

# Supplement: Neural representations of ambiguous affective stimuli and resilience to anxiety in emerging adults

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## Sample information.

*Supplemental Table 1a: Sample demographics and summary statistics for questionnaire data.*

Variable	N	
<b>Age</b>	101	
18	65 (64%)	
19	36 (36%)	
<b>Sex</b>	101	
Female	80 (79%)	
Male	21 (21%)	
<b>Race</b>	101	
American Indian/Alaska Native	2 (2.0%)	
Asian	37 (37%)	
Black/African American	10 (9.9%)	
Caucasian/White	29 (29%)	
Multiracial	11 (11%)	
Not Reported	4 (4.0%)	
Other	8 (7.9%)	
<b>Ethnicity</b>	101	
Hispanic	24 (24%)	
Not Hispanic	77 (76%)	
<b>Negativity bias</b>	41	0.69 (0.54, 0.77)
<b>Baseline anxiety</b>	101	30 (21, 42)
<b>Self-reported ambiguity tolerance</b>	101	38 (35, 43)
Statistics presented: n (%); Median (IQR)		

***Supplemental Table 1b: Number of complete observations (participants) at each timepoint.***

Number of anxiety observations at each timepoint

<b>T1</b>	<b>T2</b>	<b>T3</b>	<b>T4</b>	<b>T5</b>
101	96	96	82	81

**Longitudinal anxiety scores.**

***Supplemental Table 2: Growth curve model of anxiety scores over time.***

Fixed effects from multilevel model  
Dependent variable: Anxiety score

<b>variable</b>	<b>estimate</b>	<b>SE</b>	<b>CI</b>	<b>t</b>	<b>df</b>	<b>p</b>
Intercept	32.50	1.63	[29.3, 35.7]	19.90	100	<0.001
Time (months)	-0.01	0.23	[-0.46, 0.45]	-0.03	81	0.973

***Supplemental Table 3: Growth curve model of anxiety scores over time, controlling for quarantine onset.***

Fixed effects from multilevel model  
Dependent variable: Anxiety score

<b>variable</b>	<b>estimate</b>	<b>SE</b>	<b>CI</b>	<b>t</b>	<b>df</b>	<b>p</b>
Intercept	42.4	5.79	[31.04, 53.72]	7.33	100	<0.001
Time (months)	0.0	0.23	[-0.45, 0.46]	0.01	81	0.995
Quarantine onset between T1 and T2	-8.8	7.05	[-22.68, 4.98]	-1.25	98	0.213
Quarantine onset between T2 and T3	-12.2	6.20	[-24.4, -0.08]	-1.97	99	0.051
Quarantine onset between T3 and T4	-9.3	6.69	[-22.47, 3.77]	-1.40	99	0.166
Quarantine onset between T4 and T5	-1.9	12.80	[-26.98, 23.2]	-0.15	96	0.883

**Self-reported ambiguity tolerance and anxiety.**

***Supplemental Table 4: Self-reported ambiguity tolerance and baseline anxiety.***

Dependent variable: Baseline anxiety score (z)

<b>variable</b>	<b>estimate</b>	<b>SE</b>	<b>CI</b>	<b>t(99)</b>	<b>p</b>
Intercept	0.00	0.09	[-0.19, 0.19]	0.0	>0.999
MSTAT score (z)	-0.32	0.10	[-0.51, -0.13]	-3.4	0.001

***Supplemental Table 5: Self-reported ambiguity tolerance and longitudinal anxiety.***

Fixed effects from multilevel model

Dependent variable: Anxiety score

variable	estimate	SE	CI	t	df	p
Intercept	32.50	1.56	[29.44, 35.56]	20.81	99	<0.001
MSTAT score (z)	-0.01	0.23	[-0.46, 0.45]	-0.04	79	0.970
Time (months)	-5.05	1.57	[-8.12, -1.97]	-3.22	98	0.002
Time x MSTAT score (z)	0.20	0.23	[-0.24, 0.64]	0.88	77	0.380

**Self-reported ambiguity tolerance and behavior in post-scan task.**

***Supplemental Table 6: Self-reported ambiguity tolerance and negativity biases.***

Dependent variable: Negativity bias (z)

variable	estimate	SE	CI	t(39)	p
Intercept	0.00	0.16	[-0.32, 0.32]	0.00	>0.999
MSTAT score (z)	0.14	0.16	[-0.18, 0.46]	0.91	0.369

**Anxiety and behavior in post-scan task.**

***Supplemental Table 7: Negativity biases and baseline anxiety scores.***

Dependent variable: Negativity bias (z)

variable	estimate	SE	CI	t(39)	p
Intercept	0.00	0.16	[-0.32, 0.32]	0.00	>0.999
Baseline anxiety (z)	-0.06	0.16	[-0.39, 0.26]	-0.39	0.699

***Supplemental Table 8: Negativity biases and longitudinal anxiety scores.***

Fixed effects from multilevel model

Dependent variable: Anxiety score

variable	estimate	SE	CI	t	df	p
Intercept	33.56	2.74	[28.2, 38.93]	12.27	39	<0.001
Time (months)	-0.29	0.38	[-1.04, 0.46]	-0.76	38	0.453
Time x Negativity bias	-1.89	2.77	[-7.32, 3.53]	-0.68	39	0.498
Negativity bias (z)	0.72	0.38	[-0.02, 1.46]	1.91	37	0.064

***Supplemental Table 9: Baseline anxiety and average reaction time to ambiguous stimuli.***

Dependent variable: Average RT to surprised images in post-scan task

variable	estimate	SE	CI	t(39)	p
Intercept	0.00	0.16	[-0.32, 0.32]	0.00	>0.999
Baseline anxiety (z)	-0.03	0.16	[-0.35, 0.3]	-0.17	0.869

**Condition-level analyses: Representational similarity (RS) and baseline anxiety.**

***Supplemental Table 10: Ambiguous/threatening RS and baseline anxiety.***

**Right amygdala.**

Dependent variable: Baseline anxiety score (z)

variable	estimate	SE	CI	t(39)	p
Intercept	-0.22	0.62	[-1.48, 1.04]	-0.35	0.726
Ambiguous/threatening RS (Fisher z score)	0.56	1.55	[-2.57, 3.7]	0.36	0.718

