

**Supplementary information for:**

**Costly avoidance of Pavlovian fear stimuli and the temporal  
dynamics of its decision process**

**Juliane M. Boschet**<sup>1</sup> ORCID: 0000-0002-2607-912X

**Stefan Scherbaum**<sup>2</sup> ORCID: 0000-0002-4408-6016

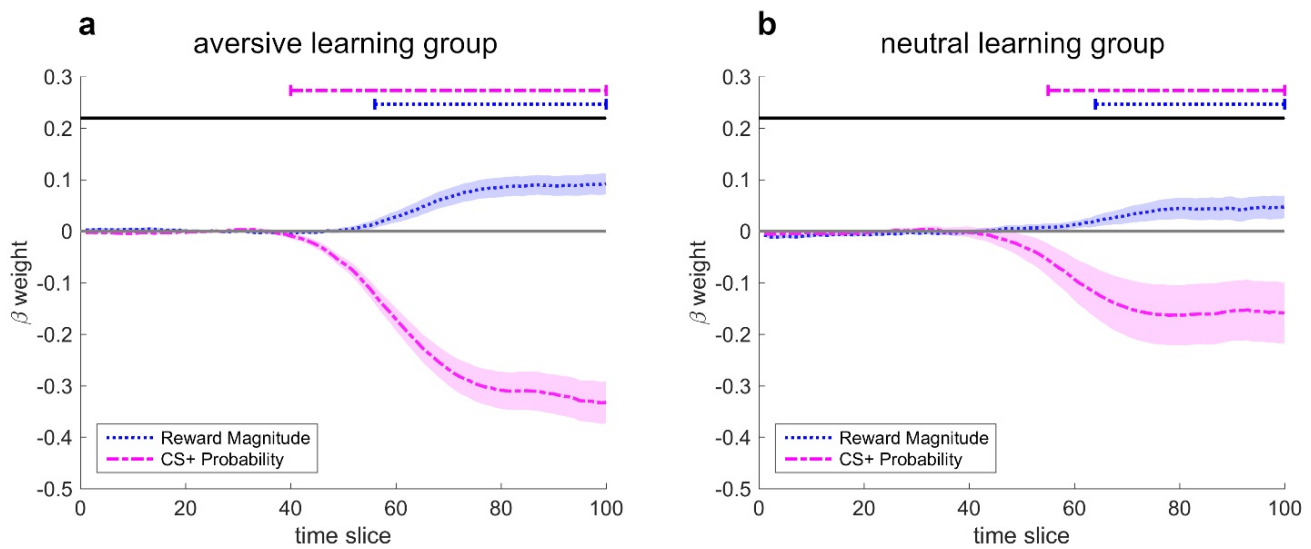
**Andre Pittig**<sup>1,3,\*</sup> ORCID: 0000-0003-3787-9576

<sup>1</sup> Department of Psychology (Biological Psychology, Clinical Psychology, and Psychotherapy), University of Würzburg, Würzburg, Germany.

<sup>2</sup> Department of Psychology, Technische Universität Dresden, Germany.

<sup>3</sup> Translational Psychotherapy, Department of Psychology, Friedrich-Alexander University Erlangen-Nürnberg (FAU), Erlangen, Germany.

Correspondence concerning this article should be addressed to Andre Pittig, Department of Psychology, Friedrich-Alexander University Erlangen-Nürnberg (FAU), Nägelsbachstraße 49a, 91052 Erlangen, Germany. Email: [andre.pittig@fau.de](mailto:andre.pittig@fau.de)

