E1A_Analysis

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Load Libraries

```
library(papaja)
library(TalkTyping)
library(dplyr)
library(Crump)
library(xtable)
library(ggplot2)
library(ggpubr)
```

E1A IKSI Analysis

```
#load E1A data
E1_data <- talk_type_E1A_data

# IKSI analysis

E1_data <- E1_data %>%
            mutate(subject = as.factor(subject)) %>%
            filter(errors == 1,
                   iksis < 5000,
                   LetterType != "Space") %>%
            group_by(subject,linguistic_unit,LetterType) %>%
            summarise(mean_iksi = mean(modified_recursive_moving(iksis)$restricted),
                      prop_removed = modified_recursive_moving(iksis)$prop_removed)

E1_aov_out <- aov(mean_iksi ~ linguistic_unit*LetterType +
                    Error(subject/(linguistic_unit*LetterType)), E1_data)

knitr::kable(xtable(summary(E1_aov_out)))
```

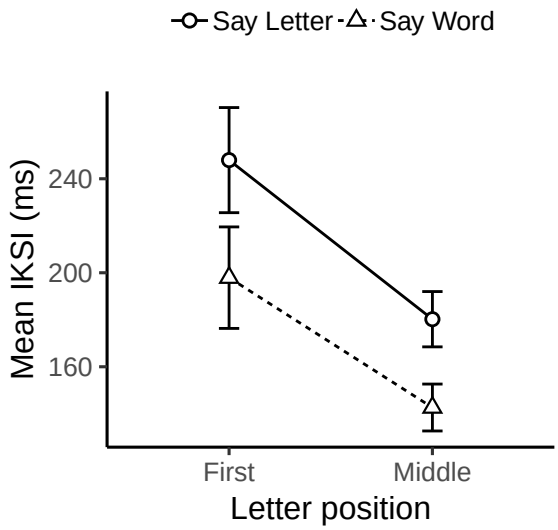
	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Residuals	39	1474756.256	37814.2630	NA	NA
linguistic_unit	1	76739.011	76739.0113	24.891295	0.0000130
Residuals	39	120235.666	3082.9658	NA	NA
LetterType	1	151196.259	151196.2589	22.284563	0.0000301
Residuals	39	264607.123	6784.7980	NA	NA
linguistic_unit:LetterType	1	1547.208	1547.2079	3.083524	0.0869404
Residuals	39	19568.881	501.7662	NA	NA

```
E1_apa_print <- apa_print(E1_aov_out)
E1_means <- model.tables(E1_aov_out,"means")
```

```
E1A_iksi_table <- E1_data %>%
              group_by(linguistic_unit,LetterType) %>%
              summarize(mIKSI = mean(mean_iksi),
                        sem = sd(mean_iksi)/sqrt(length(mean_iksi)))

levels(E1A_iksi_table$linguistic_unit) <- c("Say Letter", "Say Word")

E1A_graph_iksi <- ggplot(E1A_iksi_table, aes(x=LetterType,y=mIKSI, group=linguistic_unit,
                         shape=linguistic_unit,
                       linetype=linguistic_unit))+
  geom_line()+
  geom_errorbar(aes(ymin=mIKSI-sem,
                    ymax=mIKSI+sem), width=.1,
                linetype="solid")+
  geom_point(size=2.5)+
  geom_point(size=1.5, color="white")+
  theme_classic(base_size=12)+
  theme(legend.position = "top",
        legend.title = element_blank())+
  ylab("Mean IKSI (ms)")+
  xlab("Letter position")

knitr::kable(E1A_iksi_table)
```

linguistic_unit	LetterType	mIKSI	sem
Say Letter	First	247.9339	22.368227
Say Letter	Middle	180.2336	11.767037
Say Word	First	197.9142	21.590340
Say Word	Middle	142.6526	9.982549

```
E1A_graph_iksi
```



accuracy

```
# Accuracy

E1acc_data <- talk_type_E1A_data


E1acc_data <- E1acc_data %>%
                mutate(subject = as.factor(subject)) %>%
                filter(LetterType != "Space") %>%
                group_by(subject, linguistic_unit, LetterType) %>%
                summarise(mean_acc = mean(errors))

E1acc_aov_out <- aov(mean_acc ~ linguistic_unit*LetterType + Error(subject/(linguistic_unit*LetterType)

E1acc_apa_print <- apa_print(E1acc_aov_out)
E1acc_means <- model.tables(E1acc_aov_out,"means")

knitr::kable(xtable(summary(E1acc_aov_out)))
```

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Residuals	39	0.4066274	0.0104263	NA	NA
linguistic_unit	1	0.0039057	0.0039057	0.6985677	0.4083570
Residuals	39	0.2180470	0.0055909	NA	NA
LetterType	1	0.0008383	0.0008383	1.0114875	0.3207462
Residuals	39	0.0323229	0.0008288	NA	NA
linguistic_unit:LetterType	1	0.0000369	0.0000369	0.0807627	0.7777700
Residuals	39	0.0178246	0.0004570	NA	NA

```
E1A_acc_table <- E1acc_data %>%
              group_by(linguistic_unit,LetterType) %>%
              summarize(mAcc = mean(mean_acc),
                        sem = sd(mean_acc)/sqrt(length(mean_acc)))

levels(E1A_acc_table$linguistic_unit) <- c("Say Letter", "Say Word")

E1A_graph_acc <- ggplot(E1A_acc_table,
                        aes(x=LetterType,
                            y=mAcc,
                            group=linguistic_unit,
                            shape=linguistic_unit,
                            linetype=linguistic_unit))+
  geom_line()+
  geom_errorbar(aes(ymin=mAcc-sem,
                    ymax=mAcc+sem), width=.1,
                linetype="solid")+
  geom_point(size=2.5)+
  geom_point(size=1.5, color="white")+
  theme_classic(base_size=12)+
  theme(legend.position = "top",
        legend.title = element_blank())+
  ylab("Mean Accuracy")+
```

```
  xlab("Letter position")+
  coord_cartesian(ylim=c(.8,1))

knitr::kable(E1A_acc_table)
```

linguistic_unit	LetterType	mAcc	sem
Say Letter	First	0.9587045	0.0116924
Say Letter	Middle	0.9550872	0.0125089
Say Word	First	0.9497838	0.0086318
Say Word	Middle	0.9442452	0.0080552

```
E1A_graph_acc
```

