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Brief report

Unusual imitation and song syntax in a Chaffinch *Fringilla coelebs* during pre-breeding season

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Song development and singing behaviour in Chaffinch (*Fringilla coelebs*) have been extensively studied. Vocal imitation by a wild Chaffinch individual, however, has previously been reported only once. Here, a Chaffinch individual singing with a highly aberrant repertoire is reported. A total of 173 songs of nine song types were recorded including song elements that resembled Wren (*Troglodytes troglodytes*) and Nuthatch (*Sitta europaea*). Unlike the typical Chaffinch song that includes repetitions of two to three distinct song types, this individual sang mostly by switching among these song types in subsequent phrases.

1. Introduction

Song mimicry in a non-mimicking songbird species may help us understand the evolution and behaviour of bird song (Dobkin 1979, Baylis 1982). Song development and singing behaviour in the Chaffinch (*Fringilla coelebs*) have been extensively studied (e.g., Thorpe 1954, Hinde 1958, Slater 1983, Hanski & Laurila 1993, Riebel & Slater 1998, 1999, Lachlan & Slater 2003, Leitão & Riebel 2003). Hence this species is a suitable candidate for future detailed studies as new questions continue to arise. Thus, documenting natural variation in song behaviour within this species strengthens the foundation on which future studies will be based.

Although Chaffinch song types may show considerable variation, most males have a small repertoire of mostly two to three distinct song types. Generally, Chaffinch song consists of two to five trills (phrases of repeated syllables) followed by a complex 'terminal flourish' (a short ending sequence of mostly non-repeated elements), and the same song type is repeated several times (Hinde 1958, Slater 1981, Riebel & Slater 1999). The Chaffinch song is learnt during the first year of life, and the period immediately following fledging is a particularly sensitive phase for song learning (Thorpe 1954). Lachlan and Slater (2003) found that first-year Chaffinches preferred learning songs from males about 500 m away, which may reflect the distance of natal dispersal, although males can sometimes change song repertoire during their second year after territory acquisition (Thorpe 1958). Vocal imitation in Chaffinch has only been documented three times: a captive individual copied the song of a Canary (*Serinus canaria*) (Slater 1983), another captive individual was trained to sing the song of a Tree Pipit (*Anthus trivialis*) (Thorpe 1958), and a wild individual imi-

tated Greenfinch (*Carduelis chloris*) (Conrads 1977). Here, I describe song types of a male Chaffinch with a highly aberrant repertoire involving imitations of song elements of other bird species.

2. Material and methods

The studied Chaffinch individual was found near Båstad (56°25'N, 12°52'E), Scania, southern Sweden. The residential area of mostly summer cottages is located in a pine (*Pinus sylvestris*) forest on sandy soil. Chaffinch is common in the residential area throughout the breeding season; furthermore, breeding densities are high in an adjacent 11-ha deciduous-dominated forest along the river Stensån. In addition to Chaffinch, this forest hosts many bird species of which Wren, Dunnock (*Prunella modularis*), Blue Tit (*Parus caeruleus*), Nuthatch and Greenfinch are particularly common.

Less than 30 individuals of Chaffinch were reported from northwestern Scania prior to 1 April 2004, as compared with over 1,000 individuals during the first week of April (Swedish Species Information Centre 2006). Thus, at the time of the study Chaffinches had recently arrived to the area from their wintering grounds.

The study morning – 8 April 2004 – was overcast with a light drizzle and +6°C. Binoculars (8 ×) were used to make prolonged observations of the imitating individual, which in all respects had the plumage of a male Chaffinch (*Fringilla coelebs coelebs*). A total of 16 min of sound recordings (using Sennheiser MKE 300 microphone and Sony MiniDisc Walkman MZ-R909) were made between 06:00 and 17:00. During this period the imitating Chaffinch was heard at various points within an area of about 5,000 m^2 comprised of residential gardens. The limited spatial range over which the unusual songs were heard and the recurrence of particular song types, including normal Chaffinch song, confirmed that the same bird was recorded throughout the day. Other singing Chaffinch males where frequently encountered during the day. A follow-up during subsequent days was not possible due to logistic reasons; the mimicking Chaffinch was not relocated during a later three-week visit to the area in June–July 2004.

