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Studies in Rhythm

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STUDIES IN RHYTHM.

By CHARLES H. SEARS, Fellow in Psychology, Clark University.

I.

PERCEPTION OF RHYTHM BY CHILDREN.

This paper comprises two studies, one by the topical questionnaire method, the other an experimental investigation. By means of the questionnaire it was possible to obtain certain facts of interest pertaining to the rhythms of childhood that could not be gained in any other way. The syllabus (No. VIII in the Clark University Series for 1899-1900) called for as exact details as possible concerning the earliest perceptions of rhythm, the child's earliest interests in nursery rhymes and jingles, the favorite rhythms among children, the time of increased interest in rhythmic exercises, children especially deficient in a sense of rhythm, and the use of rhythmic repetitions or rhymes in the teaching of things difficult to retain in memory. In response to this circular about 600 returns were received, more than 100 of which are personal replies from mothers, kindergarten teachers, and others.¹ These have been collated. The data furnished in reply to the questionnaire are in many respects not altogether satisfactory, yet they contain so much material that is qualitatively suggestive that the writer feels justified in presenting an account of the results in connection with a discussion of some of their particular features in relation to their general and special bearings.

FIRST PERCEPTIONS OF RHYTHM.

In this section of the syllabus the question read as follows :

I. How early in life do children begin to be interested in music

¹The writer takes this opportunity to express his obligation to all who so kindly collected and sent replies. Mention should be made of Prof. Will S. Monroe, of the Westfield (Mass.) Normal School; Miss Lillie A. Williams, of the Trenton (N. J.) Normal School; Principal Geo. C. Purington, of the Farmington (Me.) Normal School; Prof. Oscar Chrisman, of the Emporia (Kan.) Normal School; Dr. Henry H. Goddard, of the Westchester (Pa.) Normal School; Prof. E. A. Kirkpatrick, of the Fitchburg (Mass.) Normal School; Miss Mara L. Ferguson, of the Peru (Neb.) Normal School. He is also grateful to the many personal friends, kindergarten teachers, music teachers, parents, and others who wrote personal letters in response to the questionnaire.

with a marked rhythm, trying to dance or keep time with it, with movements of body, arms, or voice? Please give any cases that have come under your notice, stating the age of the child and whether a boy or girl.

Some of the replies referred to more than one aspect of rhythm in the same child, while others gave information regarding more than one child. The returns furnished 925 different observations. Of these 395 were upon boys and 530 were upon girls. No account was taken of any observation made upon a child more than 60 months old.

Table I shows the number that manifested their sense of rhythm in each of the various ways suggested by the question. Table II gives in months the youngest age mentioned in the returns in which the perception of rhythm was manifested, and Table III gives the average age of all the children noted in connection with the different movements respectively. In Table II the figures in parentheses which accompany those representing the various ages denote the number of observations reported. In all cases the ages are given in months.

TABLE I.

MOVEMENTS OF	Boys.	Girls.	Total.
Body	88	90	178
Arms and Hands...	76	112	188
Legs and Feet	41	58	99
Dancing	138	192	330
Voice	52	78	130

TABLE II.

MOVEMENTS OF	Boys.	Girls.
Body	$\frac{3}{4}$ (1)	1 (2)
Arms and Hands...	6 (6)	3 (4)
Legs and Feet	3 (2)	6 (3)
Dancing	9 (6)	9 (2)
Voice	8 (2)	9 (5)

TABLE III.

MOVEMENTS OF	Boys.	Girls.
Body	16.9	15.5
Arms and Hands...	18.7	17.1
Legs and Feet	17.7	17.9
Dancing	23.8	29.2
Voice	25.8	24.2

In many cases the returns did not carefully discriminate between body, arm, and leg movements, *i. e.*, sometimes arm and leg movements were very likely classed as body movements. It is probable that the distinctively body movements precede those

of arms or legs. Classing these movements all as body movements and then computing the average age of the results it is found to be for the boys 17.7, and for the girls 16.8 months. Hence it would seem that the sense of rhythm finds its expression earlier in girls than in boys. This is in exact correspondence with the opinion expressed in several of the returns.

A study of the tables suggests that those rhythmic movements involving only the more fundamental muscles come earlier in the order of development than the more complicated rhythmic movements and those that involve the accessory muscles. This intimates that there may be some connection between the law of muscular development—from fundamental to accessory—and the development of the expression of rhythm. For all we know the rhythmic tendency may bear its part as a factor in muscular development.

It is perhaps needless to remark that the data from which these results have been made are nothing more than chance or accidental observations made by persons in their ordinary daily lives, and without thought of their being of any scientific importance. It is quite probable that if children were carefully observed with the end in view of finding out how early in life they begin to appreciate rhythm the average age would be younger than that represented by the observations upon which we have based our conclusions. Some characteristic replies are noted :

F., At 13 months could say but a word or two, but could hum a strain of music in perfect time and tune.

M., 9 months. He would move his hand with the clock pendulum, but this was a result of singing "tick tock" to him with the purpose of learning how soon he would respond by spontaneous movement of his own hand.

M., 6 months. Would dance up and down in time to music played on a harmonica, his mother holding him upon his feet. The same child always keeps accurate time to music by clapping, etc. Is now 3 yrs. old.

M., 24 months. Would not walk, though the physicians said he *could*. Hearing a march played on the piano and seeing his little brother and sister march, pulled himself up and amazed us all by starting off in perfect time.

M., 6 months. When he hears music in march time he seems to be very much delighted, and makes his hands go up and down, keeping time with the music. When other music is played he pays little attention.

M., 36 months. Is enchanted by light opera choruses of marked time, but impatient of solos. On returning from opera will dance to an original rhythm, keeping time with waving hands. No musical recollection of the particular tune, but the *time* and many of the dance movements are recalled vividly and reproduced, kicks and all.

F., 9 months. She kept time with her foot when the piano was played in the room below, and when the performer stumbled or lost the rhythm her foot was held suspended impatiently in the air until the time was again regular. She sang several simple little airs or snatches

of airs at 21 months, and at 23 months sang almost thirty simple little songs through very correctly.

M., 24 months. When Herbert's sister played the piano he would mark the time with his feet, planting them wide apart and swaying his body at the same time. He often kept time to the slow ticking of a tall, old-fashioned clock, singing "de-de" in the clock's monotonous tone, and also to the sewing machine. He also tried to keep time to the egg-beater and to adjust the tunes of several pieces he knew to the time of the egg-beater, finding that none of these would do he sang the scale up and down, keeping perfect time and tone as long as the egg-beating lasted.

As would naturally be expected the returns show that the appreciation of rhythm differs greatly with different children. One states, "A girl of three years dances in perfect time to certain music, and laughs with great glee and seems to appreciate the rhythm perfectly, while her brother of five years forms a perfect contrast to her, for he apparently takes notice of neither music nor rhythm." Another writes, "My boy of seven months has shown no special interest in rhythmic sounds over others. My girl of thirty-four months has never appeared to have any particular preference for music whose rhythm is strongly marked although she makes the rhythmic sounds and often wants us to sing to her." And another makes the positive claim that she had scarcely any appreciation of time until she began to go to school, and that then its development was exceedingly slow. These statements form a striking contrast to the returns already cited. Here is an open field for the study of one phase of individuality.

While rhythmic response in relation to music is the most frequently mentioned, yet appreciation for other forms of rhythmic movement came out prominently in the papers. A child of ten months with rhythmical movements of the body keeps time to the swinging of a pendulum belonging to an old-fashioned clock. One watches for hours the rhythmic flow of water as it babbles over the stones in a brook. Another takes delight in observing the moving branch of a tree as it is swayed by the wind, and still another enjoys the up and down movement of a piston rod belonging to some machinery in his father's shop. A reminiscent paper says, "As a child of three and a half years, I was especially responsive to a small water wheel which my older brothers had constructed and placed in a brook near the house. I never tired of watching it. A little later, when about four years old, I became deeply interested in a circular saw which sawed shingles in a mill within sight of my home." Is it too much to suppose that the child's great interest in action is due to its pleasurable rhythmic effects? Pleasure in regularly recurring actions as well as in sounds is instinctive, being the outcome of our whole nervous organization. Acts of listening are successive, hence they can be better adapted to sounds that

follow one another at regular intervals and the movements called forth by sounds can be executed with ease only when they follow in a regular sequence. Thus the child in his liking for well-marked rhythms accompanies them with corresponding movements of head, arms, etc. A boy striking the railing in mere wantonness does so in a regular succession of blows. This is in accordance with the disposition of his muscular frame, and he enjoys it. The child who pounds one object with another does so not merely because he likes the noise, but because he takes pleasure in the rhythm of the actions involved and in the rhythmic sequence of the sounds.

That a rhythm may take a child's fancy it must possess two characteristic qualities. The reports make these prominent.

1. It must be simple, with well-marked time divisions, in order that it may be easily recognized. There is a great preference for duple time over triple time. March music is frequently mentioned as attracting the child when all other music fails. This may be explained on the ground that rhythm whose time is not well marked or whose structure is too highly complex confuses the motor responses and so fails to awaken pleasurable interests.
2. Children in early life have a fondness for those rhythms which are termed "lively" or "fast." This is especially true of the rhythms in music. A girl of seven weeks cried convulsively when a "doleful tune" was sung, but became quiet when the tune was changed to a "lively one." It is reported that this experiment was tried many different times without varying results. A girl of about sixteen months always manifested great displeasure whenever she heard *Old Hundred* or *Nearer My God to Thee*, but was always delighted with *Marching Through Georgia*. A boy of eighteen months is described as crying every time he hears a slow or sad piece played, but as laughing and clapping his hands and trying to dance whenever he hears a lively piece played. Sprightliness of rhythm seems to fit the child's physical and mental constitution. These characteristic qualities which lead to the appreciation of rhythm in early childhood form a close parallelism to those found in the music of the early primitive races. As children grow, as the crude liking for rhythmic sequence changes into a fuller æsthetic development there is awakened an increasing fondness for the "sad" or "slow" in music. The returns contain such statements as these: "When older I preferred poems that had an element of sadness." "As I grew older a love for pathetic music or poetry predominated." "I never liked minor music till fifteen or sixteen." "Later I began to like slower music and poetry with a suggestion of sadness." Miss Fanny B. Gates in her study of the musical interests of

children¹ found that in 2,000 children, covering the ages from seven and under to sixteen and over the choice of songs on account of their time was about even between the "lively" and the "slow."

These studies suggest that rhythm is fundamental, and they furnish support to the assertion of J. Donovan² that, "The infant is capable of attending to rhythmic stimuli long before it is capable of any other act of attention."

