

THE MUSIC OF THE WOOD PEWEE'S SONG AND
ONE OF ITS LAWS.

BY WALLACE CRAIG.

THE Wood Pewee sings regularly three different phrases which have been represented as follows.

Phrase 1 Phrase 2 Phrase 3

♩ = 90

pee-ah-wee pee-oh ah-di-day

The phrases are all alike in tone, each being a clear, sweet whistle. Yet the three are not strictly coördinate: in melodic character, and also in mode of occurrence, phrases 1 and 2 resemble each other more closely than they resemble phrase 3. I shall try first to make clear the difference in melodic character between phrases 1 and 2 on the one hand, and phrase 3 on the other.

Phrases 1 and 2 are represented above in their simplest form. When most highly developed, each of them is more elaborate, beginning with a grace-note, as shown in the following notation. Phrase 3 has no such grace-notes.

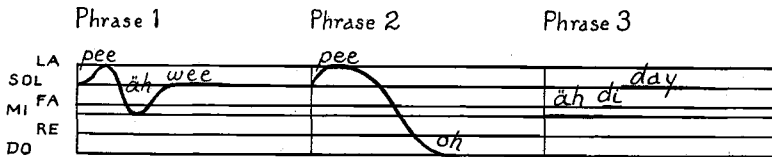
Phrase 1 Phrase 2

♩ = 81

pee-ah-wee pee-oh

Furthermore, in rendering phrase 3, the bird sings three distinct notes, each on one unchanging pitch. But in rendering phrase 1 or 2—always, whether he is singing the simple melody shown in the first musical notation, or the melody with grace-notes shown in the second musical notation—he glides from one pitch to the next with such perfect continuity that there are no distinct notes at all; the entire phrase is just one smooth glide. This

gliding or portamento rendition is suggested in the musical notation by the slur placed over the notes. But it can be represented more adequately by the graphic method, as seen in phrases 1 and 2 in the following graph. In this graph, the vertical dimension represents rise in pitch, the horizontal represents duration; the method of representation is essentially the same as that used by Mr. Saunders, but with several slight modifications; the syllables *pee-äh-wee*, etc., are copied from Mr. Saunders.¹ While the graph reveals the gliding character of phrases 1 and 2, it also shows, in sharp contrast, that there is no glide in phrase 3. This contrast is so important that it should be kept in mind always; in the following pages we shall often have occasion to speak of "the gliding phrases," meaning phrases 1 and 2, and "the non-gliding phrase," meaning phrase 3.



Now, the law which is the chief subject of this article may be stated very briefly thus: the faster the bird sings, the more 3's he sings. In other words: the faster the song, the greater is the percentage of non-gliding phrases. Some future student of the Wood Pewee's song will probably state this law in a more complicated form, in order to make it more precise mathematically. Our data are not sufficient for a very precise formulation, but they do give interesting evidence of the general truth of the law, and this evidence is of five different sorts which I shall present.

(1) The gliding phrases are sung all day long, thus constituting what has been named "the daytime singing." In this daytime singing, two phrases are never sung in immediate succession so as to form a continuous song. The bird sings one phrase, then remains silent for a long, indeterminate period before singing another isolated phrase. A few records of the daytime singing, taken at random, show not more than five or six phrases per minute.

¹ Bird Song. By Aretas A. Saunders. Albany, New York State Museum. 1929. See p. 169.

Phrase 3, the non-gliding phrase, does not occur in the daytime singing.² It occurs only in the remarkable "twilight song" which the Wood Pewee sings regularly in the morning twilight, and occasionally also in the evening twilight. This song consists of hundreds of phrases sung in immediate succession and in regular rhythm, $\frac{3}{4}$ time, as shown in our musical notations, thus constituting a continuous piece of music. This continuous composition is often a half-hour in length, and sometimes even longer. Its rhythm is such as to indicate that each phrase is sung with one expulsion of the breath, the quarter-rest at the end of the measure being used by the singer to draw his breath for the next phrase. The number of phrases per minute is about thirty, as contrasted with the five or six in the daytime singing. The phrases in the twilight song are 1's, 2's and 3's, following one another in varying order. There is always a goodly proportion of 3's. This fact, as compared with the fact that the daytime singing includes no 3's at all, shows clearly that the bird sings phrase 3 only in his more rapid song.

A preliminary account of the twilight song was published in "The Auk"³ six years ago, with a request that bird-observers make records of the song and send them to me. More than eighty persons volunteered to make records, and nineteen succeeded in doing so. These nineteen persons made 125 records, representing about 55 individual Wood Pewees, and containing a total of more than 80,000 phrases. I am deeply indebted to the bird-observers who thus furnished the basis for this study. The present paper is only a first report on the data; I hope to have ready soon a much longer paper, too long for publication in the "The Auk."

