Rhythm Ghosts

by
"Tabourot"
A Tactus Press Book

P.O. Box 9704
Austin, TX
78766-9704

PDF eBook Edition – 2018
Published by GP Percussion, Inc.
ISBN: 987-0-9714048-8-5

Contents

ILLUSTRATIONS and EXAMPLES

CHARTS and TABLES

MAPS

STANDING UP TO REALITY

> There comes a point where you have to stand up to reality and deny it. - Garrison Keillor. *Leaving Home.*

In his preface to the seventh volume of *The History and Literature of the Wind Band*, published in 1983, Dr. David Whitwell stated that the cataloging of eighteenth century music is still in progress in one of the largest libraries in eastern Europe. Whitwell also described being informed by a very distinguished scholar that one of western Europe`s largest libraries had rooms filled with uncataloged early music, a fact which had never been admitted because of fear that if scholars know about this unexplored collection they would put off research trips until the library finishes the cataloging.

Most disturbing, according to a staff informant, another renowned western European library was under such intense administrative pressure to reduce their enormous early music cataloging backlog that they periodically burned some of it to simulate progress.[1]

Readers may justifiably wonder why these institutions do not allow interested scholars to browse in the hope that they may turn up something important. Their reasons for not doing so may be related to what happened to some major Polish libraries shortly before World War II. Some apparently friendly visitors set them up to have their collections raided after the Nazi invasion. The entire ugly episode and its eventual outcome are related in Nigel Lewis`s *Paperchase: Mozart, Beethoven, Bach . . . The Search for Their Lost Music* (London: Hamish Hamilton, 1981). Anyone who reads *Paperchase* will probably understand fears about allowing random wandering in uncataloged—and cataloged—material. But it is impossible to justify bogus progress through incineration. On the basis of Dr. Whitwell`s revelations, it looks as if the jury is still out.

The author wrote Dr. Whitwell early in 1992 to explore whether, without violating confidences or embarrassing colleagues, he might be willing to furnish some information which would point the way to further research. Dr. Whitwell very kindly did so, furnishing one interesting early German example from a band music periodical along with several names.[2] One of the three persons subsequently contacted did not reply. Another replied politely but not very helpfully, which may have been due to the state of cataloging and general disinterest in uncovering early percussion music than any ill intentions. The last, Prof. Renato Meucci of Milan, was not only extremely helpful but furnished a fascinating example of early Bolognese xylophone notation which will be discussed further on.[3]

It is the author`s opinion at this time that what is occurring vis-à-vis early percussion music is not in fact a musicological Watergate but rather what Toni Morrison very accurately called "willed scholarly indifference."[4]

Of course, if one is going to look for missing early percussion music, one must be sure one knows what to look for. What makes a good theory? According to scientific historian Karl Popper, a good theory is one which makes a set of predictions capable of being tested and proved true or false.[5] This seems thoroughly reasonable, so we will try to keep it in mind.

A good theory, or more strictly a good set of working hypotheses, helps ensure that we will not flounder aimlessly instead of conducting an orderly search. If we discover that a hypothesis is erroneous, we can stop using it and replace it with another based on what we have learned. Working hypotheses are in fact aids to learning. Cognitive psychology and artificial intelligence research have converged dramatically in the discovery that it is very difficult for a person with an empty mind to learn anything. Without a set of mental schemata or intellectual maps, diagrams, and pegs to hang new facts on, fresh information appears so disorganized that it does not make sense. Learning is heavily dependent on engaging the brain`s sense-making apparatus. The Dutch psychologist Adriaan de Groote observed this for chess players in 1946; it has since been confirmed for learning in algebra, physics and medicine by various researchers including Nobel laureate Herbert A. Simon.[6]

Right now, what are the most solid available sources which can be used for planning early percussion parts? Since early percussion music as such is so scarce, perhaps we should expand the search just a little. Looking for percussion music so labeled as in a modern orchestral score is unlikely to be useful given the relatively late development of orchestration. It may be better to search for: 1. Clearly spelled out rhythm schemes; 2. Obvious references to known rhythm schemes; 3. Any kind of symbol—onomatopoeic, prosodic scansion mark, etc.—which would be useful for creating percussion parts. 4. Existing written percussion music which can be transferred, recycled or used as a stylistic pattern where appropriate. Arbeau gives drum tabulations for certain dances; such information could be applied to others of that type or metrically similar ones. 5. Marginalia or performing directions written by early musicians on the original scores and manuscripts.

The most logical things to look for in the third category, based on existing early percussion music, would be the onomatopoeia already mentioned, simple lines and strokes intended to stand for drumbeats, little geometric doodles something like early noteheads, and numbers signifying notes in a grouplet. All of these will be introduced, identified and explored.

But how do you tell the difference between early drum words and early wind instrument articulation syllables? How do you tell when a geometric doodle is a note symbol and when it is dancing masters` shorthand for dancers or dance steps? How do you know when a bunch of strokes on paper is instructions for a drummer and when it is simply scorekeeping? What if you find a writer who gives detailed descriptions of a playing process but writes in his/her second language? If a person has not completely mastered a second language, this will affect the way he/she describes quantitative relationships, for example of the type seen in rhythm notation, in such a way that interpreting it correctly can be virtually impossible unless one understands the basic structure of a particular *patois* or pidgin language.

It appears that, in order to truly refine our hypotheses, we need to do several things.

1. Explore what science knows about the ways people remember music and record music, the mental mechanisms involved, and the reasons why the theory of miraculous memory for people in earlier historic periods is inadequate for showing how early percussionists actually learned and performed.

2. Explore some ways people remember useful everyday information and decide whether these might be musically useful.

3. Make an inventory of some of the most important currently known specimens of early percussion music.

4. Explore exactly what these tell us about early percussion performance practices and techniques.

5. Compare known sources from the European tradition with some non-European systems to see what, if anything, they can tell us.

6. Compare European sources with some known contemporary groups who have invented rhythm notation of their own in real-life situations.

7. Think of some possible ways to search for as yet unknown examples of early percussion notation and/or performance directions.

These are the things we will attempt to deal with in the course of this book. We hope that the process will be enjoyable and informative for the reader.

> "What is the use of trying?" "It is a thing which people do." - T. H. Whyte. *The Book of Merlyn.*

THE OTHER PART OF THE INSTRUMENT

> The brain is my second favorite organ. - Woody Allen. *Sleeper.*

> "Beware the Jabberwock, my son!
> The jaws that bite, the claws that catch!
> Beware the Jubjub bird, and shun
> The frumious Bandersnatch!"

> Lewis Carroll. *Jabberwocky.* Quoted by Douglas Hofstadter. *Gödel, Escher, Bach.*

It would be absurd to sit back and theorize about what medieval, renaissance and baroque musicians did or did not do if we have no idea what the music-making circuits of the human brain and nervous system can and cannot do.

Music appreciation and performance begin with the ears. The outer ear or pinna apparently functions as a collector for incoming sounds and helps us localize them.[1] Our sound localizing ability, apparently genetic, has been observed in babies only a few hours old who will move their eyes in the direction of a sound.[2]

Inside the inner ear is the cochlea, a spiral tube of about 2.5 turns in humans, which looks much like a shell. Within the cochlea, lying on the basiliar membrane, is a structure called the Cortian organ which translates mechanoacoustic energy, arriving as external sound waves, to electrochemical energy, the form with which the brain and nervous system operate. [3] The cochlear nerves converge into the eighth cranial or auditory nerve itself, which terminates in a structure called the cochlear nucleus in the brain stem.[4]

Surprisingly, the human cerebral cortex has at least four "music maps" of the tonal system to which one is accustomed on different parts of the cerebral cortex.[5] What would a well-designed organic computer be doing with four musical maps? Is having a redundant or backup system in case something goes wrong with the first one a cerebral advantage? Possibly. To a primitive hunter, this could mean that a sharp blow on one part of the skull need not destroy the ability to recognize bird sounds. This must have been important to cave people who liked prehistoric chicken dinners.

