Mapping the time-course of in out of consciousness during binocular rivalry: The case of expressions and gender of face stimuli

Supplementary Materials

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Contents

1 General approach

We used R (R Core Team, 2012) and lme4 (Bates, Maechler & Bolker, 2012) to perform a linear mixed effects analysis of the relationship between rivalry, consciousness phases and subjects gender. As fixed effects, we entered rivalry and phases and subject gender (with interaction term) into the model. As random effects, we had intercepts for subjects. Visual inspection of residual plots did not reveal any obvious deviations from homoscedasticity or normality. P-values were obtained by anova of the full models for gender blocks and emotion blocks:

```
fit <- lmer(mean ~ rivalry*phase*gender + (1|subject)
```

1.1 model selection

The logic of the model selection is to compare the likelihood of different models. First, the model without any factor (the null model), then each model add a factor that we are interested in.

```
model1<-lmer(mean ~ 1 + (1|subject), dat) # null model

model2<-lmer(mean ~ phase + (1|subject), data) # add consciousness phases: formation vs dissolution

model3<-lmer(mean ~ phase + rivalry + (1|subject), data) # add rivalry: emotion(happy vs neutral) OR ge

model4<-lmer(mean ~ rivalry*phase + (1|subject), data) # add interaction

model5<-lmer(mean ~ phase + rivalry + gender + (1|subject), data) # add subject gender

model6<-lmer(mean ~ rivalry*phase*gender + (1|subject), data) # add interaction

anova(e1,e2,e3,e4,e5,e6)
```

1.1.1 Model selection : Emotion rivalry

term	npar	AIC	BIC	logLik	deviance	statistic	df	p.value
model1	3.000	-28,286.488	-28,265.524	14,146.244	-28,292.488			
model2	4.000	-28,438.196	-28,410.244	14,223.098	-28,446.196	153.709	1.000	0.000
model3	5.000	-28,437.408	-28,402.468	14,223.704	-28,447.408	1.212	1.000	0.271
model4	6.000	-28,504.426	-28,462.499	14,258.213	-28,516.426	69.018	1.000	0.000
model5	6.000	-28,438.614	-28,396.686	14,225.307	-28,450.614	0.000	0.000	
model6	10.000	-28,518.766	-28,448.887	14,269.383	-28,538.766	88.152	4.000	0.000

1.1.2 Model selection : Gender rivalry

term	npar	AIC	BIC	logLik	deviance	statistic	df	p.value
model1	3.000	-35,361.580	-35,340.337	17,683.790	-35,367.580			
model2	4.000	-35,387.699	-35,359.375	17,697.850	-35,395.699	28.119	1.000	0.000
model3	5.000	-35,387.277	-35,351.872	17,698.639	-35,397.277	1.578	1.000	0.209
model4	6.000	-35,385.490	-35,343.004	17,698.745	-35,397.490	0.213	1.000	0.644
model5	6.000	-35,386.671	-35,344.185	17,699.336	-35,398.671	1.181	0.000	
model6	10.000	-35,424.849	-35,354.038	17,722.424	-35,444.849	46.177	4.000	0.000

1.1.3 Model selection : Emotion stability

term	npar	AIC	BIC	logLik	deviance	statistic	df	p.value
model1	3.000	17,377.601	17,392.942	-8,685.800	17,371.601			
model2	4.000	17,226.769	17,247.225	-8,609.384	17,218.769	152.832	1.000	0.000
model3	5.000	17,228.251	17,253.821	-8,609.126	17,218.251	0.517	1.000	0.472
model4	6.000	17,221.530	17,252.214	-8,604.765	17,209.530	8.721	1.000	0.003

