ANATOMICAL ANALYSIS OF BASIC TANGO FIGURES

Temel Tango Hareketlerinin Anatomik Analizi

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Abstract

This study examines the fundamental movements of Argentine tango, with a particular emphasis on the average range of motion (ROM) exhibited by dancers. Screenshots from videos of Gustavo and Giselle Naveira were used to create 3D models for the purpose of measuring joint movements. Tango, a globally recognized social dance, is distinguished by its improvisational nature, which contrasts with the scripted steps characteristic of ballroom dances. The analysis encompassed a multitude of movements, including fundamental postures, open and closed embraces, forward, backward, and lateral steps, pivots, cross steps, and more intricate techniques such as sacada, giro, enganche, gancho, boleo, pasada, planeo, volcada, and colgada. The study revealed that the movements inherent to Argentine tango fall within the natural range of motion of the human joints, thereby rendering the dance accessible to a diverse population. The dance is based on a finite set of fundamental techniques that are combined with music, thereby allowing for extensive improvisation. This allows dancers to perform tango without the necessity for specialized physical conditioning, thereby demonstrating its adaptability and compatibility with the physical capabilities of the general population.

Keywords: tango, dance, movement analysis, recreation, social dance

Öz

Tango, doğaçlamaya dayalı yapısıyla diğer salon danslarından ayrışan, küresel çapta tanınmış, sınırlı sayıda temel hareketin müzikle birleştirilmesiyle birlikte sonsuz sayıda kombinasyon yaratma olanağı sunan bir sosyal dans türüdür. Yapılan bu çalışma, Arjantin tangosunun temel figürlerinin hareket analizi alanında bir incelemesini sunmaktadır. Özellikle dansçıların, hareketler esnasında kullandığı ortalama hareket açıklıklarına odaklanılmaktadır. Gustavo ve Giselle Naveira'nın video kayıtlarından elde edilen görüntüler, üç boyutlu modelleme teknikleri kullanılarak yeniden oluşturulmuş ve analiz edilerek eklem hareketleri tespit edilmiştir.

Çalışmada, temel duruşlardan, nispeten karmaşık figürlere uzanan bir hareket repertuvarı incelenmiştir. Açık ve kapalı tutuşlar, ileri, geri ve yan adımlar, pivot, çapraz adımların yanı sıra sacada, giro, enganche gibi teknikler detaylı bir şekilde analiz edilmiştir. Elde edilen bulgular, Arjantin tangosu hareketlerinin insan vücudunun doğal hareket açıklıkları dahilinde olduğunu göstermektedir. Bu durum, tangonun fiziksel kapasiteleri farklı bireyler tarafından kolaylıkla uygulanabilir olmasını sağlayan önemli bir etkendir. Bu sayede dansçılar, özel bir fiziksel hazırlık gerektirmeden tango yapabilmekte ve dansın, fiziksel anlamda herkes için erişilebilir olduğu gösterilmektedir. Sonuç olarak, bu çalışma Arjantin tangosunun biyomekanik yapısını daha iyi anlamamıza katkı sağlayarak, dans eğitimi ve performansı alanındaki araştırmalara yeni bir bakış açısı sunmaktadır.

Anahtar Kelimeler: tango, dans, hareket analizi, rekreasyon, sosyal dans

Introduction

Tango is one of the most pervasive partnered social dances globally, with a particular association with Argentina and the city of Buenos Aires. Tango is not merely a musical or dance form; it is also an integral cultural phenomenon, encompassing a multitude of norms and traditions. Accordingly, UNESCO (2009) designated tango as a cultural heritage worthy of protection, including it in the Representative List of the Intangible Cultural Heritage of Humanity.

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In the context of movement, tango is a dance with a relatively limited set of basic movements. Tango is a social activity and folk dance that can be performed by individuals with a wide range of physical abilities. It is not a challenging dance, and its movements are derived from a small set of fundamental techniques that are combined with music. In this context, a commonly held view is that anyone who can walk can dance the tango. This view is supported by the observation that the tango community, despite not engaging in any specific physical training (such as flexibility, strength, or conditioning), regularly engages in dancing. To test this proposition, which concerns a physical skill, a kinesiological analysis of the fundamental tango movements is required.