The brain`s music appreciation area is, in general, located in the fronto-temporal lobe behind the eyes. This area is also responsible for eerie experiences such as *dejà vu* ("This has happened before!") and *jamais vu* ("I know this scene is familiar but I feel that I am here for the first time.").[6] Both phenomena are involved with apparent distortions of the time sense.

Part of the ability to appreciate music consists of the ability to recognize and deal with rhythms. The rhythmic analyzer of the human brain is a miraculous thing which affects far more of our lives than the Saturday night dancing part. It is extremely sensitive to tiny variations in time span between transient sounds, sounds of very short duration like the ticks of a clock. This is why we can tell with our ears alone whether a pendulum clock is properly hung on a wall. It not only analyzes musical rhythm but any kind of information involving a recurrent pattern.

Soviet researcher Aleksandr Luria, working with Russian soldiers who had received head wounds during World War II, reported that damage to the rhythm-processing area of the brain could also destroy such abilities as memorizing poetry, sending and receiving Morse code, and even copying a simple drawing consisting of repeated geometric shapes.[7]

Poetry and music may, in fact, have at one time been a kind of redundancy system for remembering culturally important information. In 1745 a physician named Dalin recorded the case of a patient whose right side was paralyzed. Although the patient was unable to speak, he could sing hymns learned before his paralysis. This case and similar ones were used more than a century later as evidence for the theory that singing is controlled by the right cerebral hemisphere and speech by the left.[8]

Did our ancestors know about this strange cerebral quirk? Possibly. Johan Huizinga writes:

> Civilization is always slow to abandon the verse form as the chief means of expressing things of importance to the life of the community. Poetry everywhere precedes prose; for the utterance of solemn or holy things poetry is the only adequate vessel . . . . The preference for verse form may have been due in part to utilitarian considerations: a bookless society finds it easier to memorise its texts in this way. But there is a deeper reason . . . . Poetry is still the more natural mode of expression for the "higher" things. Right up to 1868 the Japanese used to compose the weightiest part of a State document in poetic form. . . .[9]

We perceive high frequencies—songs sung by coloratura sopranos, piccolo solos, etc.—even above the accompaniment of a large orchestra. But we need to have our heads turned in the direction of these sounds to hear them accurately because high-pitched sounds consist of small sound waves, smaller than the size of a human head. The head itself acts as a barrier between the sound and the ear. The deterioration of ability to hear high frequencies is one of the commonest forms of age-related hearing loss.

We are less acutely aware of low frequencies—tuba, timpani and bass viol notes—but can hear them from greater distances. These are made up of sound waves longer than the distance between the ears. That is why low notes seem to surround and envelop us and why, even if we are dancing far away from a bandstand, we can still keep time with our feet to the bass drum. This ability is not destroyed by aging, nor is the ability to accurately localize sounds.[10] In the deaf percentage of the population, about one percent, the ability to hear very low notes is often present. This, plus the fact that the nerves in the soles of the feet can perceive vibration patterns, accounts for the ability of many deaf people to dance.[11]

Lower tones are experienced by the ear as louder than higher ones even if they are the same actual intensity, and higher tones are perceived as closer together than lower ones. To be experienced as a musical pitch, a sound must be at least 5 milliseconds (.001 second) long, or it will be heard as a click. The auditory system is extremely sensitive to differences in arrival time between short sounds, and complex sounds are usually localized more precisely than musical tones.[12]

If we hear more than ten sound events per second, it is hard to distinguish them accurately; they form a sort of phonic blur. This is the auditory equivalent of the visual "flicker fusion rate" of twenty frames per second which enables us to perceive movies as continuous events rather than a series of separate frames. The ability to perceive a certain number of events in a certain time span without counting them separately can be called the "temporal numerosity" sense and has been researched by Pieron (1945) and Cheatham and White (1954).[13]

Another side to this is that events which occur too slowly, especially when physically experienced as a rhythm, may actually agitate—or at any rate fail to soothe—the human animal. Psychologist J. A. Ambrose conducted a series of experiments with five-day-old human infants who had been recently fed and provided with dry diapers. When the babies cried for two minutes or more, they were rocked by a mechanical device which performed vertical movements with a traverse of three inches. Ambrose found that 30 cycles per minute were ineffective; 50 cycles reduced the crying, while 60 cycles or more invariably stopped it, although a few babies needed 70 cycles per minute. At 60 cycles, which is close to a slow adult walking rate, the heart rate (sometimes in excess of 200 while crying) diminished, breathing regularized and the baby would relax. These rates were found effective day in, day out; babies do not habituate and fail to respond. Evidently this response is biological and the result of evolutionary selection.[14] The ineffectiveness of a rate under 60 cycles was later corroborated by several Canadian psychologists using six to eight week old infants.[15]

Willi Apel has observed about fifteenth and sixteenth century music that ". . . the whole system of mensural [measured] notation rests upon the principle of a fixed, i.e., unchangeable unit of time, the tactus, a beat in moderately slow speed (M.M. 50-60) which pervades the music of this period like a uniform pulse." He adds that it could have been M.M. 48, more or less.[16] Somehow, this seems too physically driven for pure coincidence.

Thus we arrive at two rules of thumb. *1. Assuming much less than 60 beats per minute for any piece of music is questionable. 2. Any tempo resulting in more than ten distinct notes per second may be too difficult for the ear to resolve.* (An obvious exception would be drum rolls.)

A biorhythm of special importance to singers and wind players is the breathing rate. A normal breath cycle consumes about five seconds—two to inhale and three to exhale.[17] In actual practice, experienced players and singers utilize a special method of breathing consisting of rapid forcible expansion of the diaphragm which cuts inhalation time and a very slow exhalation based on well-developed diaphram control. Still, there must be minimal time allowed for breathing.

External rhythms—beating drums or flashing lights—can assume control of cerebral rhythms, increasing their amplitude and causing them to synchronize with the stimulus in an effect called *auditory driving*.[18]

A structure deep inside the brain, the striatum, appears to control the ability to measure fairly short intervals, enabling people to perform such tasks as crossing streets in traffic, estimating cooking times accurately and the like.[19]

The hippocampus (Latin for seahorse, because of its shape), a part of the brain lying within the temporal lobe, appears to be important in memory formation. It is part of the old mammalian brain and also of the limbic system or seat of emotion. Besides the temporal lobe, it also has connections with the hypothalamus, an area in the brainstem forming part of the diencephalon, seat of many basic physiological responses. The hippocampus is rich in chemicals called neurotransmitters which excite or inhibit the rest of the brain, and hippocampal damage can trigger both epilepsy and memory problems.

Also important in rhythm response, repetitive stimulation of the hippocampus causes it to secrete more neurotransmitters (Yamamoto and McIlwain, 1960s). The hippocampus and the amygdala, another part of the limbic system, appear to be deeply involved with music, memory formation and emotions.[20] Does this explain the energizing effect of music and dancing? Possibly.

