

Similarities in Autistic and Neurotypical Visual–haptic Perception when Making Judgements about Conflicting Sensory Stimuli

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Supplementary Materials

Data is presented from an additional experiment which was similar to that reported in the manuscript text, but included a no-conflict dual modality condition.

Participants

Participants were 21 NT adults (12 female) with a mean age of 21.08 ± 5.98 .

Apparatus, Design and Procedure

The study was identical to the experiment reported in the manuscript. An additional standard was included in the dual modality condition in which the block on the front and back of the cartridge was 55mm in height (referred to herein as the dual modality no conflict condition). To offset the additional testing time, the 52mm and 57mm comparison blocks were not included in this experiment.

Analysis

The analysis was the same as the experiment reported in the main manuscript. One PSE data point was 2.5 median absolute deviations from the condition median and was replaced with the minimum value -0.1 for the statistical analysis. Data from 4 participants were removed prior to analysis as function fits were poor ($pDev < .05$) and were not improved with refitting with a lapse rate that was free to vary. See Table S1.

Table S1. Psychometric function goodness of fit (mean $pDev \pm SD$). Values closer to 1 represent better fits (see Kingdom & Prins, 2009).

	Visual	Haptic	No-conflict	Conflict 1	Conflict 2
pDev	0.31 ± 0.19	0.55 ± 0.30	0.54 ± 0.25	0.38 ± 0.27	0.43 ± 0.28

Results

Mean standard deviation (σ) parameters are plotted in Fig S1. σ_{vh} measured in the dual modality, no conflict condition was compared with the predictions derived from the MLE, SCS and sub-optimal model to explore participants visual-haptic processing using paired sample t-tests (Bonferroni corrected $\alpha = .017$) and the Bayes Factor (BF_{10}). The SD was significantly greater in the dual modality condition than the MLE prediction ($t(16) = 3.19, p = .006, d = .77$). For this comparison, $BF_{10} = 8.58$ meaning that the alternative hypothesis was 8.58 times more likely than the null. The SD in the dual modality condition was significantly lower than the predictions of the SCS model ($t(16) = 3.01, p = .008, d = 0.73$). For this comparison, $BF_{10} = 6.23$ meaning the alternative was 6.23 times more likely than the null. The SD in the dual modality condition was lower than the sub-optimal prediction, although this difference did not reach statistical significance ($t(16) = 1.16, p = .262, d = .28$). For this comparison, $BF_{10} = 0.45$ meaning the alternative was 0.45 times more likely than the null (or that the null was 2.22 times more likely).

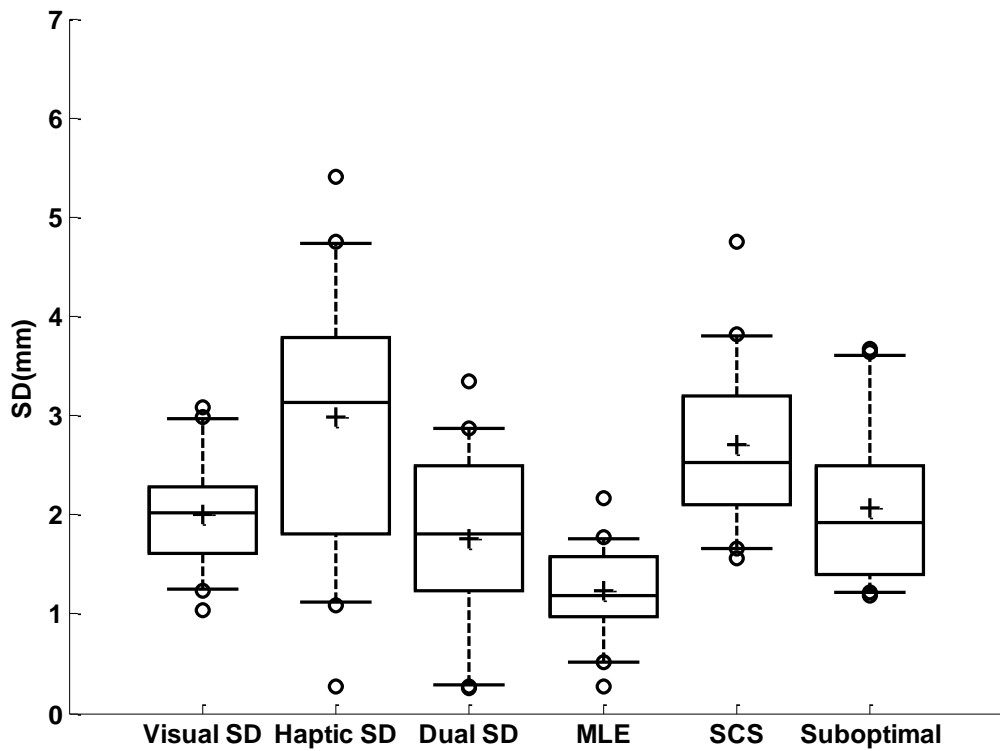


Figure S1. Standard Deviation measured in each condition and the prediction from the MLE model, the SCS model and the sub-optimal model. The dual modality data was estimated from participant's performance in the cue-consistent condition. The edges of each box represent the upper and lower quartile, the whiskers represents the most extreme decile. The line within each box denotes the condition median, the cross is the mean. Open dots represent extreme data points.

Participant PSEs in each of the dual modality conditions (conflict 1, no conflict, conflict 2) are plotted as a function of the size of the conflict (see Figure S2).

