

Basic forms of elements (syllables) of phrases in chaffinch (*Fringilla coelebs* L.) song types

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Abstract

Species-specific song of chaffinch is hereditarily fixed in features such as frequency range (KHz), duration of song pattern (sec), interval (sec) between song types, repeating one after another at singing of male, and also the general song structure. During the exit of eggs from the nest due to activation by songs of parents, young male is capable to form at first (begin) song pattern, which has homogeneous elements (even continued till the first year of their life), and then after one year perceiving and learning their own complicated singing pattern consisting of various elements like specific vocal pattern (usually consisting of three parts or phrases – started singing, a trill, a final stroke) which is characteristic for all adult males of chaffinch. Chaffinch females have species-specific song, which is poorly structured, probably, as a result of uselessness of their vocal realization and economy of energy for other vital functions.

Key words: Chaffinch, singing pattern, polymorphism of song.

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1.0 Introduction

Chaffinches (*Fringilla coelebs* L.) are one of the most widespread species of birds which were objects of studying song organizations [1-3]. As against many others, chaffinch has harmonious, frequently short, precisely organized and in the greater degree song genetically determined in a time-and-frequency range [4-7]. The size of repertoire of one individual is within the limits of 1 – 6 types of songs [8]. Explanation of birds song variability shows, that traditional patterns of vocal behaviour do not exist equally with morphological features (more likely, as separate aspect). It partly due result of *cultural evolution*, which represents the important factor – as though a traditional heredity is developed, but, apparently, it not a parameter in morphological variability [9,10]. *Basic (base) structure* of bird's vocalization represents fundamental, stabilized, *species-specific characteristic* feature of vocalization [11]. Many local populations of birds are characterized by the *population specific* image (on sonogram) of a vocal pattern (*dialect*), which has certain *lexical* (dictionary structure), *morphological* (an accent, structure) and *phonetic* (pronunciation) features [12].

Many characteristics of a vocal of birds are precisely mentioned (related) by *social training traditions* (song learning), receiving its vocal patterns by *species-specific imitation*. Therefore the tradition, custom

should be taken into account at the analysis of *geographical variability* of vocal behaviour.

2.0 Material and methods

Tape records of male song were been made in *northwest* (Curonian spit, Baltic Sea) (N=153 males) and in *the central part* of the European Russia (Zvenigorod, Moscow, Michurinsk) (N=65 males) which are geographically 1000 km apart. Sonograms of song types were analyzed with the help of computer program *Avisoft SASLab Light*. In total about five thousand songs are analyzed. Song types were designated (marked) by *Latin letters*. *The songs of one type*, which has been recorded in different points (places) of territory were designated (marked) by *numbers in ascending order* (A1, A2, A3, etc.).

The sonograms can be used for definition of vocal variants, which are geographically distributed. Frequently (usually) *two qualitative methods* define: revealing of *phonetic distinctions* (phoneme) (frequency of a sound - KHz, its form on sonogram – (a pronunciation) – *syllabic variability* – isophones; revealing of *lexical distinctions* (lexicon) (dictionary structure – change of phrases of songs) – *a regional lexicon* – isolexes.

3.0 Results and discussion

Principles of the analysis of structure chaffinch song (*Fringilla coelebs* L.) (with a support on references) (Figure-1).

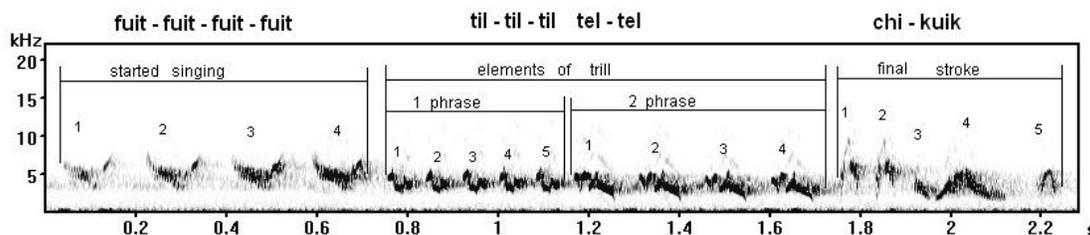


Figure-1: The analysis of structure of song type C of chaffinch (*Fringilla coelebs* L.)