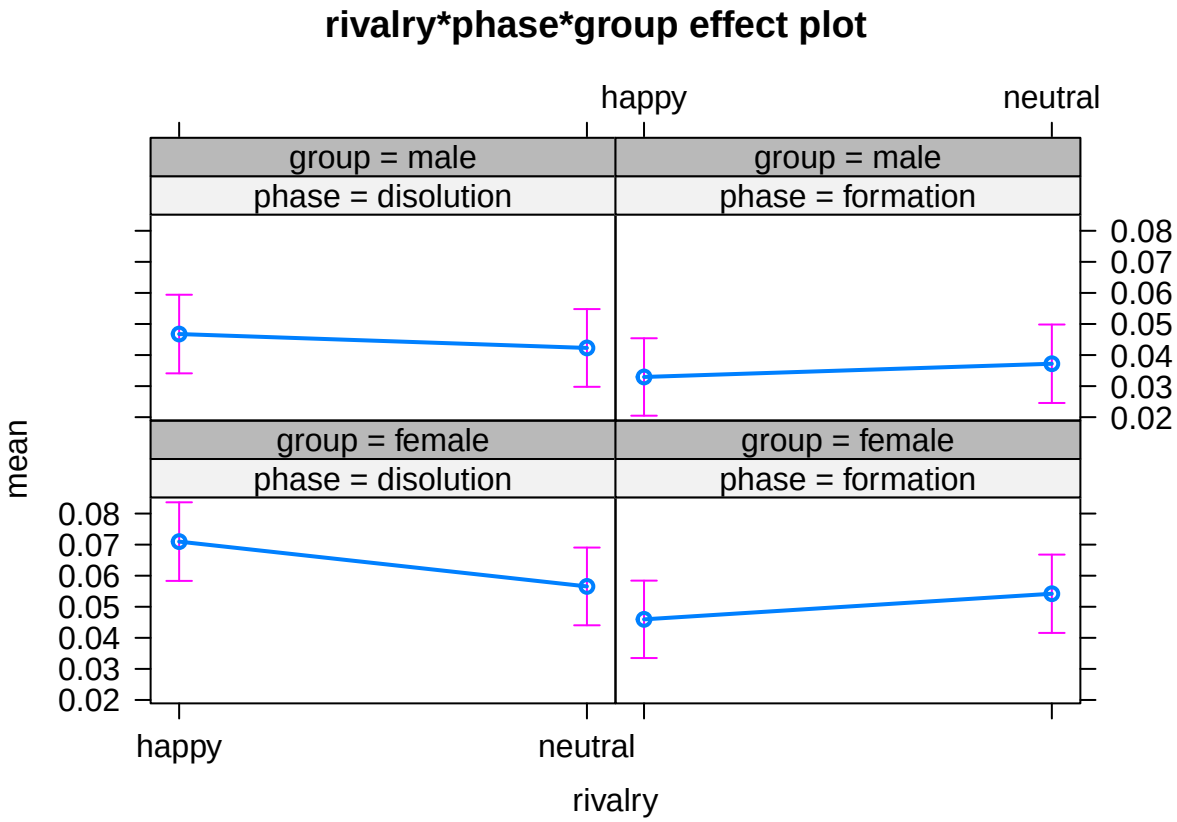
1.1.4 Model selection : gender stability

term	npar	AIC	BIC	logLik	deviance	statistic	df	p.value
model1	3.000	12,036.876	12,051.230	-6,015.438	12,030.876			
model2	4.000	12,038.858	12,057.996	-6,015.429	12,030.858	0.018	1.000	0.893
model3	5.000	12,040.105	12,064.027	-6,015.053	12,030.105	0.753	1.000	0.386
model4	6.000	12,042.086	12,070.792	-6,015.043	12,030.086	0.020	1.000	0.888

2 Emotion Rivalry

2.1 Anova model 6 emotion

term	sumsq	meansq	NumDF	DenDF	statistic	p.value
rivalry	0.005	0.005	1	7,962.133	2.911	0.088
phase	0.246	0.246	1	7,961.065	151.797	0.000
group	0.006	0.006	1	38.244	3.689	0.062
rivalry:phase	0.110	0.110	1	7,967.296	67.754	0.000
rivalry:group	0.004	0.004	1	7,962.133	2.526	0.112
phase:group	0.008	0.008	1	7,961.065	5.097	0.024
rivalry:phase:group	0.022	0.022	1	7,967.296	13.347	0.000



Warning: Speed mean that higher values are faster.