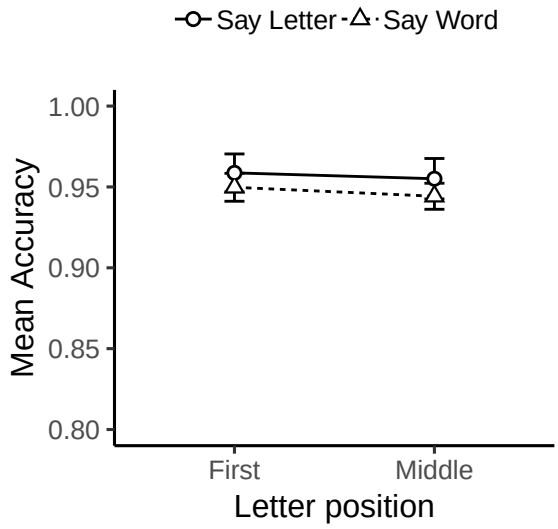
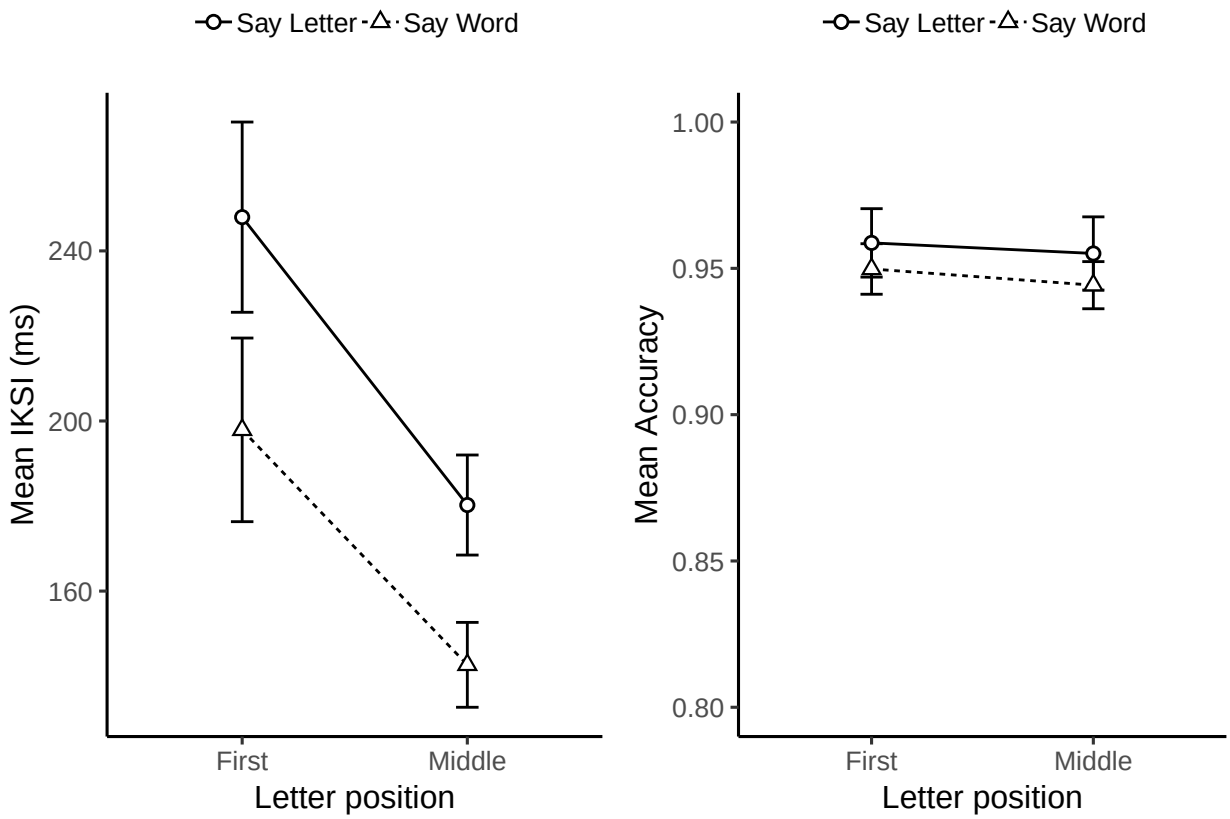


Figure 1

```
ggarrange(E1A_graph_iksi,E1A_graph_acc)
```



Demographic information

```
E1A_dmg <- talk_type_E1A_dmg
proportion_word <- E1A_dmg %>%
                    group_by(InnerVoice) %>%
                    summarize(p_word = length(InnerVoice)/dim(E1A_dmg)[1])

inner_voice_props<-c(
  round(proportion_word[proportion_word$InnerVoice=="Words",]$p_word, digits=2),
round(proportion_word[proportion_word$InnerVoice=="Letters",]$p_word,digits=2),
round(proportion_word[proportion_word$InnerVoice=="undefined",]$p_word,digits=2))
```

Save all

```
save.image(file="E1A_workspace.RData")
```