1) On perception (recognition) on hearing, the song was subdivided into three parts: the row (number) of whistle sounds (as if started singing), trill sounds (are as though poured each other) and a final stroke (the example of the analysis is shown on more widespread song type C) (Figure-1).

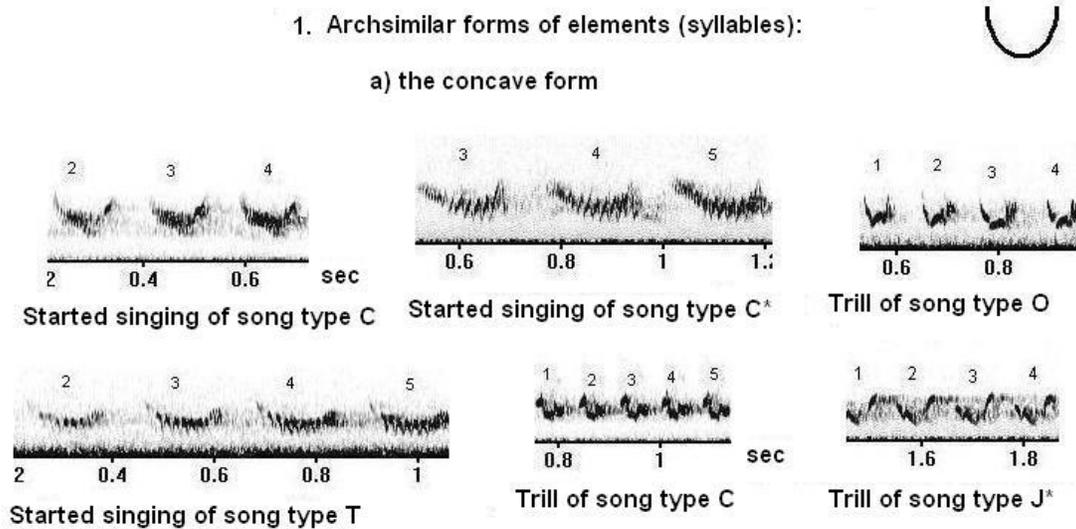


Figure-2. Archsimilar forms of elements (the concave form). * – dialect (modified) phrase of song types from different geographical populations of chaffinch (*Fringilla coelebs* L.)

Variability of separate phrases and their syllables (elements) of different chaffinch song types (*Fringilla coelebs* L.) in populations of the European part of Russia (Figure 2-9).

