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## Tango Ocho - 1: Functional Anatomical Characteristics of Dissociation and the Tango Pivot

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### ABSTRACT

Argentine tango (tango) has been used in therapy in the medical field. Tango has many unique movements, and the basic elements of tango were recently analysed according to the kinematic description of tango terms. The functional anatomical significance and clinical application of tango postures and stances as well as tango gait define level 1-grade tango therapy. Tango ocho is classified as level 2-grade tango therapy and contains the distinctive motion of tango. Additionally, ocho is a way to move the free lower limb across the stance limb (the weight-supporting lower limb). An ocho pivot is unique to tango. The ocho pivot sequence (OPS) is the method for performing ocho step sequences, including ocho adelante, ocho atras and ocho cortado. The OPS consists of the following: 1<sup>st</sup> dissociation, torsion of the body (torsion), release of the torsion and 2<sup>nd</sup> dissociation. From the OPS, many artistic and characteristic motions of the tango are developed. In this article, an analysis of the unique characteristics of tango ocho was conducted, including a functional anatomical description for use in the therapeutic application of tango therapy..

### KEYWORDS

Ocho, Ocho Pivot Sequence, Tango Pivot, Ocho Adelante, Ocho Atras, Ocho Cortado, Tango, Tango Therapy, Basic Tango Element

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## 1. Introduction

Argentine tango (Tango) has been used in the medical field [1]. Tango has many unique movements [2]. To maximize the effects of tango therapy, functional anatomical analysis of tango movement is necessary [3]. Recently, with the defining of tango terms [4], basic elements of tango were analysed according to their kinematic descriptions [5]. Following this, the functional anatomical significance and clinical application of tango posture and stance [6] as well as tango gait [7] were analysed and reported to define the level 1 grade for tango therapy.

Ocho is one of the unique tango movements [8] and the level 2 grade of tango therapy subsequent to tango posture, tango stance and tango gait. Ocho is also a basic tango element that is characteristic of gait progress and is exclusively found in the motion of tango. Additionally, this is a way to move the free lower limb across the weight limb (the

weight-supporting lower limb).

Tango posture and stance are static [6], tango gait is a linear movement [7], tango ocho is a round movement [5], and tango giro is a circular movement. In other aspects, tango posture and stance are 1-dimensional. The tango gait, ocho and giro are 2-dimensional movements on the ground. The lapis, bole, enroscar, gancho and salto are 3-dimensional movements. The tango pivot is unique, and the ocho pivot sequence (OPS) is a way to perform an ocho figure (i.e., a figure eight), including ocho adelante, ocho atras and ocho cortado. OPS is the centrepiece of the tango. In this article, an analysis of the unique characteristics of tango ocho was conducted in detail, and it includes a functional anatomical description for use in the therapeutic application in tango therapy.

## 2. Methods of Analysis

### 1) Studio setting

The functional anatomical analysis of ocho was performed at a tango school (Tango Studio, Seoul, Korea) and on the stage in the grand auditorium of Cheju Halla General Hospital as described in previous reports [6, 7]. Both are facilities well-equipped for tango lessons and the analysis of tango movement, as they have wood floors and controls for proper temperature and humidity.

### 2) Participants

It is very important to define the standard for ocho; a tango master's description and explanation of ocho is requisite for the analysis and medical definition of ocho. Two qualified tango masters and two certified tango experts participated in the analysis of ocho as the methods in the previous report describe [6, 7].

An academic expert of tango therapy and a medical doctor who was also an expert in tango with both teaching and performance experience translated the artistic and technical descriptions of tango into medical terminology.

### 3) Analysis of ocho

After the tango masters and tango experts addressed and explained the concepts behind tango, they taught the motions and sequence for ocho as they normally did during tango lessons. The expert of tango therapy provided a precise medical description of ocho with the assistance of a medical doctor. Throughout these procedures, the medical description and analysis of ocho was repeatedly discussed with the tango masters, the tango experts, the expert of tango therapy and the medical doctor.

As described in the previous reports, the results were obtained with the consensus of all advisors (tango masters, tango experts, tango therapy expert and medical doctor).

## 3. Results

### 1) Definition of terms describing tango ocho (Terminology)

Tango is a dance by nature. For the description of tango ocho, the definition of several unique terms is critical for an exact, detailed, scientific and systemic description.

#### • Axial rotatory Band

In tango dissociation, the axial rotatory band is the area in which axial rotation occurs and is defined from T10 (T10-T11 joint) to S1 (L5-S1 joint).

#### • Ocho pivot sequence (OPS):

The ocho pivot sequence (OPS) is the unique pivot process in tango, which involves pivoting while rotating the pelvic plane towards the intended direction, making a negative axial rotatory angle between the chest plane and pelvic plane. The OPS begins with the 1st dissociation and ends with the second dissociation. The OPS consists of the following sequence: 1st dissociation, torsion (of the body), release of the torsion and the second dissociation.

#### • Dissociation

Dissociation is the process by which the axial rotatory angle between the chest plane (upper body surface) and the pelvic plane (lower body surface) via the axial rotation of one of these planes but not the other.

#### • Torsion (of the body)

Torsion (of the body) is the status of the twisted body as a result of dissociation. This is the status in which the chest plane and pelvic plane exhibit an axial rotatory angle different from zero.

#### • Pivot

A pivot is the rotation of the body around the weight axis (Wt axis, Wt limb) in any manner. However, the pivot in tango is unique in that the pelvic plane becomes rotated more towards the intended direction.

#### • Round movement (Intra-Rotation)

The rotation of the body around the Wt axis, which is a part of the body.

#### • Circular Movement (Extra-Rotation)

The rotation of the body around the specific axis or point that is present out of body other than the axis that is included as a part of body.

#### • Chest plane (흉부면):

The chest plane is the coronal sectional plane of the chest.

#### • Pelvic plane (골반면):

The pelvic plane is the coronal sectional plane of the pelvis.

#### • Standard Direction (기준방향):

The standard direction is the direction perpendicular to the chest or pelvic plane.

• **Trunk-on-Pelvis Axial Rotation (TonP Rotation)**

Trunk-on-pelvis (axial) rotation is the axial rotation of the trunk on the pelvis, which remains stationary.