Henry M. Davis³ makes the statement, "Children have been known to manifest distinct pleasure on hearing music as early as the tenth day." Here is an effect doubtless due to rhythm, and one that is in its nature physiological. Prof. E. F. Bartholomew, author of *The Relation of Psychology to Music*, in a personal letter writes as follows: "I have observed marks of musical appreciation, or perhaps I would better say *rhythmical* appreciation at the age of about two weeks. The marks referred to consisted in a rhythmical movement of the eyes and face of the infant corresponding to the playing of music with a prominent accent, the expression of the face indicating pleasure and not pain." No studies have been made for the purpose of determining just how early in life the infant is capable of responding to rhythmic stimuli. However, in making such observations caution is needed for the child's movements are in themselves rhythmic, and instances may easily arise where they correspond with rhythmic noises without the latter's having anything to do in the causation of the former.

These first responses to rhythmic stimuli come forth out of those vague instinctive regions whose qualities and attributes possess those characteristics that belong to both sides of the child's dual nature. In a word, they are reflexes that are more or less conscious. The sensations connected with the first reactions on the part of the child to rhythmic stimuli, while being closely related with external and internal organic processes, are of a primitive conscious order, and in a more or less obscure way there is involved in these primitive instinctive reactions voluntary and emotional elements.

EARLY INTERESTS IN NURSERY RHYMES.

II. How early do children begin to be interested in nursery rhymes and jingles? Have you known of cases where poetry was liked before the words of it could be understood? In repeating poetry do children get the correct rhythm when they fail to get all the words? Do nonsense syllables take the place of the words omitted?

The replies to the first question in this rubric contained 826

¹ *Journal of Pedagogy*, October, 1898, Vol. XI, p. 269.

² *Westminster Review*, March, 1900, p. 300.

³ *Music*, Vol. XII, 1897, p. 28.

observations. 348 of them were made upon boys, and 478 upon girls. The youngest of these was 2 months old. 2 boys and 2 girls of this age were reported as having shown at least some liking for nursery rhymes. 12 boys and 14 girls were reported as being 60 months old before they developed any such interest. The average age of the boys is 28.2 months, and the girls 27.3 months. Some few observations had reference to children older than 5 years, but these were not regarded. The figures being based upon accidental observations are to be regarded only as of general significance. However, a comparison of these results with those of the previous topic makes our general impressions doubly sure that children become interested in nursery rhymes and jingles some little time after they manifest pleasure in rhythmic sounds and movements.

The rhythm of nursery rhymes is usually not so pronounced as it is in some forms of music, and the child must have developed some power of comprehension to be able to understand at least in some small measure the thought they intend to convey. Interest in nursery rhymes and jingles is a step in advance of the earliest appreciation of rhythm. It is the first sign of the awakening of the literary consciousness. The child now forms word pictures, and appreciates certain agreeable combinations of sounds as in the favorite "Hickory dickory dock," but still the predominantly attractive element in all nursery rhymes is their jingling rhythm. This, with its simple structure, being made up of short feet well marked off, fills the child's soul with delight.

The answers to the last three questions of the rubric are well nigh universally in the affirmative. It appears to be a general principle that in order for children to like poetry it must contain at least some familiar words which shall call up mental pictures of some of the things described. The imagery need not be complete, indeed it may be very incomplete. This accords with the observation of Miss Moore¹ for the child she studied "did not care for songs containing no familiar words." She further observed that during the child's "pre-eminently imitative period what he said expressed no reflections. Unintelligent imitation was rare, though it sometimes occurred, as in the reproduction of rhymes not fully understood; but here the rhythm was doubtless a point of interest."

The replies re-enforce the belief that in early life the rhythmic qualities of verse are a most important feature of attraction, and when in repeating poetry they fail to get all the words they do get the correct rhythm, using nonsense syllables to fill

¹ Mental Development of a Child, Psychological Review, Monograph Supplement, Oct., 1896, pp. 65 and 126.

the measures made vacant by the omission of words, and they often do the same thing in reading in case of words they are unable to pronounce.

The following have been selected as representative replies:

1. Delia enjoyed rhymes at one year old, and liked poetry before she could understand the words. Henry has followed his sister's traits, but usually at a somewhat later age.

2. In my kindergarten children often get the rhythm of songs and do not get all the words. One child puts in *la la la*, others repeat some preceding words or phrase that fills the space.

3. My boy liked nursery rhymes as early as eighteen months old. At 21 months he would insist on having Mother Goose read to him for half an hour at a time.

4. A boy a year and a half old preferred hearing nursery rhymes to playing. He learned a poem about a pig, of 20 verses, 4 lines each. He kept the rhythm from beginning to end, but sometimes changed the order of the words.

5. I remember, as a child, reading Milton's *Paradise Lost*, or rather one page of it, over and over again, wholly for the music, as the words conveyed absolutely no meaning. I must have been about ten.

6. Helen knew nearly all the Mother Goose rhymes by heart by the time she was 1 year and 9 months old, and when she wished to say anything she would first say a line of "Mother Goose," then whatever she wanted to say, making rhyme and rhythm with the line from the nursery rhyme.

7. In trying to quiet a boy of 3 months a jingle was repeated. It failed to attract his attention; in fact he seemed deaf to all, though several jingles were tried. A month later a jingle was repeated when he was crying, and immediately he became quiet and seemed fascinated by it.

8. A boy and a girl were interested in nursery rhymes before they were 2 years old, and the boy would repeat poetry, or as he called it, "would read to us from his books" when he knew only a small vocabulary of words; nonsense syllables filled out the rhythm exactly. He would begin with a line of words and would then complete the metrical form so that his first line had the same number of syllables as the third, and the second and fourth lines were alike, he also added the rhyme.

9. I have known the rhythm in a Mother Goose rhyme to quiet a child of 2 months, and by constant repetition by 5 months she could keep time with the body and hands.

Simple poems are enjoyed by most kindergarten children of 3 years, when I feel sure they do not understand the meaning of the words.

A little boy of 4 years tried to repeat a poem of three stanzas, but succeeded only in supplying a word or two while humming the rhythm.

The reports show that by five years of age the child's interest in nursery rhymes and jingles is becoming supplanted by other interests, or perhaps it is better to say that it is becoming perceptibly modified into higher forms of poetical appreciation. A mother says, "My little girl who had been especially fond of Mother Goose cared little for nursery rhymes after her fourth or fifth year. She preferred the more simple forms of poetry." A teacher in her reply says, "Three little boys in whom I have been particularly interested began to like nursery rhymes and

jingles when a year and a half old. The oldest—five and a half—seems to have lost his interest, while the second—three and a half—gets very enthusiastic over Mother Goose. For the last three months I have had fifty children of ages from 6 to 9 in my care part of the day. I have given them myths in place of jingles, and find they choose the jingles no more."

This interest, at least in many cases, seems never to become wholly lost. The jingling rhythmic qualities of the verses of early childhood may be almost swamped in the many and various interests of adult active life, yet every now and then they come to the surface, pressing themselves in upon the consciousness and bringing with them the thoughts and associations of early by-gone days. What child having revelled in them in babyhood ceases wholly to enjoy them in manhood?

A mother says, "In repeating Mother Goose to my little boy of 3 years my childish pleasure in them seems to have returned." A teacher says, "The nursery rhymes that I learned when a child of 3 and 4 years have never left my memory, but as I grew older I grew to love such practical poems as those of Will Carleton." A normal school student of twenty writes, "I still like the nursery rhymes of my childhood, but Enoch Arden, Evangeline, etc., are now more interesting to me." Another normal school student says, "The Mother Goose rhymes were of course my favorite verses. My feeling for them has never changed, and I never hear them now that my memory does not flash back to early childhood."

FAVORITE RHYTHMS AMONG CHILDREN.

In connection with this topic the syllabus contained the following section:

III. Have you noticed any favorite rhythms among children, either in music or poetry, or in drumming with the fingers, or in rhythmical shouts (like college yells)? Do they prefer music to waltz time or march time? Does this differ with age?

The returns are deficient in giving accounts of definite rhythms that have attracted children. Quite a number mention children who have had a fondness for drumming with the fingers, and some few mention children who have taken delight in certain rhythmical shouts, but in general those who have replied have contented themselves in giving those nursery rhymes, songs, or selections of poetry that have come under their observation as attractive to children.

A few observers report that children like poetry or music in which every other word or beat is strongly accented. A girl of 5 years is noted as "tapping on everything within her reach, one long tap followed by three short ones." A boy of 2 years has for his "favorite rhythm in drumming one long and one

short tap." A girl of 5 is fond of tapping with her fingers "one hard and one soft stroke." A boy of 6 "taps one long, one short, and one long beat." A girl of 4 drums with her fingers "two light taps and one heavy one." A boy of 3 in beating the drum uses two long and three short taps. A boy of 6 prefers in drumming with his fingers "three loud and three faint strokes." And a person of 20 affirms that "ever since babyhood" she has "always liked to tap first three short quick taps and then two long ones." A lady writes, "I remember from the time I was 4 years of age the habit I had of drumming on every surface with which I came in contact. The rhythm being always the same, as follows: long, short, short, long, short, short, long, short, short, short, short, long, short, short. The long strokes were made with the lower part of the hand, and the short ones with the fingers. I would often rattle latches with the same rhythm."

The following is the list of the nursery rhymes and jingles which were reported as the particular favorites of children. The number of times each is mentioned is also stated.