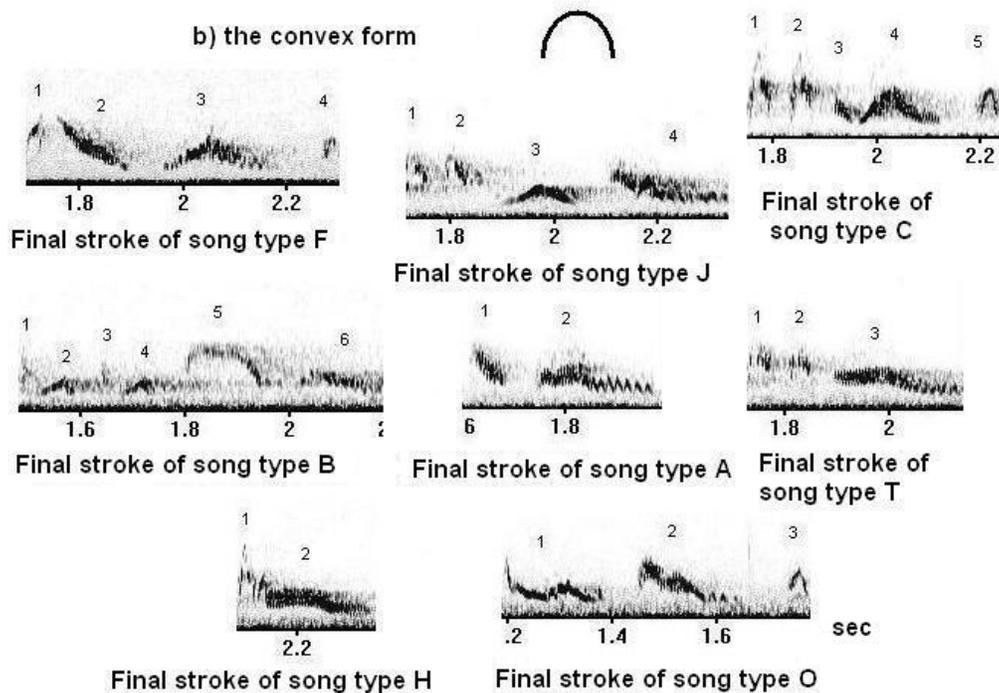


Figure-3. Archsimilar forms of elements (the convex form) of chaffinch song

- 2) Within the limits of these parts of songs on sonograms it is possible to allocate (design) the phrases (the elements similar in the form), in this case a trill includes two phrases in song type C.
- 3) Elements (syllables) can be simple (started singing and 1-st phrase of trill in song type C) and complex (compound), consisting of two and more subelements (2-nd phrase of trill in song type C).
- 4) Syllables (elements) are divided (shared) by intervals, but frequently shorter, than at phrases.
- 5) A final stroke in many types of songs consist of elements (syllables), different in the form (it is possible, therefore it such sharp, remarkable, "bright" on hearing).

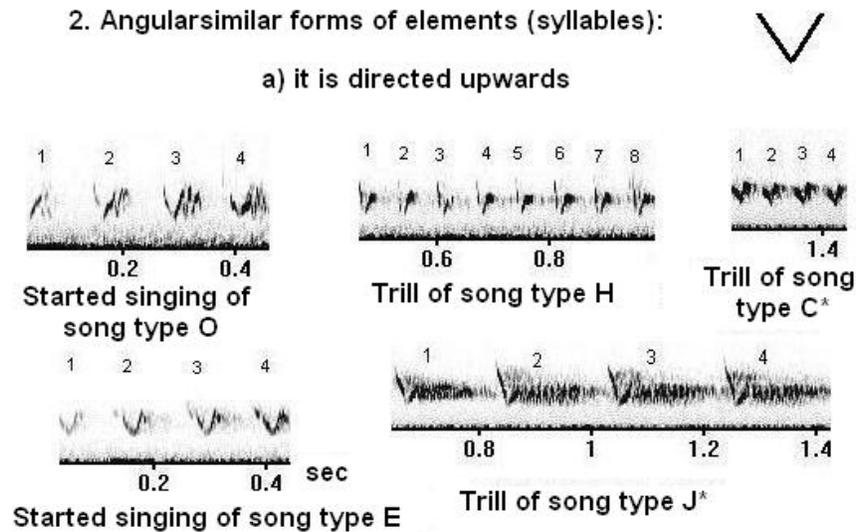


Figure-4: Angularsimilar forms of elements (it is directed upwards). * – dialect (modified) phrase of song types from different geographical populations of chaffinch (*Fringilla coelebs* L.)

