

Tarea 2. Series de Tiempo

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5/3/2020

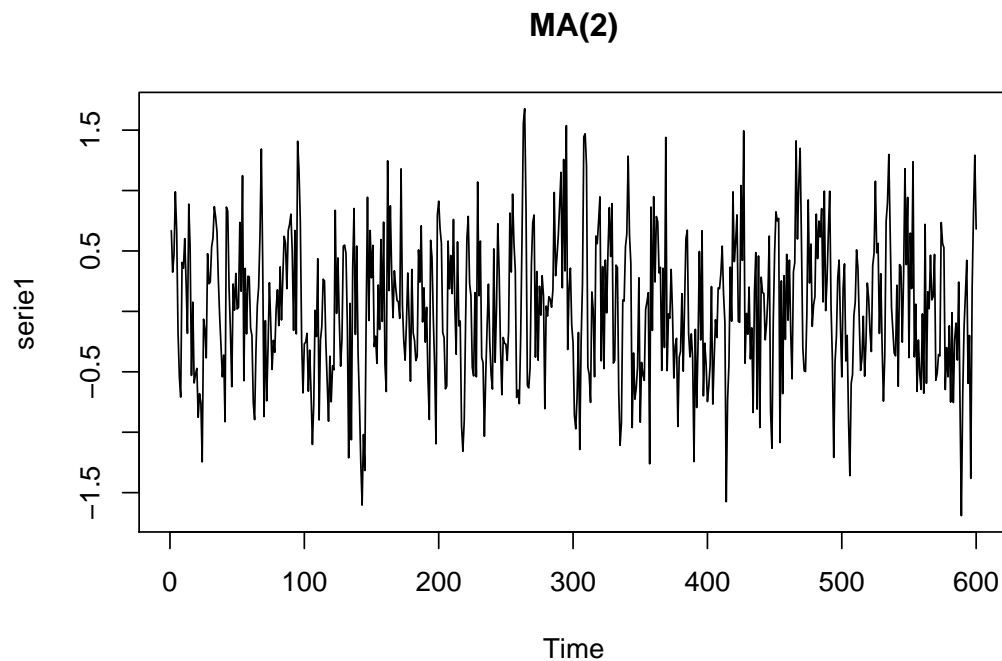
Objetivo: Vamos a simular un modelo de Medias Móviles (MA) con $q = 2$ y veremos como se comporta dependiendo del signo de los parámetros.

```
# Primero importamos todas las librerías
library(forcats)
library(astsa)
library(tseries)

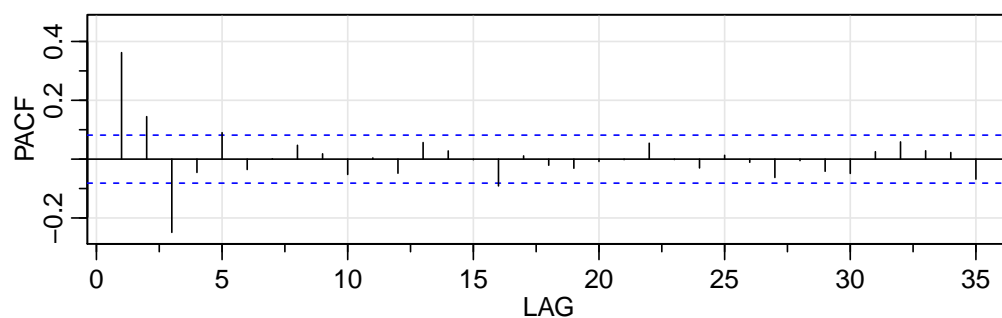
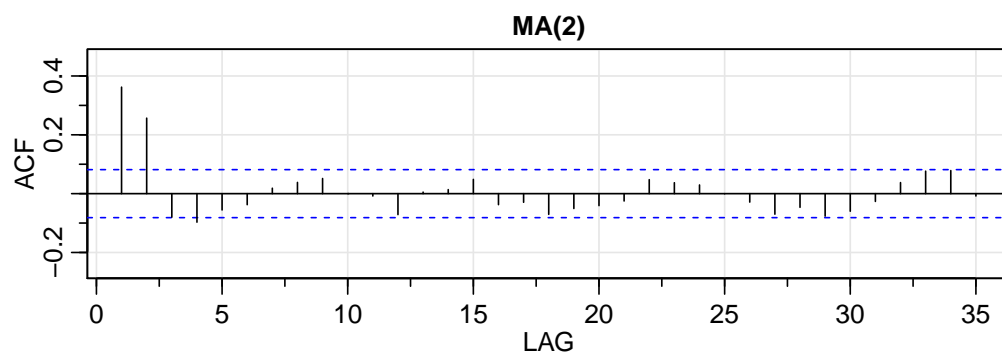
# Fijamos semilla para poder replicar los resultados
set.seed(123)
```