Apparently there is a universal set of human neuromuscular responses to music involving a type of emotional language. Dr. Manfred Clynes, a pioneer in the study of the emotional aspects of music, has discovered that these responses are remarkably stable from one individual and one culture to another, even though there are, of course, specific variations. Clynes has cross-checked his findings with aborigines and individuals from emotionally repressive cultures like the Japanese, and the results seem remarkably consistent.[21]

OPERATING MANUAL FOR THE HUMAN TAPE RECORDER

> We are simply not equipped with earlids . . . . - Marshall McLuhan
> *The Medium Is the Massage.*

Why bring up something as obvious as the fact that we do not have earlids? It means that unless we stuff something in our ears, our eardrums will be constantly bombarded with sound. Furthermore, a certain amount of phonic information sticks to the brain whether we want it or not because of a phenomenon called echoic image lasting about four seconds for auditory and one second for visual information. The echoic effect occurs even when we do not pay attention to what we hear or see.[1]

This effect was what drove Augustus the Strong, King of Poland and Elector of Saxony (1670-1733), up the castle walls. In 1711, His Majesty observed to his intense displeasure that peasant musicians, tower watchmen, municipal and theater bands, trombonists and all manner of undesirable riffraff were not only playing trumpet music, a royal and noble prerogative at the time, but even imitating imperial trumpet style! The imperial trumpeters and timpanists were likewise offended. The gravity of the situation prompted Augustus to issue a mandate stating that ". . . the playing of dances, alarms, and processional fanfares on trumpets and other instruments . . . shall not be permitted . . . at public events" unless the sponsors were sufficiently aristocratic to merit the privilege. "Such abuses shall be forbidden and prohibited, on a penalty of one hundred Rhenish guilders of gold."[2]

The human ear can input a random collection of musical notes to the brain and identify them accurately a short time later in chunks of approximately eight (actually seven plus or minus two) at a time, a span also observed for input via all sensory channels.[3] This is very handy for remembering five or nine digit ZIP codes and seven-digit telephone numbers. Most people are able to do this at least half the time, and it has been known for more than a century that rhythmically grouping numbers in bunches of two or three is often helpful.[4]

It has been demonstrated in comparative studies involving older elementary school children and college music students that musical training apparently has little effect on this approximately eight-note limit which seems biologically determined and probably established by about age nine. There are of course, exceptional people like Mozart who can intake both rhythmic and melodic information in "chunks," and music students often develop chunking strategies of their own, but the average of eight notes has been confirmed independently by various researchers such as Bower and Winzenz (1969) and Dowling (1973).[5]

It has also been shown that adding a rhythmic organization scheme to the random notes expands the attention span by approximately one note and that rhythm mistakes on recall are less common than pitch mistakes. [6] Conversely, adding pitch intervals to a time pattern appears to make learning both more difficult than a time pattern alone.[7]

Carl Seashore observed that rhythm enhances musical perception because its grouping function enables

An important difference between these and our own system of using dots for extension of musical note values is that our dots are *additive* whereas the Roman and medieval forms are *subtractive*. This basic idea survives in the custom of slashing note stems to indicate identical subdivisions.

The English Exchequer tally system described above had several advantages. It was formalized and officially adopted, which made for uniform record-keeping. It was also simple and easily understood as well as easy to make. Mathematical historian Karl Menninger felt that since it is so easy to slash simple lines like I, X and V on a stick these may have been the origin of Roman numerals. But there was in fact a huge variety of cutting forms used on various tally types from all over the world—round, slanting, straight, beveled, notches on the middle of the stick, notches on one edge, etc.[13]

In fact numbers, whether as simple tally marks or formal systems, can be and are used for notation in various rhythmic recording systems which we will explore in turn. But if something which looks as if it might be an early rhythm notation example turns up, there is something we need to keep in mind. *The switch from Roman to Arabic or Indian mathematical notation happened very gradually in Europe, and this did not happen at the same uniform rate all over the Continent.* The Augsburg merchant family, the Fuggers, adopted the Arabic/Indian system by 1494 or earlier. But we see a wide variation in individual usage within the same periods in the same geographic areas, making a hard and fast rule about what kind of numerals to expect an impossibility.[14]

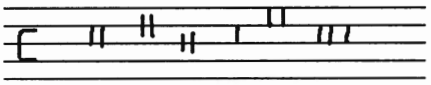
Examples of various numerals used in Europe A.D 1000 - ca. 1442

Table 1

	1	2	3	4	5	6	7	8	9	0
Gobar or Western Arabic numerals (A.D. 1000)	1	2	3	4	5	6	7	8	9	0
A. D. 1275	1	2	3	4	5	6	7	8	9	0
ca. A.D.1294 - ca. A. D. 1442	1	2	3	4	5	6	7	8	9	0

Given the widespread use of the tally principle in many cultures and the fact that it is so logical, it may well be a mathematical and cerebral fact of life. Workers at MIT`s Artificial Intelligence Laboratory invent new computer languages regularly. They observed that these languages were strikingly alike in certain basic ways. This resulted in the development of one of the essential theories of artificial intelligence (AI) called the Sparseness Principle: "Whenever two relatively simple processes have products that are similar, those two products are likely to be completely identical."[16]

Inventing a rhythm notation system is rather like inventing a computer language, but instead of figuring out how to issue instructions to a computer, you figure out a system for issuing instructions to your own brain. Let`s back up to the English money and item inventory tally system. To represent something on one of these, you would tell your brain: "Represent the various coin values or item sizes in this transaction by cutting marks of related sizes on this stick." A musical rhythm tally would involve identical instructions except that the different size marks would represent different note lengths! The principle would be the same whether you were enumerating pounds and pence, kegs of ale, sacks of grain, loaves of bread or

Example from Saxilby Fragment: 

A similar document is the Bodleian Library`s MS Digby 167, f. 131v, the content of which is similar to Zorzi Trombetta`s collection. [4]

Around 1727 a French cleric, Abbe Demotz de la Salle, invented a fairly successful system intended to help the musically unsophisticated learn church music. Interspersed with the words of the text were stemmed dots: A vertical stem indicated the same pitch as the prior note (a), a stem slanting right indicated ascent (b), a left slant indicated descent (c). [5]

Example: (a)  (b)  (c) 

Both repertoire and rhythmic relationships of some of these primitive English and Flemish systems resemble each other too much to be coincidental, according to musicologist Reinhard Strohm. He points out that late medieval Bruges was ". . . the only place in Europe where *all* these components come together: Burgundian courtly balls, Flemish and English minstrels, Venetian galleys and their crew, French and Flemish church composers, 'stroke notation,` South German merchants, and, last but not least, the girls of the town who danced to these tunes."[6]

Strohm further emphasizes that polyphony was not the exclusive art form of the wealthy and well-educated. Although admitting that social stratification existed in medieval Bruges, he points out numerous performances of both written and unwritten polyphony on all types of occasions both public and private. Religious, business and trade associations also endowed musicians` salaries.[7]

Andrew Hughes suggests that the employment of a large chorus of singers rather than a few well-trained professionals accustomed to plainsong notation may have prompted the use of some of these primitive notation schemes. It is further suggested that, as choirs became better trained in the rules of mensural polyphony, the old system was no longer needed. [8]

Something very similar evidently happened to percussionists. When Michael Praetorius published his *Polyhymnia Caduceatrix et Panegyrica* in 1619, he wrote that church choral and instrumental forces could be very variable and that not all trumpeters and timpanists could read music. Pragmatist that he was, he devoted the book to helping conductors deal with some of these problems in ways that would preserve musical integrity.[9]

To summarize, there was enough activity by people formerly assumed to be beneath musicological scrutiny to reinforce the belief that there are sources which need exploring. For percussionists one possible source might be Belgian libraries. In addition to a rich musical tradition involving all classes, Belgium has a long and industrious drumming history dating back to at least 1523, and drummers had two officially recognized feast days. Modern Belgian practice involves the coordination of many individual drum parts in public drum festivities.[10] How could this have developed without some sort of plan? Even if we do not know exactly how this was done, there must have been a system of some kind.