**Left amygdala.**

Dependent variable: Baseline anxiety score (z)

variable	estimate	SE	CI	t(39)	p
Intercept	-0.08	0.59	[-1.26, 1.11]	-0.13	0.894
Ambiguous/threatening RS (Fisher z score)	0.21	1.50	[-2.82, 3.24]	0.14	0.890

***Supplemental Table 11: Ambiguous/nonthreatening RS and baseline anxiety.***

**Right amygdala.**

Dependent variable: Baseline anxiety score (z)

variable	estimate	SE	CI	t(39)	p
Intercept	0.71	0.76	[-0.82, 2.23]	0.93	0.356
Ambiguous/nonthreatening RS (Fisher z score)	-1.78	1.86	[-5.54, 1.98]	-0.96	0.345

**Left amygdala.**

Dependent variable: Baseline anxiety score (z)

variable	estimate	SE	CI	t(39)	p
Intercept	1.6	0.75	[0.09, 3.12]	2.1	0.039
Ambiguous/nonthreatening RS (Fisher z score)	-4.0	1.84	[-7.76, -0.3]	-2.2	0.035

**Left amygdala: Sensitivity analysis (Control voxels).**

Dependent variable: Baseline anxiety score (z)

variable	estimate	SE	CI	t(38)	p
Intercept	1.2	1.3	[-1.38, 3.71]	0.93	0.359
Ambiguous/nonthreatening RS (Fisher z score)	-4.0	1.9	[-7.79, -0.24]	-2.16	0.038
Left amygdala size	0.0	0.0	[-0.01, 0.01]	0.44	0.665

*Supplemental Table 12: Threatening/nonthreatening RS and baseline anxiety.*

**Right amygdala.**

Dependent variable: Baseline anxiety score (z)

variable	estimate	SE	CI	t(39)	p
Intercept	-0.12	0.66	[-1.47, 1.22]	-0.18	0.856
Threatening/nonthreatening RS (Fisher z score)	0.34	1.79	[-3.28, 3.96]	0.19	0.852

**Left amygdala.**

Dependent variable: Baseline anxiety score (z)

variable	estimate	SE	CI	t(39)	p
Intercept	0.41	0.57	[-0.74, 1.56]	0.72	0.476
Threatening/nonthreatening RS (Fisher z score)	-1.17	1.56	[-4.32, 1.99]	-0.75	0.459

**Condition-level analyses: Representational similarity (RS) and longitudinal anxiety.**

*Supplemental Table 13: Ambiguous/threatening RS and longitudinal anxiety.*

**Right amygdala.**



Fixed effects from multilevel model  
Dependent variable: Anxiety score

variable	estimate	SE	CI	t	df	p
Intercept	30.0	10.8	[8.78, 51.16]	2.77	39	0.009
Ambiguous/threatening RS (fisher z)	9.3	27.0	[-43.59, 62.14]	0.34	39	0.733
Time (months)	1.1	1.5	[-1.9, 4.04]	0.71	36	0.485
Time x Ambiguous/threatening RS	-3.5	3.8	[-10.9, 3.88]	-0.93	36	0.358

#### Left amygdala.

Fixed effects from multilevel model  
Dependent variable: Anxiety score

variable	estimate	SE	CI	t	df	p
Intercept	33.15	10.2	[13.16, 53.14]	3.25	39	0.002
Ambiguous/threatening RS (fisher z)	1.11	26.1	[-50.04, 52.25]	0.04	39	0.966
Time (months)	-0.27	1.4	[-3.1, 2.55]	-0.19	36	0.850
Time x Ambiguous/threatening RS	-0.06	3.7	[-7.29, 7.17]	-0.02	36	0.987

### *Supplemental Table 14: Ambiguous/nonthreatening RS and longitudinal anxiety.*

#### Right amygdala.

Fixed effects from multilevel model  
Dependent variable: Anxiety score

variable	estimate	SE	CI	t	df	p
Intercept	42.15	13.2	[16.21, 68.09]	3.19	39	0.003
Ambiguous/nonthreatening RS (fisher z)	-21.60	32.6	[-85.41, 42.22]	-0.66	39	0.511
Time (months)	-0.19	2.0	[-4.06, 3.67]	-0.10	38	0.923
Time x Ambiguous/nonthreatening RS	-0.26	4.8	[-9.66, 9.15]	-0.05	38	0.958

#### Left amygdala.

Fixed effects from multilevel model  
Dependent variable: Anxiety score

variable	estimate	SE	CI	t	df	p
Intercept	56.02	13	[29.94, 82.09]	4.21	39	<0.001
Ambiguous/nonthreatening RS (fisher z)	-56.50	33	[-120.77, 7.77]	-1.72	39	0.093
Time (months)	0.58	2	[-3.41, 4.56]	0.28	39	0.777
Time x Ambiguous/nonthreatening RS	-2.17	5	[-11.89, 7.54]	-0.44	38	0.664

***Supplemental Table 15: Threatening/nonthreatening RS and longitudinal anxiety.***

**Right amygdala.**

Fixed effects from multilevel model

Dependent variable: Anxiety score

variable	estimate	SE	CI	t	df	p
Intercept	31.34	11.6	[8.66, 54.02]	2.71	39	0.010
Threatening/nonthreatening RS (fisher z)	6.16	31.1	[-54.86, 67.19]	0.20	39	0.844
Time (months)	-0.87	1.6	[-4.08, 2.33]	-0.53	37	0.596
Time x Threatening/nonthreatening RS	1.61	4.4	[-7.03, 10.24]	0.36	37	0.718

**Left amygdala.**

Fixed effects from multilevel model

Dependent variable: Anxiety score

variable	estimate	SE	CI	t	df	p
Intercept	39.13	9.9	[19.63, 58.63]	3.93	39	<0.001
Threatening/nonthreatening RS (fisher z)	-15.81	27.2	[-69.11, 37.49]	-0.58	39	0.564
Time (months)	-0.46	1.4	[-3.27, 2.34]	-0.32	38	0.748
Time x Threatening/nonthreatening RS	0.48	3.9	[-7.2, 8.15]	0.12	38	0.904

**Single-trial (actor-level) analyses: Single trial (actor-level) RS and subsequent appraisals of the actor's ambiguous image.**

***Supplemental Table 16: Actor-level ambiguous/threatening RS and subsequent appraisals of the actor's ambiguous image.***