Caso 1: $\theta_1 > 0$ y $\theta_2 > 0$

```
# Simulamos la serie
serie1 <- arima.sim(list(order=c(0,0,2), ma=c(0.4, 0.45)), n=600, sd=0.55)
# Grafico la serie
plot(serie1, type="l", main="MA(2)")
```



```
# Grafico las autocorrelaciones simples y las parciales
acf2(serie1, main="MA(2)")
```

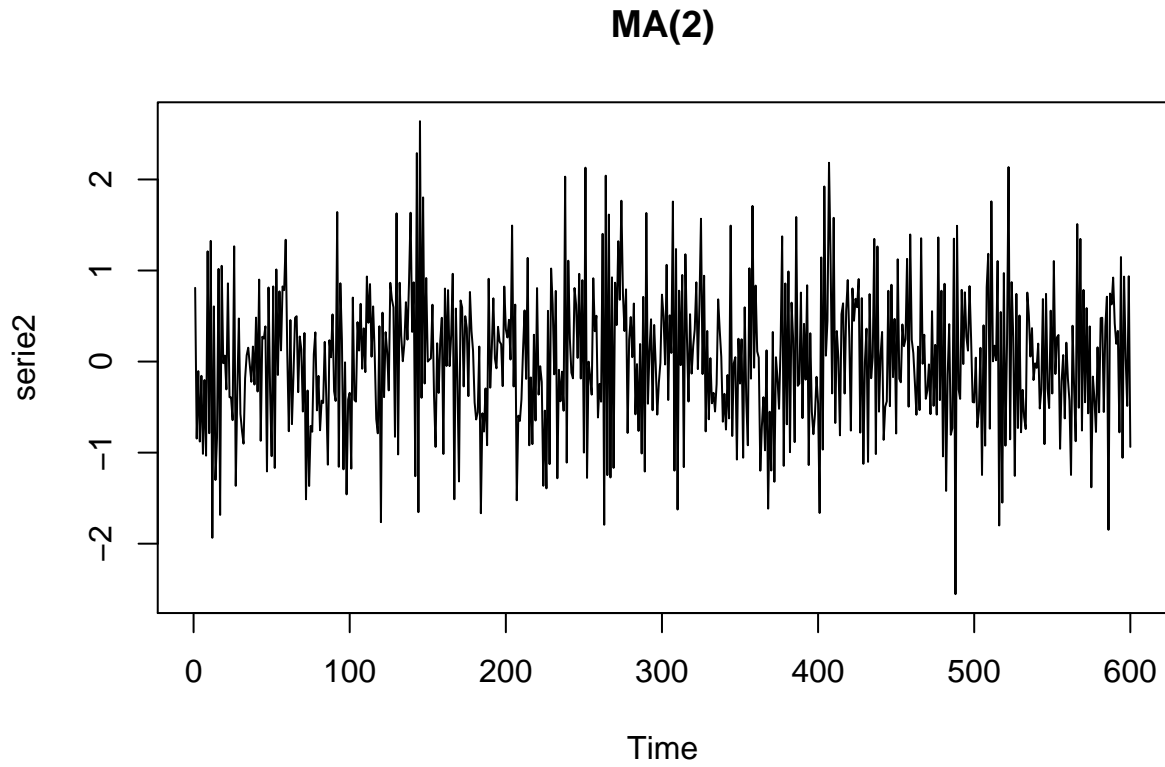


##		ACF	PACF
##	[1,]	0.36	0.36
##	[2,]	0.26	0.14
##	[3,]	-0.08	-0.25
##	[4,]	-0.10	-0.05
##	[5,]	-0.06	0.09
##	[6,]	-0.04	-0.04
##	[7,]	0.02	0.00
##	[8,]	0.04	0.05
##	[9,]	0.05	0.02
##	[10,]	0.00	-0.05
##	[11,]	-0.01	0.00
##	[12,]	-0.07	-0.05
##	[13,]	0.01	0.06
##	[14,]	0.01	0.03
##	[15,]	0.05	0.00
##	[16,]	-0.04	-0.09
##	[17,]	-0.03	0.01
##	[18,]	-0.07	-0.02
##	[19,]	-0.05	-0.03
##	[20,]	-0.04	-0.01
##	[21,]	-0.03	0.00
##	[22,]	0.05	0.05
##	[23,]	0.04	0.00
##	[24,]	0.03	-0.03
##	[25,]	0.00	0.01
##	[26,]	-0.03	-0.01
##	[27,]	-0.07	-0.06
##	[28,]	-0.05	-0.01
##	[29,]	-0.08	-0.04
##	[30,]	-0.06	-0.05

