

# Phase Adjustment Task - Y3 David Plans Group

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## 1 Summary Statistics

25 individuals successfully provided data through the app and prolific system. Similarity scores were calculated using the first 17 trials for each individual. Summary statistics for similarity scores and other metrics are presented below.

	Overall (N=25)
<b>Similarity</b>	
Mean (SD)	0.38 (0.16)
Range	0.09 - 0.72
<b>Mean confidence score</b>	
Mean (SD)	4.89 (1.80)
Range	1.18 - 7.82
<b>Mean heart rate (bpm)</b>	
Mean (SD)	78.76 (6.87)
Range	63.47 - 92.86
<b>SDNN</b>	
Mean (SD)	154.59 (100.39)
Range	49.45 - 375.94
<b>RMSSD</b>	
Mean (SD)	128.52 (76.84)
Range	42.63 - 261.65
<b>PNN50</b>	
Mean (SD)	49.84 (18.35)
Range	19.23 - 77.08
<b>Time spent on each trial (sec)</b>	
Mean (SD)	22.25 (9.48)
Range	8.14 - 41.43
<b>Mean engagement trials (sec)</b>	
Mean (SD)	27.91 (12.04)
Range	9.29 - 52.53
<b>Similarity Difference - Confidence Correlation</b>	
Mean (SD)	0.00 (0.25)
Range	-0.58 - 0.62

## 2 Were participant responses non-random?

statistic	p.value	method	alternative
99106	0.0000004	Wilcoxon rank sum test with continuity correction	two.sided

By comparing the responses from the participants to a randomly generated distribution (**5000** iterations) we can see if the participants were answering randomly. A wilcox test indicates that the distribution of participants responses is different to the randomly generated distribution (**Z= -5.059,  $p < .001$ ,  $r = -0.071$** ). This suggests participants were not responding randomly.

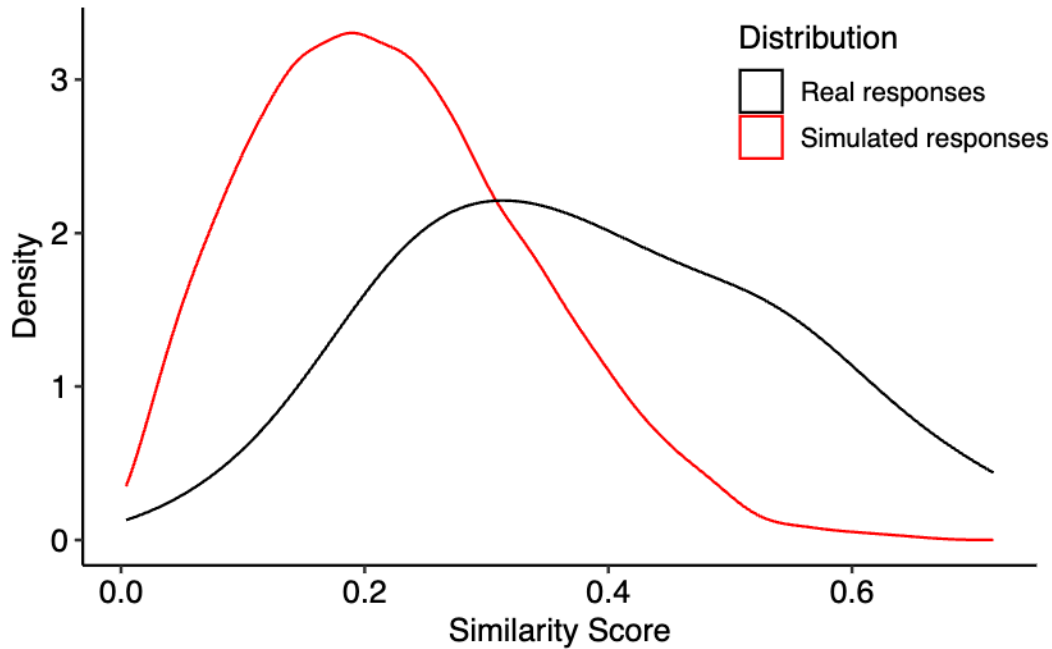


Figure 1: Probability density function of data from simulated participants responding at random (red line) and real participants' data (black line).