**Right amygdala.**

Fixed effects from multilevel logistic model

Region: Right amygdala

Dependent variable: Likelihood positive categorization

variable	odds ratio	SE	CI	z	p
Intercept	0.53	0.08	[0.39, 0.72]	-4.1	<0.001
Ambiguous/threatening RS (fisher z)	1.81	0.68	[0.86, 3.79]	1.6	0.118

**Left amygdala.**

Fixed effects from multilevel logistic model  
Region: Left amygdala  
Dependent variable: Likelihood positive categorization

variable	odds ratio	SE	CI	z	p
Intercept	0.53	0.08	[0.39, 0.72]	-4.11	<0.001
Ambiguous/threatening RS (fisher z)	0.74	0.27	[0.36, 1.51]	-0.83	0.406

***Supplemental Table 17: Actor-level ambiguous/nonthreatening RS and subsequent appraisals of the actor's ambiguous image.***

**Right amygdala.**

Fixed effects from multilevel logistic model  
Region: Right amygdala  
Dependent variable: Likelihood positive categorization

variable	odds ratio	SE	CI	z	p
Intercept	0.53	0.08	[0.39, 0.72]	-4.11	<0.001
Ambiguous/nonthreatening RS (fisher z)	1.38	0.51	[0.67, 2.84]	0.87	0.382

**Left amygdala.**

Fixed effects from multilevel logistic model  
Region: Left amygdala  
Dependent variable: Likelihood positive categorization

variable	odds ratio	SE	CI	z	p
Intercept	0.53	0.08	[0.39, 0.72]	-4.1	<0.001
Ambiguous/nonthreatening RS (fisher z)	1.43	0.51	[0.71, 2.86]	1.0	0.315

***Supplemental Table 18: Actor-level threatening/nonthreatening RS and subsequent appraisals of the actor's ambiguous image.***

**Right amygdala.**

Fixed effects from multilevel logistic model  
Region: Right amygdala  
Dependent variable: Likelihood positive categorization

variable	odds ratio	SE	CI	z	p
Intercept	0.53	0.08	[0.39, 0.72]	-4.11	<0.001
Threatening/nonthreatening RS (fisher z)	1.27	0.45	[0.63, 2.56]	0.66	0.509

### Left amygdala.

Fixed effects from multilevel logistic model

Region: Left amygdala

Dependent variable: Likelihood positive categorization

variable	odds ratio	SE	CI	z	p
Intercept	0.53	0.08	[0.39, 0.72]	-4.1	<0.001
Threatening/nonthreatening RS (fisher z)	2.52	0.87	[1.28, 4.94]	2.7	0.007