❖

ONOMATOPOEIC RUDIMENT NAMES BY LANGUAGE AND/OR GEOGRAPHIC ORIGIN

English - 8 Sources

Holme (1689)

Flam
Diddle
Dragg
Rowle
Rou
Roof
Pou
Pong
Tou

Clark (1797)

Flam
Flamadiddle
Flamadiddlediddle
Paradiddle
Roll
Ruff
Drag

Steibelt (c.1800)

Flamp
Travale

Hazeltine (1810)

Flam
Poing
Paradiddle
Drag
Roll
Ruff

Ashworth (1812)

Flam
Poing
Paradiddle
Drag
Roll
Ratamacue

Potter (1815)

Flam
Paradiddle
Drag
Roll

Rumrille (1817)

Flam
Poing
Paradiddle
Drag
Roll
Ratamacue

Lovering (1818)

Flam
Poing
Paradiddle
Drag
Roll
Ruff
Ratamacue

French - 7 sources

Janequin (1528)

Fan
fre
re
le
lan
fey
ne

Mersenne (1636)

Ton
Trelan
Plan
Colintampon
Tireliretirelirelan
Re

Kastner (1848)

Fla
Tras
Coup
Qualite
Rat

Berger (c. 1928)

de
be
tlem
dle
dleng
rrrreng
rreng

Arbeau (1589)

Tan
Tere
Fre
Plon
Colin
Dedans

Rambures (1855)

Ra
Ta
Plan

Vidal (1864)

Chi-chi
Chin-chin
Tin
Plan

German - 5 sources

Winters (1777)

Trau
Lau
Rau

Von Steuben (1794)

Flam
Drag
Poing
Roll

Kastner (1848) - Austrian

Fla
Ra

Wintzer - Benson (Contemporary Swiss)

Drreng
Drredebedletlem
Dledebedletlem
Dledebeng
Tleng
Tlem
Bataflafla
Funferruf

Bavarian

F;a
Ra
Ruf

Spanish - 2 sources

Pistofilo (1627)

Pa
Ta
Ra

Modern Castanet Syllables

Pa
Pi
Ta
Ria

Italian - 1 source

Pistofilo (1627)

Pa
Ta
Ra

Middle Eastern - 10 sources

Ikhwan al-Safa (10th century) - Farmer

Ta
Tanan
Tananan

Al Khwarizmi (10th century) - Farmer

Ta
Tan

Al Farabi (c. 950) - Farmer

Ta
Tan
Tanan
Tananan

Ibn Sina (died 1037) - Farmer

Tarn

Ibn Zaila (died 1048) - Farmer

Ha
Ta

Abdo`l qadin (died 1048) - Land

Ta
Na
Ni

Safi Al Din (13th century) - Wright

Ta
Tan
Na
Nan

Modern Dumbak Syllables

Crook

Tik
Tok
Dum
Ka

Donald

Tik
Tok
Dum
Ka

Bulos

Dum
Tek

Sources of Drum and Rhythm Syllables

Benson, Allen. "An Introduction to the Swiss Rudiments and Their Notation." *Percussionist* 17, no. 3 (Spring/Summer, 1980), 140-148.

Berger, Dr. F. R. *Methode Baloise de Tambour (Instructor for Basle-Drumming)* Basle, Trommelverlag Basel, 1964.

Bulos, Afif Alvarez. *Handbook of Arabic Music.* Beirut, Librairie du Liban, 1971.

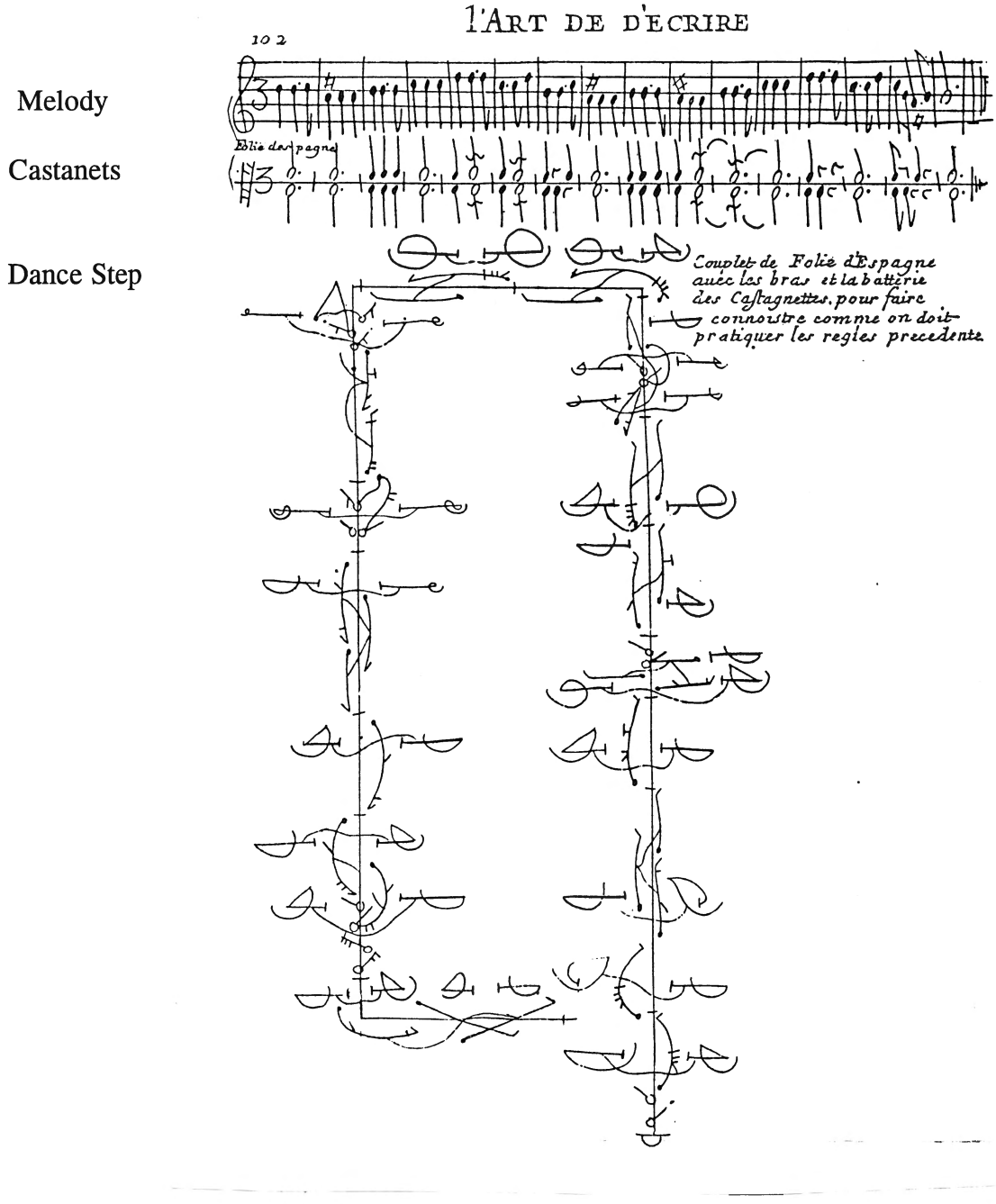
Crook, Larry. Interviews with author. Austin, TX. Spring, 1982.

Donald, Mary Ellen. *Doumbec Delight . . .* , 2d ed. San Francisco, Mary Ellen Books, 1981.

Farmer, Henry George. *Sa `adyah Gaon on the Influence of Music . . ..* London, A. Probsthain, 1943.

Kastner, Georges. *Manuel General de Musique Militaire ...* .Paris, Firmin Didot Freres, 1848. Minkoff Reprint, Geneve, 1973.

Land, Jan Pieter Nicolaas. "Essais des notation musical chez les Arabes et les Persens," in *Etudes Archaeologiques, Linguistiques et Historiques ...* . Leide, E. J. Brill, 1885.



Raoul-Auger Feuillet, *Choreographie ou l`art de de crire la dance ...*, facs. ed. (Paris, no publisher, 1700; New York, Broude Bros., Ltd., 1968), p. 102. Reprinted courtesy of Broude Bros., Ltd., Williamstown, MA.