### 3 Classifying participants as interoceptive or non-interoceptive

In order to classify participants as either interoceptive or non-interoceptive, a gaussian mixture model with 2 mixtures was applied to the similarity values following the assumption that the population is made of two subpopulations; interoceptive and non-interoceptive participants. Briefly, a Z-score for each participant was calculated for the interoceptive and non-interoceptive distributions separately, and these Z-scores were used to calculate the probability of an individual being interoceptive or non-interoceptive. The estimated probability distributions, along with the distribution of real responses can be seen below.

statistic	p.value	method	alternative
99106	0.0000004	Wilcoxon rank sum test with continuity correction	two.sided

Comparing the probabilities of a participant being Interoceptive or Non-Interoceptive allows a Bayes Factor (BF) to be calculated as the ratio of an individual belonging to one of the two distributions, over the probability of belonging to the other distribution. This allows each participant to be classified as being Interoceptive, Non-Interoceptive, or Unknown (Unclassified). This classification was carried out using three BF thresholds,  $>3$ ,  $>10$  and  $>30$ .

Overall (N=25)	
<b>BF &gt; 3</b>	
Interoceptive participants	10 (40.0%)
Non interoceptive participants	11 (44.0%)
Unknown	4 (16.0%)
<b>BF &gt; 10</b>	
Interoceptive participants	8 (32.0%)
Non interoceptive participants	10 (40.0%)
Unknown	7 (28.0%)
<b>BF &gt; 30</b>	
Interoceptive participants	5 (20.0%)
Non interoceptive participants	10 (40.0%)
Unknown	10 (40.0%)

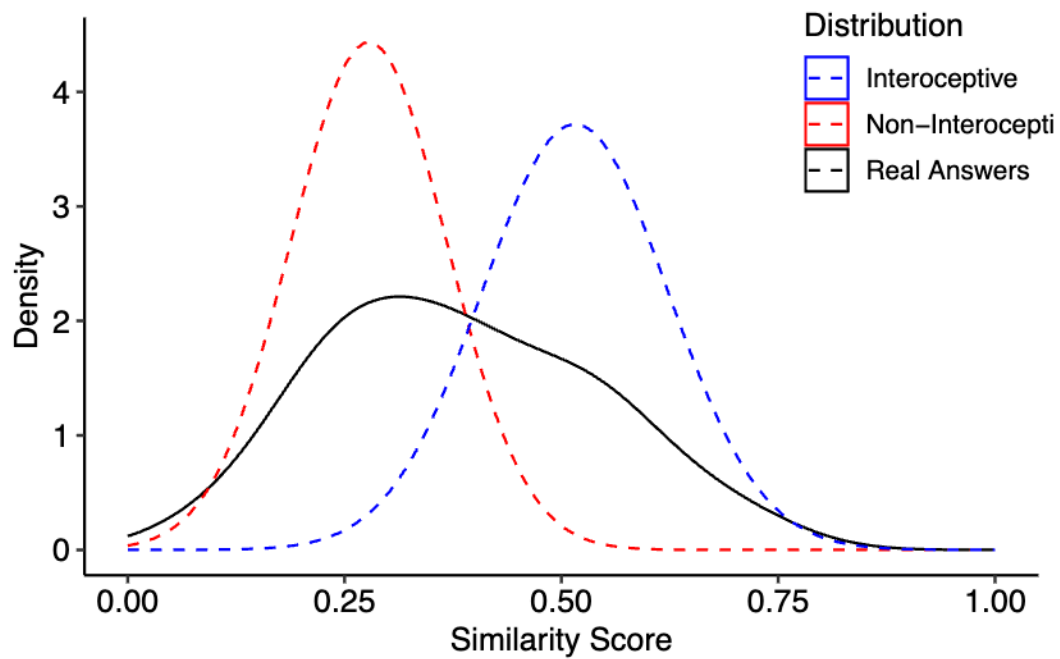


Figure 2: Probability density function of real participants' data (black line), estimated distribution of non-interoceptive participants (red line) and interoceptive participants (blue line).