### Left amygdala: Sensitivity analysis (Control voxels).

Fixed effects from multilevel logistic model

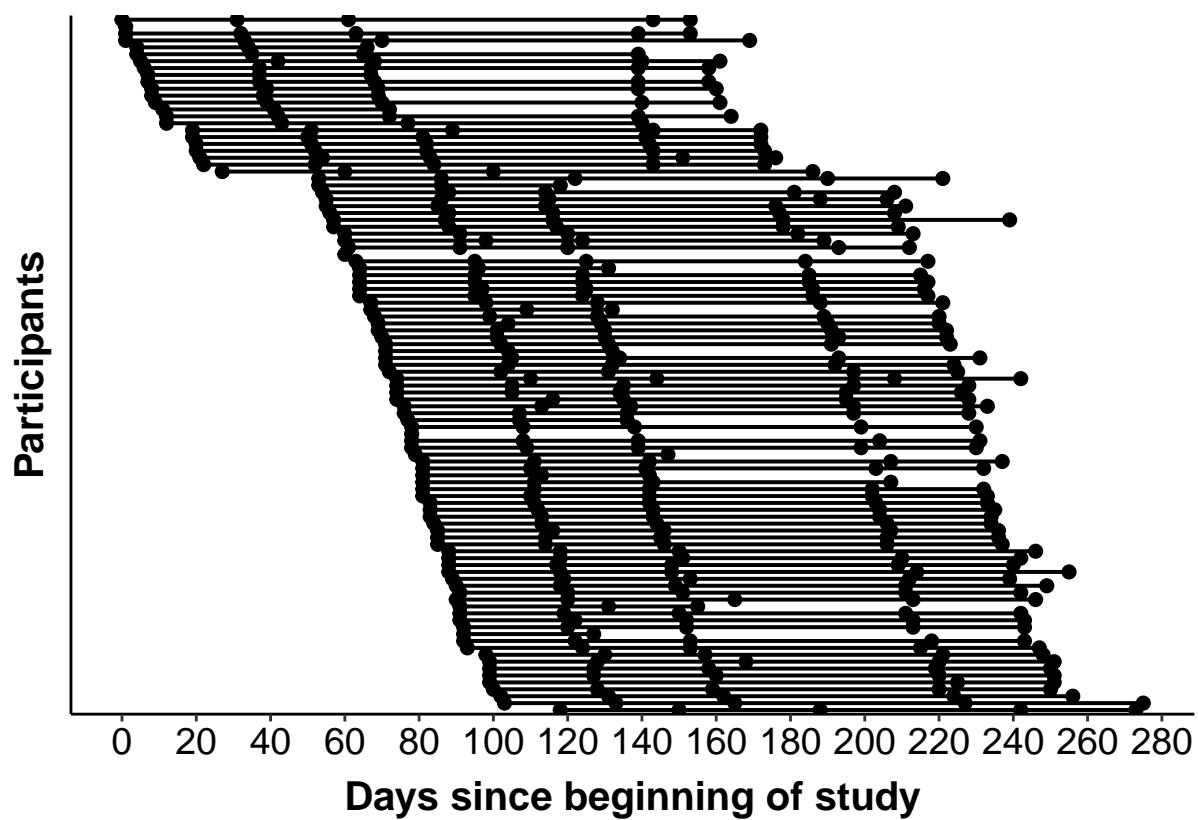
Region: Left amygdala

Dependent variable: Likelihood positive categorization

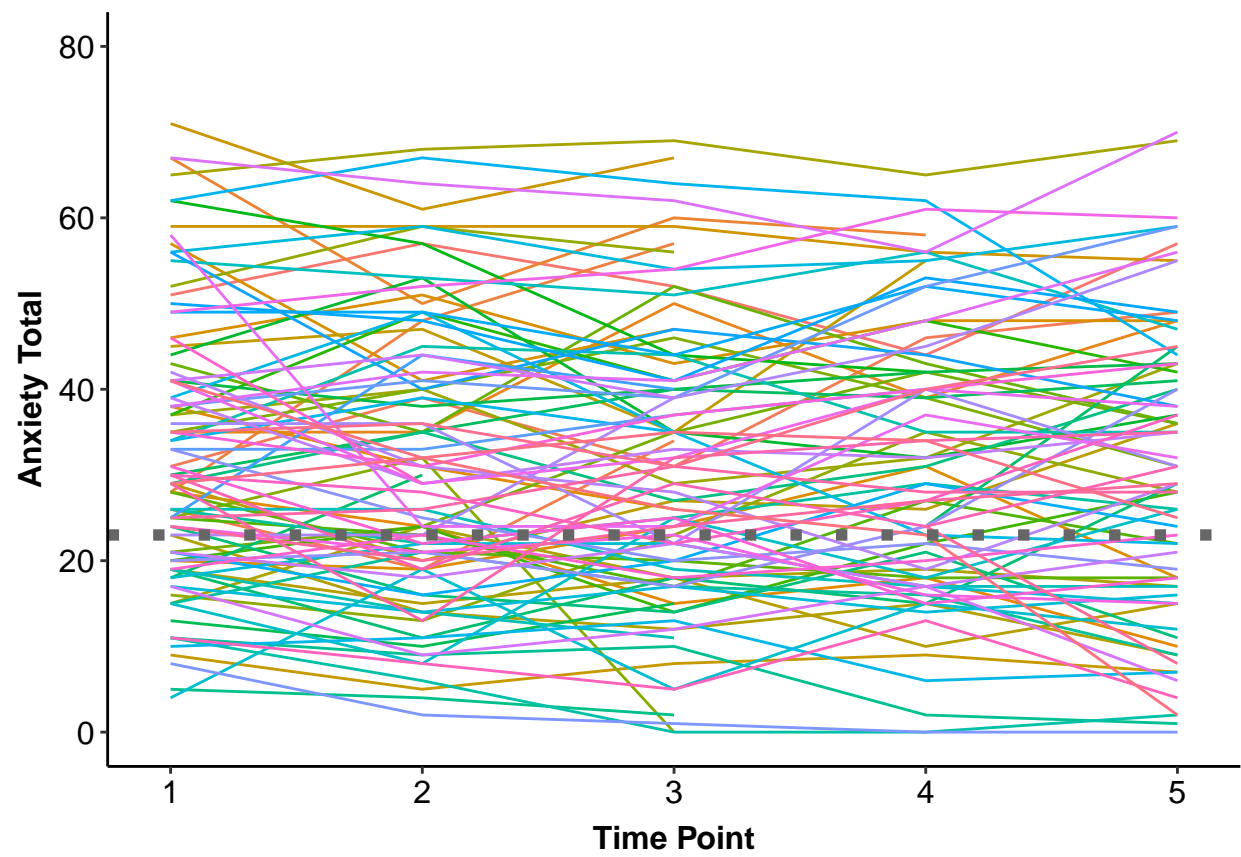
variable	odds ratio	SE	CI	z	p
Intercept	1.1	0.90	[0.24, 5.35]	0.16	0.876
Threatening/nonthreatening RS (fisher z)	2.5	0.87	[1.28, 4.94]	2.68	0.007
Left amygdala voxel number	1.0	0.00	[0.99, 1]	-0.98	0.326

Supplemental figures.

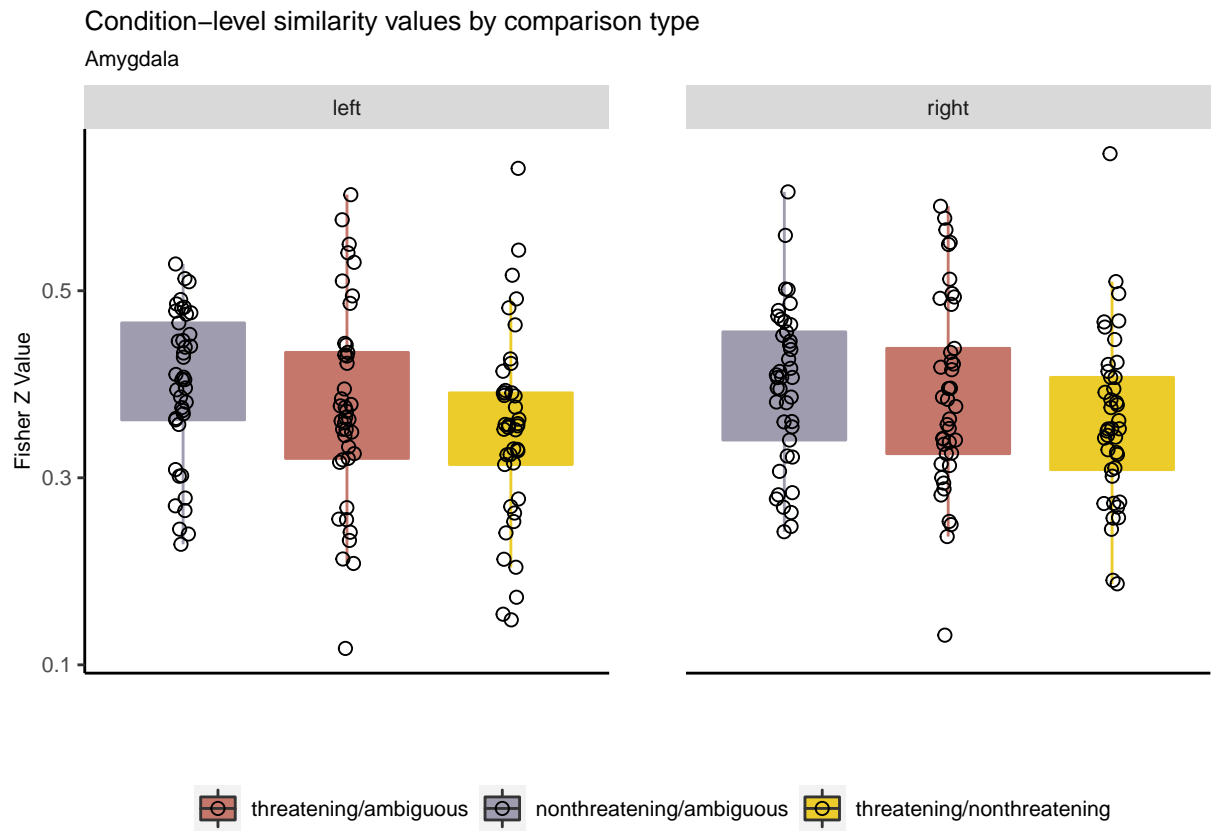
*Supplemental Figure 1a: Visualization of study timepoints.*