Spectrograms were made using the software Raven Lite 1.0 for Windows (Cornell Lab of Ornithology 2003–2005). Songs were digitized with 16-bit accuracy and at a sampling rate of 11 kHz. Generated spectrograms had the following parameters: 256 points FFT/DFT, time resolution: 11.6 ms, frequency resolution: 43.1 Hz (i.e., default settings in Raven Lite).

Table 1. Song types of the Chaffinch with aberrant song repertoire recorded in Båstad, Sweden, on 8 April 2004.

Song type	Number of occurrences
Typical Chaffinch	
– trill	39
– trill + flourish	16
Elements of Wren song types	
– Wren	56
– Wren + trill	38
– trill + Wren	2
Elements of Nuthatch calls	
– Nuthatch	9
– Nuthatch + flourish	9
– Nuthatch + trill	3
Total	172

3. Results

A total of 172 songs of nine song types from the mimicking Chaffinch were recorded (for examples, consult electronic material at Ornis Fennica web page). Visual inspection of the spectrograms suggested that the most common of the aberrant song types included elements that resembled Wren song (Table 1, Fig. 1). The Chaffinch also imitated the excitement call of Nuthatch: a short metallic "twit", which is relatively loud and of distinctive quality. Although songs are here broadly characterized as belonging to different types, variation between song types was great (i.e., they were not stereotyped). The "trill + flourish" song also varied slightly between phrases (e.g., shorter or longer trills; with or without flourish).

The normal "trill + flourish" song was consistently less than 2.5 sec in duration, characteristic of normal Chaffinch song, but over 3 sec when having the "Wren" song type (i.e., not preceded by a typical Chaffinch song).

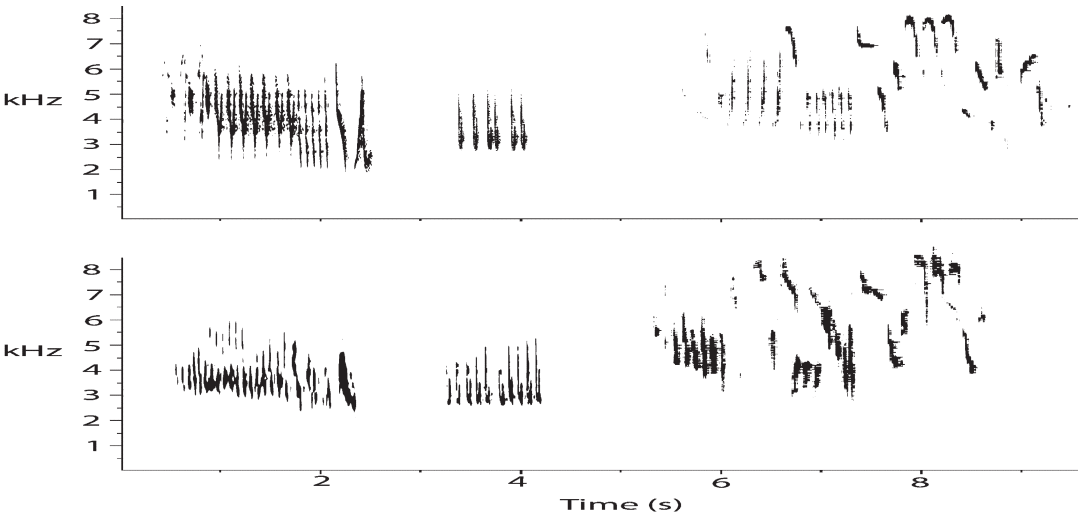

Fig. 1. The upper spectrogram shows a typical 'trill + flourish' song of a normal Chaffinch, excitement calls of a Nuthatch, and a typical Wren song; all are recorded in Scania, Sweden, during 2004. The lower spectrogram shows the aberrant Chaffinch's trill and flourish song (left) as well as its Nuthatch (middle) and Wren imitations (right). Note the staccato pulses between 3 and 5 kHz of the Nuthatch imitation and the high-frequency Wren-like elements around 8 kHz, which are never present in normal Chaffinch song. For audio files of the mimicking Chaffinch, recorded in Scania, Sweden on 8 April 2004, visit the Ornis Fennica website.