"In social dance, the emphasis is on touch, what dance feels like in social participatory dance events or the experience of participants. By contrast, in theatrical dance, there is a clear distinction between performers and the audience and the emphasis is put on how its aesthetic value." (Banfi, 2020, p. 17). In this study, the term tango is used to refer to social tango (tango de salon, tango pista). It should be noted that the figures were not analyzed in the context of stage tango (tango escenario).

Tango is not a dance that employs memorized figure templates. "Ideally, Argentine tango dancers improvise while dancing, i.e. combining steps arbitrarily that lead the dancers in different directions around the dance floor, making turns or using short sequences (ochos: figure eights, crusados: crossing of the legs, etc.) depending on the music and their ability." (Littig, 2013, p. 458). Rather, it is akin to music, with a finite number of notes but an infinite range of possibilities in terms of duration, accents, and other elements. "Unlike ballroom dance, which has scripted steps and set patterns of movement, Argentine tango is an improvisational dance that is created spontaneously between each couple each time it is danced." (Wagner, 2012, p. 2). Thus, once one has acquired a fundamental understanding of the principles of leading and following, the path to becoming a highly proficient performer is simply a matter of combining these principles and engaging in extensive practice.

Materials And Methods

The objective of this study was to analyze the average range of motion (ROM) in the fundamental tango movements executed by Gustavo Naveira and Giselle Anne Naveira, the pioneers of the contemporary tango style known as tango nuevo. Gustavo Naveira and Giselle Anne were contacted for the study and, on August 16, 2018, gave written permission for the analysis of their videos. It is not necessary to obtain retrospective approval from the ethics committee for articles produced from master's degree studies that used research data collected prior to 2020.

The data were then compared with the average active range of motion values compiled from the American Academy of Orthopedic Surgeons publications and Measurement of Joint Motion. A Guide to Goniometry, 5e' (Norkin & White, 2016).

The analysis of the couple's movements was based on the examination of screenshots from their videos on social media. A total of 1706 photographs obtained from 65 different videos were analyzed. Three-dimensional models were constructed using the Blender software, and the average joint ranges were calculated from these models. This method had a number of advantages and disadvantages. The most significant disadvantage is that the measurements were not obtained through direct observation in three dimensions or with motion analysis sensors. Instead, they were based on inferences derived from a single camera angle. Another disadvantage was the use of recordings of performances in which the couple danced alone, rather than social dancing, despite this not being classified as tango escenario. One of the primary merits of the methodology is that it enabled the dancers to perform in a spontaneous manner without concentrating on isolated movements within the laboratory environment. Based on the researcher's experience of more than twenty years of active dance, it can be stated that there is a discrepancy between the manner in which the majority of instructors elucidate a technique during a lesson and the manner in which they apply that technique in its natural flow. Another positive effect is the diversity in the number of repetitions. It is clear that it would not be feasible to have a couple of this quality dance and record for sixty-five songs in the recording studio.

In addition to the visual measurements, the researcher's professional experience as a tango instructor and

dancer was also taken into account during the analysis

The study examined the average range of joint motion in conjunction with the roles of leader and follower as they were enacted by the figures. The following figures were analyzed: postura (basic posture), abrazo abierto (open embrace), abrazo cerrado (closed embrace), paso adelante (front step), paso atrás (back step), paso al costado (side step), pivote (pivot), paso cruce (cross step), la cruzada (cross), ocho adelante (forward eight), ocho atrás (backward eight), sacada (displacement), giro (turn), enganche (entangle), gancho (hook), boleo (whip), pasada (pass), passivo levantar (upward passive), planeo (glide), volcada (lean) and colgada (hang).

Findings, Results And Discussion

The examinations commenced with postura (basic posture), which serves as the foundation for all subsequent movements. This posture was utilized as a reference point for other movements and was not subjected to further examination. In the Postura position, Gustavo Naveira, who assumes the role of the leader, presents a range of motion including 50 degrees of abduction, 40 degrees of external rotation, and a small angle of flexion in the left shoulder; 90 degrees of flexion in the left elbow, while the wrist maintains its natural position.

