Final assessment part 3.2: comparison between Dutch and English speakers using the ASA Questionnaire

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Contents

1 Introduction

This document presents statistical analyses of the comparison between Chinese and Dutch speakers perception of ASAs using the ASA questionnaire as reported in the paper. Code based on Fengxiang Li with adaptations made to Dutch.

We use the following packages:

```r
library(foreign) # Open various data files
library(nlme)    # Run multilevel linear models
library(car)     # Package linear regression
#install.packages("devtools")
#devtools::install_github("rmcelreath/rethinking")
library(rethinking) # Run ulam
library(haven) # Use read_sav fuction
library(dplyr) # Use select function
```

```
library(knitr) # Get markdown file
library(tinytex) # Use TeX environment
library(rticles) # Use CTeX documents template
library(pander) # For pandering tables
panderOptions("table.alignment.default","left")
```

2 Data file

2.1 data_cultures.sav

In Transform_raw_data.Rmd in this folder, we transformed the the different data files into 1 bigger datafile, where the data is stored in the long format. For more details look into Transform_raw_data.Rmd or Transform_raw_data.pdf.

```
data_culture <- data.frame(read_sav("data_cultures.sav"))
```

3 Analyses results reported in Section Results

3.1 Comparison of Human-ASA Interaction between Different Cultural Backgrounds

The results were reported in the section results. The analysis was based on human-ASA interaction evaluation of 30 Dutch speaker and 30 Chinese speakers on ASIMO. We compared human-ASA interaction between these two cultural background populations mentioned above. Two-level linear regression model was implemented to explore construct and dimension score differences between two sample groups. For the Bayesian analysis we used the rethinking package developed by Richard McElreath[1].

The last step is the print the results of the model analysis.

```
# Print results
cul_list$Construct=c('HLA','HLB','NA','NB','AAS','AU','PF','AL','AS','APP',
'UAA','AE','UE','UT','UAL','AA','AC','AI','AT','SP','IIS','AEI','UEP','UAI')
# Add construct/dimension name code
pander(select(cul_list,ConstructID,mean_Du,sd_Du,mean_Chi,sd_Chi,Construct),
       caption="Construct/dimension differences between two cultural groups (Part 1)")
```

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[1] https://www.rdocumentation.org/packages/rethinking/versions/2.13

Table 1: Construct/dimension differences between two cultural groups (Part 1)

ConstructID	mean_Du	sd_Du	mean_Chi	sd_Chi	Construct
1	-1.55	1.367	-0.9	1.865	HLA
2	-1.087	1.25	0.5733	1.686	HLB
3	-1.44	0.9547	-0.2133	1.658	NA
4	-1.789	0.8905	0.4222	1.444	NB
5	1.122	1.246	0.9333	1.56	AAS
6	0.6778	1.317	1.422	1.295	AU
7	0.6	1.27	1.267	1.077	PF
8	0.38	1.381	1.327	1.328	AL
9	-0.3111	1.271	1.367	1.296	AS
10	-0.9778	1.171	0.5556	1.468	APP
11	0.7556	1.21	1.222	1.185	UAA
12	0.95	1.362	1.133	1.179	AE
13	2.211	0.7138	1.286	1.033	UE
14	0.06667	1.102	0.6786	0.8818	UT
15	-0.3389	1.121	0.3333	0.9106	UAL
16	0.6889	1.652	1.595	0.9574	AA
17	0.4833	1.611	2.179	0.9691	AC
18	0.05833	1.529	0.3929	1.15	AI
19	1.278	1.155	1.5	1.048	AT
20	-0.2556	1.679	-0.2619	1.755	SP
21	-0.03333	1.008	0.5446	1.236	IIS
22	-1.56	1.345	-0.7786	1.772	AEI
23	1.2	1.084	0.5357	1.702	UEP
24	0.2583	1.304	0.6071	1.57	UAI

```
pander(select(cul_list,ConstructID,mean_diff,sd_diff,lo2_5,hi97_5,Construct),
       caption="Construct/dimension differences between two cultural groups (Part 2)")
```

Table 2: Construct/dimension differences between two cultural groups (Part 2)

ConstructID	mean_diff	sd_diff	lo2_5	hi97_5	Construct
1	-0.5718	0.3921	-1.34	0.1975	HLA
2	-1.435	0.364	-2.141	-0.7132	HLB