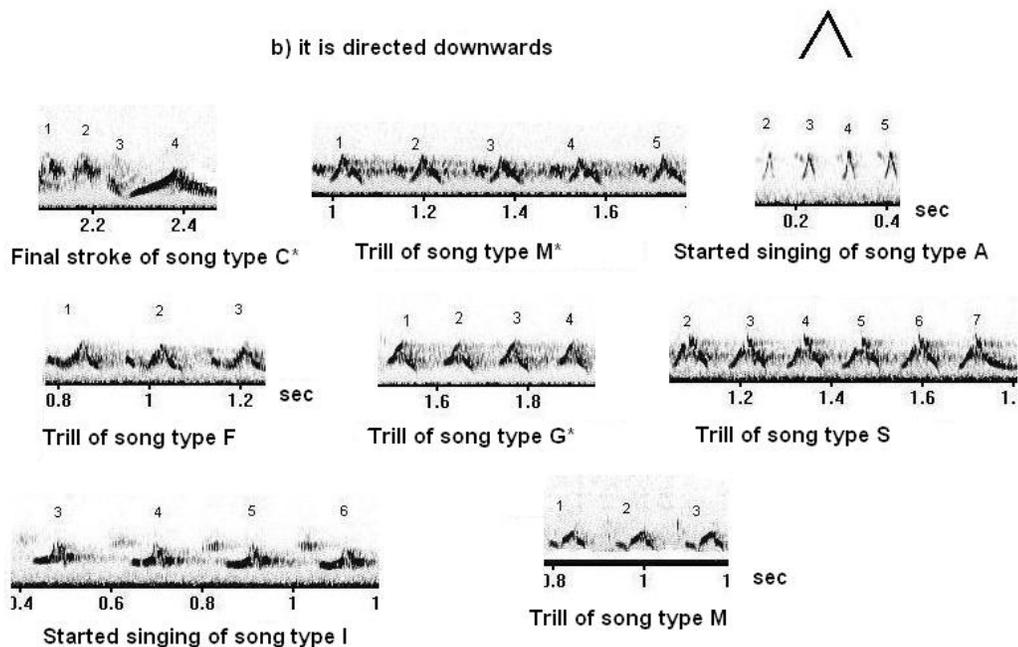


Figure-5: Angularsimilar forms of elements (it is directed of downwards). * – dialect (modified) phrase of song types from different geographical populations of chaffinch (*Fringilla coelebs* L.)

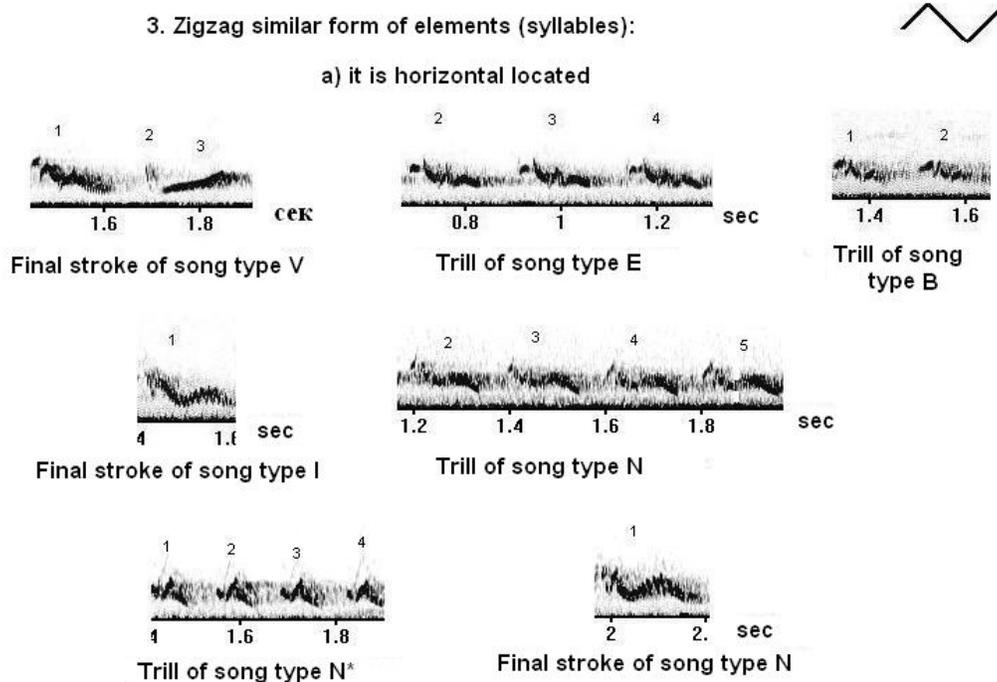


Figure-6: Zigzag similar forms of elements (it is horizontal located). * – dialect (modified) phrase of song types from different geographical populations of chaffinch (*Fringilla coelebs* L.)