• **Pelvis-on-Trunk Axial Rotation (PonT Rotation)**

Pelvis-on-trunk axial rotation is the axial rotation of the pelvis on the trunk, which remains stationary.

Because pelvis-on-trunk rotation is achieved by the rotation of the lower body using the muscular power to overcome the frictional force of the Wt limb on the ground, it requires more muscular strength than that of the trunk-on-pelvis rotation. Pelvis-on-trunk rotation is not used nearly as often in daily living.

• **Axial Rotatory Angle**

Axial rotatory angle is the relative angle of the axial rotation between the standard directions of the two planes. In tango, it refers to the axial rotatory angle between the chest plane and pelvic plane.

▶ **Positive Axial Rotatory Angle (Positive angle)**

Positive axial rotatory angle (positive angle) is when the upper body is rotated more towards the intended direction than the lower body. In tango, the positive angle is when the chest plane rotates further than the pelvic plane in the rotation direction, i.e., in the clockwise or counterclockwise direction. Trunk-on-pelvis rotation has a positive angle.

▶ **Negative Axial Rotatory Angle (Negative angle)**

A negative axial rotatory angle (negative angle) is when the lower body is rotated more towards the intended direction than the upper body. In tango, the negative angle is when the pelvic plane rotates further than the chest plane to the rotation direction, i.e., in the clockwise or counterclockwise direction. Pelvis-on-trunk rotation has a negative angle.

▶ **Neutral angle**

Neutral angle is when there is no axial rotation between the upper body and the lower body. In tango, a neutral angle indicates that there is no axial rotation between the chest plane and the pelvic plane. In neutral angle, the chest plane and pelvic plane face each other.

• **Figure**

Sequence of the fundamental movements of tango

## 2) Ocho

### 1] Ocho and Ocho pivot sequence (OPS)

#### 1) Ocho and Ocho pivot sequence (OPS)

Ocho is the unique movement of tango that traces a path the shape of the number 8. The tango-specific pivot is needed to do an ocho in tango. The procedure for the tango pivot

needed for ocho will be defined as the ocho pivot sequence (OPS), and the OPS is the procedure for the beginning of ocho movements.

The ocho pivot sequence consists of dissociation and pivoting, and the OPS is a sequence of a 1<sup>st</sup> active dissociation, torsion of the body (the status of torsion), the release of torsion (beginning of pivot), and a 2<sup>nd</sup> reactive dissociation and the consequent pivot. The pivot begins as torsion is released.

#### 2) Dissociation

Dissociation is the process in which the upper body and lower body perform axial rotation separately in the horizontal plane with the waist area as the centre of the separated axial rotations. In dissociation, the upper body surface (chest plane) and lower body surface (pelvic plane) make up the axial rotation angle difference.

The lower limit of the axial rotation of the upper body is at the levels of the L5-S1 joint. The T1-T10 vertebrae are unable to make axial rotations under normal conditions, and the upper limit of the axial rotation of the upper body is at the level of T10-T11 joint, although the rib cage, cervical spine and head also rotate.

#### 3) Trunk-on-pelvis (TonP) rotation and pelvis-on-trunk (PonT) rotation

In tango, the axial rotatory angle is the angle between the chest plane and the pelvic plane. There are two ways for dissociation to make an axial rotatory angle other than zero: trunk-on-pelvis (TonP) rotation, in which the trunk rotates with a fixed lower body, and pelvis-on-trunk (PonT) rotation, in which the pelvis rotates with a fixed upper body.

#### 4) Directional characteristics of trunk-on-pelvis (TonP) rotation and pelvis-on-trunk (PonT) rotation

The deep muscles of the axial system contract first, followed by contraction of the surface trunk muscles contract (from deep muscle to surface muscle), which include the abdominal and back muscles, in both trunk-on-pelvis (TonP) rotation and pelvis-on-trunk (PonT) rotation. Trunk-on-pelvis (TonP) rotation begins from the base (L5-S1) of the trunk and moves to top of the trunk (T1) sequentially as in the rotation of the whirl (i.e., from the bottom to the top).

## 2] Ocho Pivot Sequence

#### 1) Primary Active Dissociation (1<sup>st</sup> dissociation)

Generally, in the beginning of ocho, the 1<sup>st</sup> dissociation is achieved by rotation of the upper body first without the rotation of the lower body (trunk-on-pelvis rotation).

#### 2) Torsion

Torsion is the twisted status of the trunk when there is a nonzero axial rotatory angle between the chest surface and the pelvic surface as a result of dissociation.

#### 3) Release of Torsion (beginning of pivot) and the Secondary Reactive Dissociation (2<sup>nd</sup> dissociation)

To finish ocho through dissociation to the pivot, which is the rotation of the body mass around the Wt limb, the pivot begins with the release of torsion (the twisted status of body) and continues to reverse dissociation (the secondary reactive dissociation)

The pivot begins with the beginning of the release of torsion. During the release of torsion, the positive angle produced by the 1<sup>st</sup> active dissociation is changed to a neutral angle and then to a negative angle by the 2<sup>nd</sup> reactive dissociation. Ocho makes a pivot, which is the rotation of the pelvic plane in the intended rotational direction through the following process: 1<sup>st</sup> dissociation by TonP rotation with yielding a positive angle and resultant torsion, the beginning of a pivot by the release of torsion and then the 2<sup>nd</sup> reactive dissociation by PonT rotation from a neutral angle to a negative angle and, finally, the pivot is completed while the dancers are facing each other and maintaining an unbroken holding frame.

#### 4) Pivot

Pivot is the process and resultant status of body rotation during an ocho in tango. The pivot begins with the beginning of the release of torsion.

### 3] Approaching Steps for Ocho

There are four approaching steps for ocho: 0) Step 0 with no 1<sup>st</sup> dissociation and no 2<sup>nd</sup> dissociation, 1) Step 1 with 1<sup>st</sup> dissociation and no 2<sup>nd</sup> dissociation, 2) Step 2 with 1<sup>st</sup> dissociation and 2<sup>nd</sup> dissociation and 3) Step 3 with 1<sup>st</sup> dissociation and 2<sup>nd</sup> dissociation with anti-torsion.