Song rate was rather constant throughout the day (9 to 12 songs per min). The individual frequently switched song types. A different type of song followed the preceding song type 96 times. Two similar song types, however, followed each other 16 times, three similar song types 9 times, and four or five similar song types 2 times, respectively. The most common repeated song types were "Wren" (14 times), "trill" (9 times), "Wren + trill" (5 times), "trill + flourish" (1 time) and "Nuthatch" (1 time).

4. Discussion

Several aspects of different song types of the studied Chaffinch individual, described here, are worth mentioning: (i) it imitated song elements of Wren and Nuthatch, and this is only the second time a mimicking Chaffinch has been reported in the wild; (ii) it also sang the typical Chaffinch "trill + flourish" song; (iii) it mostly sang by switching a song type from the previously-sang song type (avoided repetitions) unlike the typical Chaffinch song with multiple repetitions of the same song type. Thus, the studied individual followed an atypical learning paradigm. The individual may have been reared in the neighbourhood, as all bird species that were imitated by the subject individual were found nearby. Natal dispersal distance may be only 500 m in the Chaffinch (Lachlan & Slater 2003). However, the origin of the studied individual remains unknown, as all of the mimicked bird species are widely distributed over southern Sweden. Slater (1983) suggested that Chaffinches can learn song phrases across species with which the bird has a social relationship. This hypothesis initiated from an observation of a captive Chaffinch that learnt to sing like its foster parents (Canary) in a situation with no conspecific individuals. Furthermore, another captive Chaffinch was trained to sing like a Tree Pipit (Thorpe 1958).

The recordings of the aberrant Chaffinch song were made at the early breeding season. Therefore, this individual may still have been in the plastic song phase with high variability among songs and inclusion of non-typical Chaffinch phrases. The failure to relocate this individual on later visits may indicate that it had moved away, or it may have only used a typical Chaffinch song repertoire and thus escaped notice. Selection imposed by social interactions may have led to stereotopy within

song types following crystallization (Marler 1997). Unfamiliar, mimicking song types may not be attractive to female Chaffinches, thus resulting in a scarcity or absence of aberrant song types in species with restricted song repertoires. Indeed Riebel and Slater (1998) demonstrated that female Chaffinches preferred songs that are within the conspecific range (i.e., had the terminal flourish). In turn, this may partly explain the rarity of Chaffinches with song types other than the conspecific range, such as the aberrant individual reported here.

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Peipon *Fringilla coelebs* poikkeuksellinen laulutapa ennen pesimäkautta

Peipon (*Fringilla coelebs*) laulun kehittyminen ja laulukäyttäytyminen ovat paljon tutkittuja. Matkintojen sisällyttäminen lauluun on kuitenkin aiemmin dokumentoitu vain kerran. Tässä työssä dokumentoidaan poikkeuksellisesti laulavan peippoyksilön laulu. Aineisto koostui 173 äänitallennuksesta ja yhdeksästä laulutyypistä, jotka muistuttavat huomattavasti peukaloista (*Troglodytes troglodytes*) ja pähkinänakkelia (*Sitta europaea*). Tyypillisistä peipoista poiketen tutkittu yksilö myös useimmiten vaihteli laulutyyppiä peräkkäisten säkeiden välillä. Artikkelin liitteinä olevat äänitiedostot löytyvät Ornis Fennican internetsivuilta.

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