Still, assuming that we are interpreting Feuillet`s notation correctly, it might be possible to get a good sound in the French style by practicing alternate hand *carretillas* so that the beginning of each overlaps with the end of the prior one.

When attempting to duplicate h, a roll lasting several measures, the speed of the music and skill of the performer should determine what technique is used.

The early form of Spanish roll technique as currently practiced may not have been unknown at the French court, as we see in item i or rolling with one hand while striking with the other. Giving special emphasis to the secondary hand strikes, which normally cover the repositioning of primary fingers in Spanish style, would give the effect of a pulsating rather than a continuous *redoble*.

M. Feuillet`s introduction to his musical example reads: "Having thus devised all these matters, one notates the Air, after which one indicates the rhythm of the Castanets underneath in the form of a score, in a way that each measure of the rhythm is in correct relation to that of the air which is notated above."[6] In the facsimile on the reverse of this page, the choreography is shown in two vertical columns below the melody and its castanet part below.

The explanation implies that writing castanet music may have been an unfamiliar concept. Still, Arbeau`s drum music more than a century earlier should have accustomed most people to the idea. Perhaps the idea of a written castanet part for dance music was unfamiliar in Feuillet`s circle of students.

THE FIRST TAMBOURINE MANUAL

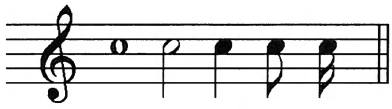
The first known instruction manual for tambourine was apparently a small book, *Instructions for the Tambourine*, which appeared about 1800 and is usually attributed to Daniel Steibelt, a popular pianist, composer, pedagogue, and finally chapelmaster to Czar Alexander I of Russia.[1] This may have in fact been the work of Steibelt`s wife, who according to James Blades was an expert tambourinist.[2] If this was the case, it is indeed ironic that after his death a public collection was needed for his family.

"The TAMBOURINE is an Instrument at this time extremely fashionable," the work begins. It continues: "The TAMBOURINE is held (and thrown around) with the left hand, the Performance is with the right; and it is customary, I may say necessary, to stand in an elegant attitude, when performing on the TAMBOURINE."[3]

Utilizing the treble staff, the author presents a fairly clear picture of tambourine performance, but unfortunately no illustrations assist the reader. Music is included. A percussionist would probably understand most of it without difficulty, but people beginning at square one may have problems.

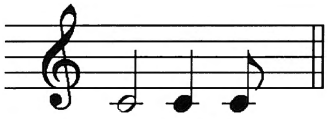
A simple finger strike is termed a *Flamp*. This is shown in the third space of the treble clef.

FLAMPS



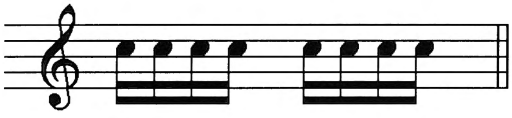
Semi Flamps are written on the first line below the staff or middle c, and the instructions state that they are performed with the knuckle and are meant to imitate the bass drum. Obviously this would imply a firm ringing note midway between rim and center.

SEMI FLAMPS



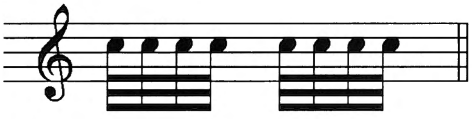
The *Travale*, presented on the third space as sixteenth notes, "is performed by striking against the Instrument, with the nails of one or all the fingers, with an up and down hand."

The TRAVALE

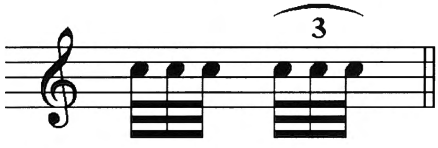


The Double Travale is performed much faster.

The Double TRAVALE,

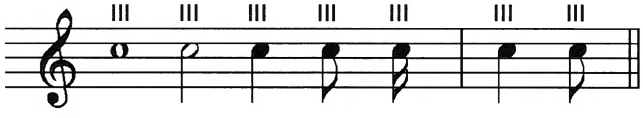


When written as triplets:



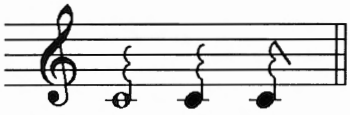
"... then it is performed by making three distinct sounds; - this is done by a sudden turn of the wrist, and an up hand, making the 1st. 2d. & 3d. fingers touch against the head of the instrument." Percussionists familiar with Brazilian frame drum techniques will doubtless recognize these maneuvers.

Jingle Notes



What we would call rolls Steibelt calls "Jingle Notes" and writes them as notes on the third treble space with short vertical lines over them, explaining "... this is best done by pressing against the Instrument, some little distance from the edge, with the fingers or thumb, sometimes, only by shaking the Tambourine."

The Bafs is written



Another type is referred to as the "Bass," written on middle c with wavy note stems. Since this, in contrast to the Jingle Notes shown with whole notes in the example, is shown with the half note as its highest value, we may surmise that this is a fairly short roll "...perform`d by sliding the finger over the head of the Tambourine, - the second finger is prefered [sic], in performing the Bass, which is strengthened by placing the thumb against it." The Bass can be performed diagonally, horizontally or in a figure eight pattern.

An elaborate C is used "For the turning, spinning, or throwing round the Tambourine ... ."

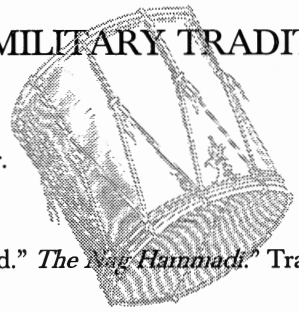
The author finishes the instructional section by writing:

> There is [sic] many other little elegancies used besides the throwing round of the Tambourine, such as beating it in various directions, producing different sounds, flourishing the hand, and the like, all of which, depends on the ear and taste of the performer.[4

The basic instructions are followed by a section of popular tunes including what the author considers proper accompaniments for the tambourine. Drummers will be sure to recognize "The fall of Paris" and traditional music and dance fans will relate to "La belle Catherine" and "Money Musk." The tambourine plays quite steadily most of the time, making the set of examples a good training exercise for novice tambourine players. [5]

❖

THE MILITARY TRADITION



I am strength and I am fear.
I am war and I am peace.
Give heed to me. -
"The Thunder: Perfect Mind." *The Nag Hammadi.*" Trans. George W. MacRae.

The military drumming tradition has given us some highly informative and also utterly confusing written and printed music. It ranges in readability from fairly normal for its time like Arbeau`s notation to almost bizarre like Thomas Fisher`s murky symbolism and Levi Lovering`s strange American hand tablature.

There are apparently two separate traditions for military drum notation. One follows Arbeau, who apparently was one of a number of writers who set down early French drum music and used normal music notation for his time. The other varies wildly: Recognizable notes used in almost incomprehensible ways, onomatopoeia, geometric symbols, numerals, tally marks and sometimes combinations of all these.

The bizarre school of drum notation actually continued into the twentieth century with the invention of some turn-of-the-century Swiss notations. The sheer tenacity of something which looks so odd coexisting with an accepted and widespread notation system raises interesting questions which we hope to answer.

One thing which we should keep in mind when thinking about this list of examples is that they may not have appeared abnormal to the people who used them. It is very likely that they were based on sound principles of cognitive psychology although the writers may not have thought in exactly those terms. When combined with familiar melodies and general culturally derived musical knowledge as we have learned from psychologist Donald Norman, they may have seemed quite simple and in fact been a both appropriate and economical set of systems.

The very oddness of some of these drum music notation systems should serve as a warning to all who would tear a musical event loose from its cultural moorings in the name of specialization. Unless we think carefully about the context in which these early notations were used, we could make some serious mistakes. For now we will present a brief listing of some of the major known military drum sources with explanations of their symbol systems.