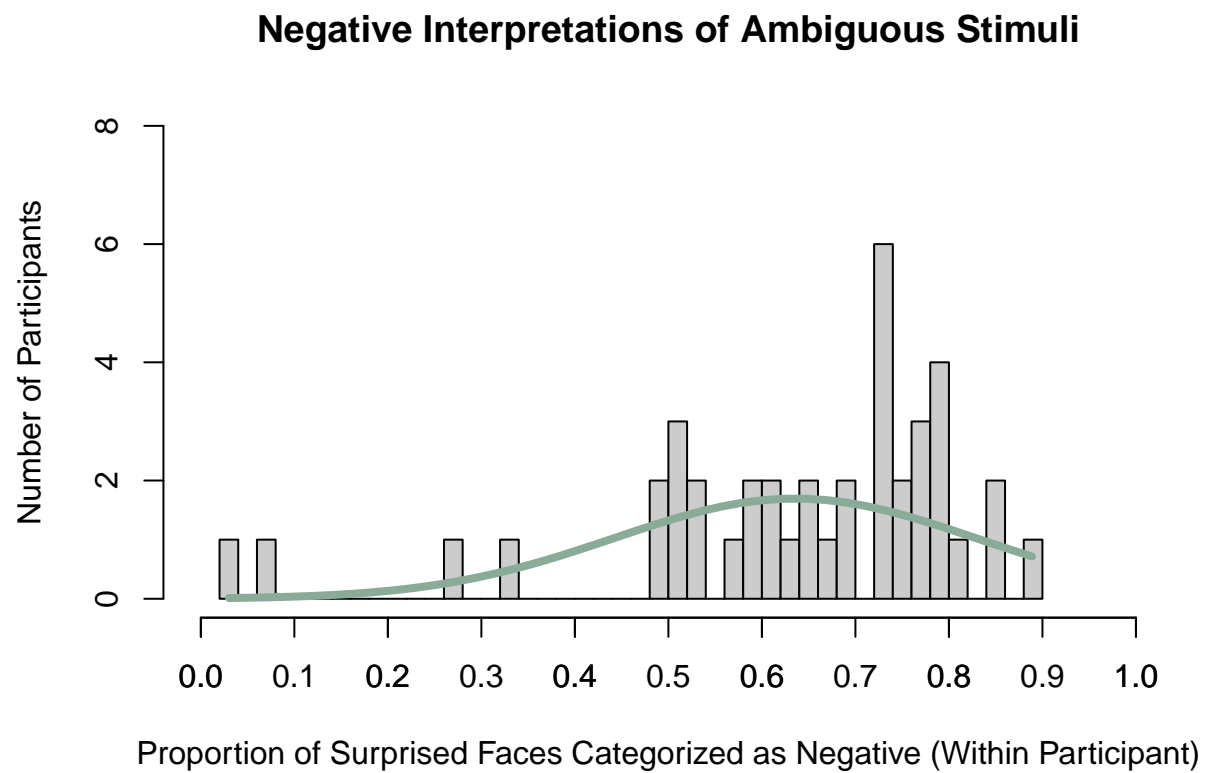
*Supplemental Figure 1b: Individual anxiety scores over time.*



*Supplemental Figure 2: Average RSA values within the right and left amygdala by comparison type.*