### 4] Ocho Adelante, ocho atras, and ocho cortado

Ocho is the figure that free limbs moving across the Wt limb make. Ocho adelante and ocho atras are figures that consist of round movements and linear movements. Ocho adelante consists of a forward ocho and the subsequent forward linear gait perpendicular to the pelvic plane. Ocho atras consists of a backward ocho and the subsequent backward linear gait perpendicular to the pelvic plane. Another kind of motion using the ocho pivot sequence is ocho cortado. Ocho cortado is composed of side-to-side gait and ocho, compared to the forward gait in ocho adelante and backward gait in ocho atras.

## 4. Discussion

### 1] Ocho

Ocho is the unique motion of tango; the shape of the path that the foot traces during the ocho is a number 8 (Fig. 1) [8]. In the case of ocho adelante and ocho atras, the two consecutive motions make the shape of an 8. First, the tango-specific pivot occurs in ocho. The process for executing the tango pivot is unique though it uses natural movements.

For convenience, the process of the performing a tango pivot for ocho will be defined as the ocho pivot sequence (OPS). In other words, the OPS is the process for beginning the motions of ocho.



Figure 1. Ocho. Ocho is the unique motion of tango that is in the shape of the number 8.

## I. Ocho pivot sequence

The ocho pivot sequence consists of dissociation and pivoting. Specifically, the OPS is accomplished by the following sequence: 1<sup>st</sup> active dissociation, torsion of the body (the status of torsion), the release of torsion (beginning of pivot), 2<sup>nd</sup> reactive dissociation and the consequent pivot. The pivot begins to develop with the beginning of the release of torsion (Fig. 2).

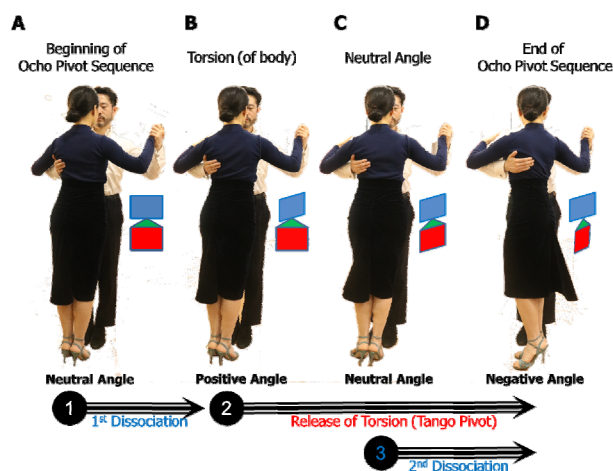


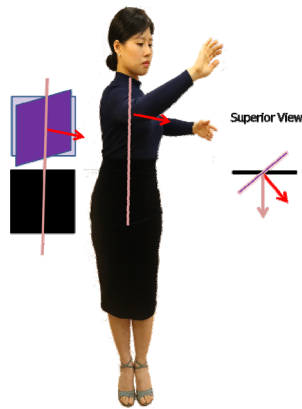
Figure 2. The ocho pivot sequence. The ocho pivot sequence consists of dissociation and pivoting, and the OPS is accomplished as a sequence of active dissociation, torsion of the body (the status of torsion), the release of torsion (beginning of pivot), reactive dissociation and the consequent pivot. The pivot begins to develop with the beginning of the release of torsion.

## II. Dissociation

Dissociation in the ocho pivot sequence occurs by the turning of the upper body without rotation of the lower body or by the turning of the lower body without the rotation of the

upper body with the vertebral column as an axial centre. Thus, dissociation has occurred. The ocho is achieved from the dissociation, and the dissociation is the core movement of ocho.

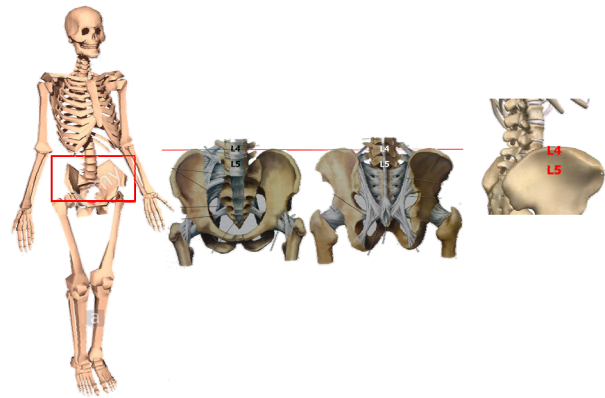
Dissociation is the process in which the upper body and lower body perform axial rotation separately in the horizontal plane with the waist area as the centre of the separate axial rotations. During dissociation, the upper body surface (chest plane) and lower body surface (pelvic plane) make the axial rotatory angle change (Fig. 3).



**Figure 3.** Dissociation is the process in which the upper body and lower body perform axial rotation separately in the horizontal plane with the waist area as the centre of the separate axial rotations. During dissociation, the upper body surface (chest plane) and lower body surface (pelvic plane) make the axial rotation angle change. The violet box indicates the chest plane; the black box indicates the pelvic plane; and the red arrow indicates the direction of the chest plane.

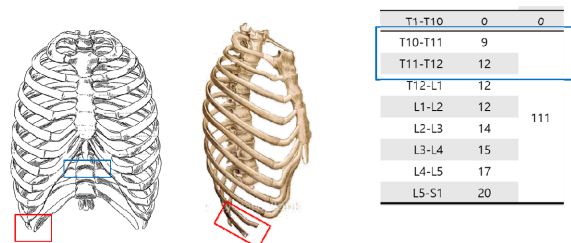
### 1) Axial system and vertical centre of axial rotation during the dissociation

According to the anatomical structure of the body, the lower limit of the axial rotation of the upper body may be at levels superior to S1 [9]. However, the iliac crest is at the level of L4-5, and a part of the L4 and all of the L5 spines are buried in the pelvis (Fig. 4). To rotate the upper body without the rotation of the lower body, the rotation of the upper body may begin actively at the level of the L3-4 joint superior to L3, although the rotation may occur at the L5-S1 joint.