Figure 1: Postura

The right shoulder exhibits 70 degrees of abduction, 45 degrees of flexion, and slight internal rotation and slight flexion at the wrist. The flexion of the elbow varies between 45 and 90 degrees, contingent upon the distance from the partner.

In the role of the follower, Giselle Naveira exhibits a range of motion including 90 degrees of flexion, 45 degrees of abduction, and 45 degrees of internal rotation in the left shoulder; approximately 90 degrees of flexion at the elbow; and slight flexion at the wrist.

The right shoulder exhibits 45 degrees of flexion, 45 degrees of abduction, and 45 degrees of external rotation. The elbow demonstrates approximately 90 degrees of flexion and 80 degrees of pronation, while the wrist exhibits 40 degrees of extension. The trunk and lower extremities exhibit consistent alignment with the anatomical posture.

In the abrazo abierto (open embrace) position, the leader's right shoulder flexion varies between 80 degrees and 0 degrees, depending on the step and turn. The other angles remain consistent with the basic posture.

Figure 2: Abrazo ACerrado

In the abrazo cerrado (closed embrace) position, where the torsos are in contact, both the leader and the follower are aligned with the basic posture.

Figure 3: Abrazo ACerrado

Upon examination of the left front step pattern of the leader in the paso adelante (step forward) movement, it is evident that a total of 15 degrees of rotation is made to the left in the lumbar and thoracic region. This is done in order to reduce the extension of the left shoulder, which has approximately 90 degrees of abduction and 50 degrees of external rotation. The body posture is consistent with the basic posture, with the exception of the rotation. With regard to the left leg, a flexion of 25 degrees at the hip joint is observed, accompanied by a slight flexion at the knee and approximately 20 degrees of plantarflexion at the foot. With regard to the right leg, a flexion of 25 degrees at the hip joint, a slight flexion at the knee, and a dorsiflexion of 15 degrees at the foot are observed.

Figure 4: Paso Adelante Of Leader

The left leg of the follower exhibits 25 degrees of flexion and slight external rotation at the hip, along with slight flexion at the knee, approximately 50 degrees of plantarflexion at the foot, and 30 degrees of extension at the fingers. The right leg displays 25 degrees of extension at the hip joint, slight flexion at the knee, 50 degrees of plantarflexion in the foot, and 40 degrees of extension in the fingers.

Figure 5: Paso Adelante Of Follower

In the movement known as “paso atrás” (backward step), there is an increase in lumbar lordosis when taking a long step due to the limitation of hip extension. There is no notable discrepancy between the techniques employed by the leader and those utilized by the follower. In the right backward step, the left hip exhibits 30 degrees of flexion, the knee displays 25 degrees of flexion, and the fingers demonstrate slight extension. With regard to the right side, there is a tendency towards 30 degrees of hip extension and slight external rotation, a slight flexion of the knee, and a slight external rotation of the foot.

Figure 6: Paso Atrás

In the paso al costado (side step), there is no distinction between the leader and follower, and the trunk and upper extremities are aligned with the basic posture. In the right side step, the left knee exhibits slight flexion, the foot displays slight plantarflexion, and the toes undergo slight extension. The right hip exhibits 30 degrees of abduction, the knee displays slight flexion, and the foot exhibits 50 degrees of plantarflexion.

Figure 7: Paso Al Costado

In the pivoting movement, a slight flexion is observed in the hip and knee joints, accompanied by a slight plantarflexion in the foot on the side of the leg bearing the body weight. With regard to the free leg, a slight flexion and external rotation at the hip were observed, along with 30 degrees of flexion at the knee and 40 degrees of plantarflexion at the foot.

