Audio-visual crossmodal correspondences in domestic dogs (Canis familiaris)

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Models: design and results

Table 1 *Model 1: Effect of congruency of the audio-visual stimulus and the order of presentation on the proportion of time spent tracing the stimulus as a % of duration of looking*

Source	*df1, df2*	*F*	*p*
Intercept	1, 42.222	218.997	<0.0001
Congruent (Y/N)	1, 33.128	4.761	0.036
Order of presentation	1,33.128	0.507	0.481
Congruent * Order of presentation	1, 42.222	0.602	0.442

Note. Linear Mixed Model (LMM) testing the effect of congruency of the visual stimulus and the order of presentation on the percentage of time the dog spent tracing, out of the total time he/she spent looking as fixed effects with dog ID as a random effect. The residuals from the model were normally distributed and the variance ratio did not exceed 2.

Table 2 *Model 2: Effect of congruency of the audio-visual stimulus and the order of presentation time spent tracing the audio-visual stimulus*

Source	*df1, df2*	*F*	*p*
Intercept	1,42.21	139.23	<0.0001
Congruent (Y/N)	1, 33.87	3.05	0.09
Order of presentation	1,33.87	0.13	0.72
Congruent * Order of presentation	1,42.21	0.05	0.83

Note. Linear Mixed Model (LMM) testing the effect of congruency of the visual stimulus and the order of presentation on the time spent tracing the stimulus as fixed effects with dog ID as a random effect. The residuals from the model were normally distributed and the variance ratio did not exceed 2.

Table 3 *Model 3: Effect of congruency of the audio-visual stimulus and the order of presentation on the duration of looking at the stimulus*

Source	*df1, df2*	*F*	*p*
Intercept	1, 36.180	740.837	<0.0001
Congruent (Y/N)	1, 34.092	0.718	0.403
Order of presentation	1, 34.092	0.140	0.711
Congruent * Order of presentation	1, 36.180	0.536	0.469

Note. Linear Mixed Model (LMM) testing the effect of congruency of the visual stimulus and the order of presentation on duration of looking at the stimulus as fixed effects with dog ID as a random effect. The residuals from the model were not normally distributed but the comparisons of the CIs from the model and a bootstrap did not show any discrepancies so the original model was retained. The variance ratio did not exceed 2.

Exclusion criteria

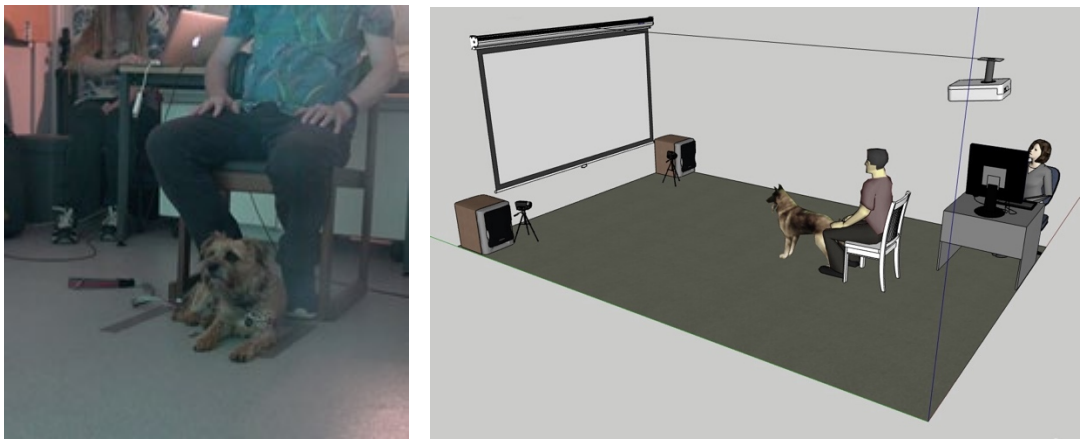
20 trials were excluded due to the dogs' failure to attend to the screen, 22 due to the dogs' overexcitement or anxiety, 71 due to dogs not looking at the screen at the start of the trial, 2 due to background noise, 7 due to the owner interacting with the dog during testing, 2 due to dogs losing interest too quickly to be able to code a behavioural response, 15 due to technical problems, 5 due to potential relevant medical problems such as ear or eye infections reported post testing. Overall 64 trials from 45 dogs aged 7-120 months (M=49.2, SD= 28.1) were included in the analysis.

Materials

The presentations were projected onto a wall with an overhead projector (Eiki Brilliant Projector LC-XB28) and a MacBook Pro laptop. The sound was played using two Behringer Europort MPA40BT speakers placed adjacent and on both sides of the wall onto which the animations were projected. An audio-visual animation of moving insects was projected in between each trial as a means of attracting the dogs' attention to the screen.

Dogs' behaviour was recorded using a SONY (Handycam XAVC 5 AVCHD Progressive) camera placed on a tripod in front and to the left of the dog. There was another camera (SONY Handycam AVCHD Progressive) placed in front and to the right of the dog which was sending a live feed to a screen monitor placed behind the dog and owner.

Experimental set up



The experimental set up: the dog was positioned in front of the owner and facing the projection, the experimenter was positioned behind the dog and owner.