**Figure 4.** The entire L5 spine is buried in the pelvic bone. However, L4 is positioned in the line with the iliac crest. A, Anterior view of the pelvic bone. B, Posterior view of the pelvic bone.

Individually, all axial joints are able to rotate at all levels of the spine [10]. Thoracic spines form the rib cage with the ribs. After the formation of the rib cage, T1-T10 are unable to make axial rotations under normal physiological conditions, but T11 and T12 are able to perform axial rotation because they are not completely fixed by the rib cage due (Fig. 5) [9]. Therefore, the axial rotation of the upper body is inferior to T10, and the upper limit of the axial rotation of the upper body is inferior to T10 at the T10-T11 joint.



**Figure 5.** Upper limit of axial rotation of thoracic vertebrae with anatomical characteristics. Thoracic spines form the rib cage with the ribs. After the formation of the rib cage, T1-T10 is unable to make axial rotation under normal physiological conditions, but T11 and T12 are able to perform axial rotation because they are not completely fixed by the rib cage [9]. Therefore, the axial rotation of the upper body is inferior to T10, and the upper limit of the axial rotation of the upper body is inferior to T10 at the T10-T11 joint.

Consequently, the overall range of axial rotation of the upper body is between T10 and S1 (Fig. 6). The rotational area between T10 and S1 is defined as the ‘axial rotatory band’. The range of the rotation band is 111° from T10 to S1 (Fig. 7).

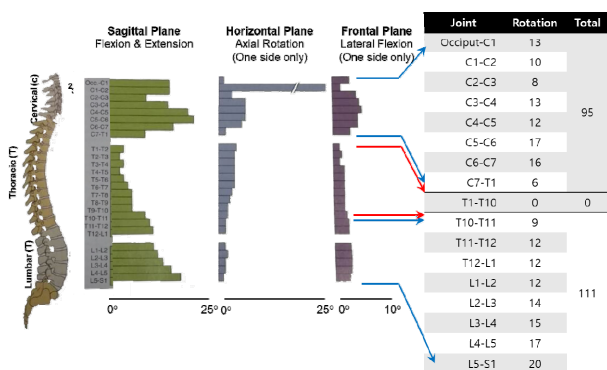


Figure 6. The available range of movement during axial rotation of the spine. There is no availability of axial rotation from T1 to T10. The rotational area is between T10 and S1, and the range of rotation is 111°. (modified... Sportmedicine)

• Axial Rotatory Band

The axial rotatory band for tango dissociation is defined from T10 (T10-T11 joint) to S1 (L5-S1 joint) (Fig. 7).

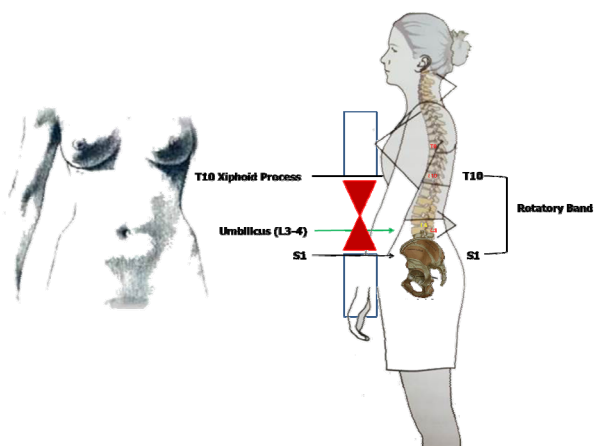


Figure 7. Axial rotatory band for tango dissociation. The rotational area between T10 and S1 is defined as the 'axial rotatory band'. The range of the rotation band is 111° from T10 to S1.

Many dancers feel that the rotation point is higher than L2-3. However, it is suspected that this is because with the rotation of the upper body, the upper trunk muscles, including latissimus dorsi and trapezius, are involved in the rotation. Therefore, the dancers possibly misunderstand that the axial rotation point they perceive is above the upper physiologic limit.

2) Landmark of Vertical Level

Anatomically, there are several approximate landmarks for the vertebral level (Fig. 8). The breast point (nipple point) is T6, and the xiphoid process occurs at the level of T10. The midpoint between the xyphoid process and umbilicus is near T12, and umbilicus is at the level of L3 [10].

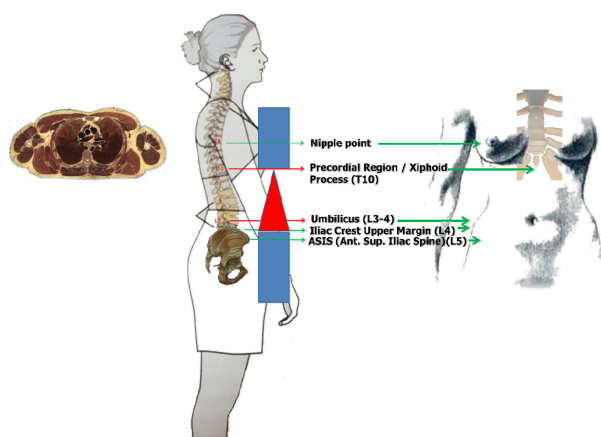
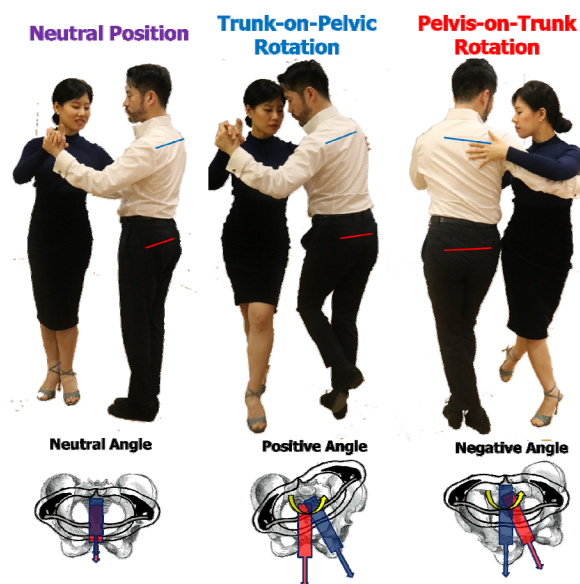


Figure 8. The approximate anatomical landmarks for the vertebral levels. The nipple point is at the level of T6, the precordial region [base of the xiphoid process] is at the level of T10, the umbilicus is at the level of L3-4, the upper margin of iliac crest is at the level of L4 and the anterior superior iliac spine is at the level of L5.