ConstructID	mean_diff	sd_diff	lo2_5	hi97_5	Construct
3	-1.096	0.333	-1.747	-0.4324	NA
4	-2.009	0.3028	-2.595	-1.409	NB
5	0.1831	0.3462	-0.4964	0.866	AAS
6	-0.6428	0.3216	-1.268	-0.006013	AU
7	-0.5976	0.2949	-1.173	-0.01281	PF
8	-0.8256	0.3336	-1.477	-0.1661	AL
9	-1.494	0.3198	-2.114	-0.8554	AS
10	-1.358	0.3287	-1.997	-0.7064	APP
11	-0.4118	0.2974	-0.996	0.1743	UAA
12	-0.151	0.3152	-0.7691	0.4726	AE
13	0.8853	0.2291	0.4318	1.333	UE
14	-0.5658	0.2566	-1.071	-0.06231	UT
15	-0.6229	0.2623	-1.135	-0.1071	UAL
16	-0.7789	0.3415	-1.444	-0.102	AA
17	-1.474	0.3386	-2.13	-0.8014	AC
18	-0.2891	0.3373	-0.9525	0.3773	AI
19	-0.1908	0.2812	-0.741	0.3647	AT
20	-0.003629	0.4094	-0.81	0.7998	SP
21	-0.5251	0.2858	-1.078	0.0454	IIS
22	-0.6764	0.3835	-1.428	0.08531	AEI
23	0.5888	0.3514	-0.09786	1.277	UEP
24	-0.2952	0.3543	-0.9915	0.4007	UAI

```
pander(select(cul_list,ConstructID,n_eff,Rhat4,P_posterior,zero_excl,Construct),
       caption="Construct/dimension differences between two cultural groups (Part 3)")
```

Table 3: Construct/dimension differences between two cultural groups (Part 3)

ConstructID	n_eff	Rhat4	P_posterior	zero_excl	Construct
1	44017	1	0.9306		HLA
2	39881	1	1	*	HLB
3	41379	1	0.9995	*	NA
4	41342	1	1	*	NB
5	39331	1	0.7079		AAS
6	41183	1	0.9754	*	AU
7	41130	1	0.9792	*	PF

ConstructID	n_eff	Rhat4	P_posterior	zero_excl	Construct
8	38910	1	0.9928	*	AL
9	38653	1	1	*	AS
10	40322	1	1	*	APP
11	40012	1	0.917		UAA
12	43075	1	0.6871		AE
13	39386	1	1	*	UE
14	41922	1	0.9863	*	UT
15	39007	1	0.9886	*	UAL
16	39142	1	0.9861	*	AA
17	38760	1	0.9999	*	AC
18	42280	1	0.8015		AI
19	39900	1	0.7516		AT
20	39235	1	0.5017		SP
21	44477	1	0.9657		IIS
22	40613	1	0.9604		AEI
23	37999	1	0.9525		UEP
24	38869	1	0.8033		UAI

```r
# Print grand means
Variable <- c("mean_Du","sd_Du","mean_Chi","sd_Chi","mean_diff","sd_diff",
              "minimum_diff","maximum_diff","n_zero_excl","percent_zero_excl")
Grand_mean <- c(mean(cul_list$mean_Du),mean(cul_list$sd_Du),
                mean(cul_list$mean_Chi),mean(cul_list$sd_Chi),
                mean(abs(cul_list$mean_diff)),mean(cul_list$sd_diff),
                min(cul_list$mean_diff),max(cul_list$mean_diff),
                sum(cul_list$zero_excl=="*"),round(sum(cul_list$zero_excl=="*")
                /length(cul_list$ConstructID),digits=4)*100)
GrandMean <- cbind(Variable, Grand_mean)
# Calculate grand mean of mean_Chi, sd_Chi, mean_Eng, sd_Eng
# sd_diff, grand mean of the absolute value of mean differences, number of
# constructs/dimensions with credible bias indication,
# and percentage of these constructs/dimensions
pander(GrandMean, caption = "Grand mean of 24 constructs/dimensions between two cultural groups")
```

Table 4: Grand mean of 24 constructs/dimensions between two cultural groups

Variable	Grand_mean
mean_Du	0.0578240740740741
sd_Du	1.24967947431344
mean_Chi	0.7383416005291
sd_Chi	1.33447064664067
mean_diff	0.736290641230318
sd_diff	0.32417961843473
minimum_diff	-2.00853731693
maximum_diff	0.88529548698032
n_zero_excl	13
percent_zero_excl	54.17