2.1.1 Contrasts main effect phases

Means phases emotion					
phase	**emmean**	**SE**	**df**	**asymp.LCL**	**asymp.UCL**
disolution	0.054	0.004	Inf	0.045	0.063
formation	0.043	0.004	Inf	0.034	0.051

Contrasts phases emotion					
contrast	**estimate**	**SE**	**df**	**z.ratio**	**p.value**
disolution - formation	0.012	0.001	Inf	12.321	0.000

Note: phases are asymmetric: Dissolution is faster than formation.

2.1.2 Contrasts interaction rivalry:phases

Means rivalry|phases emotion						
rivalry	**phase**	**emmean**	**SE**	**df**	**asymp.LCL**	**asymp.UCL**
happy	disolution	0.059	0.005	Inf	0.050	0.068
neutral	disolution	0.049	0.005	Inf	0.041	0.058
happy	formation	0.039	0.004	Inf	0.031	0.048
neutral	formation	0.046	0.005	Inf	0.037	0.055

Contrasts rivalry|phases emotion						
contrast	**phase**	**estimate**	**SE**	**df**	**z.ratio**	**p.value**
happy - neutral	disolution	0.009	0.001	Inf	6.831	0.000
happy - neutral	formation	-0.006	0.001	Inf	-4.831	0.000

Notes: Happy Dissolution is faster than neutral Dissolution. Neutral Formation is faster than happy Formation.

2.1.3 Contrasts interaction rivalry:phases:gender

Means group|phases|rivalry emotion

group	phase	rivalry	emmean	SE	df	asymp.LCL	asymp.UCL
female	disolution	happy	0.071	0.006	Inf	0.058	0.084
male	disolution	happy	0.047	0.006	Inf	0.034	0.059
female	formation	happy	0.046	0.006	Inf	0.033	0.058
male	formation	happy	0.033	0.006	Inf	0.020	0.045
female	disolution	neutral	0.057	0.006	Inf	0.044	0.069
male	disolution	neutral	0.042	0.006	Inf	0.030	0.055
female	formation	neutral	0.054	0.006	Inf	0.042	0.067
male	formation	neutral	0.037	0.006	Inf	0.025	0.050

Contrasts group|phases|rivalry emotion

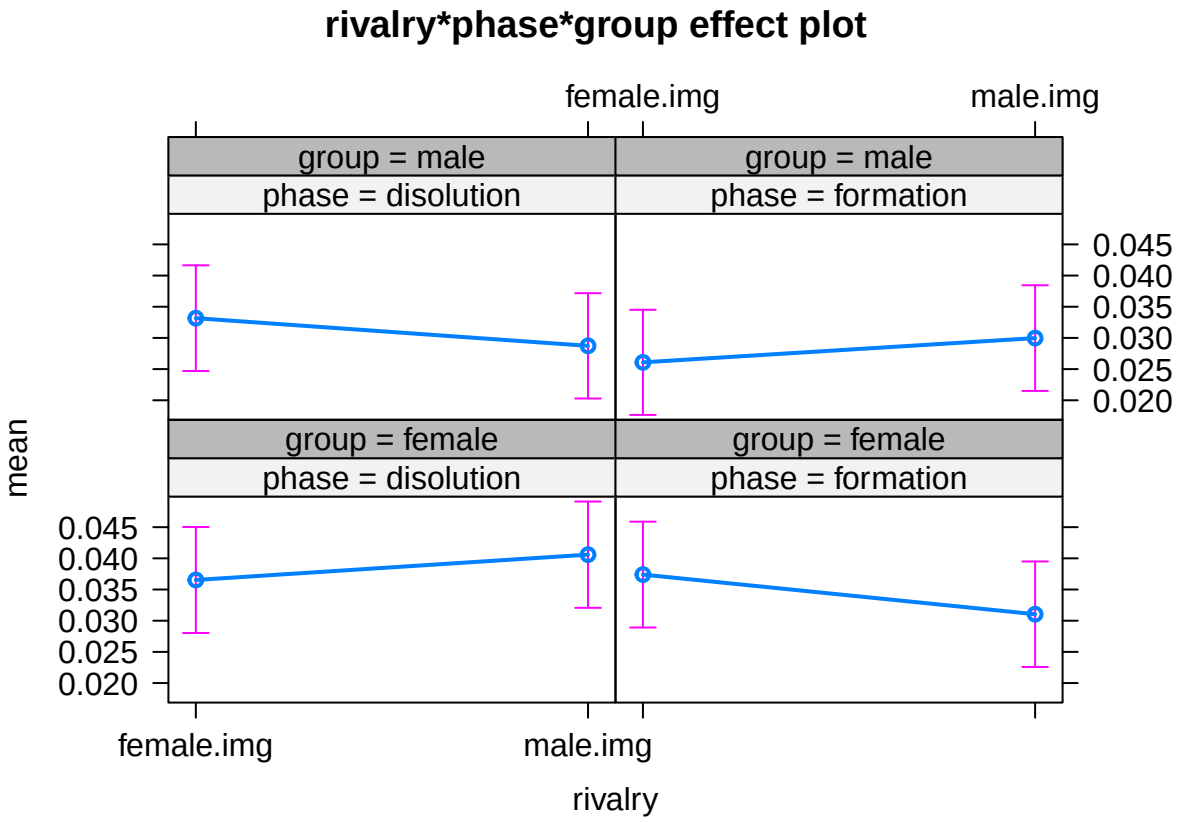
contrast	phase	rivalry	estimate	SE	df	z.ratio	p.value
female - male	disolution	happy	0.024	0.009	Inf	2.653	0.008
female - male	formation	happy	0.013	0.009	Inf	1.447	0.148
female - male	disolution	neutral	0.014	0.009	Inf	1.580	0.114
female - male	formation	neutral	0.017	0.009	Inf	1.866	0.062