3) Trunk-on-pelvis (TonP) rotation and pelvis-on-trunk (PonT) rotation

There are two directions of axial rotation in the superior view: clockwise rotation or counterclockwise rotation. Dissociation is when the upper body and the lower body do not rotate simultaneously [5]. Therefore, the upper body and lower body act as though they are separated like a doll with two pieces, an upper body and a lower body.

During the dissociation in tango ocho, there are two kinds of dissociation: the upper body rotates without the rotation of the lower body (trunk-on-pelvis rotation, TonP rotation) or the lower body rotates without the rotation of the upper body (pelvis-on-trunk rotation, PonT rotation) (Fig. 5).





**Figure 5.** Dissociation in tango ocho. In tango, the axial rotatory angle is the angle between the chest plane and the pelvic plane. A positive axial rotatory angle (positive angle) is when the chest plane rotates towards the intended rotational direction relative to the pelvic plane, and a negative axial rotational angle (negative angle) is defined as the reverse, i.e., when the pelvic plane rotates towards the intended rotational direction relative to the chest plane. According to the definition of positive and negative axial rotatory angles, trunk-on-pelvis (TonP) rotation produces a positive axial rotatory angle, and pelvis-on-trunk (PonT) rotation produces a negative axial rotatory angle.

In tango, the axial rotatory angle is the angle between the chest plane and the pelvic plane. A positive axial rotatory angle (positive angle) is when the chest plane rotates towards the intended rotational direction relative to the pelvic plane, and a negative axial rotatory angle (negative angle) is when the pelvic plane rotates towards the intended rotational direction relative to the chest plane.

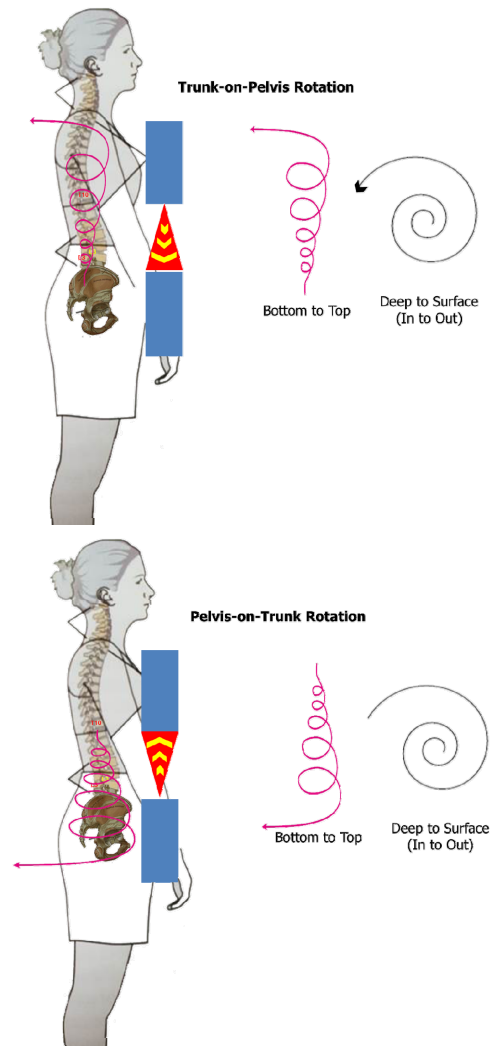
According to the definition of positive and negative axial rotatory angles, trunk-on-pelvis (TonP) rotation produces a positive axial rotatory angle, and pelvis-on-trunk (PonT) rotation produces a negative axial rotatory angle.

The consequence of dissociation is the twisted status of the body (torsion of the body, torsion), which is produced by a nonzero axial rotatory angle between the chest plane and the pelvic plane.

#### 4) Directional characteristics of trunk-on-pelvis (TonP) rotation and pelvis-on-trunk (PonT) rotation by method of rotation

The deep muscles of the axial system begin to contract, followed by the superficial trunk muscles, including the abdominal and back muscles, in both trunk-on-pelvis (TonP) rotation and pelvis-on-trunk (PonT) rotation.

Trunk-on-pelvis (TonP) rotation begins from the base of the trunk (L5-S1 joint) and moves to top of the trunk (T1), propagating upward sequentially as in the rotation of the whirl (from the bottom to the top) (Fig. 6). Consequently, trunk-on-pelvis rotation has two directional characteristics: rotation from the inner deep muscles to the outer superficial muscles (deep to surface) and rotation from the bottom vertebral level to the top vertebral level (bottom to top).



**Figure 6.** The initiation level and direction of the rotation. Trunk-on-pelvis rotation begins at the level of L3 and propagates upward. Pelvis-on-trunk rotation begins at the level of T11 to propagate downward. Additionally, the direction of muscular use is from the deep muscles of the spinae erector group to the superficial muscles of the trunk and back muscles.

In the pelvis-on-trunk (PonT) rotation, the rotation begins from the T10-T11 joint, the top level of rotation for the lower body, and propagates down sequentially as in the rotation of the reverse whirl (from the top to the bottom). Consequently, pelvis-on-trunk rotation also has two directional characteristics: rotation from the inner deep muscles to the outer surface muscles (deep to surface) and from the T10-T11 joint to the L5-S1 joint (top to bottom).

These vertical and in-and-out directional characteristics of trunk-on-pelvis (TonP) and pelvis-on-trunk rotations during dissociation are very efficient ways to obtain maximum rotational force by muscle actions. This method of rotation is used to obtain rotational power more efficiently, according to the principles of physics. Beginning rotation from the bottom, the final upper section achieves maximum acceleration and

velocity, and the power of rotation is amplified by the 3<sup>rd</sup> law of Newton. These two vertical and in-and-out directional characteristics may be similar, but they have slightly different functional anatomical mechanisms for their actions.