Old Mother Hubbard, 81; There was an old woman who lived in a shoe, 39; Little Jack Horner, 38; Little Bo-peep, 35; The House that Jack Built, 31; This Little Pig went to Market, 26; Little Boy Blue, 24; Jack and Jill, 23; Old King Cole, 21; Mary's Little Lamb, 19; Hey Diddle Diddle, 18; Hickory, Dickory, Dock, 15; Rock-a-bye, Baby, upon the Tree-top, 14; Sing a Song of Sixpence, 14; Peter, Peter, Pumpkin-eater, 13; Ding Dong Bell, 13; Jack Sprat, 12; Baa, Baa, Black Sheep, 11; Red, white, and blue, all out but you, 9; Mary, Mary, quite contrary, 9; Peep-a-boo—I see you, 8; Ene, Mene, Mine, Mo, 8; Tom, Tom, the Piper's Son, 7; Little Miss Muffet, 6; Wash the Lady's Dishes, 6; On the Green Carpet, 5; Little Drops of Water, 5; Simple Simon, 5; Peter Piper, 5; Humpty Dumpty on the Wall, 5; Twinkle, Twinkle Little Star, 4; Ring around the Roses, 4; Trot, Trot to Boston, 4; Pussy-cat, Pussy-cat, where have you been? 4; Little Sally Waters, 4; Bye O Baby Bunting, 3; Three Little Kittens, 3; The Little Red Hen, 3; Three-and-twenty Black-birds, 3; Ride a Cock Horse to Banbury Cross, 3; Brownie Jingles, 3; A Diller a Dollar, 3; Jack and the Bean Stalk, 2; This is the Way the Farmer Goes, etc., 2; A B C Rhymes, 2; Black-bird Pie, 2; Taffy was a Welshman, 2; Little Fishes in the Brook, 2; Five Little Pigs, 2; and each of the following was mentioned once: There was an old woman of whom I've heard tell; Shoe the Old Horse; Rain, Rain High; One, two, I see you; Fee Fi, Fo, Fum; I had a Little Pony; Puss in Boots; One to begin, Two to show, Three to make ready, Four to go; Cock Robin; Little Dame Crump; A white old Hen with yellow Legs; Inta, Minta, Cuta, Corn; Eggs, Cheese, Butter, Bread; Ride a Jack Horse; Poor Dicky's Dead; One, Two, Three, all out but Thee; My Black Hen; My Father's Horse-shoe; Water Water Wild-flower; One, Two, button your Shoe, Three, Four, Shut the Door; I see the Moon, The Moon sees Me, God bless the Moon, And God bless Me; Here come two jolly, jolly Sailor Boys; Go in and out the Window; Lazy Betsey, will you get up? Go to sleep, my Baby; Left,—left,—Left a good Home and I Left,—left,—etc. (For marching); Little Tommy Tucker; Leg over, leg over, Dog went to Dover; Tom Thumb; Vinegar, Salt, Mustard, Ginger, Cayenne

(for jumping rope); The Three Pigs; The Three Bears; The Pig wouldn't go over the Stile; Old Mother May, may I go out to play? Poor Baby's in the Woods; The Owl, the Eel, and the Soap-fat Man; Eutrie, Mutrie, Cutrie, Corn; Jacky Dory; Baby Bye, there's a Fly; There was a Little Girl; Miss Tucket; To Boston, to Boston; Hear the Pennies Dropping; If all the Sky was Paper; Hang up the Baby's Stocking; We're all in the Dumps for Diamonds are Trumps; Barber, Barber, shave a Pig; Rain, Rain, go away; Three Little Men in a Boat; See a Pin, and pick it up, etc.; One, Two, Three, Four, Five, Six, Seven, All good Children go to Heaven; Pussy-cat Mew jumped over the Coals; The old Woman who swept the Cob-webs from the Sky; I'm going now to run away; Star light, Star bright (said with a wish); The following rhymes for counting buttons, daisy petals, etc.: Rich man, poor man, etc., Red house, white house, etc., Coach, carriage, wheelbarrow, etc., Silk, calico, satin, rags, etc.; One for the cat to die (for swinging); Hush my Babe, Lie Still and Slumber; Just see the Boys and hear the Noise; I have a Little Finger, etc.; Six Little Rabbits went out to run; I Love Little Pussy; I'm going to write to Papa; Little Red-bird in the Tree.

The returns suggest most forcibly that children have favorites among the rhymes and jingles, but they do not indicate that their choice of them as such is dependent upon any peculiarity of rhythm. They demand for all a simple, well-marked rhythm; and then that one rhyme may be better liked than another, there must enter in other factors such as shall captivate the child's fancy. Sometimes the factor is hidden, being an associate of some innate characteristic of the child. The attractive quality may be in the flow of the words as in Hickory Dickory Dock. If the rhymes are read from a book the pictures may have a deciding influence. Then, again, one may be more pleasing than another because of its more frequent repetition or because it has been more attractively presented. One says, "From the age of 5 to 7 my favorite rhythms in music were Jesus Lover of my Soul and Yankee Doodle. I liked the former because my mother used to sing it so much about the house, and the latter was dear to me because my father used to sing or whistle it while he was trotting me on his knee."

All this does not signify that there is not a certain class of the Mother Goose rhymes and jingles better adapted to one stage of the child's awakening interests and development than any other. As regards their content they differ widely and must possess a logical and natural order in which they may advantageously be presented to the child. What this order is the mother-instinct unconscious of following any law usually discovers, and thus the mother is enabled at each stage of the child's development to present those rhymes and jingles that are adapted to his growing intellectual capacity. This is exemplified in the fact that the mother always begins with Pat-a-cake and This Little Pig went to Market, which infants insensibly appreciate even before they can talk, and then a little

later proceeds to amuse the child with those rhymes that are more complex.

In some cases the Mother Goose melodies do not seem to have been, at least to any great extent, a part of the child's early environment. In this particular his early education seems to have been neglected. In such instances the deficiency appears to have been partially atoned for by the songs sung to them by their parents and others, by the rhythmical rounds employed in children's games, by the counting-out rhymes which, as Will S. Monroe, in his study of the play interests of children,¹ has shown, "are apparently universal features of children's plays," and by the rhythmical exercises that come during the first years of school life.

Among young children march time has the preference over waltz time. Of the 212 cases reported 89% preferred march time. In later life waltz time has the preference. This change in musical taste takes place sometimes as early as the eighth year, sometimes it comes as late as the fifteenth or sixteenth year, but on the average the transition period is between eleven and twelve years of age. Four always preferred march time. Some few have always liked waltz time the best. A reminiscent paper reads, "When a child of five I used to despise march time, and a troop of soldiers marching would fill me with terror." This is an unusual experience.

INCREASE OF INTEREST IN RHYTHMIC EXERCISES, MUSIC, MARCHING, DANCING, ETC.

IV. Have you observed any time during the period of childhood or adolescence in which there is a marked increase of interest, in music, marching, dancing, automatic tapping, rocking, swaying, swinging, or any other rhythmic movements?

Describe cases in which a special desire has arisen for jig or clog dancing, for playing the banjo or drum. State sex of child and age in which the phenomena first manifested itself.

The number reporting in regard to an increased interest in music was 356. Of these 267 had reference to girls, and 89 to boys. The ages in which a new feeling is experienced for music range from 8 to 25, there being four of the former, and only one of the latter. The average age for the girls is about 12, and for boys about 13. My results do not differ materially from those given by Dr. Lancaster, who found in his study of the psychology and pedagogy of adolescence² that the period in which there is most likely to be a marked increase of interest in music lies between the ages of 10 and 16.

Concerning marching there were 259 replies—167 girls and

¹ Proceedings National Educational Association, 1899, p. 1088.

² *Pedagogical Seminary*, Vol. V, p. 101.

9: boys. The results of the returns indicate that from 9 to 10 for the girls, and from 10 to 11 for the boys, is the time on the average in which a special interest arises in marching. Several teachers affirm that the best time to have successful marching in school is between the ages of 9 and 14. That the age of special interest in marching should be younger than that for love of music is perhaps due to the simplicity of the rhythm of march music, and to the fact that marching calls for action on the part of the child.

The returns contained 385 observations on dancing. 111 were upon boys, and 274 upon girls. Among all primitive peoples music and dancing almost always go together, and young children show a strong tendency to dance whenever in the presence of music. The replies made no reference to this instinct, but confined themselves to the interest in dancing as it appears in connection with social life. The replies cover the ages from 10 to 20. The average of all the ages given makes it appear that a special interest in dancing is likely to arise when the child is 13 or 14. Boys manifest this awakening a little later than girls. Many of the returns gave the indefinite answer, "The interest arose in the adolescent period."

A few testified that they had never experienced any marked increase of interest in music, marching or dancing, and some affirmed that their interest had been a gradual growth.

The following selections are given as typical returns:

F., 22. I positively refused to take music lessons until 13, when I grew to love it with my whole heart.

F., 25. Grew very fond of music at 14. Was filled with rapture about once or twice a year. Such times generally came upon me after hearing an especially enjoyable "musical." After I was 18 the interest decreased.

F., 23. My interest in music was especially aroused at the age of 12. I had a great desire to become a musician. I dreamed of devoting my life to music. The spell lasted only a few years. I never had any especial musical ability.

M., 25. At about 14 I experienced a very marked increase of interest in music. I earned money, bought a violin, and took lessons. I imagined myself as being one of the world's greatest violinists.

M., 26. I experienced at about the age of 14 a strong desire for playing in a band, or beating the drum. Have not entirely gotten over it. I ascribe it to the influence of reading a book called *British Battles on Land and Sea*.

F., 18. At 8, when I went to school, we were all so delighted with marching that going home we used to form one long line and march, shouting,

Left, right, left, right,
Point the toes so merrily;
Left, right, left, right,
March we all so cheerily.

F., 23. When 9 I began to love to march. I think it was because we

began then to have marching in our school. I have retained my love for marching until now.

M., 24. As a child of 9 or 10 I delighted in marching. At about 16 I took great interest in dancing, and I believe my interest in marching increased also. I still greatly enjoy marching, dancing, fancy steps and all.

F., 19. At 13 I was seized with a strong desire to learn to dance, and have had the desire ever since.

F., 21. I have never had much interest in dancing, having been taught that it was wrong.

M., 23. I became infatuated with dancing when about 16. I used all my spare minutes in practicing the different dancing steps and changes. Waltzing was my favorite dance. I would waltz by myself just before going to bed and before I was fully dressed in the morning. Would do this sometimes a half hour at a time. The dictum of my landlady spoiled my fun.

F., 21. I always liked to dance. At 15 my fondness for it deepened. For one or two years it was my chief amusement. It was the thing that I preferred before all other things to talk about. Did not care much for young people who were not interested in dancing.

The returns do not indicate that rhythm as a special factor is in any way closely connected with the increase of interest either in music, marching, or dancing. Rhythm is a pleasure-giving factor constantly present. Other elements come in to arouse this interest. It occurs at the time in life when new thoughts and new sentiments are being awakened. The love of nature and of the beautiful in art, the appreciation of melody and harmony are rapidly unfolding, and conspire to increase the love for music and dancing. Often some accident in the environment may be its prime cause. One says, "I was always fond of music, but my greatest interest in it came at 25, when I was elected to succeed an accomplished organist in church." Other reasons given are: a new piano, joined the band, neighbor's new organ, best friend sang in the choir, teaching of music in school, asked to play in Sunday School, exercises for decoration day, gymnastic exercises, patriotic and political rallies, seeing a militia company march and drill, marching exercises in school, classmates attended dancing school, playmates danced, seeing dancing, a dancing club among my friends, etc.

Automatic Tapping, Rocking, Swaying, Swinging, etc. The returns furnish no data for the conclusion that there is any special time in which there is a marked increase of interest in these rhythmic movements. They have their genesis in early life, usually arising between the ages of 4 and 10. Occasionally some of them come later. They frequently persist through life. Sometimes, owing to the inhibitory influences of self-consciousness, the inclination to participate in them gradually fades out of itself, and there are instances where they are overcome because of admonition on the part of the child's parents or friends. Many of them, such as swaying of the body, trotting

the foot and the like are automatic, and while entered into unconsciously are performed with a slight conscious impression of pleasure. Some report never having had such tendencies.¹

The following, culled from the reactions of different individuals, will serve to represent the replies given:

F., 20. When Mary was 11 or 12 if she had to stand still when reciting she almost invariably forgot what she had to say.

