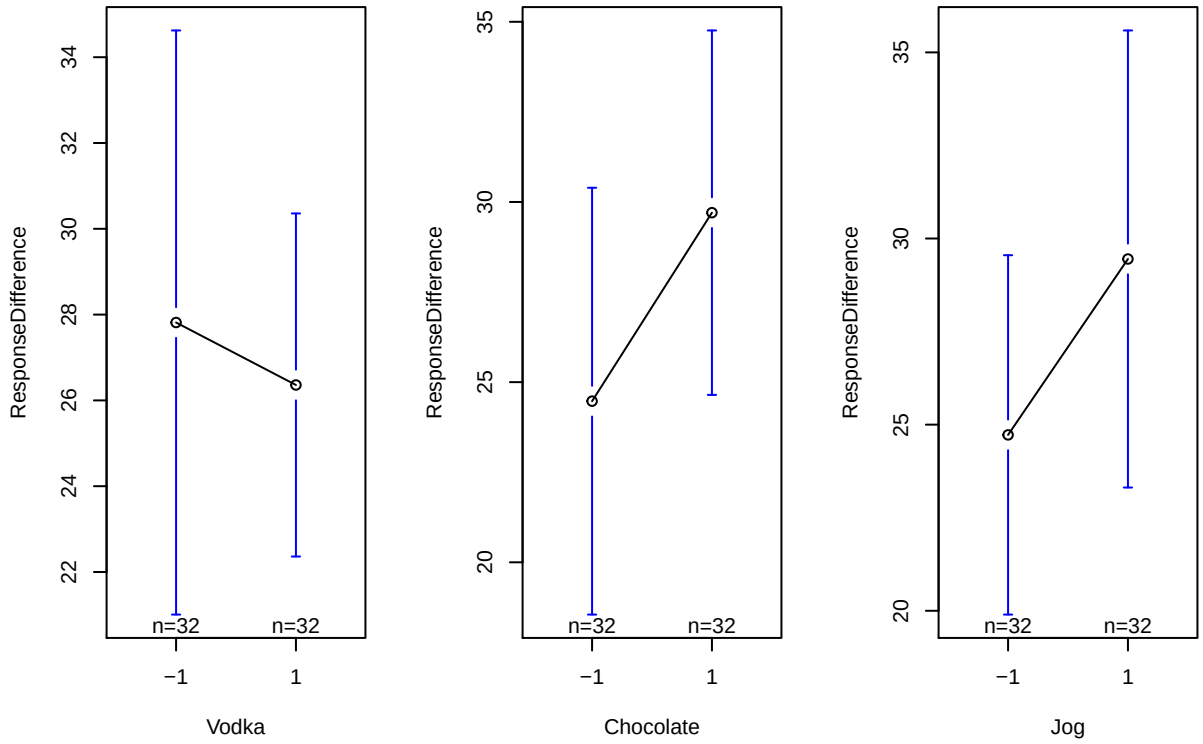
```
## Loading required package: carData
```

```
## Warning: package 'carData' was built under R version 3.4.4
```

```
##
## Attaching package: 'car'
```

```
## The following object is masked from 'package:dplyr':
##
##     recode
```

```
library(phia)
```




```
plot(interactionMeans(aov(ResponseDifference ~ factor(Vodka) + factor(Chocolate) + factor(Jog))))
```