Trunk-on-pelvis rotation may occur in daily living. However, pelvis-on-trunk rotation is not common in daily living but generally does occur in dance, including tango. In the exercises for strengthening the trunk, pelvis-on-trunk rotation is achieved using equipment. Pelvis-on-trunk rotation is performed regularly in dance. However, one should wear dance shoes that are slippery enough to overcome the frictional force of the ground and in order to prevent ankle sprain when performing pelvis-on-trunk rotation in dance without any supportive equipment.

### III. Functional anatomical characteristics of trunk-on-pelvis (TonP) rotation and pelvis-on-trunk (PonT) rotation

#### • Muscles related to dissociation: Axial rotation of the trunk

Dissociation is fundamentally the axial rotation of the body. The basic concept of tango dissociation is that one part of the upper body or lower body remains stationary, while the other part rotates axially. However, the functional anatomical viewpoint is different between the rotation of the upper body rotation and the lower body. Most body muscles are related to the axial rotation of the trunk or the pelvis. Moreover, muscular actions involved in the rotation of the trunk or pelvis while the other remains stationary, are more complex from a functional anatomic standpoint.

The functional anatomical understanding of dissociation is approached via the simple rotation of the trunk or the pelvis relative to each other. Due to anatomical differences, the upper body rotation and the lower body rotation will be described separately. Thereafter, the effects of the one-part rotation on the other part will be considered.

During axial rotation of the upper trunk, the direct-acting muscles are the axial rotation muscles, antero-lateral trunk muscles, back muscles, shoulder-related muscles and the muscles of pelvis and lower limbs [9].

The muscles related to the axial rotation of the body are as follows: multifidus, rotator brevis and longus in the deep spinal erector muscles; obliquus externus abdominis, obliquus internus abdominis, transverse abdominis in antero-lateral trunk muscles; latissimus dorsi in back muscles; trapezius and rotator cuff in the shoulder frame-related muscles; and quadratus lumborum and iliopsoas muscles in pelvis and lower limbs.

The muscles of the shoulder girdle act on the scapula, primarily to stabilize it. There are six major muscles that anchor the scapula: four posterior muscles (trapezius, rhomboid

major, rhomboid minor and levator scapulae) and two anterior muscles (pectoralis minor and serratus anterior) [10].

Isometric contraction plays a role in maintaining the posture necessary for one part of the body (the upper or lower body) to remain stationary while the other part rotates. Additionally, isometric contractions for maintaining the dance postures and isotonic contraction for maintaining tension also play a role.

#### • Medical viewpoint

*The abdominal bracing required for dissociation is an important medical tool. [6] The dissociation in ocho is beneficial for the rehabilitation of some disease conditions, but therapists should be aware that torsion may be harmful to some conditions or may aggravate an injury or even cause an injury in some instances. Therefore, a functional anatomical understanding of dissociation must precede the effective application and prevention of the side effects of tango therapy.*

## IV. Result of dissociation

The result of dissociation is the twisted status of the body (torsion), which is made by the change in axial rotatory angle between the chest plane and pelvic plane.

### 2] Ocho Pivot Sequence (OPS)

#### 1) Primary Active Dissociation (1<sup>st</sup> dissociation)

Generally, in the beginning of the ocho pivot sequence (OPS), the 1<sup>st</sup> dissociation is developed by the rotation of the upper body first without the rotation of the lower body (trunk-on-pelvis rotation). The upper body turns first, the chest plane is rotated axially, and the pelvis plane remains fixed without axial rotation. As a result, the 1<sup>st</sup> dissociation occurs, and the body becomes twisted (torsion).

First, during the ocho pivot sequence, the upright tango posture should be maintained. Additionally, body position should be held firmly and stably with partners facing each other in a parallel manner.

#### 2) Torsion of the body (Torsion)

Torsion is the twisted status of the trunk with the development of a nonzero axial rotatory angle between the chest surface and the pelvic surface as a result of dissociation.

#### 3) Release of torsion (Beginning of Pivot) and the Secondary Reactive Dissociation (2<sup>nd</sup> dissociation)

To finalize an ocho sequence from dissociation to the pivot, which is the rotation of the body mass around the Wt limb as a column of axial rotation, the pivot begins with the release of torsion (the twisted status of body), and the release is continued into the reverse 2<sup>nd</sup> dissociation (the secondary



reactive dissociation).

In the beginning of the torsion release, the torque produced from the elasticity associated with releasing the twisted body naturally leads the motion.

Torsion of the twisted body begins to release towards a neutral angle. Generally, the release of torsion is finished at the neutral angle. The beginners in the tango class are the same.

However, the purpose of ocho is the rotated status of the pelvic plane towards the intended direction of the chest plane and the consequent negative axial rotation angle.

Ocho is led by the leader with just a signal. The pelvic plane of the leader and follower should rotate more than the degree of rotation of the chest plane to accomplish the purpose of ocho in tango, unlike the motion of linear gait.

Therefore, in tango, rotation of the body is not performed as a single body segment containing the trunk and lower body, including the pelvis and lower limb simultaneously. The trunk and the lower body mass rotate separately with a time delay (dissociation), and in this, the power for the secondary reactive dissociation is obtained.

During the release of torsion and for the secondary reactive dissociation in ocho, both the elasticity of the twisted body (passive power) and muscular contraction (active power) are used.

Using this power, the second dissociation (the secondary reactive dissociation) subsequently follows the primary dissociation along the release of torsion. In the secondary dissociation, pelvis-on-trunk rotation occurs.

The purpose of ocho is consequently the production of a negative angle between the chest plane and the pelvic plane from a neutral starting angle when partners are facing each other.

Here, the important points are the pelvic plane rotates relative to the chest plane towards the intended direction, keeping the rule of tango which is that the partners face each other and maintain an unbroken frame, whether the passive power of elasticity or the active power of muscular actions are used.

The ocho pivot sequence is an excellent and elegant way to make an axial rotatory angle change between the chest plane and the pelvic plane from the position in which the partners face each other with a neutral angle between the chest plane and the pelvic plane.