Note: Dissolution happy is faster for female participants than for male participants.

3 Gender Rivalry

3.1 Anova model 6 gender

term	sumsq	meansq	NumDF	DenDF	statistic	p.value
rivalry	0.001	0.001	1	8,741.741	1.068	0.301
phase	0.028	0.028	1	8,742.603	27.884	0.000
group	0.001	0.001	1	38.265	1.325	0.257
rivalry:phase	0.001	0.001	1	8,753.250	0.550	0.458
rivalry:group	0.000	0.000	1	8,741.741	0.403	0.525
phase:group	0.001	0.001	1	8,742.603	1.068	0.301
rivalry:phase:group	0.045	0.045	1	8,753.250	44.182	0.000



Warning: Speed mean that higher values are faster.

3.1.1 Contrasts main effect phases

Means phases gender					
phase	**emmean**	**SE**	**df**	**asymp.LCL**	**asymp.UCL**
disolution	0.035	0.003	Inf	0.029	0.041
formation	0.031	0.003	Inf	0.025	0.037

Contrasts phases gender					
contrast	**estimate**	**SE**	**df**	**z.ratio**	**p.value**
disolution - formation	0.004	0.001	Inf	5.281	0.000

Note: phases are asymmetric: Dissolution is faster than formation.

3.1.2 Contrasts interaction rivalry:phases:gender

Means group|phases|rivalry gender

rivalry	phase	group	emmean	SE	df	asymp.LCL	asymp.UCL
female.img	disolution	female	0.037	0.004	Inf	0.028	0.045
male.img	disolution	female	0.041	0.004	Inf	0.032	0.049
female.img	formation	female	0.037	0.004	Inf	0.029	0.046
male.img	formation	female	0.031	0.004	Inf	0.023	0.039
female.img	disolution	male	0.033	0.004	Inf	0.025	0.042
male.img	disolution	male	0.029	0.004	Inf	0.020	0.037
female.img	formation	male	0.026	0.004	Inf	0.018	0.035
male.img	formation	male	0.030	0.004	Inf	0.022	0.038