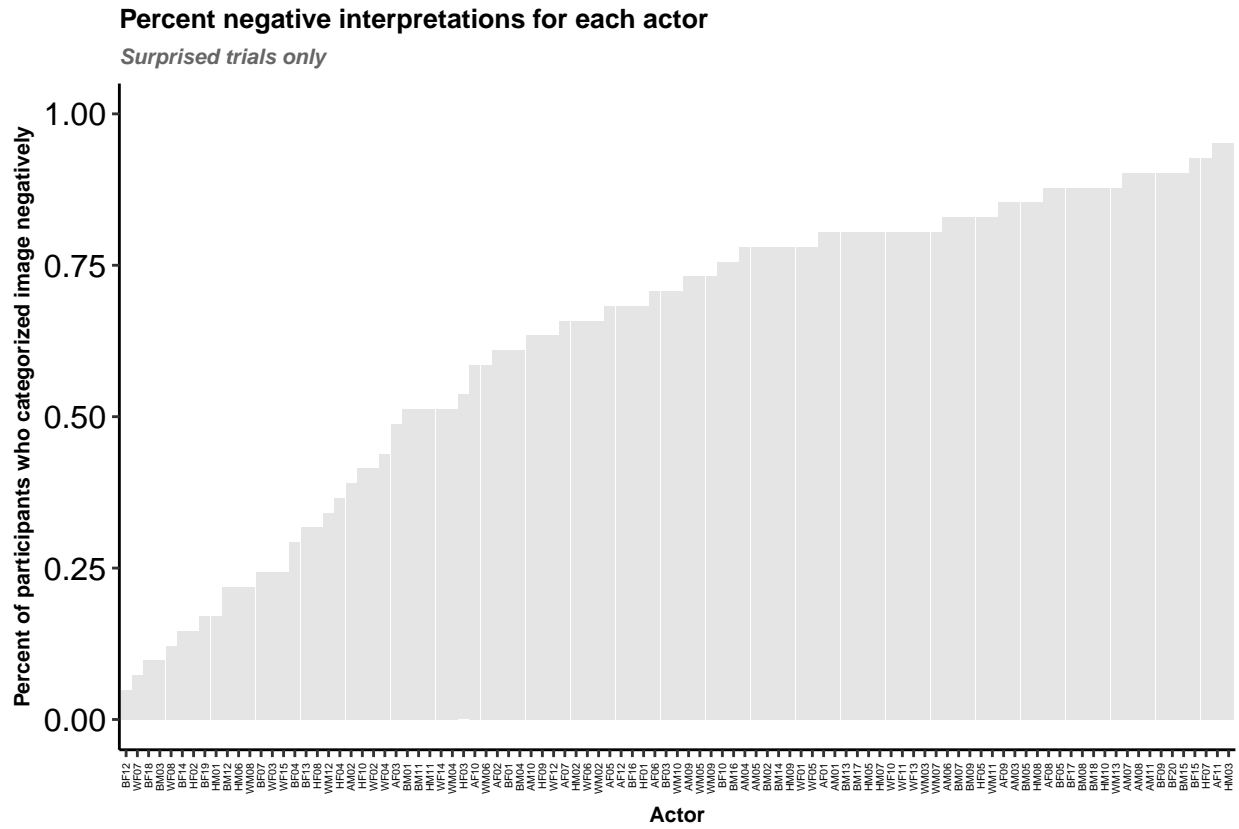


*Supplemental Figure 3: Negativity biases in sample.*

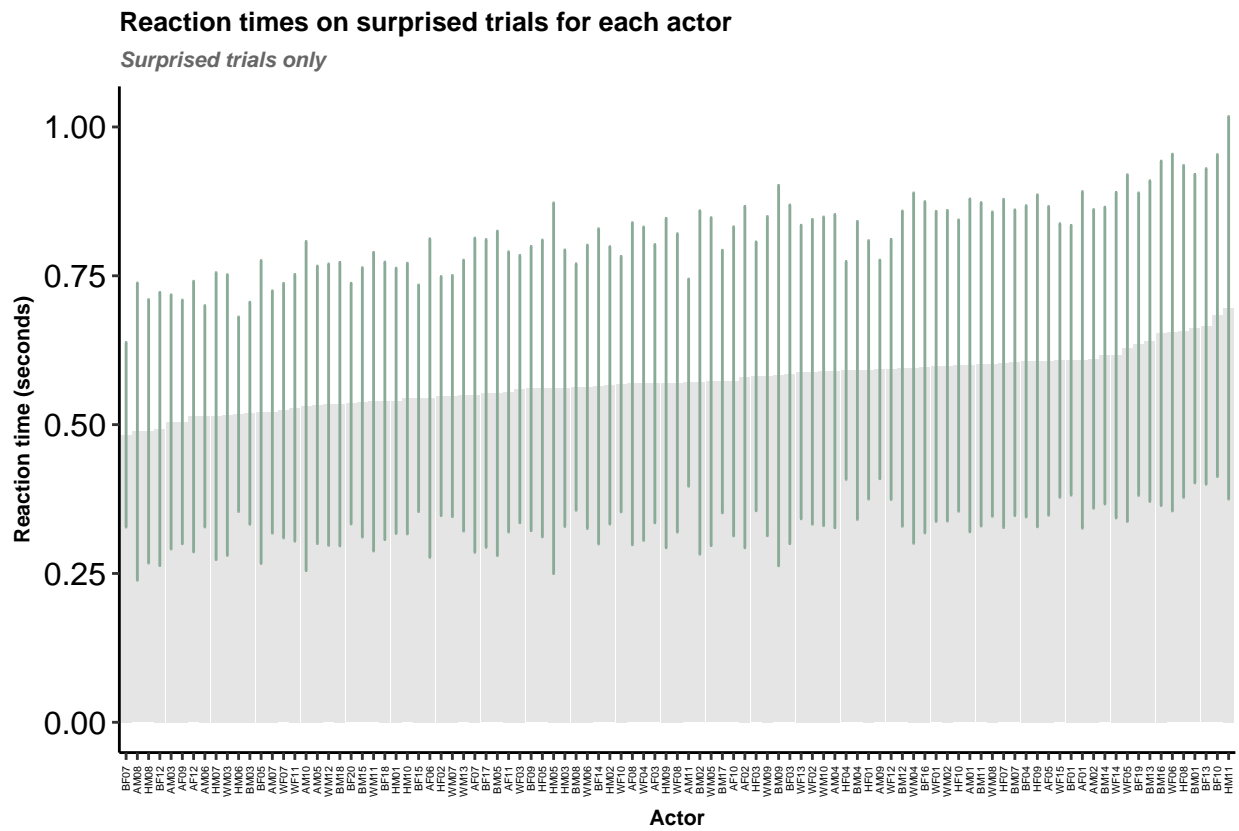




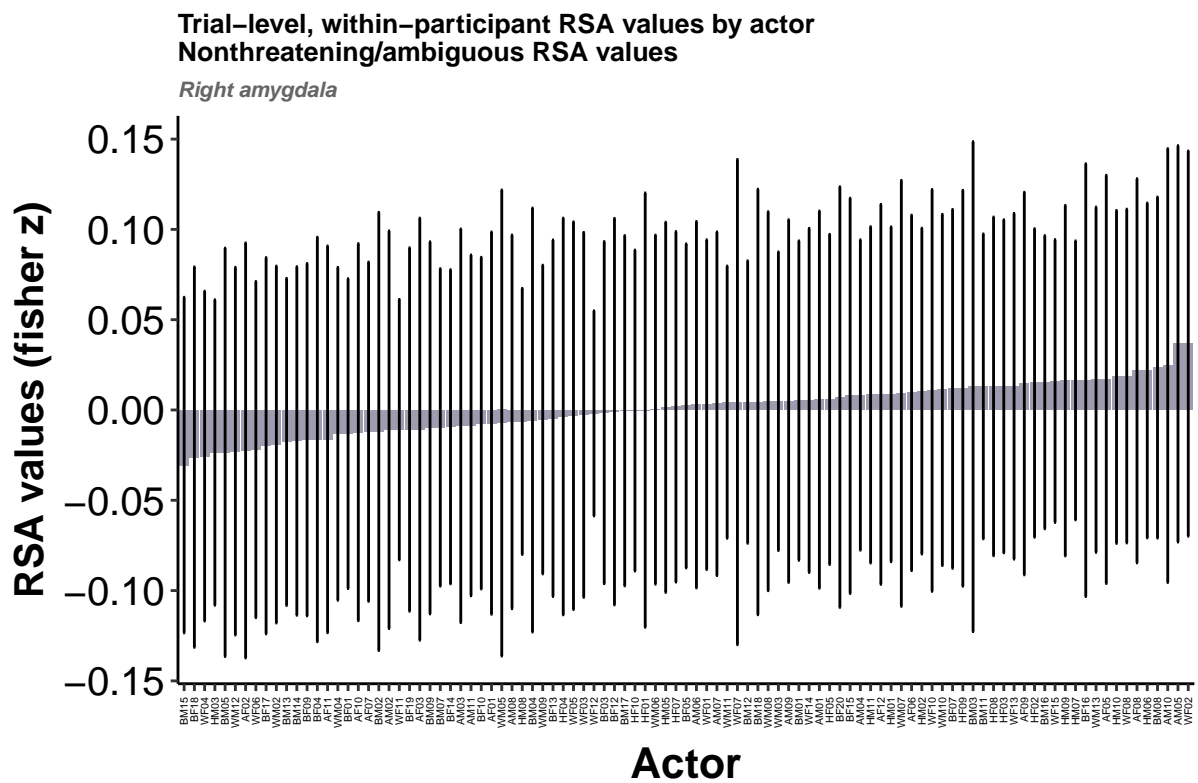
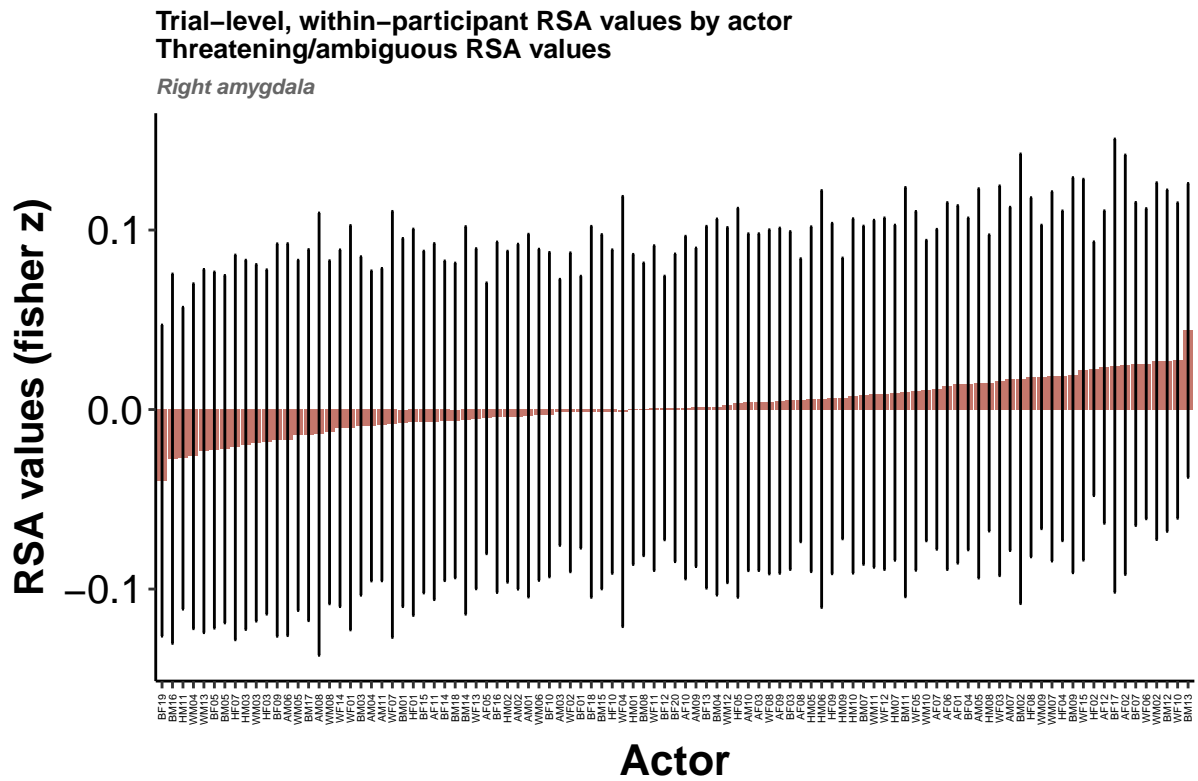
*Supplemental Figure 4: Percentage of participants