Basically, the 1<sup>st</sup> dissociation is performed by active muscular contraction, and the 2<sup>nd</sup> dissociation is more complex in its action mechanisms and is achieved by both elasticity from the release of torsion, which is produced by the 1<sup>st</sup> active dissociation, and active muscle contraction, which is powered by the 1<sup>st</sup> active dissociation.

During the release of torsion and the 2<sup>nd</sup> dissociation, many beautiful and artistic movements that are unique to tango are produced.

#### 4) Pivot

Pivot is the process and resultant status of body rotation by the ocho pivot sequence in tango. Generally, a pivot is the rotation of the body mass on the axis of a body part. In dance, a pivot is the rotation of the body mass on the axis of the Wt limb. However, in tango, a pivot is uniquely performed execute ocho. The point of uniqueness is the dissociation by TonP and PonT. In particular, the rotation of the plantar surface occurs during the pivot. A pivot in the tango begins with the release of torsion and is completed with the 2<sup>nd</sup> dissociation.

#### • Tango Pivot

The tango pivot begins at the beginning of the release of torsion. During the release of torsion, the positive angle produced by the 1<sup>st</sup> dissociation is changed to a neutral angle and then to a negative angle by the 2<sup>nd</sup> dissociation. The ocho pivot sequence makes a pivot, which is the rotation of the pelvic plane to the intended rotational direction, by the following process: 1<sup>st</sup> dissociation by trunk-on-pelvis rotation, creating a positive angle and resultant torsion; the beginning of the pivot by the release of torsion and the subsequent 2<sup>nd</sup> reactive dissociation by pelvis-on-trunk rotation, changing the neutral angle to a negative angle, resulting in the completion of the pivot while partners remain facing each other with an unbroken frame.

In other words, the ocho pivot sequence is potentially interpreted as the time gap between the reaction time of the upper body and lower body by the intentional and reflexive delay of signal transduction from the upper body to the lower body via waist.

### 3] Approaching Steps for the Ocho Pivot Sequence

The approaching steps for the ocho pivot sequence are as follows:

- 0) Ocho pivot sequence Step 0.
  - No 1<sup>st</sup> dissociation and no 2<sup>nd</sup> dissociation
- 1) Ocho pivot sequence Step 1.
  - 1<sup>st</sup> dissociation and no 2<sup>nd</sup> dissociation
- 2) Ocho pivot sequence Step 2.
  - 1<sup>st</sup> dissociation and 2<sup>nd</sup> dissociation
- 3) Ocho pivot sequence Step 3
  - 1<sup>st</sup> dissociation and 2<sup>nd</sup> dissociation with anti-torsion

### 0) Ocho pivot sequence Step 0.

#### • No 1<sup>st</sup> dissociation and no 2<sup>nd</sup> dissociation

Step 0 of the ocho pivot sequence is that a pivot is achieved without any body twisting due to the absence of 1<sup>st</sup> and 2<sup>nd</sup> dissociation. The whole body rotates as one mass

without any torsion of the body. The chest plane and pelvic plane always maintain a neutral angle. The frame between partners is broken. Because of the absence of dissociation, any pelvis-on-trunk rotation and trunk-on-pelvis rotation are also absent. Basically, the tango ocho is not produced as a pivot per se by this method. This method is incorrect in tango ocho.

Step 0 of the ocho pivot sequence also needs to overcome static friction force and requires more balance than just walking or standing. Therefore, if necessary, this pivot can be used by the leader to maintain tension in spite of the broken frame in specific situations, including tango therapy.

Additionally, regardless of the presence or absence of dissociation, the slipperiness of the foot, including the status of the dancer's shoes and socks, is very important, especially in tango therapy as well as in tango lessons because of the risk of ankle sprain.

**- Ocho pivot sequence Step 0-1. No Dissociation to 1<sup>st</sup> and 2<sup>nd</sup> Dissociation**

This is the rotation of the whole body as one mass with a neutral angle.

**- Ocho pivot sequence Step 0-2. No Dissociation to 1<sup>st</sup> and passive 2<sup>nd</sup> Dissociation**

This is the production of a slight final passive 2<sup>nd</sup> dissociation with slight pelvis-on-trunk rotation through the turning force of simple rotation. In tango, this is not good because the frame is broken more.

**• Medical viewpoint**

For therapeutic purposes, step 0 (without dissociation) is used for the evaluation and strengthening the balance capacity of the patients or the subjects.

**► 1) Ocho pivot sequence Step 1**

**• 1<sup>st</sup> dissociation and no 2<sup>nd</sup> dissociation**

Step 1 of the ocho pivot sequence is a pivot with the 1<sup>st</sup> dissociation and subsequent release of torsion. In the first step of the ocho pivot sequence, the 1<sup>st</sup> dissociation occurs. Initially, the trunk-on-pelvis rotation should be performed, and a positive axial rotatory angle should be produced by the 2<sup>nd</sup> dissociation with pelvis-on-trunk rotation during the release of torsion. However, Step 1 of the ocho pivot sequence is the level at which the pelvis-on-trunk rotation only reaches the neutral angle between the chest plane and pelvic plane because the 2<sup>nd</sup> dissociation by pelvis-on-trunk rotation does not occur. Ocho adelante and ocho atras is possible to some extent.

**- Ocho pivot sequence Step 1-1. 1<sup>st</sup> dissociation and no 2<sup>nd</sup> Dissociation**

Step 1-1 of the OPS is Step 1 of the OPS with only the 1<sup>st</sup> dissociation and formation of a neutral angle between the chest plane and pelvic plane without the 2<sup>nd</sup> dissociation.

**- Ocho pivot sequence Step 1-2. 1<sup>st</sup> dissociation and contralateral 2<sup>nd</sup> Dissociation**

Step 1-2 of the OPS is performed with the 1<sup>st</sup> dissociation and a contralateral 2<sup>nd</sup> dissociation. In the normal ocho pivot sequence, the pelvis-on-trunk rotation occurs through the neutral angle during the release of torsion and continues until forming a negative axial rotatory angle.