F., 19. Henry, till 9, had a habit of swaying his body from one foot to the other. At the same time his eyes were fixed and his hands opened and closed in time to each sway of the body.

F., 16. Ever since I was 5 years old I have had a habit of classifying every sound or action into some rhythm. When I walk I say one, *two*, one, *two*. When I hear a clock tick I say, tick, *tock*, tick, *tock*.

M., 43. From my earliest recollection I have had a tendency to sway the body, and when sitting to trot the foot and to sway the legs from side to side. I have persisted in doing these things in spite of being admonished thousands of times by my friends.

M., 45. When a child I enjoyed rocking in a chair and swinging my feet whenever they hung over the edge of anything I was sitting on. I have always had a tendency to drum with the fingers and tap with the foot. When a child I did it for pleasure, but in maturity I find it connected usually with nervous restlessness, especially when waiting for anything which I constantly expect and which I want, *e. g.*, my dinner or a lecture.

F., 47. My mother tells me that when I was just old enough to sit alone she left me in my cradle, and when she returned I was sitting up with my hands on the side of the cradle and rocking vigorously. I am still, at the age of 47, rocking. I have liked to swing as long as I can remember. If I am not in a rocking chair I am very likely to sway my body, especially when studying. I often drum with my fingers and tap my feet when in deep thought.

Jig and Clog Dancing. The information furnished by the returns is meager. Only 52 cases are reported. These show that an interest in clog dancing may arise as early as 7, or as late as 18 years of age, but that the most usual period for such a special desire to arise is between 10 and 15 years of age. Of the cases reported three are girls, one of 10 years, one of 12 years, and the third found special pleasure in participating in the exercise from the age of 15 to 18. Before 10 or 12, clog dancing when entered into appears to be largely a matter of spontaneous acquisition, but in the early years of adolescence it becomes more of a business, effort is made to learn the different steps, and there is much time and practice given in order to become proficient in the art.

F., 23. At the age of 10 or 12, I, a girl, danced jigs a great deal.

F., 18. Joe, at 9, would practice clog dancing in a room by himself.

F., 19. At 9 my brother attended dancing school, but never cared to learn anything but jigs, etc., but danced them beautifully.

M., 40. When Frank was between 14 and 15 and was wanted by any

¹Somewhat related to this topic is the valuable article of Lindley and Partridge, *Pedagogical Seminary*, Vol. V, pp. 41-60.

member of the family they knew that he could be found in the barn practicing clog dancing.

F., 21. I knew a number of young men about 15 or 16 years old who used to meet on moonlight nights and dance clog dances on a wooden bridge until the floor of that bridge was one mass of splinters.

M., 27. T's passion at 10 was jig and clog dancing, and a rolling and swaying walk keeping time to a rhythmical tune which he whistled. Now, at 20, he is very proficient in clog dancing.

F., 19. Last summer a show came to town with a clog dancer as a specialist. A little French boy of 11 years saw him, and ever since has been clogging till I believe he can beat the specialist.

M., 17. At the age of 12½ years I suddenly had a d sire for clog dancing, and for hours would practice some step that I had seen. The desire to learn the dance has increased as I grow older.

F., 22. When Will was 7 he began to jig-dance, and he did it not only once in awhile, but all the time. Often when he would be standing and talking all at once he would begin to whistle and jig, or if he was playing with other boys he would do the same thing, stop and dance, and then go on with his play for awhile, then stop and dance again.

Playing the Banjo or Drum. 45 cases—25 boys, 20 girls—were reported in which a special desire was experienced for playing the banjo. This interest was awakened in every instance in the period of early adolescence between the ages of 13 and 17. According to the replies it is during this same period that interest in playing other musical instruments such as the guitar, harp, mandolin, etc., takes its rise. Desire for playing the piano and organ in the majority of cases probably comes earlier.

The drum seems to be the first musical instrument to which the child gives his attention. It is a purely rhythmical instrument, and the one first invented by primitive man. If these results are typical, here is an illustration of the theory that the development of the race is in many ways repeated in that of the child. Boys frequently have a desire to drum by the time they are 3 or 4 years old, and it is a prominent musical interest during their early childhood. The returns indicate that the drum psychosis is peculiar to boys. Out of 291 observations only three girls are noted. The period from 10 to 14 is the time when boys organize their drum corps.

F., 23. At 15 I was seized with a great desire to play the banjo.

M., 21. From 10 to 15 I took a decided interest in drumming and dancing jigs.

M., 23. From 11 to 15 I was first interested in clog dancing, then the banjo, and then the violin.

M., 27. At 15 I had a great desire to play the banjo, but in about two years I lost my interest in it.

F., 18. A boy of 7 that I know marches and plays the drum in good time, and never tires of it.

M., 24. From 4 to 6 James would amuse himself for hours marching and beating a drum.

F., 21. Walter, from 6 to 10, had a great passion for drumming. He made a drum of a nail keg, and was always at it.

F., 19. My brother when 8 years old teased for a drum till he got it. He soon learned to play in good time.

F., 20. Dave took a sudden interest in drumming. He would get his little rocking chair, and when sitting on the floor would drum on the seat of the chair. After his parents bought him a drum he drummed always.

CHILDREN DEFICIENT IN RHYTHM SENSE.

V. Have you ever noticed any children to be especially deficient in a sense of rhythm, unable, for example, to keep step in marching or to keep time in calisthenics, or to learn to dance? How young may a child learn to dance in perfect time?

The aim of the question was to discover as far as possible how generally the rhythm sense in children is defective, and to get suggestions as to the possibilities of its improvement. Almost without exception those who sent returns replied to this question, citing one or more cases in which a child if not deficient in rhythmic feeling was at least deficient in ability to express the feeling in certain prescribed ways. The tabulated replies show that because of a defective sense of rhythm 268 children found difficulty in marching, 134 in dancing, 81 in calisthenics, 79 in music, 63 in keeping step in walking, 44 in poetic rhythm, and 17 in the execution of drill exercises. 12 were said to be able to learn dance steps, but could not fit them to music. It is very probable that a child who was reported as unable to enter into any one of these exercises was also unable to perform one or more of the others. A personal communication from a director of physical training in one of our largest cities makes this assertion: "There are frequent cases in our schools where a sense of rhythmic time is lacking in both pupils and teachers." Similar observations have been made by army officers. Theodor Billroth¹ gives statements from the officers of six army divisions who assert that there are certain recruits who never learn rhythmic marching. One says that 20-30 per cent. of those who enter his divisions are unable to keep step in marching, another finds 2 per cent., another 1-4 per cent., and two others 33 per cent., while the sixth declares that men have been in his division 10 or 12 years without learning to march in correct time.

The following are selected as representative replies:

1. In my kindergarten some children will pass two or three years seemingly without this sense, and then suddenly develop it.
2. A young man could not learn to keep step at West Point, and for two years was in the "awkward squad," the usual period being three months.
3. I have had children in my kindergarten who did not keep time, but usually were children who were slow in doing anything, and who preferred to look on rather than join.

¹ Wer ist Musikalisch? Deutsche Rundschau, Oct., 1894, p. 79 ff.

4. A girl in high school could not write verses nor sing in time. She did not care for dancing, and her reading of poetry was most monotonous from the fact that the rhythm did not appeal to her.

5. Some children seem to have no sense of rhythm. A pair of five year old twin boys are unlike in this respect, as one is quick to respond to rhythm and change of time; the other enjoys trying to take part in rhythmic exercises, but fails quite materially.

6. I knew one girl who always attended school where marching and singing was engaged in several times each day, and yet at the age of 20 she told me she always marched by watching the step of those in front of her, that the music gave her no idea as to when to move her feet.

7. I have known two girls, one about 14, one about 5, who always had trouble to keep in time in calisthenics. The younger one could not keep step in marching. Several young men of my acquaintance could not learn to waltz. One of these simply couldn't waltz unless he counted one, two, three all the time.

8. I have had children in my kindergarten for two years, and given them special help in our rhythmic exercises, and yet have failed to see any apparent increase in ability to keep time even to the simplest march. This has been the case in many instances with boys, but I have never known a girl to fail after repeated efforts.

The results of the returns render it emphatic that in the expression of rhythm there are wide individual variations. They do not justify the conclusion that some children are void of a feeling for rhythm. Since rhythm is so largely physiological in its nature its sense would seem to be a universal possession of man. Different persons differ in their feeling for rhythm just as they have certain peculiarities of physiological structure and tendencies. To be without rhythmic qualities is to be abnormal, it is to have a nervous organism incapable of performing its proper functions. Every one can express rhythm in some form, but not every one can express it in all forms. The reason why a child fails to express himself in a certain way is because he has never developed that mode of expression, and not because he is wanting in rhythmic disposition or tendency. Prof. Hayden says, "In answer to your question I recently asked in a first year room for the children who failed in keeping step when the class was marching. Two were pointed out whom I found could sing in good rhythm. I think also that any normal child can be made to express rhythm in any of the ordinary forms called for in the child's school life. He is sure to drive a nail in rhythm if you give him a hammer and tell him to hit once hard and once soft."

The returns indicate that the power to perceive and reproduce rhythmic forms of expression may be improved by cultivation. Several instances are given where such has been the case. A teacher of dancing¹ makes the following statement: "I have had repeated instances among my pupils, at the be-

¹ Brookes: Modern Dancing, p. 16.

ginning of their practice, who seemed totally devoid of an ear for music, yet in the end have been capable of adapting the step to the music with critical exactness." The following is a portion of a communication that is of interest along this line:

"I experimented along Froebelian lines with my first child (a girl). When she was three months old I rocked her in my arms in rhythmic time, always accompanied by sounds also in rhythm, called her name, swung the colored balls in rhythmic time, trotted her about in rhythmic steps. The child was quietly attentive and seemed beyond a doubt to appreciate it. This same plan was carried out in the succeeding months of her infancy—making it a point to sing simple, good melodies to her when she was wide awake and when presenting new objects to her.

"At one year of age she could dance her doll in perfect time to a polka tune; a few weeks later (she did not then walk) she threw the doll aside very forcibly in the middle of the polka and herself polka'd about like a frantic dervish. This was ever after her habit. It seemed she would get so full of the spirit of the rhythm that every nerve in her little body responded, and she would thump and hitch about on the floor like mad. (She hitched, never crawled on hands and knees.) At 14 months she kept splendid drum-beat time. At 22 months the Mother Goose jingles fascinated her, and although speaking German she learned to repeat them very quickly. At 3½ years she rhymed constantly in melody, and kept up perfect meter in the melody she invented. At the present, 3 years and 10 month, she rhymes in words.