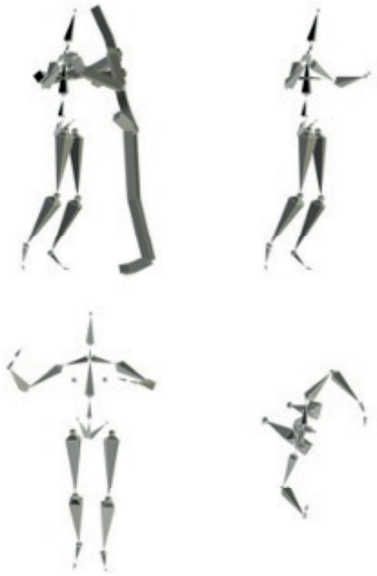

Figure 8: Pivote

The paso cruce (cross step) exhibits comparable characteristics to the paso adelante and the paso atrás. The distinguishing feature of this movement is the significant adduction of both hip joints that occurs during the step.

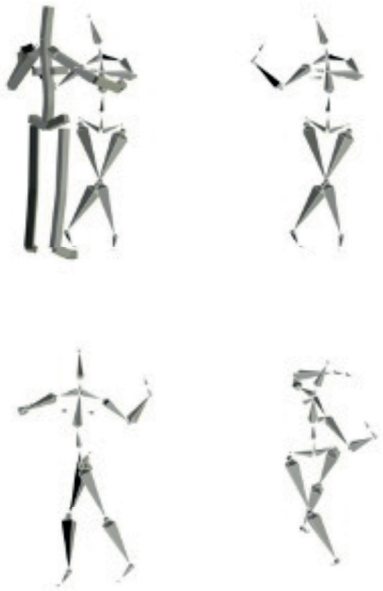

Figure 9: Paso Cruce

In nearly all la cruzada (cross) movements, a slight depression, flexion, and adduction of the left hip are accompanied by a slight flexion of the left knee, marking the initial phase of the cross movement. Meanwhile, the right leg maintains its anatomical position. Upon completion of the weight shift, the left hip and knee flexions cease, while a slight increase in right hip extension and a decrease in right plantar flexion occur.

Figure 10: La Cruzada

Upon examination of the ocho adelante (eight forward) and ocho atrás (eight backward) figures, it was determined that the eight forward was executed through a combination of external pivot and forward step, whereas the ocho atrás was performed through a combination of internal pivot and backward step. The aforementioned movements were not subjected to further analysis, as they exhibited distinctive characteristics.

Sacada (displacement) is defined as the act of one partner walking between the legs of the other partner who is taking a step, in close contact with the free foot, and transferring their own weight to the point where the partner's weight was in the previous position. Sacada can also be referred to as a front, side, or back sacada, depending on the direction of the step involved. The front sacada maintains the defining characteristics of the front step. In the case of a backward sacada, the lower extremity is aligned with the direction of the backward step, accompanied by a rotation of the lumbar and thoracic regions towards the side of the sacada leg. The addition of horizontal abduction to the upper limb occurs in the opposite direction, with the degree of abduction varying according to the size of the step. The side sacada movement is consistent with the paso al costado.

Figure 11: Sacada Atráss Of Leader

The giro (turn) is executed by repeating a combination of ocho adelante, a side step, ocho atrás, and a side step in succession. Each step maintains its distinctive characteristics.

Figure 12: Counter-clockwise Giro Of Follower

Given that the enganche (entangle) movement is predominantly executed with the right leg, an analysis was conducted on the enganches performed with the right leg by the follower. In the right hip, 40 degrees of flexion, slightly external rotation, and slightly abduction were observed, along with 90 degrees of flexion in the knee and 35 degrees of plantarflexion in the foot, with the toes in the natural position. In the left hip, slight flexion, slight abduction, and approximately 40 degrees of external rotation were observed, while the knee exhibited approximately 30 degrees of flexion, the foot demonstrated slight plantarflexion, and the toes exhibited slight extension.

Figure 13: Enganche Of Follower

The gancho (hook) movement involves the free leg being folded at the knee and wrapped around the partner in a hook-like shape. An examination of the right leg of the follower performing the gancho movement revealed slight internal rotation and flexion of the right hip, with the right knee flexed to 120 degrees and the foot exhibiting slight plantarflexion. Additionally, a slight adduction of the left hip, flexion of the knee, and dorsiflexion of the foot were observed.