There may be some logical explanations for the highly idiosyncratic and conservative nature of much early military drum music. We will explore some of these and do so again in a subsequent section. In interpreting and transcribing early American drum music, the only completely reliable rule is that a note on the staff means that the drum is struck. Neither rests nor note values can be taken at face value. The following section will explain the peculiarities of each writer`s system and include some actual examples.

The notation in early American drum manuals may represent tablatures indicating which hand should play more than exact representations of rhythm. Alvan Robinson, Jr., whose military music manual of 1818 will be discussed, explains the mental process involved.

> . . . the performer should have a general knowledge of the airs, and marches calculated for the different beats of the drum, and their divisions of time ; observing in Common and Compound Time to bring down the left foot at the commencement of each bar, and raise it in the middle. And in Triple Time, to bring down the left foot at the first part and raise it at the third. At the beginning of a march ... the hard stroke of the first roll must come down with the first note . . . . [Here Robinson explains the exception for rolls used as an upbeat; the four, eight and sixteen bar structure of marches, and other military conventions and stylistic matters.][1]

Although fife music exists for some of the drumbeats, it is not always helpful because the drum notation does not necessarily map into the fife melody in a logical, one-for-one or geometric ratio pattern. Accordingly, there are places where mistakes in the drum part may logically be assumed in order to explain what may appear to be rhythmic anomalies.

There is a psychological reason for this. Edward Feigenbaum, a Stanford professor of computer science who has extensively studied the laws of rote learning, has written: "The phenomena of rote learning are well-studied, stable, and reproducible. For example, in the typical behavioral output of a subject, one finds . . . . Overt errors are generally attributable to confusion by the subject between similar stimuli or similar responses. . . . As one makes the stimulus syllables more and more similar, learning takes more . . . trials."[2]

Early American drum manual notation is frequently visually monotonous to an exceptional degree, as one will notice from the examples. On seeing one for the first time, the barely differentiated mass of notes reminded the author of a computer core dump or diagnostic print-out of a program`s contents as seen internally by the computer`s central processing unit, represented in binary form by 1 and 0.

Early drum music is in fact very like the situation encountered in the early days of computers when programs were written in binary form entirely in 1s and 0s rather than the higher level languages like PASCAL. The visual monotony of the symbols caused so many boredom-and-fatigue-induced errors that the computer pioneers were forced to translate these binary symbols into a very simple language consisting of short words and letters like A (add), MVC (move characters), PUT, etc. This language called assembly code, one step above pure binary numerals, is still in use.

Drum rudiments such as the flam, paradiddle, 7-stroke roll and the like may have been the equivalent of a musical assembly code enabling the drummer to think in coherent groups rather than a confusing mass of units or notes.

The author has found the following basic assumptions useful in transcribing early Anglo-American drum music.

1. Assume the phrase structure to be in four-measure blocks and to coincide with related fife tunes.

2. Do not assume normal note-rest values but rather a general proportion of long and short.

3. If after a number of tries a certain note or figure appears too anomalous to fit, try assuming an error.

A frequent transcription problem is the presence of a small number 3 over a note group. Most modern musicians will assume that it represents a triplet, which to us means three equal note values. In much early music, this could also mean a group of three notes, for example, two sixteenths and an eighth. Apparently it was assumed that everyone knew the last note was a little longer. The best way to handle this is to check the fife melody. If the drum part seems to go against this and create a hemiola rhythm within a marching beat, it should be transcribed to conform to the fife rhythm. Triplet grace notes as an upbeat in fife music, which can have a 7-stroke roll accompanying them, are innocuous since they are short preliminary notes rather than embedded in the marching beat itself.

VENERABLE READS

The Anglo-European Military Tradition Crosses the Atlantic

European Examples in Chronological Order

Arbeau, Thoinot. *Orchesography.* Trans. Mary Stewart Evans. Introd. and notes by Julia Sutton. Langres, Jehan des Preyz, 1589. New York, Dover, 1967. The manuscript to the original having been lost, this version is based on a corrected copy of the 1888 Fonta "reprint" which contained various copyist`s errors. Labanotation for the dances was done by Mireille Backer and Julia Sutton. Drum notation is written in old style angular noteheads with downward stems on the midline of a five-line staff. The F-clef is used, as are rests and time signatures. Minims, crotchets and quavers (equivalents of half, quarter and eighth notes) are used. There are occasional errors in the translator`s notes for the 1948 edition, which are contained in the current one, and these are corrected by Julia Sutton. For a complete and accurate commentary, both Evans` and Sutton`s notes should be consulted. There is no barring in notation exclusively for drum although there are time signatures; it is present when drum music is printed with a melody.

Pistofilo, Bonaventura. *Il Torneo . . . .* Bologna, Clemente Ferroni, 1627. (The Humanities Research Center, University of Texas, Austin.) Pistofilo uses both notes on a five-line staff with clef and time signatures and onomatopoeic rhythm syllables written beneath them. A flam is indicated by two notes crowded together; a verbal explanation for a roll is given in the text. *Ra* is the syllable for a ruff or short roll; *Ta* for right and *Pa* for left. The barring is somewhat odd but basically understandable. There are no dynamic markings. John Florio`s *A Dictionary Italian & English . . .* London, T. Warren for Jo. Martin, Ja. Allestry, and Tho Dicas, 1659, also in the Humanities Research Center, was used in translating Pistofilo.

Mersenne, Marin. *Harmonie Universelle, contenant la theorie et la pratique de la musique.* Reprint edition. Paris, 1636. Paris, Centre National de la recherche scientifique, 1963. Mersenne`s handwritten music, included in the reprint as inserted leaves, employs no time signatures, rests or clefs. It is written on the middle line of a five-line staff with right stems pointing up and left down. Note values of half, quarter, eighth, sixteenth and thirty-second are used. Barring is either missing or by phrases, not measures. Flams are written as a pair of vertically aligned left and right strokes. *Baton rond* refers to single strokes; *baton rompu* to doubles, *baton melé* to mixed doubles and singles.[1] There are no dynamic markings. The English translation by Roger E. Chapman (The Hague, Martinus Nijhoff, 1957) was also consulted.

Philidor MS 1163, 1705. Bibliothèque Municipale, Versailles. The drum music, included with fife music, is written in the bass clef. The first drum part is written with downward stems on the midline and the second on the top line. Time signatures are used. Except for flams (double stems), all stems on a part are in the same direction. A few dynamic indications—f (*fort*) for loud and d (*douce*) for soft are used. Barring, note values and other musical conventions appear normal. There is no special roll sign, but some of the notes, especially final ones, could be legitimately interpreted as rolls.[2]

Fisher, Thomas [Thomas Harper]. *Warlike Directions, or the Soldier `s Practice.* 2d. ed. London, Harper, 1643. (The British Library.) The drum notation, contained on pp. 4-7 of this work, utilizes a composite tally, numeric and letter system. Right hand notes are portrayed with a vertical mark, left ones with a "I," the ruff with an "r" and a half ruff with "2." The combined ruff and half ruff are written "r2." No staff, clef, barring or time signature is used, although phrases are written on separate lines. The notation is for the Old English March contained in Walpole.

Holme, Randle III. *The Academy of Armory, A Storehouse of Armory and Blazonry . . .* [c. 1688]. Facsimile edition. Edited by I. H. Jeayes. London, The Roxburghe Club, 1905. (Humanities Research Center, University of Texas, Austin.) Holme contains onomatopoeic drum rudiment names. An old English march from the time of Charles I is notated on a three-line staff with the equivalent of quarter, half and whole notes, plus onomatopoeic syllables such as Pou, tou etc. No clef, time signature or barlines are present in the march.