## 4 Correlation between similarity scores and heart rate variability

Similarity scores were not correlated with heart rate metrics:

### 4.1 All participants

Var. 1	Var. 2	r	p-value	Type
similarity	Mean Heart Rate	0.22	0.293	Pearson
similarity	Mean Heart Rate	0.19	0.353	Spearman
similarity	SDNN	-0.25	0.232	Pearson
similarity	SDNN	-0.22	0.286	Spearman
similarity	RMSSD	-0.03	0.905	Pearson
similarity	RMSSD	0.00	0.984	Spearman
similarity	PNN50	0.25	0.233	Pearson
similarity	PNN50	0.19	0.369	Spearman

### 4.2 Interoceptive Participants ( $BF > 3$ )

Var. 1	Var. 2	r	p-value	Type
similarity	Mean Heart Rate	0.21	0.554	Pearson
similarity	Mean Heart Rate	0.14	0.707	Spearman
similarity	SDNN	0.24	0.497	Pearson
similarity	SDNN	0.47	0.178	Spearman
similarity	RMSSD	0.55	0.098	Pearson
similarity	RMSSD	0.50	0.143	Spearman
similarity	PNN50	0.74	0.015	Pearson
similarity	PNN50	0.76	0.016	Spearman

### 4.3 Non-Interoceptive Participants ( $BF > 3$ )

Var. 1	Var. 2	r	p-value	Type
similarity	Mean Heart Rate	0.18	0.601	Pearson
similarity	Mean Heart Rate	0.25	0.451	Spearman
similarity	SDNN	-0.29	0.393	Pearson
similarity	SDNN	-0.30	0.371	Spearman
similarity	RMSSD	-0.24	0.475	Pearson
similarity	RMSSD	-0.16	0.634	Spearman

Var. 1	Var. 2	r	p-value	Type
similarity	PNN50	-0.10	0.763	Pearson
similarity	PNN50	-0.10	0.776	Spearman

## 5 Correlation between Similarity scores and engagement metrics

Likewise, there was no evidence of correlation between similarity scores and engagement metrics.

### 5.1 All participants

Var. 1	Var. 2	r	p-value	Type
Similarity	Mean time taken on trials	0.31	0.130	Pearson
Similarity	Mean time taken on trials	0.23	0.272	Spearman
Similarity	Mean engagement trials	0.34	0.101	Pearson
Similarity	Mean engagement trials	0.26	0.206	Spearman

### 5.2 Interoceptive Participants ( $BF > 3$ )

Var. 1	Var. 2	r	p-value	Type
Similarity	Mean time taken on trials	0.59	0.074	Pearson
Similarity	Mean time taken on trials	0.56	0.096	Spearman
Similarity	Mean engagement trials	0.63	0.051	Pearson
Similarity	Mean engagement trials	0.62	0.060	Spearman

### 5.3 Non-Interoceptive Participants ( $BF > 3$ )

Var. 1	Var. 2	r	p-value	Type
Similarity	Mean time taken on trials	0.07	0.846	Pearson
Similarity	Mean time taken on trials	0.00	1.000	Spearman
Similarity	Mean engagement trials	0.06	0.864	Pearson
Similarity	Mean engagement trials	-0.04	0.924	Spearman