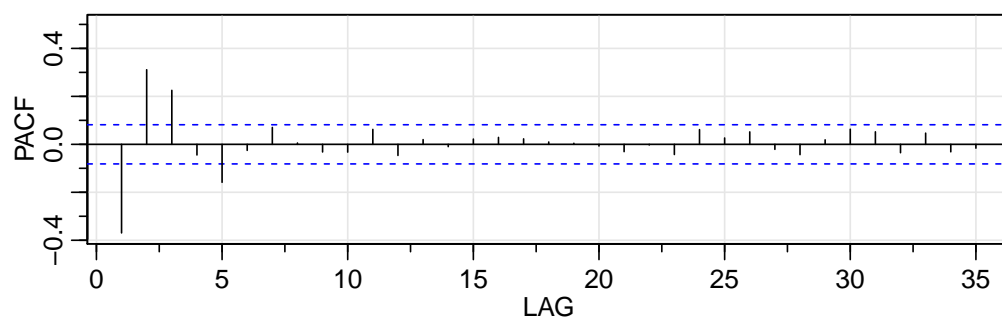
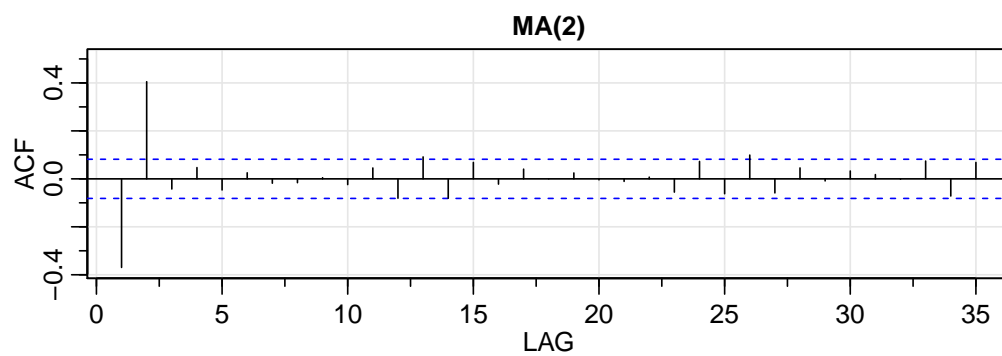
```
## [31,] -0.03  0.03
## [32,]  0.04  0.06
## [33,]  0.08  0.03
## [34,]  0.08  0.02
## [35,] -0.01 -0.07
```

Caso 2: $\theta_1 < 0$ y $\theta_2 > 0$

```
#Simulamos la serie
serie2 <- arima.sim(list(order=c(0,0,2), ma=c(-0.3, 0.55)), n=600,sd=0.66)
#Grafico la serie
plot(serie2, type="l", main="MA(2)")
```



```
#Grafico las autocorrelaciones simples y las parciales
acf2(serie2, main="MA(2)")
```