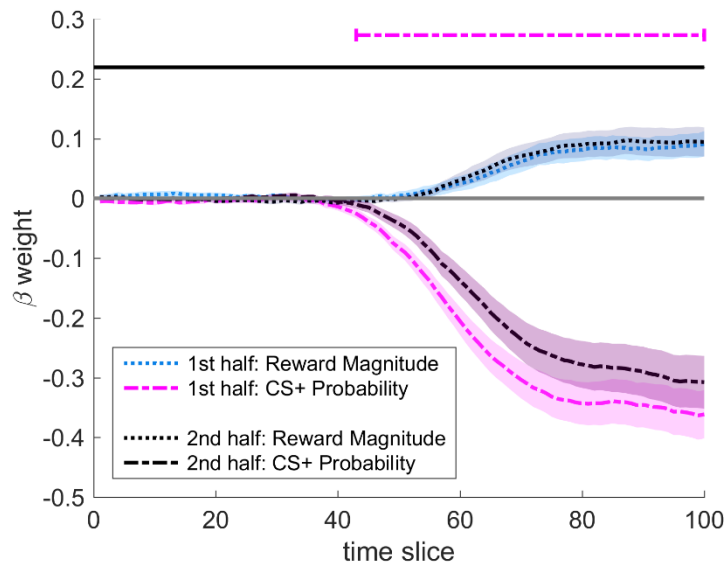


**Supplementary Figure S1.** Time-continuous beta weights from TCMR analysis in (a) the aversive learning group and (b) the neutral learning group for the predictors Reward Magnitude and CS+ Probability when excluding participants with a proportion of CS+/high reward choices > 90% or < 10%. Positive  $\beta$  weights indicate movement tendencies towards the CS+/high reward option, negative  $\beta$  weights indicate tendencies towards the CS-/low reward option. Horizontal lines at the top indicate segments of significant impact. Shaded areas represent standard error of the mean. Only segments of more than 10 successive significant *t*-tests were accepted as meaningful. In the aversive learning group, a time slice corresponds on average to 7.8 ms. In the neutral learning group, a time slice corresponds on average to 7.7 ms.

**Supplementary Table S1.** Segments of significant beta weights for Reward Magnitude and CS+ Probability separately for the aversive learning group and the neutral learning group when excluding participants with a proportion of CS+/high reward choices > 90% or < 10%.

Beta for	aversive learning group				neutral learning group			
	Start	End	Duration	Peak strength	Start	End	Duration	Peak strength
Reward Magnitude	56	100	44 ( $\approx$ 343.2 ms)	.092	64	100	36 ( $\approx$ 277.2 ms)	.047
CS+ Probability	40	100	60 ( $\approx$ 468.0 ms)	.334	55	100	45 ( $\approx$ 346.5 ms)	.164

*Note.* In the aversive learning group, a time slice corresponds on average to 7.8 ms. In the neutral learning group, a time slice corresponds on average to 7.7 ms. Only segments of more than 10 significant *t*-tests were accepted as meaningful.