"Singing to her constantly the first three years of her life, that is presenting every new thing to her in a song, has made a decided difference in her as compared with other children of her age. She invents songs, and plays and sings simultaneously, and what is more she comprehended the thought very clearly at once. At 2 years she would transpose the idea in the song and then laugh very heartily over it.

"The child 20 months younger than the first one carried parts of melodies perfectly before she was a year old, and is so susceptible to sounds that her ear-mindedness when it comes to harsh and penetrating sounds is a real trial; she gets completely unnerved when hearing them.

"Both parents unmusical."

That rhythmic ability develops with age is indicated by the results of my experimental investigation, published in connection with this study.

The ages given in answer to the question "How young may a child learn to dance in perfect time?" range from 3 to 8, the average of all the ages being 4½ years. One says, "Juanita

is 5 years old, and the youngest member of a dancing school. Her teacher is very proud of her because she is the youngest and dances the best of any in the class." Another says, "Mrs. W. has several dancing classes, but her best pupils are those in the children's class of 3 and 4 years of age. These keep perfect time, and are the most graceful." A teacher of dancing¹ states that he has made good dancers of children aged from 3½ to 4 years.

USE OF RHYTHMICAL REPETITIONS IN TEACHING.

In former days the use of rhythmical repetitions for teaching facts difficult to remember was a prominent feature in the methods of school work. Recognizing that the method is no longer a "fad," and thinking it would be of interest if not of practical value to find out to what extent such repetitions are now used, and to get the opinions of teachers and others as to the value of extending the method, the following section was placed in the syllabus:

VI. Have you ever made use of rhythmical repetitions or of rhymes in the teaching of things difficult to retain in memory? Do you think the method could be extended with advantage?

439 replies were received. 348 of these affirm that they have either used the method in their teaching or that it was used as a means in their own instruction. 91 claim to have had no experience in the use of the method, and it is quite probable that those who did not reply to the question did not because it called for knowledge outside of their experience. The following is a list of the rhythmical repetitions contained in the returns with the number of times each was mentioned:

Number of days in the months, 291; Multiplication tables, 74; Names of the Presidents, 46; Sovereigns of England, 32; History of Columbus, 19; Arithmetic tables not including the multiplication tables, 17; Capitals of the different States, 16; Historical dates, 12; Books of the Bible, 10; Counties of State, 10; Rules in Grammar, 9; Teaching of number lessons, 8; Learning the alphabet, 7; Rules in orthography, 5; Bones of body, 5; States in the Union, 4; Rules in Latin grammar, 4; Lines and spaces of musical staff, 4; Location of cities, 4; Bones of face, 3; Constellations, 3; Ten Commandments, 2; Names of Apostles, 2; Lists of prepositions and conjunctions, 2; Spelling of the word Mississippi, 2; and each of the following was mentioned once only—Productions of the different States, Occupations in the different States, Spelling of the word Tennessee, Sovereigns of France, Days of the week, Townships of county, Roman numerals, Lakes of Scotland, Minor Prophets, Wives of Henry the Eighth, The gunpowder plot.

Several cases were reported of such rhymes being made by individuals. One says, "From 10 to 15 years of age I made

¹ Brookes: *Modern Dancing*, p. 13.

rhymes in order to learn History." Another says, "When Leonora finds a recitation hard to learn her mother sets the words to music, and she learns them without any difficulty."

A few typical replies are:

1. I was taught all the capitals of the United States by singing them, but when called upon to give the capital of a single State I had to go all over the whole rhyme.

2. If the rhymes are lost the whole key is gone. It detracts from independence of thought. I prefer the association method.

3. When I learned the alphabet in rhyme I remember that for a long time I could not think of *A* as standing for anything but *Adam*. It was the same with each of the letters.

4. I tried it one year and found that it affected the common conversation of the pupils to such an extent that everything they said took on the form of rhyme, even if it lacked rhythm.

5. I was taught all of the multiplication tables by means of rhythmical repetitions, but I have not followed the plan in my teaching. It was suggested in Bible class the other Sunday that we learn the books of the Bible in jingle form—the pastor giving the jingle which he was taught when a very small boy. The Kings and Queens of England I have always remembered because the jingle staid with me. I do think rhythm helps one to retain some things in memory.

6. In number lessons I often use such rhymes as these :

One and one are two,
That's not hard to do.
Five and five are ten (fingers),
We call them little men.

Here are some fishes in the sea,
Father, mother, and children three,
How many fishes do you see ?

I make use of rhythmical repetitions frequently in primary teaching, and believe the method could be extended with advantage.

Of those replying about two-thirds think the method might be employed with good results, but they would limit it in its extent. They nearly all agree that it is more applicable to young children than it is to older pupils. Some few think its use is of questionable value, and the remainder assert positively that it has no practical importance as a means of imparting knowledge. The advantages claimed for it are that it saves time, that it awakens and sustains interest, and that it aids the memory. The latter is made the most emphatic. One says, "Certainly a useful device. It is like a chain, if one link is pulled up the whole comes immediately before the mind." Some think it a kind of mnemonics that is of great value for memorizing unconnected facts. The disadvantages stated as arising from the use of the method may be summed up as follows: The child's interest in the rhythm leads him to give too little attention to the facts presented. It has a tendency to cultivate a sing-song style in reading. It would take no more energy to learn and remember the facts independently. To re-

call the facts one has to begin at the first and go over the whole rhythm. This makes the method a waste of time. If one fail to recall the rhythm he fails to recall the fact. It destroys the tendency to associate events with other practical events.

A consideration of the rhythmical repetitions given in the returns leads one to conclude that, if these results represent the general habits in regard to learning by the rhythmical method, then its use may be particularly helpful in learning those things that are not worth while learning.

CONCLUDING CONSIDERATIONS.

In the primitive history of mankind labor, play, and art were inseparable. The bond of union was rhythm. When in the process of evolution these forms of mental-bodily activity became differentiated the ordered articulation of movements remained forming a fundamental element of each division. Thus rhythm is still a principle underlying and unifying all forms of human activity. Not only does it appear in the arts of movement—music, poetry, dance—but in the various labor activities, and in the arts of rest—sculpture and painting—which are the embodiments of the results of labor. It governs all natural activity of the animal body as a regulating economical element for the expenditure of vital force. Rhythmic activity permits of the rhythmic automatic formation of movements from which springs satisfaction, freedom of mind, and opportunity for the imagination to act. Irregular forming of activity or unrhythmical movements are in a much greater sense consumers of energy in that every new operation demands a new action of the intellect. In a word, rhythm lightens and facilitates labor, it is a prominent source of æsthetic pleasure, and it is an element of art for which every one has in some measure a perception.

The ancient philosophers were not unmindful of the significance of rhythm in its relations to man. Plato observes that the young find delight in noisy movements, and affirms that man is by nature rhythmical, that the gods gave to man this sensation, and accompanied it with pleasure, and that by means of this pleasure the gods awakened in mankind a passion for graceful, alternating movements, and by means of song and dance processions made strong the bonds of human sympathy. For Aristotle rhythm, like imitation and harmony, was inborn. He makes three classes of rhythm, distinguishing (1) a rhythm of form, (2) a rhythm of tones, and (3) a rhythm of speech. The first may be apprehended in the movements of the dance, the second is expressed in connection with harmony in the song, and the third is what we denominate as meter. Music calls forth the feeling of pleasure. This is due to rhythm in its

connection with harmony. Poetry has had its origin and rise in rhythm in connection with imitation and harmony. Building upon this foundation the Greeks, in the education of their youth, were led to ascribe high importance to the formal structure in music. Because of its beneficial effects upon speech and action they believed in filling the human soul and penetrating the whole life with rhythm and harmony. However, they laid not less stress upon the value of body movements. The dance accompanied by music and song was the most complete expression of rhythm, and a most important means of culture and ethical self-discipline. It was a religious performance. In old Hellas rhythm played a prominent part in the development of poetic literature, and in the social and political life of the people it was no small factor. The Thessalians looked upon the office of leading-dancer as one of high political dignity, and the Lacedemonians attributed their success in war largely to the discipline which their young men had acquired in the orchestral practices. Among this cultured people of antiquity the sense of rhythm was so strongly developed that in the theater mistakes in the rhythm of either body movements or speech were censured. To these ancients rhythm was a principal permeating the whole universe. They believed it originated simultaneously with the old Orphean Eros who ordered the "primeval chaos" and set in motion the "procession of the stars."

In the education of to-day rhythm holds no important place in the mind's curriculum. Its relation to body movements is not a matter of concern. Unrhythmic movements, awkwardness or ungraceful gestures, while not meritorious do not offend. The rhythm of poetry is given almost no attention, so that most people make most poetry rather prosy. It is in music that we lay stress upon rhythm, and even here it occupies a place subordinate to melody and harmony. In general we fail to recognize that rhythm is the corner stone of all music, of all motion, of all life. While the Greeks may have made rhythm an altogether too important element in the education of their youth, we, on the other hand, have erred in not appreciating the fact that all life, mental and physical, is perfect in proportion to the perfection of its rhythm. The sweetest affection, the loftiest reaches of faith, joy, and peace are dependent upon the rhythmic activities of matter and mind. Rhythm sinking deep into the recesses of the soul brings gracefulness in its train. Brain activity is not made up of currents of force, but rather of rhythm among the brain cells. Lack of appreciation of the part that rhythm plays in the processes of life has prevented child life in the home and in the school from rising to the heights it should have attained. What shall be done in the line of rhyth-

mic instruction is a problem difficult of solution. Two or three principles may help.

1. As the child begins very early in life to appreciate rhythm so should the appropriate means thus early be offered to foster and develop its perception. The training should continue until the adolescent period or longer. When in early life the expression of rhythmic tendencies has been checked by external influences, or where the environment has not been favorable to call them forth and develop them, the returns indicate that the child of 9 or 10 years, when called upon to express himself in any way rhythmically, has been at a disadvantage, and that he has been slow in acquiring the power to keep step in marching, to keep time in calisthenic exercises, etc.

2. The child's nature is such that the only method to pursue in bringing out the rhythm of his being is to give him some form of activity in which to express it. These forms of activity should appeal to the child's interests, he being unconscious of their purpose.

3. The method of development should be an indirect one. No barren rhythmical exercises and no mechanical devices for a special training are necessary. It is not to be taught as an abstract thing *per se*. The development is to come through those forms of activity that call for the expression of the child's sense of rhythm, but that have other objects in view that stand out prominently. These forms of activity are such as physical culture exercises, rhythmic plays and games, singing, marching, dancing, etc. Music in connection with these aids in securing exactitude of rhythm.

