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African musical rhythm: An overlooked factor in East Africa's middle and long distance running success?

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Abstract

This review article presents the contribution of rhythm as socio-cultural contributor to the dominance of East-African distance athletes. It aimed to qualitatively review similarities between growing up in music, bodily participation in music performances, rhythmic structures, polyrhythms, *hemiola* and syncopation and flow as elements of music and success of East African distance runners. Results of the review in general, suggest that East African music reflects the rhythm of life and performs a crucial function by integrating rhythm and human movement, including distance running as specific manifestation of human movement. It seems if East African runners perceive the function of rhythm differently than western runners and could have the ability to weave complex rhythms together in their running by interlocking and crossing different rhythmic patterns and structures. Because East-African runners grow up with and within rhythm through their music traditions and bodily participation in music performances, they most likely succeed to "live" rhythm in their distance running as opposed to western athletes who often deconstruct the running motion into different elements and implement a "learn to run" approach. Experience in and exposure to the polyrhythms of drumming as significant element of East African music could contribute to the distance runners being able to experience "flow" in their running. The broad findings of this conceptual review could have several significant implications for distance training in western countries as well as sport coach education syllabi.

Keywords: African rhythm, distance running success, East African athletes.

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Introduction

East-African middle and long distance runners have dominated track events (Onywera, 2009) since the 1968 Mexico City Olympics, and have exhibited a similar dominance in international cross-country and road-racing (Wilber & Pitsiladis, 2012; Lucia, Oliván, Bravo, Gonzalez-Freire & Foster, 2008; Scott & Pitsiladis, 2007). Some scholars (Onywera, 2009; Scott, Geogiades, Wilson, Goodwin, Wolde & Pitsilades, 2003) suggested several factors to explain how a relatively small population of athletes can dominate middle and long distance events over such an extended period of time. Identified factors vary from genetic predisposition (Wilber & Pitsiladis, 2012), physiological factors such as favorable skeletal-muscle-fiber composition and oxidative enzyme profile (Foster & Lucia, 2007; Larsen, 2003, Wilber & Pitsiladis, 2012), living at high

altitude (Wilber & Pitsiladis, 2012), socio-cultural background, government support, the environment, nutrition (Wilber & Pitsiladis, 2012), training conditions (Baker, Horton, Robertson-Wilson & Wall, 2003) and traditions such as cattle raiding which often involved covering distances of up to 100 miles under stressful conditions (Pitsiladis, Onywera, Georgiades & O'Connell, 2004). Billat, Lepretre, Heugas, Laurence, Salim and Koralsztein (2003) argue that East-African athletes' running success is clearly not as ~~a~~ result of one single factor. Scott *et al* (2003) agree and emphasize that the disproportionate success of East-African distance runners is multi-factorial and that no single adequate explanation exists. Hamilton (2000) focuses on the possible contribution of social variables to East-African running success whereas Baker *et al.* (2003) include cultural factors in their review of possible influential factors. In addition, Hamilton (2000) postulated that both the African and western *mind-set* contribute to East-African runners' dominance in middle and long distance events. According to this postulation, East-African athletes have established the perception of invincibility in their own minds as well as in the minds of their western opponents, thereby gaining a psychological advantage. Hamilton (2000), however, pointed out that although many of the above factors have been disproved they continue to be presented as possible contributors to the success of East African distance runners. Although researchers have offered diverse socio-cultural and physiological explanations of East African athletes' dominance in distance running, an analysis of relevant literature revealed that no research has ever explored the possible role and contribution of music and rhythm as a socio-cultural factor in this context. This study therefore attempts to contribute to the scholarly debate by proposing that Africa's indigenous culture of music, dance and rhythm, in combination with other factors, could be another contributor to East-African dominance in middle and long distance running. The researchers of this particular study postulate that parallels between Africa's polyrhythmic drumming, dancing rhythm and the success of middle- and long distance runners cannot be ignored.