Contrasts rivalry|phases|group gender

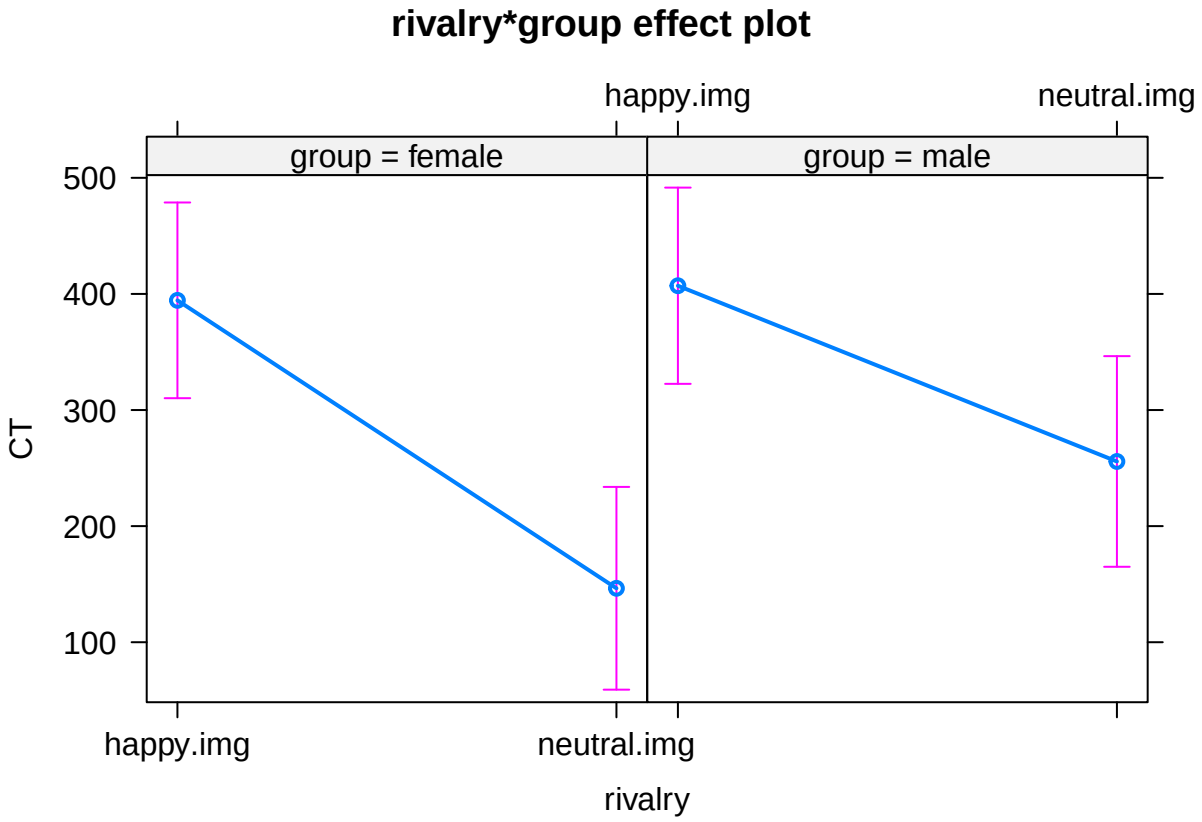
contrast	phase	group	estimate	SE	df	z.ratio	p.value
female.img - male.img	disolution	female	-0.004	0.001	Inf	-2.743	0.006
female.img - male.img	formation	female	0.006	0.001	Inf	4.616	0.000
female.img - male.img	disolution	male	0.004	0.001	Inf	3.241	0.001
female.img - male.img	formation	male	-0.004	0.001	Inf	-2.913	0.004

Note: female participants: slower formation and faster dissolution of the male content. male participants: slower formation and faster dissolution of the female content.

4 Stability

4.1 Anova stability emotion model 4

term	sumsq	meansq	NumDF	DenDF	statistic	p.value
rivalry	9,800,451.892	9,800,451.892	1	1,201.386	150.934	0.000
group	66,090.733	66,090.733	1	35.076	1.018	0.320
rivalry:group	573,952.450	573,952.450	1	1,201.386	8.839	0.003



Warning: CT mean that higher values are more stable.