From the first three sections it appears that the perception of rhythm develops very early in life, following which there soon comes an interest in rhymes of the Mother Goose type and in the so-called lullaby songs, which interest passes over gradually into that for poems and music whose sentiment and thought are beyond the pale of appreciation until the adolescent period. Throughout this whole stage of development rhythm is prominently the common factor—at first the only means of attraction, at the end a much less absorbing element of interest. The returns enforce the belief that children like poetry whose meaning they only partially comprehend—a fact of pedagogical interest.

If the conclusions reached are well founded there can be little doubt as to the general nature of the application. To neglect to make use of the rhythmic interests in developing the higher poetic sentiments is to limit the child's future appreciation of poetry and music. It is to be pedagogically guilty of not opening up to the child in the right way one of the broadest fields of culture. It is a trite but true saying that a taste

for poetry can hardly be acquired late in life, but should be developed by home and school training. To cultivate in a child the love of poetry is to acquaint him with the highest and noblest form of the best literature of his mother tongue making him a partaker of all the inspiration it carries. Lanier in his Introduction to *The Boys* Percy says, "I know that he who walks in the way these following ballads point, will be manful in necessary fight, fair in trade, loyal in love, generous to the poor, tender in the household, prudent in living, plain in speech, merry upon occasion, simple in behavior, and honest in all things." Some one has somewhere said that, "Poets are prophets, and Tennyson can teach a girl that 'T is only noble to be good,' and Burns can make a boy understand that

' The honest man, though e'er sae poor,
Is king of men for a' that !'

better and earlier than preachers or reformers."

In developing a taste for poetry the child's early interest in rhythm presents the fundamental element to be utilized in the first years of training. The sonorous rhythm of the stanzas of a poem like Kipling's *Recessional* when read aloud in the presence of young children appeals to them, attracting them to the poem itself. If the rhythmic qualities of the verses please them, almost any thought or sentiment is acceptable. In support of this assertion is the testimony of such replies as the following:

1. A little girl of 5 was very fond of hearing *Hiawatha* read. The same child at 7 and 8 delighted in Scott's *Marmion* and Shakespeare's plays. 2. A girl of 8 liked to hear *Lady of the Lake* read aloud. 3. A girl of 6 listened with great interest to some of Tennyson's poems. 4. "In the kindergarten we sometimes read selections from the best poetry to the older children, those of 5 and 6 years, and are frequently requested by the children to re-read these selections."

These illustrate a point. It is not advocated that they be the material first used in the child's literary teaching. This place should be occupied by literature of the nursery rhyme type. Mother Goose sheds a beneficent influence over early child life. The fear of some matter-of-fact people that the repetition of an obvious impossibility like "The cow jumped over the moon," may teach children to lie is groundless. Children spend their lives in a world of imagination, and if they are not allowed the good old standard giants and fairies they will spontaneously create monsters and pigmies for themselves.

The pedagogical value of nursery rhymes depends upon their psychological constituents. They are helpful in developing both the sense of rhythm and the sense of rhyme. They aid in stimulating the imagination and in feeding the growing in-

terests of early childhood. They are the heritage of centuries and contain a wealth of material suited for infant and child instruction that mothers have not yet dreamed of, and that has never yet come within the scope of the versatile imagination of the kindergartners. What is needed is that they should be systematically arranged, but without any attempt at an impossible cast-iron grading. The classification following the child's growing interests and intelligence would naturally begin with those rhymes and jingles that are the simplest and most concrete, and gradually advance to those that express more complex and abstract ideas. It is permitted only to suggest in the briefest possible outline the groups that an analysis of the rhymes and jingles would naturally fall into that there might be certain classes of them adapted to the different stages of the child's progress:

1. Those which in some way appeal to the child's personal interests by affecting his personality—such as concern parts of his body, etc., and into which movements and gestures enter as prominent features.

2. Those which have reference to animals and their doings. This class has two divisions: (a) those in which animals and children hold some relation to each other, and (b) those in which no such relation exists.

3. Those which refer to or make observations on the flight of time, on the weather, on the sun, moon, and stars, etc. These will occupy the child's interest about the same time as the rhymes and jingles included in class 2, although the interest may be awakened a little later.

4. Those that express social relations, *i. e.*, those that attract the child's awakening attention in relation to other children and people.

5. This class should contain the rhymes and jingles used in the rhythmic plays and games of childhood, counting-out rhymes, riddles, etc.

Such a classification, being based upon the psychological development of the child, is thoroughly pedagogical, and would be a contribution to the literature for young children that would be gladly received in the home and in the school.

The kind of literature which has been referred to as being good for the child possesses both form and content. On the other hand there is much of the so-called poetry written for early childhood which is objectionable in that it is destitute of content, its whole value lying in the jingling rhythmic qualities of its verses. This is pedagogically bad. It is always possible without destroying the child's interest to embody in these rhythmic forms some little thought which, though not comprehended in the present, will be in some more advanced stage

of the child's development. So all through the child's early life he may, because of his appreciation of rhythm, enjoy poetry, the full realization of whose thought and sentiment he does not experience until more advanced in years. The principle to be derived from this fact is obvious. Take advantage of the rhythmic interest to store the child's mind with those higher forms of poetry that shall furnish material of thought and sentiment for use and enjoyment in his later life. This can be done without sacrificing the child of the present for the child of the future, and when so done the child's present enjoyment becomes the prophecy of his future. This often repeated assertion is all true, but of vastly more importance than this storing of the mind for future use is that which the child assimilates at the time of presentation. It is thus that he builds up intellectual fibre which enables him to assimilate still more. In this way in a far greater degree than in the other does the child's present doing foretell his future.

What has been said of poetry holds in regard to music. Rhythm, the fundamental element of music, lies originally at the foundation of the child's interest in music. Melody and harmony are secondary or artificial elements, and are of later appreciation. Make the rhythm such as shall attract the child, and the opportunity is given for employing those musically artistic qualities that educate and refine the musical perceptions of children. Music for children should possess two qualities, it should be child-like and it should be musical. It should reach out in various directions into the later life of the child, being in some sense a preparation for each successive stage in the child's development. Music may be made subservient in strengthening the religion, the poetry, and the imagination of the child. It offers an opportunity for lifting the child to planes of elevated thought and emotion. By it his higher spiritual entity may seek and find communion with that of his companions. W. S. B. Mathews says,¹ "Music comes into the child-life in two main aspects: as an *incidental*, a convenient method of securing pleasant attention and simultaneous utterance, as in marching songs, and the like; and as *educational*, as in devotional songs, the songs of home, and so on. Now the general impression would be that it need not matter whether the music of the first class possess artistic quality or not, since its prime object is merely that of securing unity in the action. But here we come upon a deeper principle. There are musical forms (artistic songs) which, while securing all the external ends of the shallow marching songs, at the same time have in them seeds of eternal life. So while

¹ Music Review, Vol. II, p. 179.

the child sings them his feelings are kindred, and certain expectancies form themselves in him which later find their full realization in poetical music, like the sonatas and symphonies of the great masters. . . . It is not a matter of indifference whether even the more elementary forms of children's music are common in quality. There is an education in merely wearing silken garments. Nor is it merely external." In the child-songs of the educational class he asserts that quality is of pre-eminent importance.

Not of insignificant importance is the use of rhythmic exercises for the promotion of health. The activity of the general life proceeds irregularly and by fits and starts, while that of rhythmic exercises, such as the dance, proceeds regularly and methodically. In the former there is continuously renewed reflection and effort of the will in order to subdue the resistance which the organism opposes to the work in hand, in the latter there is only exertion at the beginning—the muscles being once put in motion, each perfected motion calls out a new one without any further renewed activity of the will. The rhythmic exercise releases the nervous strength accumulated in the psychical centers without the wear and tear attendant upon the routine of the daily life, while the automatic movements awaken within the individual pleasurable sensations. Herein lies its special value as a means of healthful recreation—a source of pleasure that improves the physical and animates the moral powers, that develops bone and muscle and strength of cerebral fibre, and that brings the muscles of the body into beneficial action. Rhythm brings that exhilaration of mind which makes exercise doubly beneficial, and prevents in physical growth the development of angularity and counteracts the many vicious attitudes and habits which children too often contract. By it the evils of over-mental education may be largely avoided by breaking up the irksomeness of study. In school, when children seem weary of their work, music in connection with rhythmical physical exercises is of untold value. Under such influences the unused and flaccid muscles of the body are stimulated, the listless form springs anew into life and activity, the dull eye again sparkles with animation, and the mind turns back with alacrity to its task. The effect of rhythmic exercises on the mind is well expressed in the words of Dr. Andrew Combe,¹ "In acquiring readiness and forming habits, we merely turn to account that organic law which associates increased aptitude, animation and vigor with regular exercise. It is not the soul or abstract principle of the mind which is thus

¹Physiology Applied to the Improvement of Mental and Physical Education (cited by Brookes, *Modern Dancing*, p. 10).

changed, but simply the organic medium through which it is destined to act. In physical education we are quite alive to the advantages of repetition and practice. The same principle applies to the moral and intellectual powers, because these operate by means of material organs."

When we consider that the mind works rhythmically, that the body consists of nearly four hundred organs of motion whose action is rhythmic, that rhythm has been a prominent factor in the development of the race, and that probably the development of the race is in many ways repeated in that of the child, we are led to believe that the subject of instruction in rhythm demands more attention in both the home and the school than is now given it. The question in just what the instruction shall consist and in what manner it shall be given is a problem as difficult to solve as are a multitude of other pedagogical questions. We can only refer to the suggestions and principles already stated, and repeat that the child's early environment should frequently furnish strongly marked rhythmic music and exercises to which he may have opportunity to respond, and then in connection with the expression of rhythm there will come a development of the feeling of rhythm. But to obtain the desired results the method must take into consideration that no work of art is in itself purely rhythmic. While rhythm is an indispensable factor, yet it is only one of the factors in the creations of music, poetry, or the dance; frequently, and even in the more primitive formations, it has its foundation in the union of two or all three of these. In all cases the rhythmic forms are suited to the peculiar kind of material which forms the subject matter of the rhythm in such a manner that they are intelligible and valuable only in connection with this material. Working from this standpoint, and with the understanding that there is danger in over development just as there is in arrested development, is it not possible to build upon rhythm as a fundamental principle of human nature to the end that the whole character of the individual may be exalted, and that there may be a new delight in conforming to common standards of obedience and hope? May the child not thus be led "to strive for the most life possible and for the greatest possible enjoyment of life with the least possible sacrifice in life's force and life's pleasure?"

II.

EXPERIMENTS IN RHYTHMIC TAPPING.

The purpose of this study was the determination of the ability of children at various ages to perceive and reproduce rhythms tapped off in their presence.