Walpole, Horace, Earl of Orford. *Catalogue of Royal and Noble Authors of England.* 2d. ed. London, 1759. 2 vols. The Old English March and a copy of Charles I`s warrant reviving it, attested by Arundell and Surrey and certified as a true copy of the original by Ed. Norgate, Windsor, is contained in I, 200-202. The notation for the march and preceding voluntary faces page 200. The note heads are angular old style with upward stems in the bottom space of a three-line staff. A C-clef is used; there are no rests or time signatures. Note values corresponding to the brevis (whole note), minim, and crotchet are used. Notation is supplemented with onomatopoeic syllables: *Pou* (right), *tou* (left), *R* (ruff), and *Poung* (probably a sustained note according to James Blades). *Potang* is used for a crotchet followed by a dotted minim. Fermatas are used over *Poung* strokes. One barline is used to delimit a phrase.

Simes, Thomas. *The Military Guide for Young Officers.* 2 vols. Philadelphia, Humphreys, Bell and Aitken, 1776. (Perry-Castaneda Library, University of Texas at Austin. AAAS copy, microfiche Evans 15083.) Simes uses rudiment names to explain military signals. No notation. Although published in North America, this work represents the British tradition.

Collins, Robert. *Scotch Duty for Drum & Fife* [ca. 1800]. Henry G. Farmer Music Collection, University of Glasgow. This small handwritten manuscript is thoroughly conventional in notation style with fife music on the treble and drum on the bass line in a grand staff. Its chief interest is the hint of a distinct Scottish style.

Winters, George Ludwig, Wittwe. *Kurze Anweisung das Trommel-Spielen . . ..* Berlin,. Winters, 1777. (Library of Congress microfilm Music 5000.) This German music is written on the midline of a normal staff in bass clef. Upward stems are for left, downward for right, and double stems for flams. Time signatures are used; there are very few rests. Dynamics are indicated both by verbal directions beneath the staff and by gradually ascending (for crescendo) and descending (for decrescendo) note beams. Notation is essentially normal. The syllable *Trau* is used for quarter notes, *lau* for eighths, *rau* for sixteenths. The melody to *O Haupt voll blut und wunden* as a funeral march is included.

Potter, Samuel. *The Art of Beating the Drum with the Camp, Garrison & Street Duty by Note.* London, Samuel Potter, 1815. (The British Library microfilm.) Potter uses normal notation for both drum and the fife manual which form a set. Notes are on the next to bottom space of a bass clef. A dot over a note

signifies right; under it, left. The grace notes for flams have an upward stem if played by the left hand and a downward one if right.

North American Examples in Chronological Order

von Steuben, Frederick William, Baron. *Revolutionary War Drill Manual.* Facs. ed. Boston, Isaiah Thomas and Ebenezer T. Andrews, 1794. New York, Dover, 1985. Von Steuben refers to rudiment names in explaining military signals. No notation.

Clark, Benjamin. Drum Book 1797. Unpublished MS owned by the Massachusetts Historical Society, Boston. This handwritten book uses a staff with left hand notes on the midline; right on the next to bottom line. Bass clef is used. Stem directions are inconsistent. Flams are drawn with two notes on a single stem. Barring is based on musical phrases rather than measures. Eighth rests are occasionally used. Rolls, although written out in "Rules for the Drum" on the last page, are notated as a number beneath a note within pieces. Quarter, eighth, sixteenth and thirty-second notes are used. Thirty-seconds are apparently used for double strokes as in a ruff. There is no fife music.

Hazeltine, David. *Instructor in Martial Music, Containing Rules and Directions for the Drum & Fife.* Exeter, NH, C. Norris and Co., 1810. Copy in the Newberry Library, Chicago. This work contains written directions and onomatopoeic drum rudiment names exclusively. There is no actual music notation in the normal sense. Fife music in the manual is normal.

Ashworth, Charles Stewart. *A New, Useful and Complete System of Drum-Beating . . . .* Washington, DC, no pub., 1812. Copy in the New York Public Library. Ashworth, originally from England, uses no time signatures but employs barlines. The music is written in the treble clef with left hand notes, stems up, on the next to top line and right hand notes, stems down, on the next to bottom line. Flams are joined with a wavy diagonal line. Stem slashes signify accents, as in the poing stroke. Coloration is used for dynamics. White noteheads are for soft notes; black ones for normal volume. The apparent equivalent of quarter, eighth and sixteenth notes are used; rolls are written out in sixteenth notes. An empty measure between two double bars means to rest until the next downbeat, otherwise rests are not used. Fife music is notated normally.

Rumrille, J. L. and H. Holton. *The Drummer `s Instructor or Martial Musician.* Albany, Packard & Van Benthuysen, 1817. Copy in the New York State Library, Albany. This music is written on a five-line staff with no clef or time signatures. Left hand notes are on the top line; right on the bottom. It includes bass drum instructions. Dynamic coloration—white noteheads for light and dark for heavy—is used. Apparent equivalents of quarter, sixteenth notes ("quick") and eighths ("less quick") are used. Flams are notes joined by a diagonal line. Rolls are signified by numbers; a soft roll has a small zero as a subscript. An eighth rest is used for a rest on the beat; a white square means to rest a whole beat. Barring is odd but understandable in terms of the system. Fife music included in written normally. Instructions for bass drum, which utilize simpler beating patterns, are included.

Lovering, Levi. *The Drummers Assistant or the Art of Drumming Made Easy.* Philadelphia, Bacon & Co., 1818. Antiqarian Society of America Readex S44624. MWA copy. This music is written on the middle line of a separate three-line staff for each hand, left on the upper and right on the lower, joined into a "grand staff." Coloration for dynamics—apparently black notes for heavy, white notes for light—

Chardin, Sir John. *Travels in Persia 1673-1677.* London: Argonaut, 1927; New York: Dover, 1988.

Chase, Gilbert. *The Music of Spain*, 2d rev. ed. New York: Norton, 1941; New York: Dover, 1959.

Cipolla, Carlo M. *Literacy and Development in the West.* Baltimore: Penguin, 1969.

Clanchy, Michael. *From Memory to Written Record: England, 1066- 1307.* Cambridge, MA: Harvard University, 1979.

Clynes, Manfred. *Sentics, the Touch of Emotions.* Garden City: Anchor/Doubleday, 1977

Cuevas, P. Mariano. *Documentos Ineditos del Siglo XVI.* Mexico: Talleres Graficos del Museo Nacional de Arqueologia ..., 1914, 98-9. Quoted in Stevenson, 1952, 59.

Dalzell, William Ronald. *The Shell Guide to the History of London.* New York: Norton, 1981.

Darnton, Robert. *The Great Cat Massacre and Other Episodes in French Cultural History.* New York: Basic Books, 1984.

Davies, Edward. *Celtic Researches, on the Origin, Traditions &Language, of the Ancient Britons ...* . London, 1804.

Defoe, Daniel. *A Tour through the Whole Island of Great Britain (1724-26).* Edited by Pat Rogers. London: G. Strahan, 1724-26; London: Penguin, 1971.

Demarest, Donald and Coley Taylor. *The Dark Virgin: The Book of Our Lady of Guadalupe, a Documentary Anthology.* New York: Academy Guild Press, 1956.

Dewdney, Selwyn. *The Sacred Scrolls of the Southern Ojibway.* Toronto: University of Toronto, 1975.

Diringer, David. *The Book Before Printing: Ancient, Medieval and Oriental (The Hand-Produced Book).* New York: Dover, 1982.

Diringer, David. *Writing.* Ancient Peoples and Places no. 25. London: Thames and Hudson, 1962.

Dobie, J. Frank. *A Texan in England.* (Austin: University of Texas, 1980.

Dolmetsch, Mabel. *Dances of Spain and Italy from 1400 to 1600.* London: Routledge and Kegan Paul, 1954; New York: Da Capo, 1975.

Dolmetsch, Arnold. *The Interpretation of the Music of the Seventeenth and Eighteenth Centuries....* Revised by Alec Harman London: Novello, 1915; Seattle: University of Washington, 1969.

