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The impact of Argentine tango music on the human brain

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Abstract: *Music and music therapy have always been present and important over time. Already in prehistoric populations, both medicinal and religious or traditional rituals have occurred on musical backgrounds of different types of improvised and manufactured instruments. In most cases, they also had vocals together with the instruments, or rarely just vocals, without any musical instruments. But in any case, had music not brought, in all these occasions, efficiency and benefit in the therapeutic process, it would have long been abandoned. Just as well, in our modern culture and science, different ways of implementing and using music in different types of treatments have been sought over the centuries. Even physiological measurements have shown that individual reactions to the same music are very different from one person to another, regardless of age, gender, ethnicity and culture. And for these reasons, the personal tastes of each patient must be taken into account when listening to therapeutic music. (Werner, 2014, 102). In addition, there is a social aspect of Argentine tango, which helps anyone feel like they belong to a community of people, meaningful and soulful. It is a pleasant and attractive social activity that can greatly improve the quality of life!*

Key-words: *Argentine tango music, music therapy, dance therapy, brainwaves*

1. General features of Argentine tango music

Argentine tango music is much more varied than the tango music from ballroom dancing. A large part of the tango music has been composed by a variety of different orchestras over the last century. Not only is there a large quantity of music, but also a stylistic difference between these orchestras, which makes it easier for Argentine tango dancers to spend all night dancing only Argentine tango. The four representative schools of Argentine tango music are Carlos di Sarli, Juan d'Arienzo, Anibal Troilo and Osvaldo Pugliese. These are dance orchestras, playing dance music.

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When the spirit of music is characterized by the marking of the counterpoint, clarity in articulation is needed. It has a clear or repetitive impulse, a strong tango rhythm based on 2x4, 2 on 4 beats (*dos por cuatro*). Ástor Piazzolla stretched the classical harmony and counterpoint, and moved the tango from the dance floor to the concert stage. His compositions tell us something about our contemporary life and dance, which is very much about modern dance. (Denniston, 2003)

While historically the Argentine tango has been danced on tango music, such as the one produced by orchestra leaders like Osvaldo Pugliese, Carlos di Sarli, Juan d'Arienzo, Anibal Troilo, in the 1990's, a younger generation of tango dancers began to dance the tango steps on alternative tango music, namely music from other genres, such as "world music", "electro-tango", "experimental rock", "trip hop" and "blues", to name a few. Dancing "*tango nuevo*" is often associated with alternative music, see *nuevo tango*. (Denniston, 2003)

The "**Golden Age**" of tango music and dance was, as all agree, the period from 1935 to 1952. The tango was performed by "*orquestas tipicas*", bands that often include over a dozen performers.

The *sexteto tipico* ("traditional sextet") of the 1920`s had only a piano, a double bass, two bandoneons, and two violins, making a total of six musicians. This grew steadily over time, adding more bandoneons, violins and singers. (Lavoca, 2012, 220)

The Argentine tango also enjoys two other similar dances: the waltz (*valsecito criollo argentino, vals porteño, vals tango*) and the milonga.

The tango-waltz music is in 3/4 beats. The tango-waltz is danced in a quite relaxed and quiet dancing style, unlike the Viennese waltz, where dancers often take 3 steps on one measure, and turn almost constantly, maintaining a rigid and uncomfortable position.

The milonga music is in 2/4 beats, and has a strong accentuated sound, sometimes an underlying "habanera" rhythm. Dancers often insert double time steps (syncopated or otherwise called, traspiés). But both the milonga dance and the waltz use the same techniques and basic elements as the Argentine tango (Denniston, 2003).

Milonga already existed in Argentina, it was a sung poetry, in which the most important element were the lyrics, the music being a very simple song supporting the poetry.

1.1. Listening and interpreting the Argentine tango music

Listening to Argentine tango music for the first time, especially nowadays, where our main music in general is modern pop music, it can be difficult to hear what is

happening, and therefore what we hear may sound like a "wall of sounds". The good news is that listening can immediately change the experience, enriching it, creating a relationship with music. As for the dancers, they dance on what they hear, so that the dance will always change even without learning new steps, just by developing one's musicality.

