

Dissecting and validating the salience of recognition cues used by female zebra finches' to discriminate con- and heterospecific males

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Successful sexual reproduction relies on accurate mate selection criteria, including correct species recognition [1, 2]. In studying species recognition in birds, video playback of visual and/or acoustic cues can be a valuable method for investigating the relative importance of these sensory cues in the recognition process by allowing independent manipulation of the two communication modes. Despite video-playbacks' widespread use to disassociate the roles of visual and acoustic recognition cues, the validity of behavioural responses towards video-playbacks have not yet been tested in a free-choice pair bonding paradigm. In a model system for social recognition research, the zebra finch (*Taeniopygia guttata*) [3], we investigated females' behavioural responses to playbacks of male conspecific and heterospecific cues from an experimentally novel sympatric species, the plumhead finch (*Neochmia modesta*). Multiple unfamiliar male conspecifics and heterospecifics were individually filmed and footage was edited to create video playback stimuli of a male singing and performing additional courtship behaviours. Simultaneous (but acoustically alternating) playbacks were presented to the female subjects. To investigate the relative importance of visual and acoustic cues in species recognition we presented playbacks of visual cues only, acoustic cues only, these cues concurrently and then a combination of visual and acoustic cues where the songs of the two stimulus species were swapped and edited so that both species appeared to be visually singing each others song. This study represents the first application of the use of heterospecific song in species recognition in female zebra finches and the first to alter the visual and acoustic cues without affecting the spatial association of these cues that are used for proximity decisions [4]. The female subjects' response behaviour was recorded using a scan-sampling design every 10 s where both location and behaviour was noted. The species discrimination preferences of females were determined by calculating the average proportion of total choice time that they spent in proximity to the conspecific (or conspecific acoustic when the songs were swapped between species) [3]. In addition to spatial discrimination we measured and found significant individual variation in behavioural response to the video playbacks themselves irrespective of presented species.

In monogamous species such as the zebra finch where both sexes invest in parental care there is minimal reciprocal research on criteria that males may use for selecting females [5, 6, 7]. To validate our behavioural assay, we predicted that significant behavioural variation displayed by female zebra finches in our employed testing context might be able to correlate with mating decisions made by male zebra finches. By observing pair bonding behaviours in a free-flight aviary mate choice paradigm, the relevance of females' variation in mate selection behaviour (choosiness) [8] in our experiments to behavioural pairbonding was confirmed. We found significant positive correlations between the average

proportion of total choice time that females were actively engaged with the visual presentation of males and male zebra finches' preferences for a particular female (see Figure 1). These results are the first to demonstrate a biologically relevant statistical relationship between variable female choice behaviours in one testing context and subsequent mate choice decisions made by males using an alternative testing paradigm in a socially monogamous species.

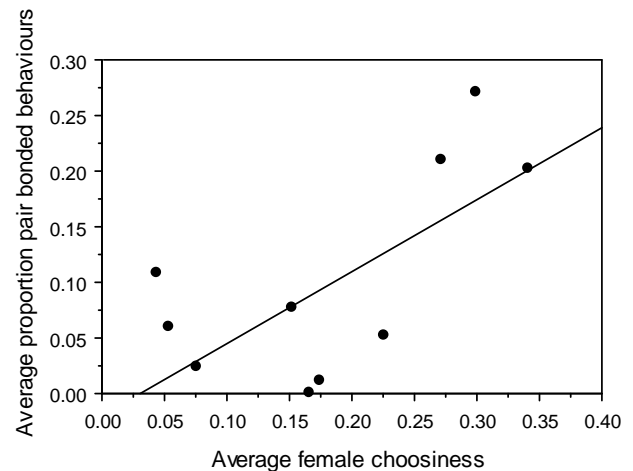


Figure 1. A regression plot showing the average proportion of total pair bonded behaviours that each female was selected to engage in with the subject males in relation to the average observed female choosiness in the video playback trials. Individual data points indicate the 10 female stimuli.

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