The tests were made upon pupils in the public schools of Worcester, Massachusetts.¹ Three of these schools were elementary, two containing many children of foreign parentage, and the other very few. Tests were also made upon pupils in the classical and evening high schools. The whole number of pupils examined was 1,297. Of these 646 were boys, and 651 were girls. The range of age was from 5 to 19 years.

TABLE I.

Showing the number of each age tested.

AGE.	BOYS.	GIRLS.	AGE.	BOYS.	GIRLS.
5-6	26	27	12-13	59	60
6-7	34	34	13-14	68	52
7-8	41	36	14-15	56	51
8-9	39	45	15-16	50	60
9-10	43	57	16-17	49	47
10-11	61	50	17-18	37	45
11-12	44	52	18-19	39	35

After some consideration of more elaborate methods it was finally decided to make the tests in the simplest way possible. Rhythms of varying difficulty were tapped off with a pencil upon a table, and the child was required to reproduce them in the same way, his success in each case being judged by the operator and recorded with incidental observations. This method has been followed throughout the investigation. It will be noticed that the method adopted is chiefly motor, *i. e.*, it is a test of the child's ability to express rhythms of certain standard forms rather than a test of his keenness in discerning rhythms or of his feeling for it. Nevertheless the active and passive aspects are not absolutely independent. Ability to execute involves ability to perceive, and great keenness of perception would hardly be present without some skill in execution. It is perhaps fair to assume that the two run in general parallel, with the ability to execute always lower than the ability to perceive.

¹The writer desires to express his indebtedness to Superintendent Carroll and the school authorities of Worcester for the privilege of making these tests in the schools, and also to the principals and teachers of the schools where tests were made for their interested co-operation and numerous courtesies.

As a preliminary to the specifically rhythmic tests each subject was requested to tap a little on the table in any way he saw fit. This will be referred to as the *ad libitum* tapping.

The rhythmic tests themselves were made with a series of seven rhythmic patterns differing from one another in difficulty. The following are the expressions in musical notation of the patterns used:

In making the tests each rhythm was repeated by an assistant¹ three times, *i. e.*, three measures were given. Previous to and during the investigation my assistant practiced the rhythms daily, and attention was given to keeping the rhythms as uniform as possible in rate, intensity, and accentuation, a matter by no means unimportant.²

In order to determine objectively the exact nature of the pattern rhythms executed by the assistant a careful record of

¹ My wife acted as assistant in the experiments, and she also aided me in the work of tabulating the results.

² Wundt: *Outlines of Psychology*, p. 150.

them was made in the laboratory at the close of the work in the schools. Here the rhythms were tapped out on a tambour, the pulses of which were recorded on a kymograph in connection with a time line in hundredths of a second.¹ The following is a statement of the intervals between taps expressed in these units:

Rhythm I. 31-58-31.5-56-31.5.

Rhythm II. 28-29-56-28.5-29.5-55-29-29.

Rhythm III. 53-52-26-28-53.5-51-51.5-25-28.5-51-51-51.5-25.5-31.

Rhythm IV. 50-50-48.5-48-23-27-49-49-48-49-46.5-23.5-26-47-47-48-49.5-50-22-26.

Rhythm V. 24-26-49-23-25-50-50-51.5-23.5-26-48.5-21.5-25-50.5-49.5-49-21-26-49.5-23-25.5-47.5-47.5.

Rhythm VI. 56.5-56.5-17-16-24.5-54-57.5-53.5-16.5-16-22-54.5-53-53-16.5-16-20.

Rhythm VII. 58-56.5-14.5-14.5-13.5-16.5-57-58.5-56-14.5-14-12.5-16.5-55.5-56.5-57.5-14.5-14.5-14-16.5.

These results, it will be observed, show no greater variations than would naturally be expected, and such as probably had no influence on the work of the pupils tested.

The task of each subject was the tapping of ten measures of each kind. In case of failure at the first trial with any rhythm a second and a third trial were given, the pattern being repeated by the assistant before each. If the subject still failed, further trials were postponed till after tests with all the other patterns. After going through the whole list, however, there was a return to those rhythms which the pupil had not been able to execute, and the assistant now not only tapped, but also counted the rhythm. Two of these counting trials were given in each case if necessary. Thus each subject tested might receive as many as five chances to succeed in tapping the rhythm correctly. The counting trials were left until the last in order to prevent suggesting to the subject that method of assisting himself. In no case was the subject permitted to tap synchronously with the assistant. Each subject was tested separately, and care was taken that each should feel at ease and have a comfortable position. The smaller children stood, the larger ones sat, at the table. Aside from this they were left free to do their best. There was rarely a case in which the work was not taken pleasantly and even eagerly. Every precaution was taken that no subject should know what was wanted until he was ready for the test.² The time necessary

¹ As a matter of fact the rating of the fork is 99 per second instead of 100, but the difference is here of no consequence.

² How far the nature of the tests was divulged, in a way to lead to

for making the tests varied from five to eight minutes. In making the records the observer carefully noted the following points: 1. The number of the trial in which the subject succeeded in tapping each rhythm correctly. 2. Whether the subject retarded or hurried the time. 3. Whether the subject counted in those trials in which it was not suggested by the assistant. 4. Whether the subject had taken any music lessons aside from those occurring in the regular school work, and if he had done so, how many. 5. Whether the subject struck continuously upon the same spot on the table or distributed the taps at different points so as to mark the rhythm spatially as well as temporally. 6. Any peculiarity displayed by the subject in his execution of the tests.

AD LIBITUM TAPPING.

It is unnecessary at this point to go into details with reference to the physical influences that affect the rate of such tapping movements. The studies of this subject already made would lead to the expectation that the subjects would show individual differences arising from various causes, including physical and mental excitement and fatigue, also that the extent of the movement, if not excessive, would have little influence on its rate, and, finally, that within narrow limits the girls might perhaps be slower than the boys.¹

This *ad libitum* tapping was the first test of the series. On entering the room the child was told to take the pencil and tap on the table in whatever way he pleased—to tap in his ordinary way. As he tapped the operator noted whether the tapping was regular or irregular, whether its rate was medium, fast, or slow, and whether it was uniform or rhythmic. The standard of comparison was the operator's normal rate, which is between three and four taps per second. The following table gives the percentage of those who tapped at the different rates, and regularly or irregularly:

A study of this table reveals that which we were led to conjecture, *i. e.*, that the proportion of girls having a slow rate is greater than that of the boys. It will be observed that in both

previous practice on the part of those tested after the first occasion, the writer has no absolute knowledge, but regards the number thus influenced as insignificant.

¹ These statements are based on the following: W. Griffiths: Rhythm of Muscular Responses, *Journal of Physiology*, 1888, p. 39. Horsley and Schaefer: Experiments on the Character of Muscular Contractions, *ibid.*, 1886, p. 96. F. B. Dressler: Some Influences which Affect the Rapidity of Muscular Movements, *American Journal of Psychology*, Vol. IV, p. 514. Cattell and Fullerton: On the Perception of Small Differences, 1890, p. 114. Camerer: Versuche über den zeitlichen Verlauf der Willensbewegung, 1866, pp. 41 and 45. Von Kries:

TABLE II.

Showing percentage of subjects tapping at different rates.

Rate.	REGULAR.			IRREGULAR.		
	Medium.	Slow.	Fast.	Medium.	Slow.	Fast.
Boys,	55.7	17	12.9	7.5	2.2	4.7
Girls,	45.6	26.1	10.7	9.5	4.6	3.5

the regular and the irregular tapping the percentage of slow tappers is greater, while the percentage of fast tappers is smaller, for the girls than for the boys. The girls also show a somewhat greater percentage of irregularity: 17.6 per cent. against 14.4 per cent.

Every precaution was taken to prevent suggesting the idea of rhythm, yet 47 or 7.3 per cent. of the boys, and 55 or 8.4 per cent. of the girls beat rhythmically in this *ad libitum* trial. Had it been intimated, the probabilities are that a much larger number would have responded in this way. Of the total number who beat in regular rhythms 32 boys and 34 girls, or 62.1 per cent. of the boys, and 58.1 per cent. of the girls beat the pattern numbered III above. Of these more than seven-tenths of the boys were between 8 and 13, and nearly four-fifths of the girls were between 7 and 12 years of age.

TABLE III.

Showing the percentage of those who in their ad libitum tapping beat rhythmically and non-rhythmically.

BOYS.				GIRLS.			
Uniform tapping.	Regular rhythmic.	Irregular not rhythmic.	Irregular rhythmic.	Uniform tapping.	Regular rhythmic.	Irregular not rhythmic.	Irregular rhythmic.
80.7	5.0	12.1	2.3	77.2	5.2	14.5	3.2

THE RHYTHMIC TESTS.

In working up the results of this part of the investigation the records were divided into three classes. In the first class were put those of all subjects who succeeded in tapping the rhythm on the first trial, *i. e.*, who did it with ease; in the

Zur Kenntniss der willkürlichen Muskel-thätigkeit, *Du Bois-Reymond, Archiv für Physiologie*, 1886, Supplement I, pp. 2-7. Wm. L. Bryan: On the Development of Voluntary Motor Ability, *American Journal of Psychology*, Vol. V, pp. 173 and 177.

second class those of all subjects who had difficulty, but yet were finally successful; and in the third those of all subjects who, after five trials, had still failed to master the rhythm. The percentage of subjects in each of these classes was calculated for each age, and the results combined in curves like the following, which shows the proportion of those who succeeded easily (or with difficulty, or not at all) in their attempts to tap the sixth of the rhythms indicated above.

Curves representing the results of the tests with the sixth rhythm expressed in percentages.

The solid lines represent the records of the boys; the dotted lines those of the girls. The lower curves represent in per cent. those who executed the rhythm with ease; the upper curves all who succeeded at all. The elevation of the upper curve above the corresponding lower one in any case represents, therefore, the per cent. of those who found difficulty in tapping the rhythm; and the distance from the upper curve to the 100 per cent. line shows the per cent. who failed completely.

The following curves show the average results of all the tests on all the rhythms, no regard being had to the differences in the difficulty of the rhythms:

Curves based upon the average of all the tests.

The percentages from which these average curves were plotted are the averages of the percentages that were used for plotting the curves for these separate rhythms. As in Figure I the solid lines represent the work of the boys, and the dotted lines that of the girls. The two lower curves represent the average percentage of those who executed the whole number of rhythms with ease, while the upper curves indicate the average percentage of those who succeed at all. The elevation of the upper curve above the corresponding lower one in any case represents therefore the average per cent. of those who found difficulty in tapping the whole series; and the distance from the upper curve to the 100 per cent. line shows the average per cent. of those who failed completely.