4.1.1 Contrasts main effect rivalry

Means rivalry emotion					
rivalry	emmean	SE	df	lower.CL	upper.CL
happy.img	400.767	30.422	39.990	339.282	462.251
neutral.img	201.066	32.099	49.207	136.567	265.564

Contrasts rivalry emotion					
contrast	**estimate**	**SE**	**df**	**t.ratio**	**p.value**
happy.img - neutral.img	199.701	16.262	1,203.642	12.280	0.000

4.1.2 Contrasts interaction rivalry:group

Means rivalry|group emotion						
rivalry	**group**	**emmean**	**SE**	**df**	**lower.CL**	**upper.CL**
happy.img	female	394.471	42.964	39.737	307.619	481.323
neutral.img	female	146.443	44.517	45.660	56.816	236.070
happy.img	male	407.062	43.081	40.244	320.009	494.114
neutral.img	male	255.689	46.255	52.869	162.907	348.470

Contrasts rivalry|group emotion						
contrast	**group**	**estimate**	**SE**	**df**	**t.ratio**	**p.value**
happy.img - neutral.img	female	248.029	21.472	1,203.568	11.551	0.000
happy.img - neutral.img	male	151.373	24.428	1,203.700	6.197	0.000

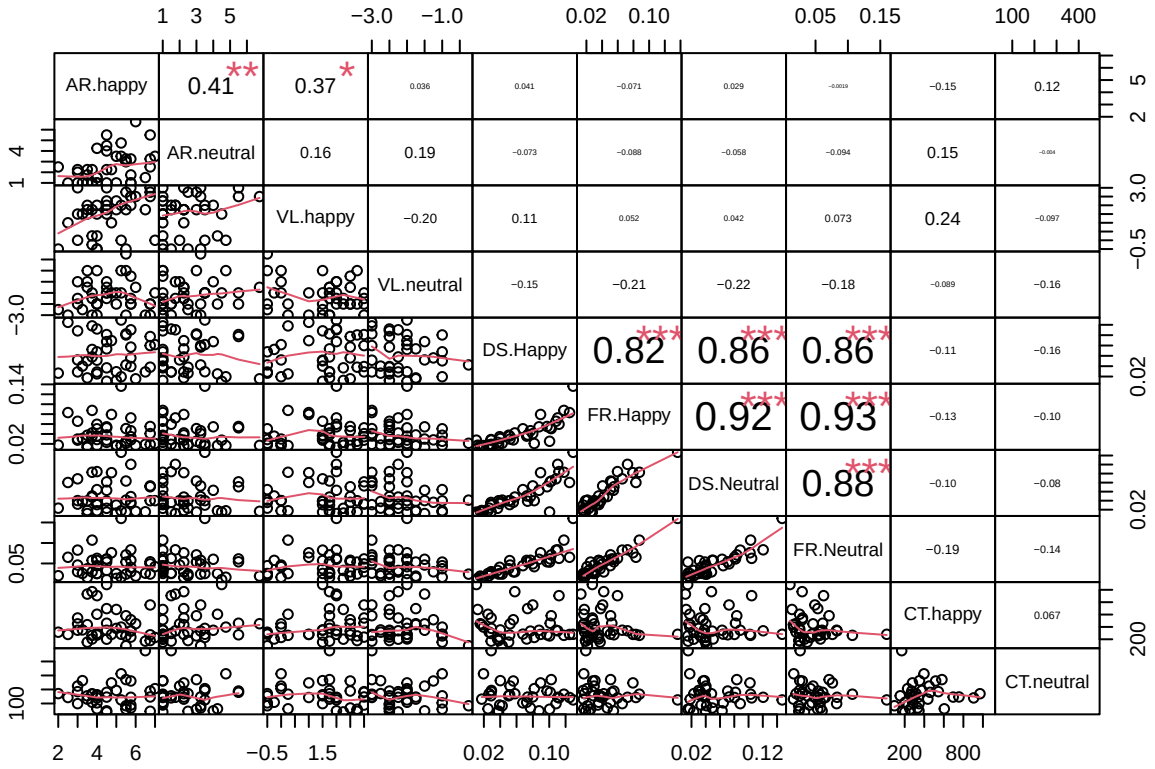
4.1.3 Contrasts interaction group:rivalry

