**Computing typical Brier scores and standard error estimates**

'final.data' is the complete subset of data that has been used in the analysis.

'Cont_BS' indicates the contribution to the Brier score from a prediction and the outcome of a particular question.

**Creating the 'Cont_BS' variable**

```
final.data$Cont_BS <- (final.data$Bestguess - final.data$Outcome)^2
```

**Computing typical Brier scores**

```
Brier.typical <- aggregate(final.data$Cont_BS,
                           by=list(final.data$ParticipantId),
                           FUN=mean, na.rm=TRUE)
```

**Computing typical standard error estimates of Brier scores**

**Obtaining standard deviation estimates**

```
Brier.typical.sd <-aggregate(final.data$Cont_BS,
                             by=list(final.data$ParticipantId),
                             FUN=sd, na.rm=TRUE)
```

**Obtaining Standard error estimates**

```
Brier.typical.se <- Brier.typical.sd$x/sqrt(nlevels(final.data$QuestionId))
```

**Computing Brier scores and standard errors from linear fixed-effects model**

**Fitting a linear fixed-effects model with constant variances of errors within participants**

```
library(nlme)
Linear_c <- gls(Cont_BS~ParticipantId-1, data= final.data, method="ML")
```

**Creating a data frame with the results of the ' Linear_c ' model**

```
write.csv(data.frame(summary(Linear_c)$tTable),
      file="Linear_c.csv")
Linear_c.df <- read.csv("Linear_c.csv", header = TRUE)
```

**Obtaining the Brier scores as fixed mean estimates**

```
Brier.Linear_c <- Linear_c.df$Value
```

**Obtaining the standard error estimates of Brier scores**

```
Brier.Linear_c.se <- Linear_c.df$Std.Error
```

**Fitting a linear fixed-effects model with non-constant variances of errors within participants**

```
Linear_nc <- gls(Cont_BS~ParticipantId-1, data= final.data,
        weights = varIdent(form = ~1|ParticipantId), method="ML")
```

**Creating a data frame with the results of the ' Linear_nc ' model**

```
write.csv(data.frame(summary(Linear_nc)$tTable),      file="Linear_nc.csv")
Linear_nc.df <- read.csv("Linear_nc.csv", header = TRUE)
```

**Obtaining the Brier scores as fixed mean estimates**

```
Brier.Linear_nc <- Linear_nc.df$Value
```

**Obtaining the standard error estimates of Brier scores**

```
Brier.Linear_nc.se <- Linear_nc.df$Std.Error
```

**Computing Brier scores and standard error estimates from a 'Mixed_q' model with questions as a random effect and non-constant variances of errors within participants**

```
ctrl <- lmeControl(maxIter = 100, msMaxIter = 100, opt='optim');
Mixed_q <- lme(Cont_BS ~ ParticipantId-1, random = ~1 | QuestionId,
        weights = varIdent(form = ~1 | ParticipantId),
        control=ctrl, data = final.data)
```

**Creating a data frame with the results of the 'Mixed_q' model**

```
write.csv(data.frame(summary(Mixed_q)$tTable), file="Mixed_q.csv")
Mixed_q.df <- read.csv("Mixed_q.csv", header = TRUE)
```

**Obtaining the Brier scores as fixed mean estimates**

```
Brier.Mixed_q <- Mixed_q.df$Value
```

**Obtaining the standard error estimates of Brier scores**

```
Brier.Mixed_q.se <- Mixed_q.df$Std.Error
```

**Computing inter-question correlation**

```
library(lme4)

model <- lmer(Cont_BS ~ ParticipantId-1 + (1 | QuestionId), final.data)

print(model)
```