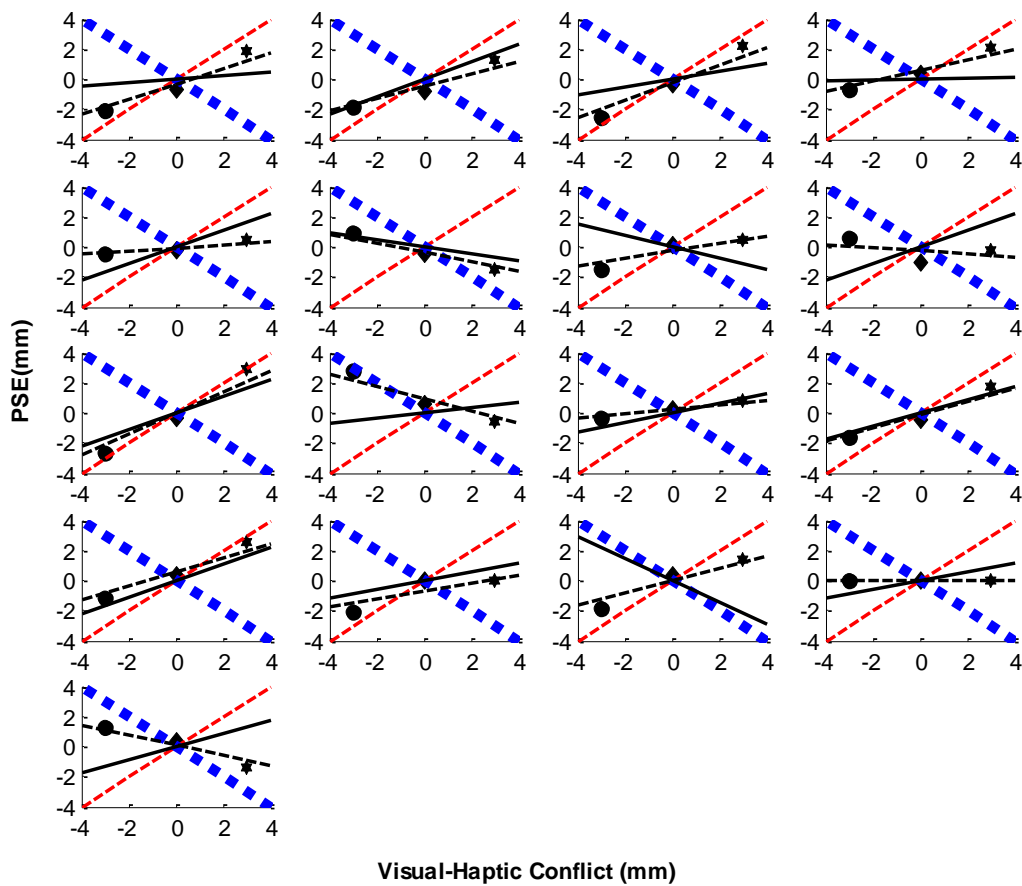


Figure S2. PSEs plotted as a function of cue-conflict in each of the dual modality conditions (conflict 1, no conflict, conflict 2). Conflict 1 (visual block of 58mm and a haptic block of 52mm) is represented by a star, the no conflict condition (visual block of 55mm, haptic block of 55mm) a diamond and conflict 2 (visual block of 52mm and a haptic block of 58mm) a circle. The dotted black line is the best linear fit of the measured data points for each participant. The solid black line is the MLE prediction for that participant, the red line is the prediction for complete visual dominance and the blue line for complete haptic dominance. If the fit of the measured data points fall closely to that of the model predictions then the participant is performing in a manner which approximates that particular model.

PSEs for conflict 1 and 2 were averaged after reversing the polarity of the data in the conflict 2 condition, so that more positive PSEs indicated more visual capture and more negative PSEs more haptic capture. Pearson's correlation coefficient was calculated to explore the extent to which participant's performance was consistent with the MLE model predictions. There was no significant correlation between measured and predicted PSEs ($r(17) = .07, p = .770$)

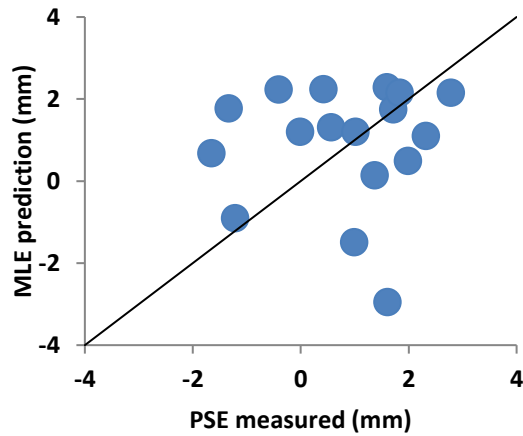


Figure S3. Average PSE across the dual modality conflict conditions as a function of the MLE predictions. Data in the conflict 2 condition was reversed in polarity so that a positive value indicated that the participant was displaying more visual capture and a negative value more haptic capture. If the data points fall close to the solid $x = y$ line then it suggests that they are performing in a manner well predicted by the MLE model. The dashed line indicates where data points would fall for complete visual dominance and the dotted line for complete haptic dominance.

Residual sum of squares was also calculated to explore the strength of each model fit to the data. Residual sum of squares are included in Table S1.

Table S2. Residual sum of squares comparing measured dual modality SD with predictions derived from the MLE, SCE and suboptimal models. Models of visual and haptic capture were approximated by comparing performance with visual and haptic SD. Lower values indicate that model was a better fit to the dual modality data.

Dual vs	MLE	SCS	Sub-optimal	Visual	Haptic
	6.88	18.58	17.61	11.75	26.37