The Relationship between Automatic Imitation, Interoception, and Coupling with the Cardiac Cycle

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Background

Interoceptive accuracy, the ability to perceive internal bodily signals such as the heartbeat, has been found to be related to the tendency to **automatically imitate** others hand movements (Ainley et al. 2014; Palmer & Tsakiris, 2018). Here, we adapted an **automatic imitation paradigm** so that stimuli could either be presented during **systole** or **diastole** (Figure 1). In addition, we measured participants **interoceptive abilities** using a heartbeat detection task (HDT), heartbeat counting task (HCT) as well as German version of the Interoceptive Accuracy- (IAS) and Interoceptive Attention Scales (IATS). Last, participants also filled in the Toronto Alexithymia Scale (TAS-20), as previous research has found a link between automatic imitation and alexithymia (Sowden et al. 2016).

Results

In our **confirmatory analysis** we do not replicate a relation between interoceptive accuracy measures and automatic imitation (Figure 2, $N = 62$). Further, we do not find an effect of timing with the heartbeat. In contrast, in an **exploratory analysis** we find that confidence ratings in an interoceptive accuracy task was related to performance in the automatic imitation task (Figure 3). Further, we also find that a subscale of the TAS was related to performance on the automatic imitation task.

Discussion

Our results suggest that **confidence** in perceiving interoceptive signals may have a greater impact on automatic imitation scores than interoceptive accuracy.
Further, we highlight that the need to dissociate between different **levels of interoception** when investigating related constructs.

1 Paradigm

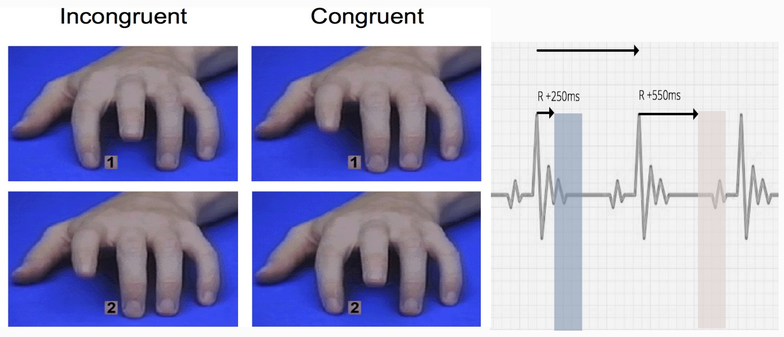
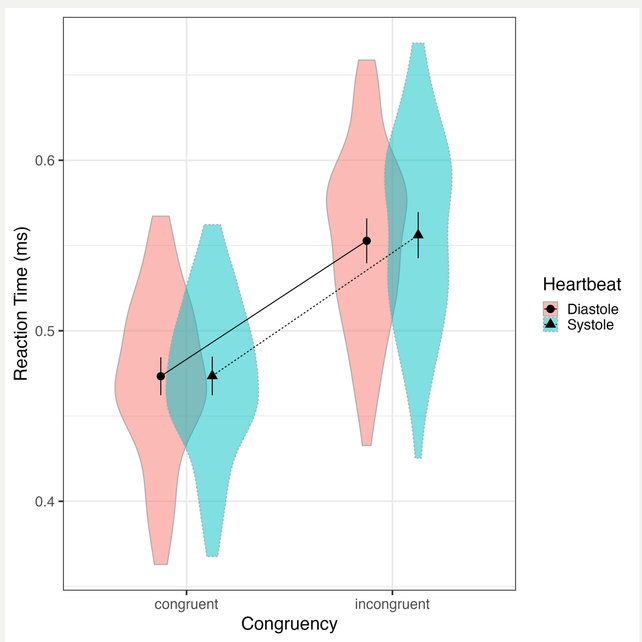


Figure 1. Adapted automatic imitation task. Stimuli were presented either during systole (R+250ms) diastole (R+550ms).