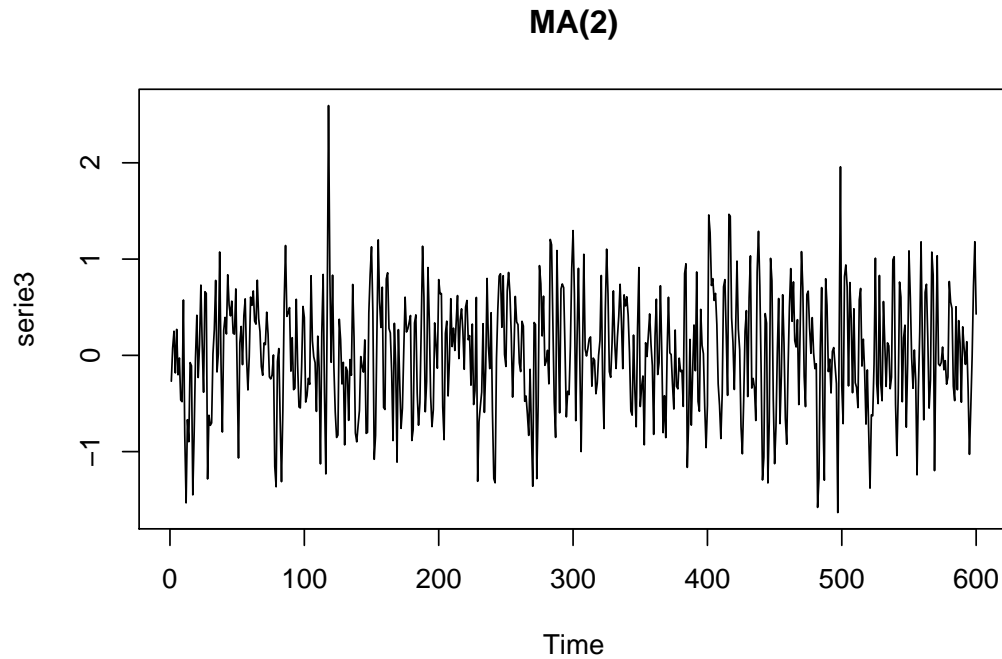


##		ACF	PACF
##	[1,]	-0.37	-0.37
##	[2,]	0.41	0.31
##	[3,]	-0.04	0.23
##	[4,]	0.05	-0.04
##	[5,]	-0.05	-0.16
##	[6,]	0.03	-0.03
##	[7,]	-0.02	0.07
##	[8,]	-0.02	0.01
##	[9,]	0.00	-0.03
##	[10,]	-0.02	-0.03
##	[11,]	0.05	0.06
##	[12,]	-0.08	-0.05
##	[13,]	0.09	0.02
##	[14,]	-0.08	-0.01
##	[15,]	0.07	0.02
##	[16,]	-0.02	0.03
##	[17,]	0.04	0.02
##	[18,]	0.00	0.01
##	[19,]	0.02	0.00
##	[20,]	0.00	-0.01
##	[21,]	-0.01	-0.03
##	[22,]	0.01	0.00
##	[23,]	-0.06	-0.04
##	[24,]	0.07	0.06
##	[25,]	-0.06	0.03
##	[26,]	0.10	0.05
##	[27,]	-0.06	-0.02
##	[28,]	0.05	-0.04
##	[29,]	-0.01	0.02
##	[30,]	0.03	0.06

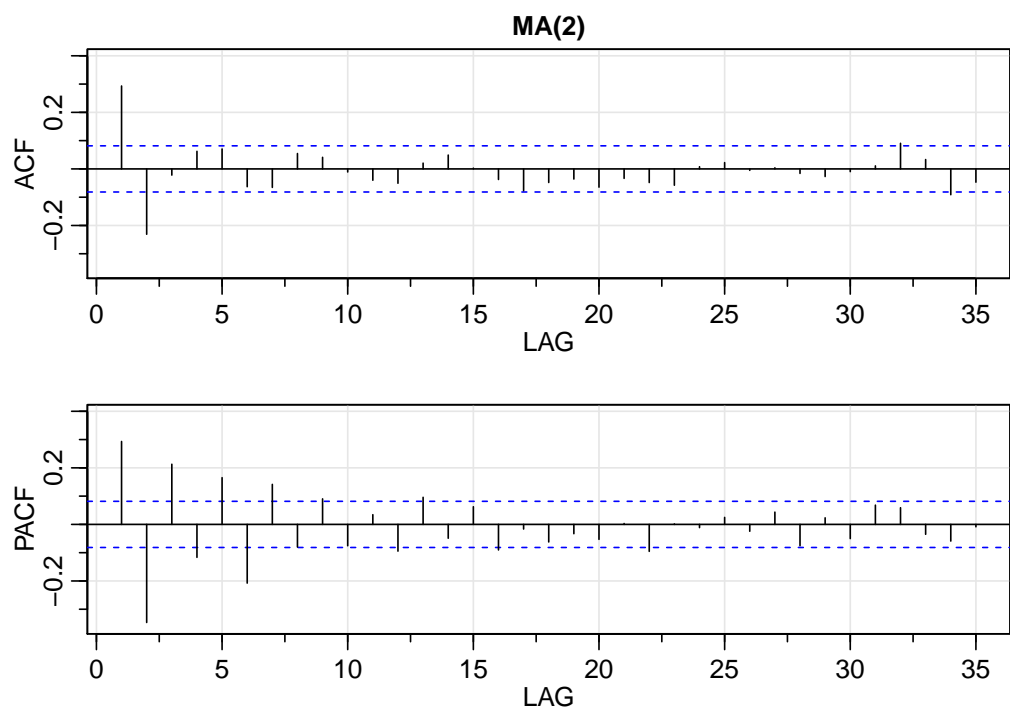
```
## [31,] 0.02 0.05
## [32,] 0.00 -0.04
## [33,] 0.07 0.05
## [34,] -0.07 -0.03
## [35,] 0.07 -0.02
```

