PIGEON COURTSHIP BEHAVIOUR IN RESPONSE TO LIVE BIRDS AND VIDEO PRESENTATIONS

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1 INTRODUCTION
Over the last decade several studies have demonstrated the utility of video based technologies for presenting stimulus patterns for studies of animal behaviour (Szwarc and Rosenbaum, 1980; Cook and Mineka, 1990; Clark and Uetz, 1990; Evans and Marah, 1991; Evans et al., 1993: McDougal and Galet, 1994). In a recent experiment Shimizu (1997) found that male pigeons (Columba livia) exhibited courtship displays to video images of female pigeons that were similar to their responses to live females, while exhibiting no courtship behaviour to video images of a non-conspecific (parrot). In the experiments reported here we carried out initial studies to ascertain whether both male and female pigeons would produce courtship behaviour to video images of the opposite gender birds. In a second set of experiments we investigated how similar male courtship behaviour was when live models were substituted for the open arena, so that it was flush with one wall. A Sony 8mm VHS Handycam recorded both audio and video behaviour of the subjects.

2 METHODS
Apparatus: Experiments were conducted in an arena measuring 1.25 m wide x 1.25 m long x 1.25 m high, with a TV set which displayed stimulus conditions, positioned so that it was flush with one wall. A Sony 8mm VHS Handycam recorded both audio and video behaviour of the subjects.

Stimuli in Experiment 1 consisted of video-recordings of, (1) a sexually receptive female pigeon, (2) a non-sexually receptive female pigeon, (3) a sexually receptive male pigeon, and (4) a non-conspecific (a domestic mallard duck).

For experiment 2, similar sets of stimuli were made but males were the models, and females the subjects.

Procedure: The stimulus conditions were counterbalanced across subjects using 4 x 4 Latin Squares. Each test trial was scored on a number of courtship dimensions, including frequency of 'Courtship Cooing', 'Tail Dragging', 'Driving' and 'Displacement Preening'. In addition, the duration of 'Parading', 'Inflation/Erection of feathers', and 'Total Courtship Duration' were scored. The video tapes of a random sample of test trials were scored twice, once by one of the experimenters and also "blindly" by another person, yielding an r = 0.996.

Experiments 3 and 4: Experiment 3 was essentially similar to experiment 1 except that 5 male subjects were used, and three experimental conditions. These consisted of (1) a live female bird model, (2) a videotaped version of the same female model, and (3) a video of an empty room. In Experiment 4 a narrow walkway was substituted for the open arena, so that videotaped records of the male birds behaviour could be "standardized" for easy automatic computer analysis of records. The same three stimulus conditions used in Experiment 3 were repeated.

3 RESULTS

Figure 1: Male Recognition Experiment 1 - Total Courtship Duration.

Figure 2: Female Recognition Experiment 2 - Total Courtship Duration.

Figure 3: Arena Experiment - Total Courtship Duration.

Figure 4: Arena Experiment - Proportion of Half Circles and Waltzing.

Figure 5: Runway Experiment - Total Courtship Duration.

Figure 6: Runway Experiment - Proportion of Half Circles and Waltzing.

Figure 7: Automated Scoring in the Arena Experiment - Average Velocity of Movement of the Pigeon’s Path.

Figure 8: Automated Scoring in the Arena Experiment - Frequency of Half Circles (Waltzing).

4 CONCLUSION
1. Both male and female pigeons exhibit robust courtship behaviour to video images of conspecifics of the opposite gender, that is essentially similar to that exhibited to live models.  
2. The courtship behaviour contains all of the elements seen in natural courtship, "bowing", "cooing", "waltzing", "tail-dragging" and "charging".  
3. The same courtship behaviour is exhibited in an arena and runway.  
4. Automated computer scoring of courtship responses is feasible and reliable.  
5. These data, together with our detailed ethograms (see poster ...) will be critical for the construction of our virtual pigeon for future "neuroethological studies".

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