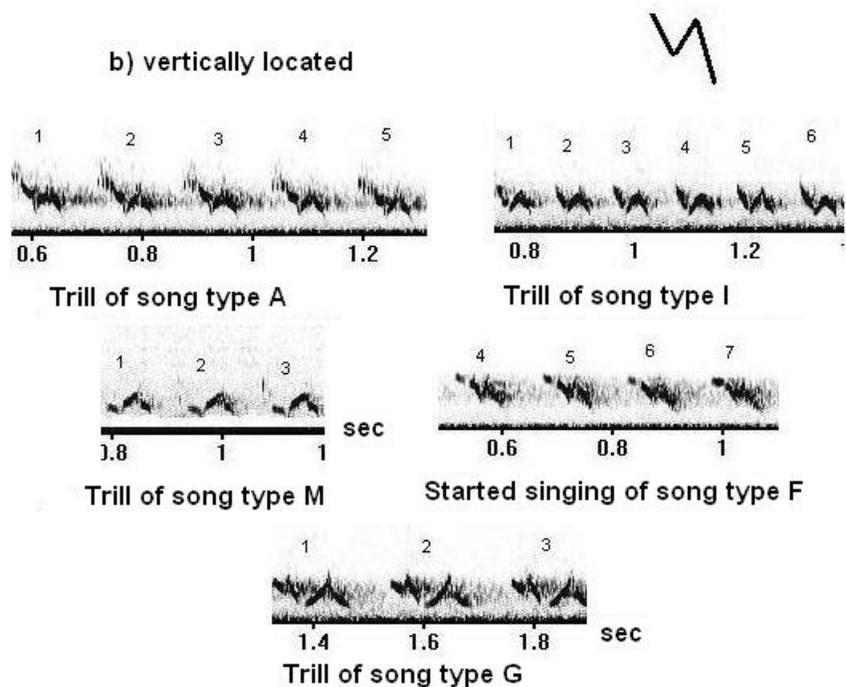
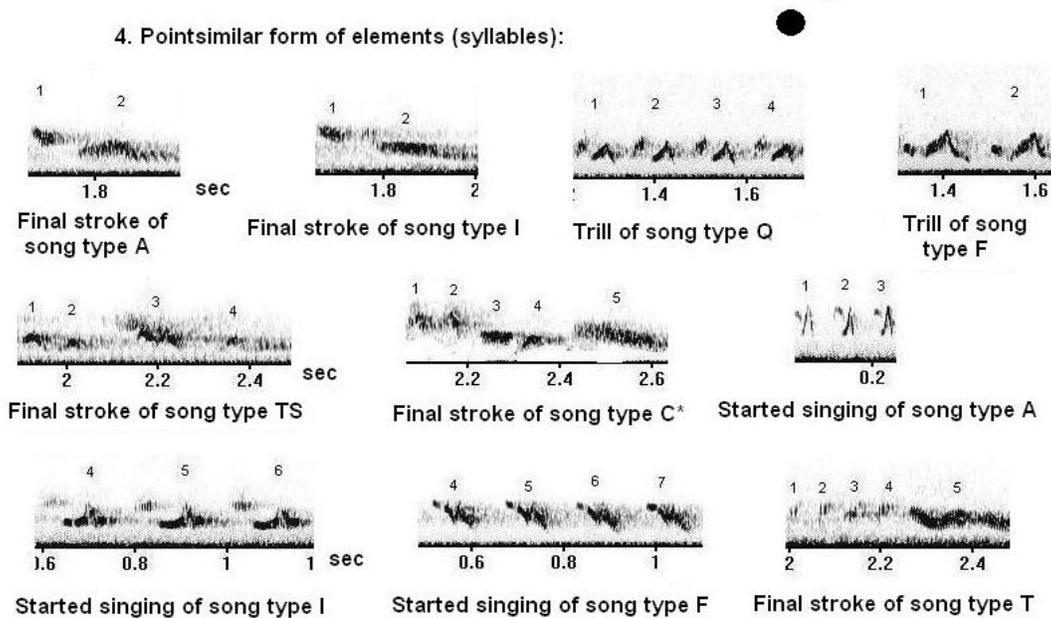


Figure-7; Zigzag similar forms of elements (vertically located) of chaffinch song**Figure-8:** Pointsimilar forms of elements of chaffinch song.

* – dialect (modified) phrase of song types from different geographical populations of chaffinch (*Fringilla coelebs* L.)