that categorized each actor's surprised face negatively.*



*Supplemental Figure 5: Reaction times to each actor's surprised face.*

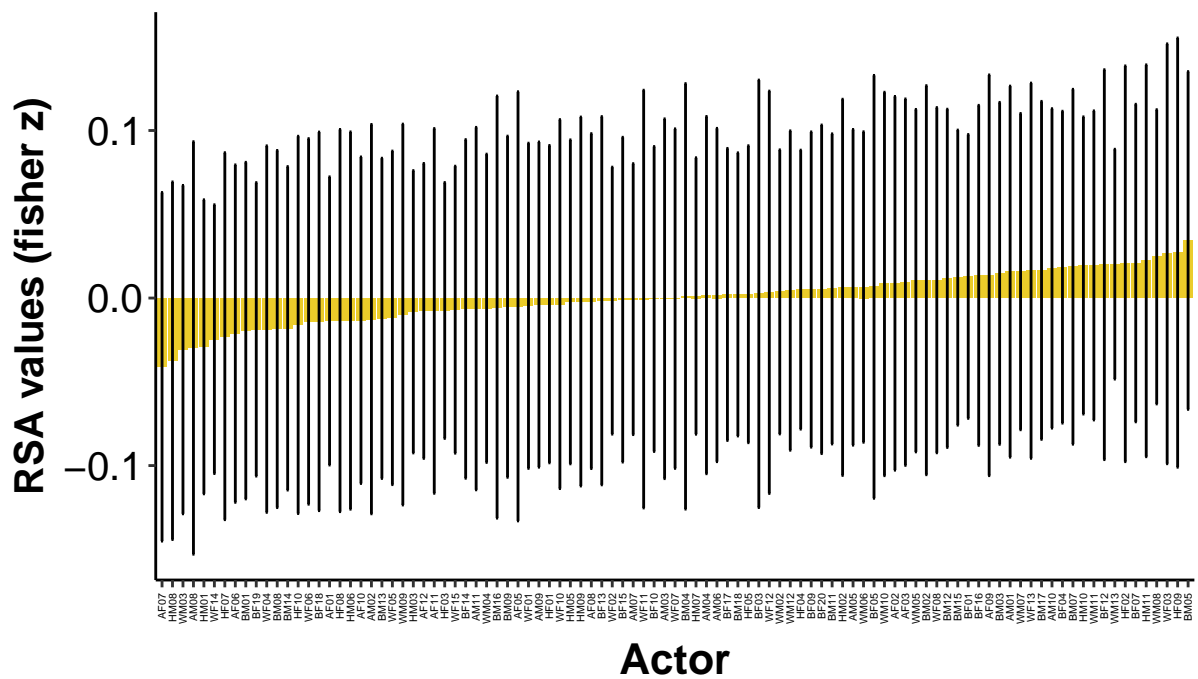


*Supplemental Figure 6: Distribution of RS values by condition comparison type and by actor.*