Music is embedded in East-African social and cultural life and is performed regularly in diverse social contexts. Whenever communities in East-Africa come together, music in general, forms an integral part of the activities. Within African culture it is assumed that all people have some musical ability, and are therefore capable of taking part in musical performances. Musical performances can therefore not be divorced from social and cultural activities. A significant part of East-African music is intended to reflect the rhythm of life, and rhythm leads to music and human movement (Agordoh, 2005).

Rhythm and its relation to human movement

Rhythm is, by its simplest definition, musical time. The origin of the Greek word denotes '*flow'* and rhythm is indeed the essence of timely flow. Rhythm is found in all human action and is not confined to music (Clayton, 1996). All physical happenings, including movement, occur in space and time, and rhythm orders all

time-bound events into periods of some regularity. Rhythm is an integral part of human movement, and subsequently, of running. According to Chernoff (1991) the essence of rhythm lies in its repetition and the unvarying recurrence of a pattern of sound. The power of rhythm lies in the coherence of its forward movement. Human beings are fundamentally rhythmic beings as music begins with and within us. The human body experiences pulse and tone; tensions and resolutions; phrasing of actions; and bursts of intensity repetition and developments (Ansdell, 1995).

The foundation of African rhythm is found in its use of polyrhythms. Whereas western music tends to rely on a single metric pulse unified on the downbeat, with rhythmic movement as generally straightforward and used as an attribute of melody, African music incorporates multiple rhythmic lines in which the rhythms used have different starting points and different timing (Chernoff, 1991). Rhythm, however, is not just pulse but an organization of events against a pulse. Rhythm begins with some kind of identity which can be recognized and repeated in shorter or longer periods of time. Many of the human body's systems also have an organization which can be seen as essentially rhythmic; from the simple rhythms of short period respiration, heart beat, to the longer periodic regulation of the autonomic and metabolic processes (Ansdell, 1995). Tiérou (1992:13) opines that both the African musician and participant perceive an inner music that is in stark contrast to the externally motivated musical behaviour characteristic of western culture: *"The African lives with it, experiences it, plays it with an energy of which westerners are scarcely capable*".

East-African music culture versus Western music culture

Africans are perceived as rhythmic people (Agawu, 1995) as a result of African culture's predisposition towards percussion and percussive textures. The emphasis on rhythm is therefore a direct result of what some westerners perceive as a lack of melodic sophistication (Nketia, 1974). Western music, on the other hand, focuses on the melodic structure of music with rhythm as secondary to the melody. Chernoff (1991:1094) emphasizes an important difference between African and western music by explaining its function: *"In many African societies, music fulfills functions that other societies delegate to different types of institutions. Music serves a crucial integrative function within many types of institutionalized activities, and musicians perform a complex social role in community occasions"*. Music is an integral part of everyday life as can be seen in East African work songs which include lullabies for babies; game songs for children; music for adolescent initiation rites; funerals; weddings and other rituals (Miller, 2009). Rhythm in Africa is simply thought of as the stimulus for the body movement to which it gives rise, and, for the most part, is then given the same name as the choreography that it sustains.

Growing up "in rhythm"

Africans embrace music into their lives at a very early age. Children in East-Africa are born into rhythm as they are exposed to their mothers' rhythmic movement even before they are born. Children play musical games and are capable of dancing to, and playing complex rhythms (Miller, 2009). The rhythmicity of the sounds heard by infants may have an important bearing on early responses evoked. Learning to participate within a context where musical activity serves as an agent for the representation and socialization of indigenous values contrasts with other types of pedagogy such as verbal and written discourse typical of western learning (Chernoff, 1991). School music in Western countries promotes a formal, at the expense of an intuitive, understanding of music and rhythm. Hargreaves (1986) recognises that as western children tend to gain competency in reading and writing standard notation, they simultaneously appear to lose their sensitivity to the musical sense of rhythm. This is referred to as the 'wipe-out phenomenon' in which mechanistic, formalised music training 'wipes out' the intuitive understanding of the inherent characteristics of music. In East-Africa music and human movement are considered in combination, with music as an indispensable element in children's games and upbringing (Miller, 2009).