A word should be said as to the degree of precision of the mathematical statements. All enumerations of phrases, e. g., statements as to the percentage of 1's, 2's and 3's, are highly exact. But the statements involving time, e. g., the number of phrases per minute, are in most cases only rough approximations. The reason for this cannot be explained in this short article. The making of accurate time measurements is a problem which I am obliged to leave in

² In a few cases, observers report that they have heard phrase 3 in the daytime. But these cases are rare; and the phrase that was heard was apparently not exactly the regular phrase 3.

³ The Twilight Song of the Wood Pewee: a Preliminary Statement. By Wallace Craig. Auk, vol. 43, pp. 150-152, April, 1926.

large part to future students of the Wood Pewee's song. Now I shall proceed to the second line of evidence.

(2) The twilight song proper is preceded by a short prelude, and usually followed by a postlude, which somewhat resemble the day-time singing. That is to say, in the prelude and the postlude there are long rests between phrases, and there are few or no 3's—only 1's and 2's. This is a second line of evidence showing clearly that when the Wood Pewee sings with long rests between phrases, his phrases are all of the gliding variety.

(3) Within the twilight song proper, as a rule, the 3's are introduced gradually; the proportion of 3's rises to a maximum, remains near the maximum throughout the middle part of the song, and gradually declines toward the end. And the data (although, as stated before, the data on this point are not mathematically precise) indicate that there is a parallel change in the rate of singing, as measured by the number of phrases per minute.

(4) There are great differences between individuals. The maximum proportion of 3's at the culminating point of the twilight song varies, for different individuals, from 25% to 57%, and this seems to be correlated with differences in the rate of singing as measured by the number of phrases per minute. Calculation of this correlation for 23 individuals gives $r = .594$, with P. E. = .091. Mathematically this correlation is fairly good, and it is possible that a still higher correlation will be found when there are more complete data concerning time.

(5) It would be interesting to know whether there is a similar correlation in regard to the twilight songs sung on successive mornings by the same individual. Assuming that every Wood Pewee sings a little slower some mornings and a little faster other mornings, the question is: Does he sing the highest proportion of 3's on the mornings when he sings most rapidly? It is difficult to get any answer to this question, because, for one thing, each individual Wood Pewee generally sings very much the same song on successive mornings; the day-to-day variation is too slight to furnish the basis for a correlation table. The bird whose maximum proportion of 3's is 25% sings this same percentage morning after morning; and the bird with 57% of 3's is equally consistent. Among all our birds there was just one (the second individual observed by

Prof. Yanney in Ohio) who sang on six different mornings, from June 23 to July 31, with enough variation to supply a basis for a correlation table. The data in this one case are such that they favor, but do not conclusively prove the hypothesis that this bird sang the highest proportion of 3's on the mornings when he sang at the most rapid rate.

The five lines of evidence may be summed up in this way. Under (1) and (2) the data are abundant and show clearly that when the Wood Pewee is singing most slowly, i. e., with long rests between phrases, he sings no 3's at all. The evidence under (3), (4) and (5) calls for further study to make it precise and conclusive, but it all does favor the thesis that the faster the Pewee sings, the more 3's he sings.

This thesis is interesting because it appears to state a musical law, not a simply mechanical law. If it had been found that phrase 3, which marks the bird's more rapid singing, was shorter than the other two phrases, that fact might have been attributed to the mere mechanics of the respiratory organs. But phrase 3 is not shorter than the others. As I have represented them, the three phrases are equal. As Mr. Saunders⁴ has represented them, phrase 3 is equal to phrase 1 and it is longer than phrase 2. The essential difference between phrase 3 and the other phrases is of a musical character; and it is the same sort of difference that is found in human compositions between the character of rapid and that of slow music.⁵ Remember that phrase 3 is the non-gliding, the other two are the gliding phrases. Phrase 3 is comparatively energetic, with emphasis on rhythm. The other two phrases are flowing, languorous, with emphasis on the melodic factor, not on the rhythmic. During the long ages of evolution, the Wood Pewee's rapid song has evolved a phrase musically suited to rapid singing, while his deliberate song has evolved two phrases musically suitable for deliberate singing. This is one line of evidence indicating that, within the limits of his small intelligence, the Wood Pewee is a true musician.

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⁴ Loc. cit.

⁵ *Evolution of the Art of Music.* By C. Hubert H. Parry. N. Y., Appleton, 1906. See pp. 9-10.