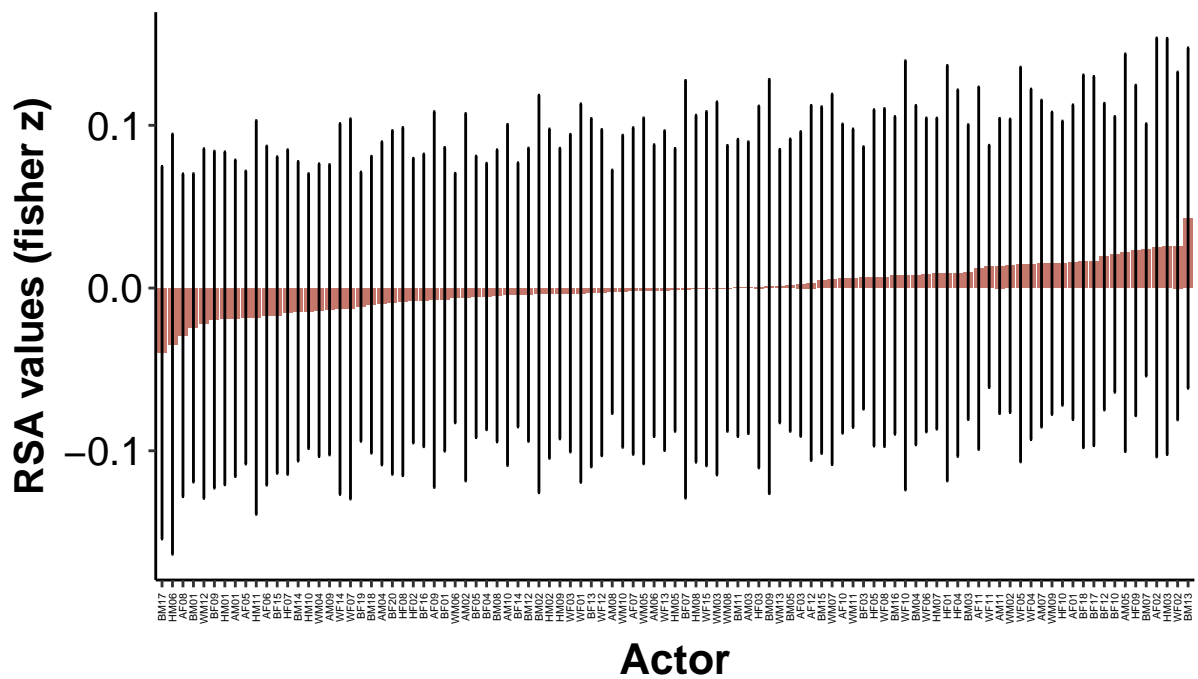
**Trial-level, within-participant RSA values by actor**  
**Threatening/nonthreatening RSA values**

*Right amygdala*



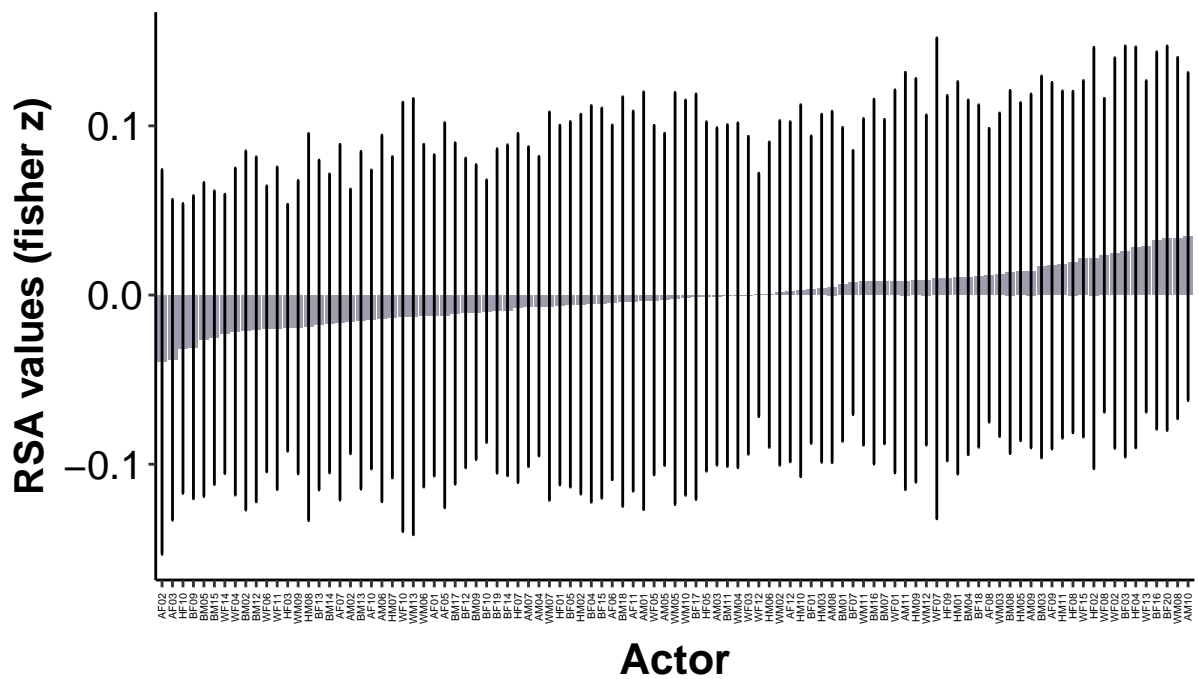
**Trial-level, within-participant RSA values by actor**  
**Threatening/ambiguous RSA values**

*Left amygdala*



**Trial-level, within-participant RSA values by actor**  
**Nonthreatening/ambiguous RSA values**

*Left amygdala*



**Trial-level, within-participant RSA values by actor**  
**Threatening/nonthreatening RSA values**

*Left amygdala*