Caso 3: $\theta_1 > 0$ y $\theta_2 < 0$

```
#Simulamos la serie
serie3 <- arima.sim(list(order=c(0,0,2), ma=c(0.6, -.33)), n=600,sd=.5)
#Grafico la serie
plot(serie3, type="l", main="MA(2)")
```



```
#Grafico las autocorrelaciones simples y las parciales
acf2(serie3, main="MA(2)")
```



##		ACF	PACF
##	[1,]	0.29	0.29
##	[2,]	-0.23	-0.35
##	[3,]	-0.02	0.21
##	[4,]	0.06	-0.12
##	[5,]	0.07	0.17
##	[6,]	-0.06	-0.21
##	[7,]	-0.07	0.14
##	[8,]	0.05	-0.08
##	[9,]	0.04	0.09
##	[10,]	-0.01	-0.08
##	[11,]	-0.04	0.03
##	[12,]	-0.05	-0.09
##	[13,]	0.02	0.10
##	[14,]	0.05	-0.05
##	[15,]	0.00	0.06
##	[16,]	-0.04	-0.09
##	[17,]	-0.08	-0.02
##	[18,]	-0.05	-0.06
##	[19,]	-0.04	-0.03
##	[20,]	-0.06	-0.05
##	[21,]	-0.03	0.00
##	[22,]	-0.05	-0.10
##	[23,]	-0.06	0.00
##	[24,]	0.01	-0.01
##	[25,]	0.02	0.02
##	[26,]	-0.01	-0.02
##	[27,]	0.00	0.04
##	[28,]	-0.02	-0.08
##	[29,]	-0.03	0.02
##	[30,]	-0.01	-0.05

```
## [31,] 0.01 0.07
## [32,] 0.09 0.06
## [33,] 0.03 -0.04
## [34,] -0.09 -0.06
## [35,] -0.05 -0.01
```

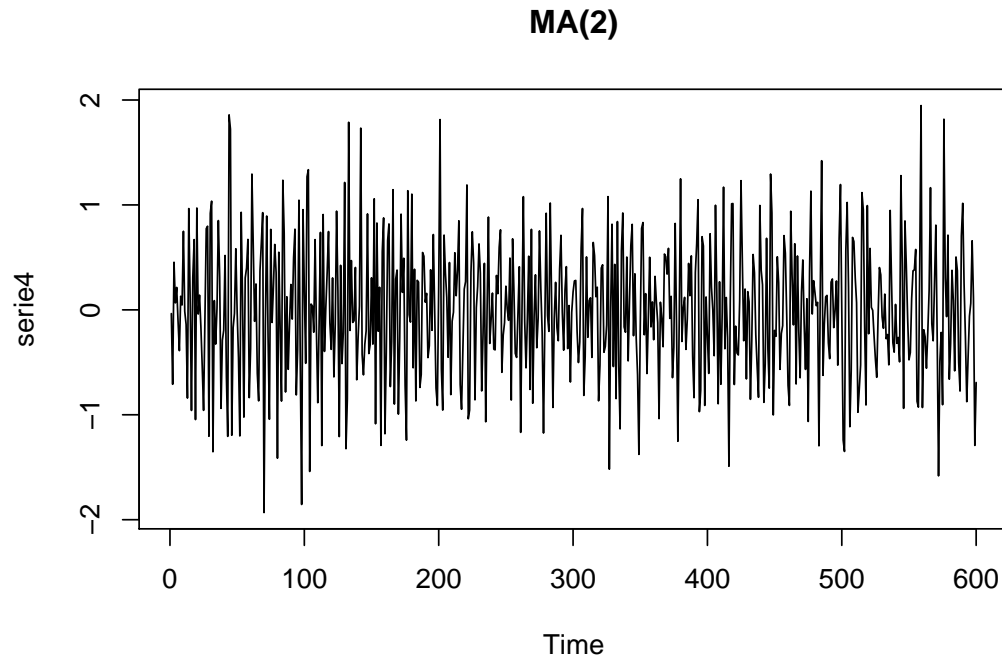
Caso 4: $\theta_1 < 0$ y $\theta_2 < 0$

```
#Simulamos la serie
```

```
serie4 <- arima.sim(list(order=c(0,0,2), ma=c(-0.4, -.55)), n=600,sd=.55)
```