Means group|rivalry emotion						
group	**rivalry**	**emmean**	**SE**	**df**	**lower.CL**	**upper.CL**
female	happy.img	394.471	42.964	39.737	307.619	481.323
male	happy.img	407.062	43.081	40.244	320.009	494.114
female	neutral.img	146.443	44.517	45.660	56.816	236.070
male	neutral.img	255.689	46.255	52.869	162.907	348.470

Contrasts group|rivalry emotion						
contrast	**rivalry**	**estimate**	**SE**	**df**	**t.ratio**	**p.value**
female - male	happy.img	-12.591	60.843	39.990	-0.207	0.837
female - male	neutral.img	-109.246	64.198	49.207	-1.702	0.095

5 Correlation between Speed, Valuation, mean of predominance

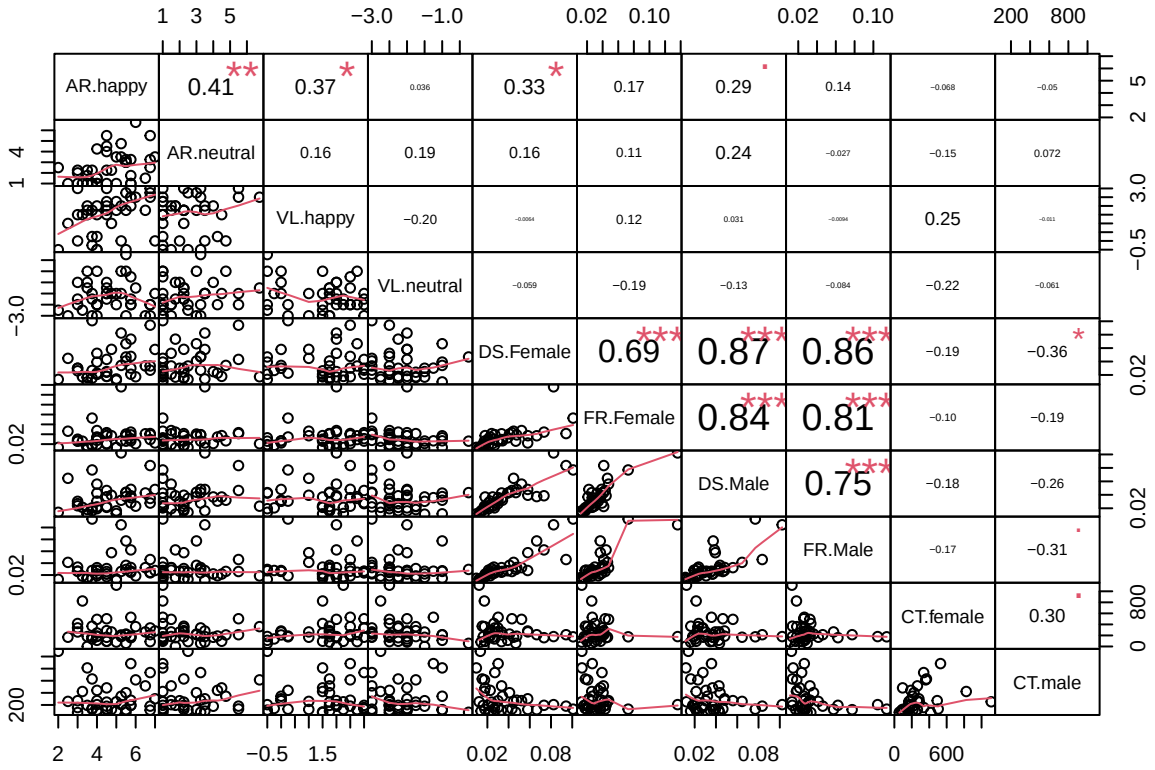
5.1 Correlation emotion rivalry (pearson)



The no significant coefficient is barred.

VL : valence AR : arousal MP : mean of predominance DS : dissolution FR : formation

Correlation gender rivalry (pearson)



The no significant coefficient is barred.

VL : valence AR : arousal MP : mean of predominance DS : dissolution FR : formation