4.0 Conclusions

The concept of "*biomorphism*" (as ecological vocal polymorphism) in a song of chaffinch can has and precise *frameworks (limits)*, because it is feeble, marked (expressed) in song types at dwelling (inhabit) of chaffinch *in similar biotopes* (different ecological places) (leaf-bearing and coniferous vegetation – wood and bushes), despite of the *big variety and variability of song types* of chaffinch in *these territories* of a wood (forest) and forest-steppe. A *species-specific area* of chaffinch (*Fringilla coelebs* L.) basically is located in zones of wood (forest) and forest-steppe, where *biotopes* (different ecological places) in many factors *are ecologically similar, but a variety of song types thus remains*. Therefore to allocate (distinguish) here "ecological phenotypes" of song it would be not absolutely correct. Here there can be simply a variety of song types of chaffinch, formed in result of "mistakes" of copying at song training (learning) by young birds and at improvisation of songs in their structure at singing. But it is impossible to assert (approve) precisely, which of song types of chaffinch "is adapted" in the structure to birch or oak woods (forest) and which of these song types were generated (created) in fur-tree or pine vegetation. Thus the *form (figure) of elements* (syllables, phrases or parts) of songs can not to change under action (at influence) of ecological factors, because in the greater degree *qualitative aspect of songs* (a variety of forms of elements in the songs, observable on sonograms) are *result of "social" interaction* of birds, its *copying* from each other song types (its elements), are result of *song improvisations* or also it displays (expresses) *genetic variability* (at species of birds without social traditions of *song training or learning*). And, mental essence (psychical sign) of birds (though and in a rudiment) is so plastic, that its genetic inclinations can to change already in the first generation, at adaption to an environment.

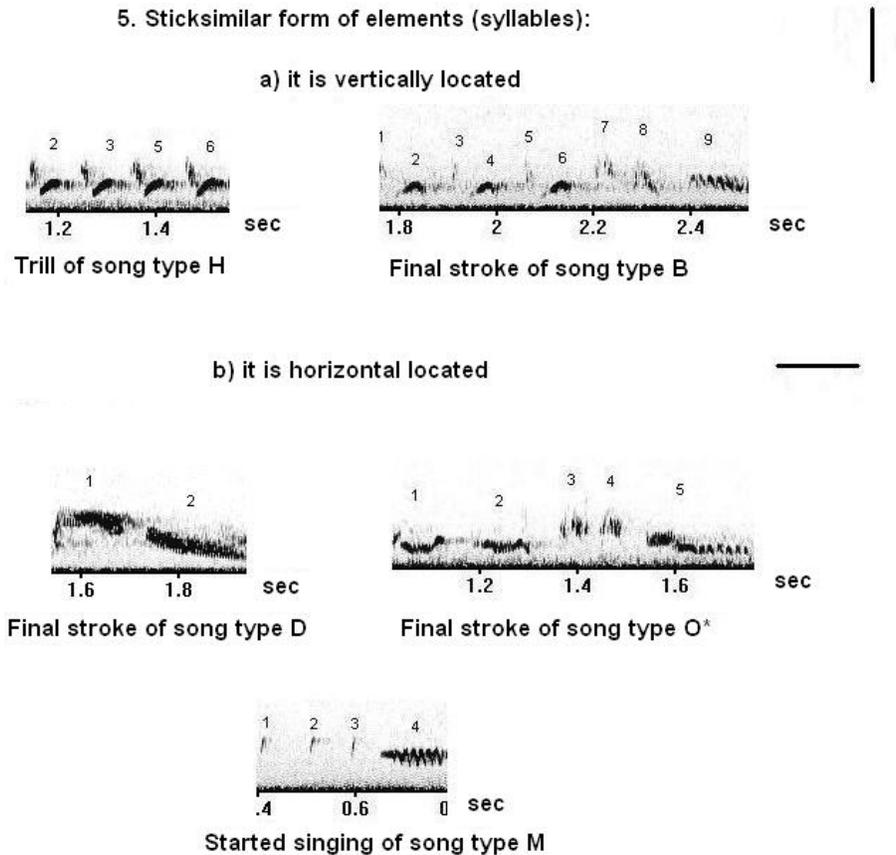


Figure-9: Sticksimilar forms of elements of chaffinch song.

* – dialect (modified) phrase of song types from different geographical populations of chaffinch (*Fringilla coelebs* L.)

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