Similar curves were plotted for each of the rhythmic patterns separately; for the averages of different groupings of the patterns (the three easy ones, I, II, and III; two of moderate difficulty, IV and VI, and the two of greatest difficulty, V and VII); and for all the patterns together, except pattern V, which was found to be the most difficult of all the tests.

A careful study of these curves, both separately and in relation to one another, seems to justify the following statements:

1. Among the youngest children the boys are superior to the girls, but somewhere between the ages of 6 and 7 years the girls become as proficient as the boys. After this time, in

the case of simple rhythms, there is little difference between the sexes, the advantage being slightly in favor of the girls, but as the rhythms are increased in difficulty the inferiority of the boys becomes more apparent.

2. Assuming that the average curves of Figure II represent the development of the rhythmic ability of the average subject, it would appear that the period of the most rapid progress in the case of the boys ends between 9 and 10 years; in girls between 7 and 8 years. After these ages the progress is slower; and after 16 or 17 there seems to be an actual falling off, though this may, of course, be merely accidental.

3. It is probable that the periods of apparent retardation in the case of the boys between 10 and 11, and 14 and 15 are also accidental, especially as no such periods are perceptible in the case of the girls.

AIDS EMPLOYED TO FACILITATE THE TAPPING.

The subjects made use of two chief aids in beating the rhythms: 1. Counting. 2. Distributing the taps at different points on the table.

The following table is an abstract from a more extended one giving the results of the observations upon this matter:

TABLE IV.

Giving in percentage the proportion of subjects making use of different means of assistance in tapping the rhythms.

	Counted.	Struck different places.	Did both.	Did neither.
Boys,	19.2	23.7	20.3	36.8
Girls,	32.2	15.8	27.3	24.7

The difference between the boys and girls in this table is striking.

The full table from which this is taken shows a decided though irregular progress from year to year in the use of these helps up to about 16. At all ages a larger per cent. of the girls counted; at all ages, except 6, 15 and 16, a larger per cent. of the boys marked the rhythms spatially;¹ at all ages, except 6, 7, and 17 a larger per cent. of the girls made use of both means of assistance; and at all ages after 7 a larger per cent. of the boys resorted to no aid whatever. These last differences may possibly explain, in part, the general superiority of the girls over the boys.

¹ Was this possibly from a more familiar association with the rhythms of machinery in movement?

Another and more important influence is the special study of music, which is much more general with the girls, about twice as many having taken lessons upon some musical instrument. In the following curves are shown the average results for those who had and who had not taken such lessons. The curves begin at eleven years, no subjects under that age having had musical instruction other than that in singing given in the regular work of the school. The number of individuals at each age who had had lessons is as follows: Between 11 and 12, boys 2, girls 6; 12 and 13, boys 6, girls 17; 13 and 14, boys 7, girls 9; 14 and 15, boys 13, girls 23; 15 and 16, boys 15, girls 32; 16 and 17, boys 21, girls 17; 17 and 18, boys 9, girls 24; 18 and 19, boys 7, girls 13. Total number of boys, 80; girls, 141. The number who had not had lessons can be found in each case by subtracting from the corresponding number in Table I, page 32. A combination of the two curves here shown would give, of course, the portion of the average curve above (Figure II) lying to the right of the 11 year ordinate.

As before, the solid lines represent the boys; the dotted lines the girls. The curves show clearly enough the superiority of those who had received special musical instruction, and thus throw light upon the superiority of the girls over the boys in the latter part of the general curve. How far this superiority is the effect of musical training, and how far it is a cause in leading to greater interest in music, and so to the taking of special music lessons, is something that cannot be decided by the data in hand. Most likely it operates in both ways.

The curve for those not having had special music lessons is interesting, also, in another connection. There comes out in it more clearly than in the average curve, a time of superiority of the girls from about 12 to 15 years, followed by a time of inferiority extending to the end of the record. This corresponds

very closely with the period of their relative superiority and inferiority physically, as shown by the anthropometric curves for stature and weight, and makes the inference natural that we have in the average rhythm curve a picture of increasing physical development and power of co-ordination. This is what might be expected considering that the tests were addressed to the executive side of the rhythmic faculty rather than to its perceptive side.

SPECIAL CASES.

There were three boys and six girls who failed to execute any of the tests. These were all under 7 years of age. This, for the reason given in the last section, indicates not that they were wholly deficient of the sense of rhythm, but probably no more than that they were unable to express themselves in the required manner. At the other extreme were 22 boys and 33 girls who succeeded in tapping all the rhythms. Of these 4 boys and 17 girls had studied music outside of the public schools, a much larger proportion of the girls being thus able to profit by this form of special training.

SCHOLASTIC AND RHYTHMIC ABILITY.

If Wundt is right in affirming that rhythm is a characteristic of the apperceptive processes,¹ and if rhythm has even a small portion of the psychical importance that some have been ready to assign to it, a comparison of general school standing with ability in the execution of rhythms becomes a question of some interest. It must be admitted at the outset, however, that some children who do exceedingly good work in school seem quite deficient in rhythmic ability, while others who show little aptness for school studies have that ability well developed. For example, one boy of 12 years, who was in the *seventh* grade, *i. e.*, with pupils averaging about 12-13 years, and was marked *excellent*, tapped with ease I and II only, with difficulty III and VI, and failed altogether on IV, V, and VII. Another boy of 12 years who was in the *second* grade, with pupils averaging about 6-7 years, and was marked *poor*, executed all the tests with ease excepting V, which he succeeded later in getting. However, such cases are so rare as to suggest abnormality.

The data for judging of the scholastic ability were given by the teachers. They were asked to arrange the pupils in five grades (excellent, good, fair, poor, and very poor) from the point of view of their school work. In tabulating the results, however, in view of the difficulty of making an accurate judg-

¹ Physiologische Psychologie, II, S. 246.

ment of a pupil's rank in school, it was thought best to reduce the number of classes by calling all on one side of fair "good," and all on the other side "poor." Those who fell in the middle group of "fair" were also omitted as less likely to show the relation in question than the extreme cases. The following table shows the percentage of subjects ranked "good" or "poor" succeeding or failing with each of the standard rhythms. The number of cases in each group was as follows: boys, "good," 251, "poor," 90; girls, "good," 302, "poor," 90.

TABLE V.
Showing Rhythmic Ability in relation to rank in school.

Test.	SUCCEEDED.				FAILED.			
	BOYS.		GIRLS.		BOYS.		GIRLS.	
	Good.	Poor.	Good.	Poor.	Good.	Poor.	Good.	Poor.
I	98.7	96.4	98.9	95.2	1.3	3.6	1.1	4.8
II	97	92.8	97.8	91.6	3	7.2	2.2	8.4
III	96.1	85.5	96.8	85.5	3.9	14.5	3.2	14.5
IV	83.2	63.8	91.4	67.5	16.8	36.2	8.6	32.5
V	69	43.3	72.4	55.4	31	56.7	27.6	44.6
VI	87.5	74.7	88.2	65.1	12.5	25.3	11.8	34.9
VII	55.2	36.1	59.1	39.7	44.8	63.9	40.9	60.3

Study of this table shows that in the simplest tests the difference between the "good" and "poor" is not great, but that this difference increases as the tests become more and more difficult, and justifies the conclusion that good ability in executing a rhythm is more likely to be associated with considerable intellectual alertness than otherwise. If some means had been employed by which the mental aptness of the subjects could have been more accurately determined it is very likely that the results would have been more marked, for many pupils who are classed as "poor" in school work have intellectual aptitudes that are not taken into consideration in the making up of the school records. Whether this relation is more than that between good physical condition and development on the one hand, and both good standing in school and good ability to tap rhythms on the other, remains as yet undetermined.

GENERAL NOTES AND OBSERVATIONS.

In the counting as an aid in tapping there were many variations. Many felt they could not count the more difficult tests, and did not attempt it. There were cases in which they could not count the difficult part of the rhythm, but counted as far as they were able, and then tapped the remaining part as best they could. Some of these succeeded in performing the test.

Cases occurred in which subjects needed to count a few measures only, and then could tap the remainder of the ten with perfect ease. Many of those who did not count and failed to get a rhythm in the first three trials tapped it readily and easily in the first counting trial. Among those who did not count there was a tendency quite strongly marked to vary the time or lose the rhythm altogether before the end of the ten measures.

Two or three testified that they got the rhythms by watching the movements of the assistant's pencil; a few got the time from the swing of the assistant's hand—both, of course, during the giving of the patterns. A small number of subjects was found who kept time not by counting, but by using the syllables *da, da, or la, la*.

Some who marked the rhythms spatially were asked to strike each time the same point on the table. It was the universal testimony that this made the work more difficult. A few under these conditions made a failure of the tapping.

Some knew at once when they failed to get a rhythm correctly; others were less accurate in judging their own results, and, therefore, gave evidence of less capacity on the perceptive side. Several instances occurred in which the subject tapped number III instead of IV, V, VI, or VII, as the case demanded. Frequently VI was tapped in place of VII. Generally, in such cases, it was apparent that the subject was unable to distinguish fully between the rhythms, but there were other subjects whose difficulty seemed clearly to lie in an insufficient voluntary control of the muscles.

In a part of the subjects keeping time by moving the body back and forth, or in some similar way, was a noticeable characteristic. Some moved the head only, others moved the body as well as the head. Only a part of these were conscious of what they did. Some asserted that they felt the rhythm in their muscles. A few affirmed that they knew when they were tapping a rhythm correctly, because of a feeling of pleasantness that attended the movements.

GENERAL SUMMARY OF RESULTS.

In the *ad libitum* tapping the girls tend to tap a little more slowly than the boys. In this test there appeared also a strong tendency, though rhythmical tapping was not suggested by the experimenters, to tap rhythmically.

Nine subjects, 3 boys and 6 girls, all under 7 years, failed to tap any of the rhythms, while fifty-five subjects, 22 boys and 33 girls, executed all without any failure. Twenty-one of these had given special attention to the study of music.

The results of the rhythmic tests show the boys to be more

skillful than the girls up to an age which lies between 6 and 7 years. After this time the girls are more skillful than the boys. This superiority is the most apparent in the curves representing the most difficult rhythms. Increase in ability to express rhythm by tapping movements seems to be rapid up to 9 or 10 years. After this age progress is slower up to 15 or 16 years, after which there is possibly a falling away in skill. The curves do not make it certain that there are any periods of retardation in the development of rhythmic ability.

Two aids were used in tapping the rhythms, namely, counting and marking the rhythms spatially. A much larger proportion of the girls than of the boys took advantage of these means of assistance.

Those having had special training in music were more successful in the execution of the tests than those who lacked such instruction. These two facts explain in part, at least, why the girls were more successful than the boys.

A comparison of rhythmic ability and rank in school work leads to the conclusion that good ability in executing rhythms and intellectual aptness are more frequently associated than otherwise.

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