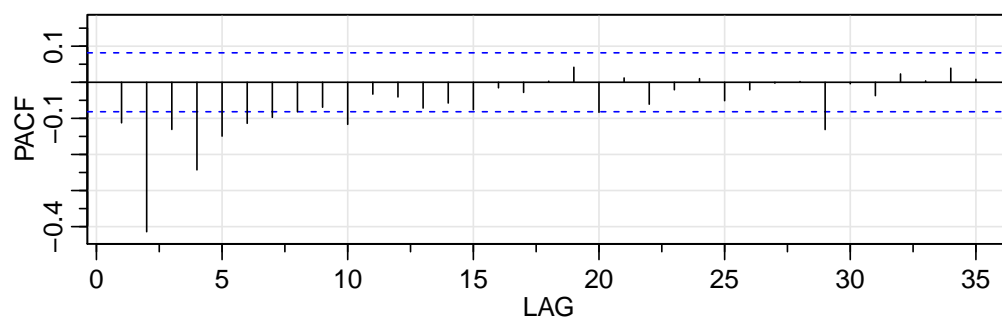
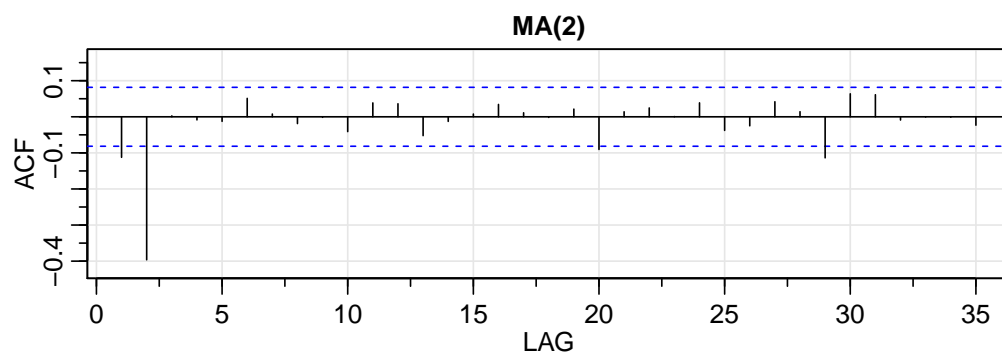
```
#Grafico la serie
```

```
plot(serie4, type="l", main="MA(2)")
```



```
#Grafico las autocorrelaciones simples y las parciales
```

```
acf2(serie4, main="MA(2)")
```



##		ACF	PACF
##	[1,]	-0.11	-0.11
##	[2,]	-0.40	-0.41
##	[3,]	0.00	-0.13
##	[4,]	-0.01	-0.24
##	[5,]	-0.01	-0.15
##	[6,]	0.05	-0.11
##	[7,]	0.01	-0.10
##	[8,]	-0.02	-0.08
##	[9,]	0.00	-0.07
##	[10,]	-0.04	-0.12
##	[11,]	0.04	-0.03
##	[12,]	0.04	-0.04
##	[13,]	-0.05	-0.07
##	[14,]	-0.01	-0.06
##	[15,]	0.01	-0.08
##	[16,]	0.03	-0.02
##	[17,]	0.01	-0.03
##	[18,]	0.00	0.00
##	[19,]	0.02	0.04
##	[20,]	-0.09	-0.08
##	[21,]	0.01	0.01
##	[22,]	0.02	-0.06
##	[23,]	0.00	-0.02
##	[24,]	0.04	0.01
##	[25,]	-0.04	-0.05
##	[26,]	-0.03	-0.02
##	[27,]	0.04	0.00
##	[28,]	0.01	0.00
##	[29,]	-0.11	-0.13
##	[30,]	0.06	0.00


```
## [31,]  0.06 -0.04
## [32,] -0.01  0.02
## [33,]  0.00  0.00
## [34,]  0.00  0.04
## [35,] -0.02  0.01
```