Participation in music

A significant part of African music is functional and is performed in specific contexts. Working songs are performed when working, and celebratory music in the context of a celebration (Titon, 1992). The extent of participation in music-making in East-Africa is high in comparison to the western culture of passive listener. Chernoff (1991: 1093) emphasizes the participatory nature of African music by stating that *"African musical contexts exhibit a high degree of integration of spectators into the music-making process".* A distinguishing characteristic of human beings is not only their capacity to move rhythmically but their ability to entrain their movements to an external timekeeper, for example, a drum. Rhythmic behaviour, such as dancing or running, involves an ordering of output with reference to a sustained pulse (Bispham, 2006) as is seen in traditional African dance.

Rhythmic structure

Western music is rhythmically straightforward in comparison to the complexity of East African rhythm. The majority of western music utilizes a single underlying pattern, or meter, that accounts for all the simultaneously sounding parts. African music, in contrast, challenges the concept of meter as is known to a westerner, in weaving complex rhythms into one another, interlocking and crossing different patterns. According to Titon (1992) one of the most important aspects in African rhythm is its meter ambiguity, in which duple and triple time seem to be mixed together. In this regard Chernoff (1991) attempts to explain the complexity of African rhythm by using as example a rhythm that is so

fundamental to African music that it has been characterised as the standard pattern. This rhythm supports many pieces in various African cultures' repertoires and serves as an illustration of the inherent difference between western and African conceptualization of rhythm:

‖: X + X + X X + X + X + X X + X + X X + X + X + X :‖

In this representation the sounded note is indicated by an X. Clayton (1996) stresses that the rhythm itself seems clear enough, but that a point of reference is needed beyond the shortest pulse for the rhythm to become musically meaningful, or, in order to dance to it. In contrast to African notation, western notation would typically assign a 12/8 time signature in an attempt to regularize the rhythm.

In addition to the standard rhythm as illustrated above, East-African rhythm is known for its cross-rhythms established in its polyrhythmic music. The cross-rhythms add to the perceptual implications that illustrate the difference between African and western music. In African rhythm the standard rhythm can be crossed with a unifying pulse:

‖: X + X + X X + X + X + X X + X + X X + X + X + X :‖

‖: X + + + X + + + X + + + X + + + X + + + X + + + X + + + :‖

Western listeners will respond to above rhythm by aiming to maintain a triple-time feeling; however, to dance and move to the rhythm, a duple-time perception is needed. The varying placement of the second rhythm helps the first rhythm to make sense, but changes the effect of the rhythm in a way that let it be *"something that one can hear and understand so that one can move or dance to it"* (Chernoff, 1991:1097). Instead of following a well-defined rhythmic line, the listener and participant have to find another rhythm that will allow the person to make sense of what is already there. Rhythmic meaning in African music is therefore understood within relationship to several rhythms (Miller, 2009).

The effect of multiple rhythmic lines has been described as the 'conflict of rhythms' (Chernoff, 1991), in which the main pulse is obscured. A main pulse, however, does exist. The entrances of rhythmic parts may be staggered, but in combination the parts do establish an emergent pulse. The pulse can, however, not be defined as the fastest common unit of time that unites the various rhythms as the main pulse is a simple duple time that represents the timing of dance steps. It has been suggested that East African music involves an underlying pulse which is felt but not constantly expressed (Temperley, 2000). There is therefore an underlying regular beat which is often not explicit but is present in the mind of the performer. African drummers often avoid sounding notes on the main pulse, leaving room for dancers to punctuate musical phrases. It is this characteristic of African music that links the music to its participatory social context in which it brings the dancers and participants into the emergent

rhythmic structure. In an African musical context, the unifying rhythmic perception is grounded in human movement.

The relationship between middle and long distance running and the East-African culture of music, dance and rhythm

Running is essentially a rhythmic activity. Globally coaches and athletes agree that rhythm is an important element in achieving running success. There is, however, a marked difference between African and western cultures in the conceptualization and perceived function of rhythm. Musical practice in East Africa is conceived as a motor activity, almost inseparable from dance. Arom (1991) remarks that it is striking to observe just how often Africans, simply by listening to music, almost immediately translate the sounds to human movement, resulting in a music culture in which listeners participate in the music-making process. In the west, music is seen as a luxury, an art form and also as entertainment (Miller, 2009) in which the listener is not expected to participate but takes on the role of a passive listener.