2 Linear Mixed Model



Fixed Effect	Estimate	Std. Error	df	t value	p value
Congruency	0.081	0.003	59.825	26.179	.001*
Heartbeat	-0.002	0.002	3074.045	-1.645	.100
HDT	0.107	0.007	13796.019	16.145	.001*
Congruency* Heartbeat	-0.002	0.003	13799.129	-0.524	.601
Congruency*HDT	0.014	0.027	60.133	0.514	.609
Heartbeat*HDT	0.018	0.013	3110.357	1.373	.170
3-way interaction	-0.008	0.027	13809.916	-0.289	.773

Figure 2. Results from our preregistered analysis. **Figure**: Interaction of heartbeat timing and congruency.

Table: linear mixed model; formula: lmer(rt ~ congruency*heartbeat*HDT + (0 + congruency + hb | id))

3 Correlation with congruency effect

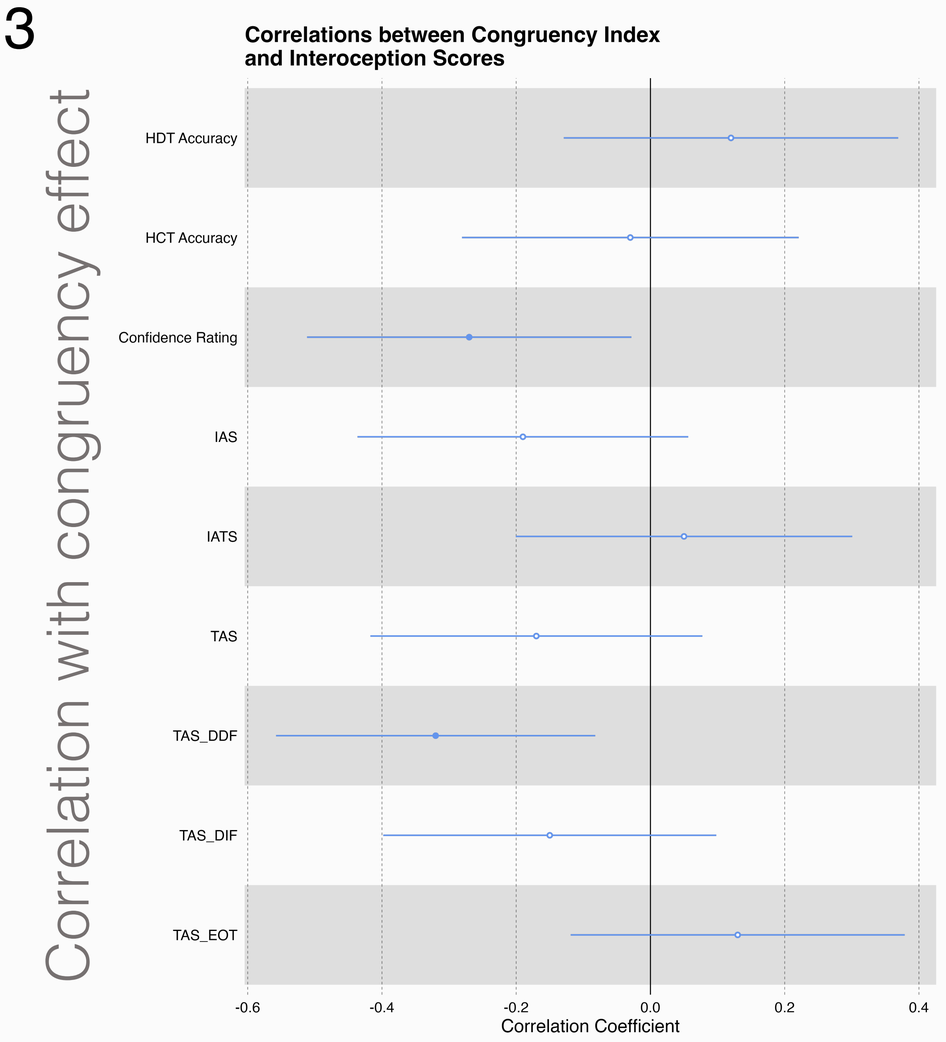


Figure 3. Correlations of interoception indices with the congruency index.

References/Acknowledgments

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