Figure 14: Gancho

In the technique known as the boleo (whip), the free leg is swung in conjunction with a sudden turn. The lower back exhibits slight flexion, while the back experiences slight extension. The hip of the free leg demonstrates slight adduction and external rotation, while the knee joint is positioned behind the knee joint of the weight-bearing leg and flexes within a wide range of values between slightly and 120 degrees. The hip and knee joints of the leg bearing the weight are flexed to a slight degree.

Figure 15: Boleo

A slight adduction is observed in the weight-bearing leg during the pasada (passing) movement. In regard to the hip joint, the passing leg was observed to exhibit approximately 40 degrees of flexion, accompanied by slight adduction and internal rotation. The knee joint demonstrated approximately 120 degrees of flexion, while the foot exhibited 30 degrees of plantarflexion.

Figure 16: Pasada

The passivo levantar (upward passive) gesture involves elevating the follower to a passive position. Due to the subtlety of this movement, it is challenging to analyze in the visuals unless exaggerated. The follower assumes a passive stance on one leg, with slight elevation of the hip joint on the side bearing no weight. This is accompanied by a slight upward elevation of the leading motion by the leader.

An examination of the planeo (gliding) movements reveals a significant variation in the flexion of the hip and knee on the weight-bearing side, as well as the extension of the lumbar region and unweighted leg, in direct proportion to their increase or decrease. When the average of the aforementioned movements was taken into consideration, it was observed that the lumbar region exhibited slight extension, the right hip demonstrated 50 degrees of flexion, the knee exhibited 90 degrees of flexion, the foot exhibited slight dorsiflexion, and the toes exhibited slight extension. On the left side, the hip exhibited 45 degrees of external rotation, the knee exhibited 30 degrees of extension, the foot exhibited slight flexion, and the plantarflexion of the foot exhibited 45 degrees.

Figure 17: Planeo

Upon examination of the volcada (lean) position, it was noted that there was a slight extension observed in the lumbar region. The right hip and knee joints were observed to maintain their natural position, while 45 degrees of plantarflexion in the foot and 50 degrees of extension in the toes were detected. On the left side, there is 40 degrees of abduction, 50 degrees of flexion, and slight external rotation of the hip; 45 degrees of flexion in the knee; and 50 degrees of plantarflexion in the foot. The follower shifts the body center of gravity to the frontal side on the sagittal axis and shares body weight with the leader, with weighted contact on the left side of the thoracic region.

Figure 18: Volcada

The colgada (hanging) technique can be performed in a multitude of positions; however, the most prevalent form involves the ground contact points of the follower and the leader approaching each other, with the follower, supported by the leader's upper limb, laterally flexing the hip away from the leader. As the joint openings do not exhibit a consistent pattern, it is only possible to describe the nature of the movement.

Figure 19: Colgada

A review of the 1706 images, analyzed in terms of joint range of motion, revealed that all movements exhibited average values within their respective ranges.

In the context of tango or dance training in general, it is evident that a significant number of instructors tend to overlook the fundamental principles of movement analysis, which could otherwise enhance the efficacy of dance training. “Another compelling reason for connecting anatomy instruction to the technique class comes from visible successes witnessed by dance instructors.” (M.F.A, 2010, p. 79). In order to gain a comprehensive understanding of and to provide an accurate explanation of the movements in a universal context, it is essential to undertake a kinesiological study.

It has been established that Argentine tango, a social dance, is a form of movement that can be integrated into daily life without the necessity for specialized training to exceed the physical capabilities of the human body, as is often required in professional sports. It is evident that the movements are compatible with the demands of daily life, within the natural limits of a healthy human body, and in a way that does not cause health problems.

“There are really no exclusively ‘leader steps’ or ‘follower steps’ at all.” (Turner, 2008, Chapter 3: Leading and following). While the fundamental techniques and mechanics of leader’s and follower’s steps in tango appear to be uniform, subtle distinctions emerge when considering the impact of footwear. The preference for high-heeled shoes among female dancers introduces a slight variation in posture and step technique.

Kaynakça

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