Locomotion as a sequence of individual steps rather than a continuous rhythmic movement have been studied extensively (Brèniere, Bril & Fontaine, 1989). Frequency, or pace, may affect the difference between rhythmic and discrete movements. If, for example, a continuous cyclical arm movement is performed slowly enough, the movement will exhibit kinematic fluctuations that suggest that they might be executed as a sequence of discrete movements. Rhythmic and discrete actions are therefore often intertwined (Hogan & Sternad, 2007). It could be that western track and field coaches tend to over-analyze the motion of running and by analyzing it as combination of discrete movements the inherent rhythmical quality and integrative function exhibited by East African runners are often lost.

It could be argued that musical elements inherent in East Africa's culture of music, dance and rhythm that could have an effect on the success in middle and long distance running also include the use of polyrhythms, hemiola and syncopation as well as the altered state of being brought about by the rhythmic foundation.

Polyrhythms in relationship to middle and long distance running

Polyrhythmic music and dance are often described as typically African. Polyrhythms, which can be defined as the simultaneous combination of contrasting rhythms in a single piece of music (Miller, 2009), can be linked to middle and long distance running as it emphasizes the contrasting rhythms involved in running. Kubik (2010: 37) highlights this link between the polyrhythmic music of Africa and human movement as follows: *"If there is any trait in African music and dance tradition, it is the presence of distinctively African concepts about, and attitudes towards motion".*

A basic difference between African dance and music culture and that of Western society, is that the body tends to be used as a single block within western music culture, whereas in Africa, body movement is split into several independent body centers. Motional behavior in response to music and rhythm within the African culture is therefore an important link to middle and long distance running as running is essentially polyrhythmic. The production or perception of a pulse involves the engagement of the motor system in a way that enables an individual to manage both fine and gross temporal control in ballistic and smooth movements (Bispham, 2006) which implies that arm and leg movements, breathing rhythm, heart and biological rhythms do not occur as one fixed rhythm. In running there is more than one area of motion, for example the movement of the legs, arms, position of the head and feet. The same holds true for both music-making and dancing in Africa. The musician, for example, does not only produce sound for its own sake, but he moves his hands, fingers, head, shoulders and legs in certain coordinated patterns during the process of music production. It could be that Western coaches tend to deconstruct running into a number of separate elements. This reality is evident in the way distance runners are trained; focusing on separate elements in running such as breathing rhythm, arm rhythm and rhythm of the feet. Running is often over-analyzed to the extent that it becomes an 'unnatural' or learned human movement.

Hemiola and syncopation in relationship to middle and long distance running

The hemiola and syncopation are two rhythmic patterns that are significant in East African music (Temperley, 2000). The hemiola, an implied shifting between two different meters (most often 3/4 and 6/8), is often produced in a simple alternation between quarters and dotted quarters. It is suggested by Temperley (2000) that African musicians and participants are able to perceive both duple and triple meters simultaneously. When applied to middle and long distance running it suggests that the African runner might have an advantage with the ease of which running pace can be changed. The hemiola, as rhythmic pattern is especially important in cross-country and long distance running as a tactical shifting in running rhythm and pace is essential for success in these events.

Syncopation, defined as a rhythm in which highly accented events, for example long notes, tend to occur on weak beats immediately before a much stronger beat, is an important element in African rhythm. Toussaint (2005) explains this concept as a combination of hesitation and anticipation. Syncopated rhythms are understood as belonging on the beat following the actual beat, and therefore can be seen as reinforcing the prevailing meter rather than conflicting with it (Temperley, 2000). African musicians and participants proceed from motion, where the beginning of the movement occurs at the same time as the rhythmical figure, reflecting a syncopated pattern, as is reflected in running. The start of the running motion, the upward movement of the leg, can be equated to the syncopated rhythms' 'off beat' as it is not accentuated. The accented beat can therefore be seen as the actual strike of the foot (Toussaint, 2005). Western

musicians and listeners proceed from hearing, separating the two phases by a bar-line. Any sound is preceded by an action; however, that action is not taken into account in the western perception of rhythm. A western perception of meter therefore differs in that meter is perceived to involve a shifting of the metrical structure in order to better match the phenomenal accents, whilst the African perception of meter favors the maintenance of a regular structure even if it means a high degree of syncopation.