Durán, Fr. Diego. *The Aztecs: The History of the Indies of New Spain.* Translated by Doris Heyden and Fernando Horcasitas. New York: Orion, 1964.

Durand-Forest, Jacqueline. *L`Histoire de la Vallée de Mexico Selon Chimalpahin Quaichtlehuanitzin (du XIe au XVIe siecle).* Paris: Editions L`Harmattan, 1987.

Edmonson, Munro S., ed. *Sixteenth-century Mexico: The Work of Sahagun.* Albuquerque: School of American Research, University of New Mexico, 1974.

Elizabeth Rogers Hir Virginall Booke (1656) (British Museum Add. MS. 10337), 2d rev. ed. Edited and calligraphed by Charles J. F. Cofone. New York: Dover, 1982.

Erasmus, Desiderius. *De ratione studii*, Froben ed. In *Opera* (1540), 1:466. Quoted in Yates, 126-127.

Falvy, Zoltan. *Mediterranean Culture and Troubadour Music.* Translated by Maria Steiner. Revised by Brian McLean. Studies in Central & Eastern Europe, Music 1. Budapest: Akademiai Kiado, 1981.

Farmer, Henry George Farmer. *Sa `adyah Gaon on the Influence of Music . . . .* London: A. Probsthain, 1943.

Farmer, Henry George. *The Minstrelsy of "The Arabian Nights," a Study of Music and Musicians in the Arabic "Alf Laila wa Laila."* Hinrichsen Ed. 402. London: Hinrichsen, 1945.

Farmer, Henry George. *The Rise and Development of Military Music.* London: W. Reeves, 1912; Freeport, N. Y.: Books for Libraries, 1970.

Feigenbaum, Edward A. "The Simulation of Verbal Learning Behavior." In E. A. Feigenbaum and J. Feldman, eds., *Computers and Thought.* New York: McGraw-Hill, 1963, 299. Quoted in Weizenbaum, 161.

Ferguson, Marilyn. *The Brain Revolution, the Frontiers of Mind Research.* New York: Taplinger, 1973.

Feyerabend, Paul Feyerabend. *Against Method,* 3d. ed. London: Atlantic Highlands and Humanities Press, 1975; U.K.: Verso, 1993.

Fincher, Jack. *The Brain: Mystery of Matter and Mind.* Washington: U. S. News Books, 1981.

Fitz Nigel, Richard. *Dialogus de Scaccario; The Course of the Exchequer.* Edited and translated by Charles Johnson with corrections by F. E. L. Carter and D. E. Greenway. Oxford: Clarendon Press, 1983.

Ford, Madox Ford. *Return to Yesterday.* New York: Liveright, 1959.

Fry, Edmund. *Pantographia; Containing Accurate Copies of All the Known Alphabets in the World ....* London: Cooper and Wilson, 1799.

Gaines, Helen Fouché. *Cryptanalysis: A Study of Ciphers and Their Solution (Elementary Cryptography).* New York: Dover, 1956.

Garcia Granados, Rafael. *Diccionario biografico de historia antiqua de Mejico.* Vol. 3. Mejico: Instituto de Historia, 1953.

Garcia Granados, Rafael. *Diccionario biografico de historia antiqua de Mejico.* Vol. 3. Mejico: Instituto de Historia, 1953.

Garibay Quintana, Angel Maria. *Historia de la Literatura Nahuatl,* 3d. ed. Vol. 2. Mexico: Editorial Porrua, S. A., 1987.

Garibay Quintana, Angel Maria. *Historia.* Heyden translation, 1:13, 1:239. Quoted in Thomas 238.

Gauthier-Pilters, Hilde and Anne Innis Dagg. *The Camel: Its Evolution, Ecology, Behavior and Relationship to Man.* Chicago: University of Chicago, 1981.

Goitein, S. D. *A Mediterranean Society: The Jewish Communities of the Arab World as Portrayed in the Documents of the Cairo Geniza.* Berkeley: University of California, 1983.

Grose, Francis Grose, Esqr. *Military Antiquities Respecting a History of the English Army from the Conquest to the Present Time.* Vol. 2. London: S. Hooper, 1786.

Guido of Arezzo. *Epistola de ignoto cantu* (ca. 1030). In *Source Readings in Music History (from Classical Antiquity through the Romantic Era),* selected and annotated by William Oliver Strunk, 121-125. New York: Norton, 1950.

Guido of Arezzo. *Prologus antiphonarii sui.* In Strunk, 117-120.

Harrison, Frank Llewellyn. *Music in Medieval Britain.* London: Routledge and Kegan Paul, 1963.

Hawking, Stephen. *A Brief History of Time from the Big Bang to Black Holes.* New York: Bantam, 1988; Bantam trade paper ed., 1990.

Hirsch, E. D. Jr. *Cultural Literacy: What Every American Needs to Know.* Boston: Houghton, 1987.

Horton, John. *Scandinavian Music: A Short History.* New York: Norton, 1963.

Hucbald. *De Harmonica Institutione (Melodic Instruction).* Translated by Warren Babb. In Claude V. Palisca, ed. *Hucbald, Guido and John on Music: Three Medieval Treatises.* New Haven: Yale, 1978.

Huizinga, Johan. *Homo Ludens: a Study of the Play-Element in Culture.* Boston: Beacon, 1950.

Idelsohn, Abraham Z. *Jewish Music: Its Historical Development.* New York: Holt, 1929; New York: Dover, 1992.

Isidore of Seville. *Etymologiarum*, Book III (excerpts). Translated by W. M. Lindsay. In Strunk, p. 93.

Kahn, David. *Kahn on Codes: Secrets of the New Cryptology.* New York: Macmillan, 1983.

Kandell, Jonathan. La Capital*: The Biography of Mexico City.* New York: Random House, 1988.

Kays, John. *The Horse*, 3d ed. New York: Arco, 1982.

Koestler, Arthur. *The Act of Creation: A Study of the Conscious and Unconscious in Science and Art.* New York: Dell, 1967. Quoted in Wertheim, 293.

Lafaye, Jacques. *Quetzalcoatl y Guadalupe: La formación de la conciencia nacional en Mexico.* Traducido por Ida Vitale y Fulgencio Lopez Vidarte. Mexico: Fondo de Cultural Economica, 1985.

Lai, T. C. and Robert Mok. *Jade Flute: The Story of Chinese Music* New York: Schocken, 1985.

Langacker, Ronald W. *Language and Its Structure: Some Fundamental Linguistic Concepts*, 2d ed. New York: Harcourt, 1973.

Langwill, Lyndesay G. *Waits, Wind Band and Horn.* London: Hinrichsen Edition Ltd., 1952.

Leon-Portilla, Miguel. *Aztec Thought and Culture: A Study of the Ancient Nahuatl Mind.* Translated by Jack Emory Davis. Norman: University of Oklahoma, 1982.

Leon-Portilla, Miguel, ed. *The Broken Spears: The Aztec Account of the Conquest of Mexico*, expanded and updated ed. Translated by Angel Maria Garibay and Lysander Kemp. Boston: Beacon, 1990.

Leon-Portilla, Miguel. Translation from the Otomi in *Precolombian Literatures of Mexico.* Norman, University of Oklahoma, 1969, 95. Quoted in Thomas, 238.

Lerdahl, Fred and Ray Jackendoff. *A Generative Theory of Tonal Music.* Cambridge, MA: MIT, 1983.

LeRoy Ladurie, Emmanuel. *Montaillou: The Promised Land of Error.* Translated by Barbara Bray. France: Editions Gallimard, 1978; New York: Braziller, 1978.

Lindsey, David L. *Spiral.* New York: Atheneum, 1986.

London Museum. *Medieval Catalog.* London: HMSO, 1967.

Index

D

E

F

G

H

I

J

K

L

M