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Lack of Vocal Mate Recognition in Female Red-winged Blackbirds.—The vocal recognition of mates as individuals, though generally assumed to occur, has been demonstrated for only a few avian species. All or most of these species breed monogamously (Beer 1970). In an effort to determine if polygynously breeding birds recognize their mate's vocalizations, we presented territorial female Red-winged Blackbirds (*Agelaius phoeniceus*) with playback tapes of mate and non-mate male songs. We assumed that differential responses to mate and non-mate song would indicate that females were recognizing their mates.

Red-winged Blackbirds are exceptional in that the females sing characteristic songs in connection with the establishment and maintenance of individually defended "sub-territories" within the confines of the male's larger territory (Nero 1956, pers. obs.). Female Red-wings sing two fairly distinct song types (Fig. 1a–b). The females' Type 2 songs are evoked by territorial intrusion, both by conspecific females and by other species, and likely function as aggressive, territorial songs. Type 1 song is evoked during the early part of the breeding season by male song, and probably functions in pair-bond maintenance (Beletsky 1983). During the early weeks of the breeding season, a male's song delivery is closely followed in time by his mate's song (Fig. 1d) (Smith and Reid 1979); the female's Type 1 song either immediately follows male song, or is initiated midway through the male's song. Upon listening to this vocal interaction, we had the impression that the females were responding specifically to their mates' songs. Females seldom responded to songs of other territorial males nearby, but responded frequently to their mates' songs.

This study was conducted during the spring of 1977 on a maturing field in Old Field, Long Island, New York. Males in the present study had 1–3 females nesting on their

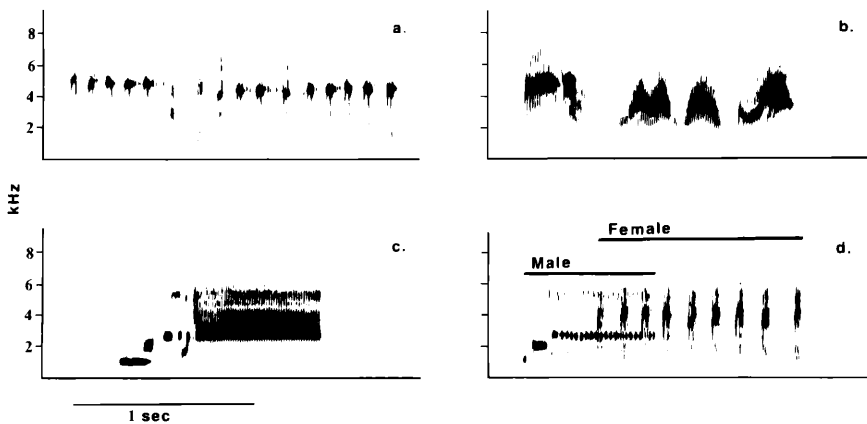


FIGURE 1. a. Type 1 female song; b. Type 2 female song; c. typical male song; d. Type 1 female song immediately following, and overlapping, male song.

territories, though only one female/male was used as a playback subject. Three territorial males were captured with decoy traps (Smith 1972) and marked with colored leg bands before the females arrived on the territories; females were not captured or marked. Songs were recorded with a Nagra IV-L tape recorder through a Sennheiser 211 microphone mounted on a 46 cm parabolic reflector. Sonagrams were prepared with a Kay Elemetrics Vibralyser model 7030A. Territorial boundaries for both males and females were determined by observing commonly used song perches and then connecting the outermost of these points.

For each of the 3 banded males, a technically good recording of a song was replicated many times and these replications were spliced together to make a 3-min long playback tape. Each song on the tape, approximately 1 sec long, was separated by 11 sec of silence, so that the songs were delivered at the rate of 5 songs/min. (Males in the sample population each possessed 5–7 renditions, or variations, of their species-typical "conc-a-ree" song. The renditions used in the playback tapes were picked at random from each male's repertoire. Smith and Reid (1979) have shown that specific renditions are not used in different social situations and so the various renditions are apparently equivalent in terms of the information they convey.) Playback experiments were initiated on 20 April, after females had established themselves on the male territories, and terminated 15 May, when pre-copulatory and nest-building behaviors were frequently observed.

Each tape was played back on the males' own territory, and on one of the other male's territories. Each of the 3 females tested (one on each of the 3 male territories) was exposed to the taped songs of her mate and to songs of a nearby non-mate. The resident male was present on the territories for varying amounts of time during these playbacks. All females were tested between 06:00 and 09:00 EDT. A Nagra amplifier/loudspeaker, connected by 17 m of cable to the Nagra recorder, was placed in the female's sub-territory. A playback test was initiated when the resident male and female were in the vicinity of the loudspeaker, and after the female had sung within 2 sec of her mate's song. Each test consisted of playing two tapes. Either the mate or non-mate tape began the test and the other tape followed, 10–60 min afterwards. After an interval of 7 days, the same female was tested again, but the tapes were presented in reverse order from the first test. We assumed that it was the same female one week later, since females appear to maintain territorial position throughout the breeding season (Nero 1956, Lenington 1980); in addition, females were recognizable by their idiosyncratic Type 2 songs.

The songs sung by the females in response to the playback songs were noted verbally into a cassette recorder. A female was scored as having responded to a particular song if she sang within 2 sec following broadcast of a male song. The use of a 2 sec response criterion was designed to reflect the natural timing of female song to male song. Data collected from the two tests of each female were pooled for analysis. The percent response of a female was determined by dividing the number of female song responses by the total number of male songs presented during the playback periods.

The percent responses of the females exposed to mate and non-mate tapes, respectively, were as follows: Female no. 1, 54% and 53%; Female no. 2, 37% and 22%; Female no. 3, 38% and 47%. G-test analysis of these data reveals that the females responded with equal frequency ($P > .05$) to the two song variations, i.e., they did not discriminate between taped mate and non-mate songs. This suggests that female Red-wings may not recognize mates on the basis of song.

A possible complication with this interpretation is that the resident male remained on the territory during at least a portion of all playbacks, at times directing songs at the loudspeaker, and perhaps influencing the females' responses. However, during the times the resident males did not respond to male song playback by singing, we did not observe any difference in the females' behavior toward the experimental songs.

Because of the small number of individuals tested, the results presented here should not be considered conclusive. However, the apparent lack of individual mate recognition found does not seem to be solely related to the acoustic mode of communication in the Red-wing. Females showed no difference in behavior toward males with blackened shoulder epaulets even if they had been mated for a period of weeks prior to treatment of the male's feathers (Smith 1972).

As in most avian breeding systems, including the Red-wing's, sexual partners must specifically exchange such basic information as reproductive state, readiness to copulate, etc., the non-discriminatory responses by the females puzzled us (especially as field observations had indicated that females responded preferentially to their mate's songs). Perhaps females are indeed responding to their mate's songs, but the responses are mediated by cues other than the actual physical structure of the male song; some territorial correlate of the song may be involved (e.g., the direction from which the song emanates, or the amplitude (intensity) of the song). As in most cases the mate's song is the loudest one the female hears, we believe that this may be one cue to which she could possibly attend.

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