Altered state of being or 'flow' in relation to middle and long distance running

Traditional African music performances can last from one to several hours emphasizing the power of the rhythm in 'transporting' participants to an altered state of mind. This effect may reduce the sense of fatigue and increase the level of arousal. Neher (1962) reported on this phenomenon in the early 60's when he observed the unusual behaviour in ceremonies involving drums. Neher (1962) described the behavior as a trance state during which the individual experience unusual perceptions over an extended period of time. These physiological and psychological states provoked by the use of drums have remained a mystery for several decades.

Rhythmic body movements as observed in dance and drumming in East Africa induce an altered state of consciousness by suppressing cortical and enhancing subcortical functions while slowing and increasing alpha and theta brainwaves. Rhythm in Africa organizes the time structure of the music events during a ceremonial ritual and include tempo, time intervals and group temporal processes into a shared time structure (Fachner, 2011) thereby creating the conditions conducive for a trance state to occur.

An altered state of mind and being, or flow, where there is freedom from the restrictions of actual time has long been reported by long distance runners. Subjective descriptions made by distance runners such as a state of pure happiness; endless peacefulness; boundless energy and a reduction in pain sensation are similar to claims made by people describing a trance state (Dietrich & McDaniel, 2004). East African athletes' ability to integrate different time intervals and temporal processes with the time structure and motions of long distance running resulting in an altered state of being may offer another explanation for their dominance in these events.

Conclusion and recommendations

Greek antiquity has left civilization with clear definitions concerning rhythm. Unfortunately modern development of western civilization led man so far away from the ability to perceive rhythm and use it spontaneously that the ancient definitions recently had to be "rediscovered" (Zatorre & Salimpoor, 2013). Rhythm, however, is not indigenous to Africa alone. Tiérou (2009) explains that it is not the prerogative of certain people; it is universal as rhythm is the beat of the heart. That makes rhythm a potentially valuable tool or training technique available to all sport coaches. This review article has argued that the perception

of rhythm as socio-cultural contributor to the dominance of East-African distance athletes has never been explored. It qualitatively explored similarities between growing up in music, bodily participation in music performances, rhythmic structures, polyrhythms, hemiola and syncopation and flow as elements of music and success of East African distance runners. Results of the review in general, suggest that East African music reflects the rhythm of life and performs a crucial integration function by integrating rhythm and human movement, including distance running as specific manifestation of human movement. Tiérou (1992) commented on this practice by stating that the African lives with rhythms, experiences it, plays it with an energy of which westerners are scarcely capable. It seems if East African runners might perceive the function of rhythm differently than western runners and could have the ability to weave complex rhythms together in their running by interlocking and crossing different rhythmic patterns and structures resulting in an advantage over western opponents. Because East-African runners grow up with rhythm through their music traditions and bodily participation in music performances, they probably succeed to "live" rhythm in their distance running as opposed to western coaches who often deconstruct the running motion into different elements and implement a "learn to run" approach. Experience in and exposure to the polyrhythms of drumming as significant element of East African music could contribute to successful distance runners being able to experience "flow" in their running.

The broad findings of this review could have several significant implications for distance running in western countries. It is recommended that sport coach education syllabi consider the conceptualization and integration of rhythm training into sport psychology sessions, incorporate multi-rhythmic movement patterns and structures in distance running training programs and integrate drumming sessions and rhythmic dance exercises from an early age in order to "live" rhythm rather than "learn" rhythm. It would be interesting to assess the effects of such training on the performance levels of western distance runners in future research.

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