However, Step 1-2 of the ocho pivot sequence is to make a negative axial rotatory angle. The artificial contralateral trunk-on-pelvis rotation from the neutral angle rather than from the continuing ipsilateral pelvis-on-trunk rotation is made from the static neutral angle at the end of Step 1-1 of the ocho pivot sequence in order to supplement the negative axial rotatory angle change from Step 1-1 of the ocho pivot sequence that is finished in the neutral angle.

In the normal ocho pivot sequence, the negative axial rotatory angle is made by pelvis-on-trunk rotation in the 2<sup>nd</sup> dissociation at the end of the release of torsion.

Step 1-2 of the ocho pivot sequence is completed with a neutral angle by the release of torsion developed in Step 1-1 of the ocho pivot sequence. Step 1-2 of the ocho pivot sequence is adding the contralateral trunk-on-pelvis rotation at the end of Step 1-1 of the ocho pivot sequence to make a negative axial rotatory angle.

The important point is that the ocho pivot sequence is the production of a negative axial rotatory angle in the intended direction. In fact, Step 1-2 of the ocho pivot sequence does not occur during the dance. This is just the training to become familiar with the final posture of the complete ocho pivot sequence, which is the production of a negative axial rotatory angle.

**• Medical viewpoint**

*For therapeutic purposes, Step 1 of the ocho pivot sequence (without the 2<sup>nd</sup> dissociation) is used for the evaluation and strengthening of twisting-related muscles of the axial system in patients or subjects.*

**► 2) Ocho pivot sequence Step 2.**

**• 1<sup>st</sup> dissociation and 2<sup>nd</sup> dissociation**

Step 2 of the ocho pivot sequence produces a negative axial rotatory angle in the intended direction by the standard sequence of: 1<sup>st</sup> dissociation, release of torsion, and 2<sup>nd</sup> dissociation at the end of the release of torsion.

If the ocho adelante or ocho atras is performed with the standard pivot sequence, the tracking path of the moving foot draws half of a figure 8 (ocho), as the original meaning of ocho in tango suggests. Consequently, the half-8 (ocho) is made by consecutive trunk-on-pelvis and pelvis-on-trunk rotations.

### ► 3) Ocho pivot sequence Step 3

- **1<sup>st</sup> dissociation and 2<sup>nd</sup> dissociation with anti-torsion**

Step 3 of the ocho pivot sequence is basically the same as Step 2 of the ocho pivot sequence. The difference is that the effects of the figures are enhanced during the release of torsion by adding a rotatory force with the production of anti-torsion at the initiation of release of torsion. Step 3 of the ocho pivot sequence is the professional level of the ocho pivot sequence in which figures of high difficulty level are made.

#### **4] Ocho adelante, ocho atras and ocho cortado**

Ocho is the figure that the free limb makes as it moves across the Wt limb. In principle, the dancer moves the free limb in the side-to-side, forward or backward directions, which are parallel or perpendicular to the pelvic plane (perpendicular rule), while partners keep their body frames facing each other (the rule of keeping the frame). In spite of the diagonal movement of the free limb across the Wt limb, the dancer is able to move to the perpendicular direction to the pelvic plane, and two dancers are able to maintain an unbroken holding frame facing each other through the unique movement of ocho.

- **Perpendicular rule**

The perpendicular rule is to move straight forward, backward or side-to-side in every step in either a perpendicular or parallel direction relative to the pelvic plane in a linear movement. Through ocho, even when the line of progression is diagonal, the movement of the free limb across the Wt limb is perpendicular to the pelvic plane. Therefore, from the viewpoint of the pelvic plane, the free limb moves straight forward or backward.

- **Keeping the holding frame unbroken while facing each other**

Tango is a dance. One of the intentions of tango is that two people dance together while facing each other and simultaneously maintaining a holding frame. Using the ocho pivot sequence, the dancers move diagonally after pivoting while keeping this intention. However, all components of the ocho pivot sequence are also natural anatomical movements.

### ► Ocho Adelante and Ocho Atras

Ocho adelante and ocho atras are figures that consist of round and linear movements.

Ocho adelante comprises sequential movements, which consist of a forward ocho pivot sequence followed by forward linear gait perpendicular to the pelvic plane. Ocho atras consists of a backward ocho pivot sequence followed by backward linear gait perpendicular to the pelvic plane.

By using the ocho pivot sequence, the unique way of

pivoting in tango, it becomes possible to move the free limb in the diagonal direction across the Wt limb while adhering to the principles of the tango: the perpendicular rule and keeping the holding frame unbroken while facing each other.

Another kind of figure using the ocho pivot sequence is ocho cortado. Ocho cortado comprises side-to-side gait and ocho, as opposed to the forward gait of ocho adelante and backward gait of ocho atras.

### **5] Ocho: Tangology**

Ocho means 8 in Spanish. This is because the tracking path of the foot draws the shape of an 8 when two consecutive ocho adelante or ocho atras sequences are performed.

Because ocho is a unique characteristic of tango ocho, many types of movements become possible in tango (i.e., there is increased variability of tango movements). Through these variable movements, particularly round movements, the artistic expression, according to the music, is enhanced. Various features of tango are unique, characteristic, beautiful and artistic, such as boleó, giro, enroscar, lapis, planeo and others, and they are possible because they are derived from ocho.

Ocho is the basis for many beautiful and artistic motions in tango, including giro, enroscar, and boleó. Perhaps the most beautiful and artistic characteristics of tango come from the ocho. Dissociation is at the core of the ocho.

## **5. Conclusion**

Ocho is a unique way to rotate the body mass around the Wt limb as a centre in tango. The resultant rotation of the body mass is defined as a pivot, and the process of making a pivot is defined as an ocho pivot sequence (OPS). In ocho, the twisting of the body (dissociation) is a unique aspect of tango. A forward linear gait with forward OPS is ocho adelante, and a backward linear gait with backward OPS is ocho atras.

The ocho pivot sequence (OPS) consists of dissociations and pivots and is accomplished as a sequence: 1<sup>st</sup> active dissociation, torsion, the release of torsion (beginning of the pivot), 2<sup>nd</sup> reactive dissociation and the consequent pivot.

Ocho is the basis for the many beautiful and artistic motions of tango. Dissociation is at the core of the ocho.

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