## 6 Differences in HRV / engagement / confidence between interoceptive / non-interoceptive participants (BF>3)

	Interoceptive participants (N=10)	Non interoceptive participants (N=11)	Unknown (N=4)	Total (N=25)	p value
<b>Similarity</b>					< 0.001
Mean (SD)	0.54 (0.09)	0.24 (0.07)	0.38 (0.03)	0.38 (0.16)	
Range	0.42 - 0.72	0.09 - 0.34	0.36 - 0.41	0.09 - 0.72	
<b>Mean confidence score</b>					0.354
Mean (SD)	5.48 (1.59)	4.32 (1.94)	4.97 (1.89)	4.89 (1.80)	
Range	1.76 - 7.82	1.18 - 6.71	2.88 - 6.82	1.18 - 7.82	
<b>Mean heart rate</b>					0.685
Mean (SD)	80.02 (6.30)	77.39 (7.77)	79.41 (6.66)	78.76 (6.87)	
Range	72.79 - 92.86	63.47 - 89.74	71.44 - 87.37	63.47 - 92.86	
<b>SDNN</b>					0.247
Mean (SD)	134.25 (96.23)	191.23 (107.03)	104.65 (70.92)	154.59 (100.39)	
Range	49.45 - 375.94	66.22 - 333.92	57.27 - 210.04	49.45 - 375.94	
<b>RMSSD</b>					0.740
Mean (SD)	125.82 (70.37)	139.80 (84.75)	104.28 (84.61)	128.52 (76.84)	
Range	47.23 - 239.30	42.63 - 261.65	57.58 - 230.84	42.63 - 261.65	
<b>PNN50</b>					0.836
Mean (SD)	52.50 (19.06)	47.52 (19.97)	49.56 (15.14)	49.84 (18.35)	
Range	25.71 - 74.40	19.23 - 77.08	40.71 - 72.22	19.23 - 77.08	

	Interoceptive participants (N=10)	Non interoceptive participants (N=11)	Unknown (N=4)	Total (N=25)	p value
<b>Time spent on each trial</b>					0.449
Mean (SD)	23.23 (10.76)	19.79 (8.03)	26.59 (10.29)	22.25 (9.48)	
Range	8.14 - 40.03	8.32 - 35.44	19.08 - 41.43	8.14 - 41.43	
<b>Mean engagement trials</b>					0.347
Mean (SD)	29.42 (12.90)	24.28 (10.94)	34.07 (12.44)	27.91 (12.04)	
Range	9.94 - 50.23	9.29 - 44.35	25.94 - 52.53	9.29 - 52.53	

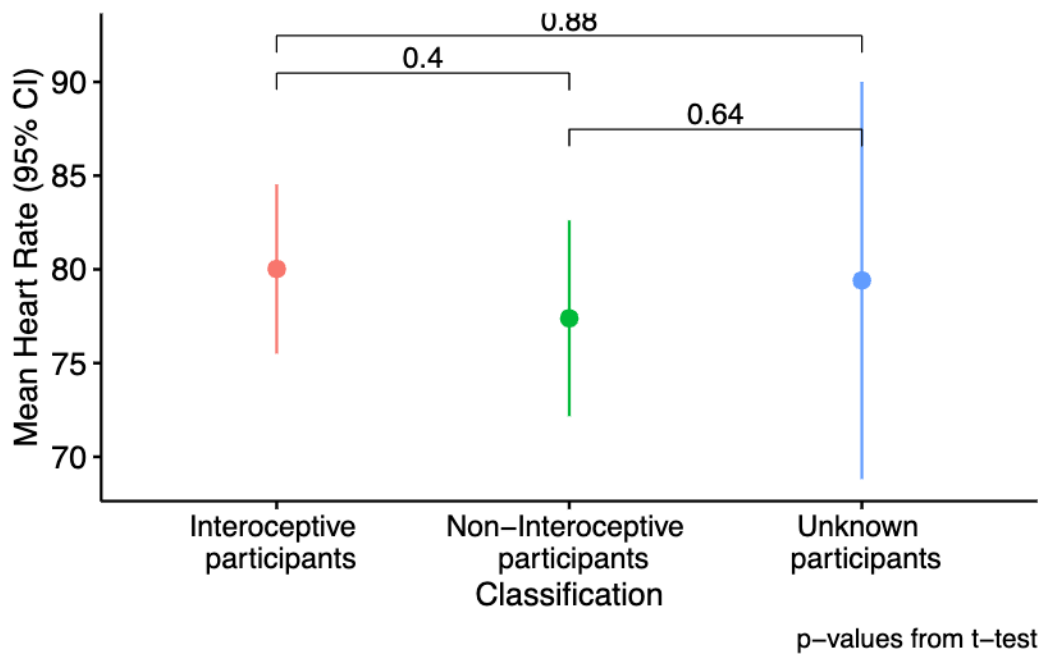


Figure 3: Difference in mean heart rate between participants classified as interoceptive, non-interoceptive or unknown.