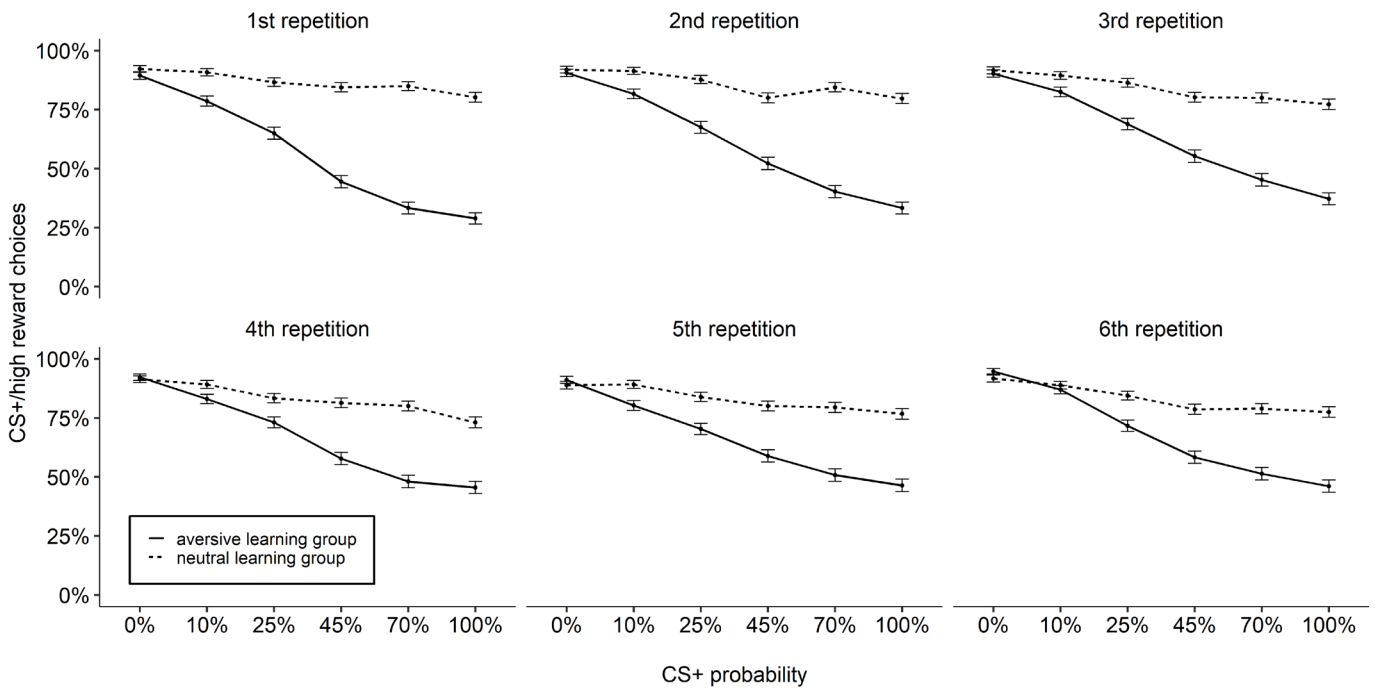


**Supplementary Figure S2.** Time-continuous beta weights from TCMR analysis for the predictors Reward Magnitude and CS+ Probability for the first half (light-colored) and the second half (dark-colored) of the approach-avoidance paradigm in the aversive learning group when excluding participants with a proportion of CS+/high reward choices > 90% or < 10%. Positive  $\beta$  weights indicate movement tendencies towards the CS+/high reward option, negative  $\beta$  weights indicate tendencies towards the CS-/low reward option. Horizontal lines at the top indicate segments of significant difference between both halves for a specific predictor. Shaded areas represent standard error of the mean. Only segments of more than 10 successive significant t-tests were accepted as meaningful. In the aversive learning group, a time slice corresponds on average to 7.8 ms.

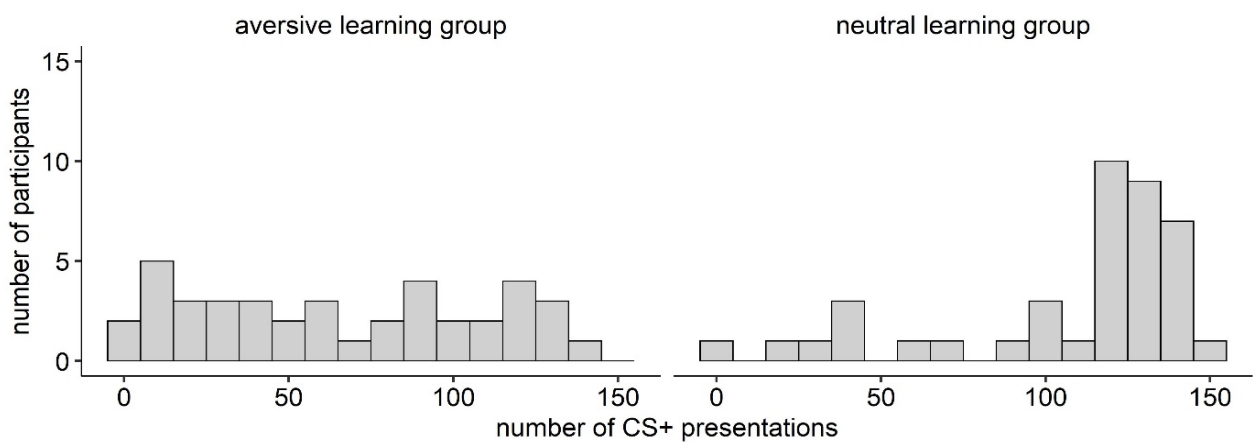
**Supplementary Table S2.** Segments of significant beta weights for Reward Magnitude and CS+ Probability separately for the first and the second half of the approach-avoidance paradigm in the aversive learning group when excluding participants with a proportion of CS+/high reward choices > 90% or < 10%.

Beta for	first half				second half				first vs. second half		
	Start	End	Duration	Peak strength	Start	End	Duration	Peak strength	Start	End	Duration
Reward Magnitude	58	100	42 ( $\approx$ 327.6 ms)	.091	56	100	44 ( $\approx$ 343.2 ms)	.097	-	-	-
CS+ Probability	39	100	61 ( $\approx$ 475.8 ms)	.363	46	100	54 ( $\approx$ 421.2 ms)	.308	43	100	57 ( $\approx$ 444.6 ms)

*Note.* In the aversive learning group, a time slice corresponds on average to 7.8 ms. Only segments of more than 10 significant t-tests were accepted as meaningful.



**Supplementary Figure S3.** Mean percentage of CS+/high reward choices (with standard error) in relation to CS+ probability, separately for each trial repetition, i.e., the number of times a specific trial had been presented during the task (1<sup>st</sup> to 6<sup>th</sup> repetition).



**Supplementary Figure S4.** Total number of CS+ presentations during the approach-avoidance paradigm for each participant of the aversive learning group and the neutral learning group.