The dance music can be considered as a complex comprising of four elements: the beat (*compas*), the rhythm, the melody and the lyrics. The lyrics are optional, although there are always feelings being expressed. The first step in developing our ability to listen is to learn to discern these four elements.

The beats and the rhythm are not the same. By beats, we mean the usual pulse of the music. The beat alone is not music, but it is the foundation of music. In tango, we walk on beats, so without the beat there is no dance based on walking. Also, the beat is a physical phenomenon, such as the heartbeat or the breath rhythm. Some people think of them as having no "sense of rhythm", but the beat exist in us, waiting to be discovered (Lavoca 2012, 222).

The beats are not equal - they each have their features, and each orchestra has a different quality of the beats. A first attempt to discern and feel these features would be to classify them in the opposite spectrum: hard or soft, strong or weak, sharp and stiff (*stacato*) or rounded and smooth (*legato*). The features of the beats greatly influence the quality of the steps during the dance. Dancing on different orchestras does not mainly refer to choosing different sequences for different types of music, though we could: it resides in the mannerism. The different features of the beats inspire different qualities of steps - different ways to place one`s feet on the floor. The "*arrastre*" in particular can have a big impact on how the weight is being transferred to the floor (Lavoca 2012, 224).

In order to maintain the musicality, dancers can perform both segmented and combined various musical instruments from the orchestra, such as the bandoneon, the piano, or the violin, but the main rhythmic devices in the tango are syncopated - beats that occur in unexpected places, and that can be found in many Argentine tango orchestras. To offer a few well-known examples: Anibal Troilo, Juan d'Arienzo, Astor Piazzolla, Ricardo Tanturi, Edgardo Donato, etc.

For the dancers, awareness of the beat/the rhythm and the melody, and the possibility of hearing them separately, extends the range of music we enjoy and offers us freedom. In tango music, the melody is often treated as rhythm. Often, the impossibility of separating them entirely, but learning to discern between melody and rhythm, is one of the most important skills of all dancers (Lavoca 2012, 230).

2. The benefits of the Argentine tango

According to Dr. Patricia McKinley, the dance covers six main areas considered important for a high quality of life and for aging successfully: the physical exercise, the social satisfaction, the spirituality and attention, the knowledge, the meaning, and the emotional and educational health.

While all types of dance offer some types of benefits, the Argentine dance - the tango, in particular - has proven that these areas improve among both healthy and disabled populations. Also, it seems to confer more benefits than ballroom dancing, given that the combination between the music, the feeling of accomplishment, and the attention required to follow the improvisational movements render tango very special in improving both the cognitive and the physical health. In addition, since Argentine tango is, first and foremost, a walking dance, it is actually easier to learn and perform than many other dances and, since the partners are encouraged to constantly switch between them, it is much nicer to meet the community of dancers (McKinley, 2015).

1. Exercise: tango is good for the cardiovascular health. The intensity can be modified to ensure that it is an endurance exercise, by increasing the mobility, balance, and step length and core strength.
2. Social satisfaction: the tango dance has been found to be an important activity that is engaged and self-promotes, due to the amount of joy and identification within the group of people with similar interests and goals, including the improvement of mobility, a sense of connection with, and understanding of the others, and the ability to learn a new activity while reducing isolation.
3. Spirituality and attention: tango induces a state of flow and spirituality. Flow is a state of mind in which the action is so pleasant that one wants to do it again and again and never stop.
4. Cognition: there are specific cognitive abilities that can be improved, such as spatial-temporal orientation and the synchronization with the partner. Therefore, the dance seems to be an effective exercise to counteract dementia.
5. Significance: dancers not only want to learn the steps, they also want to execute them with grace and to maintain the synchrony and harmony of the couple. They often express a specific purpose for dancing tango. They want to expose themselves to doing something new, while having fun and meeting new people. Anyone who engages in a tango class generally has a specific purpose in mind. For healthy people, it could be social interactions, the ability to dance tango at a wedding, a trip to Argentina, etc.. For people with disabilities, the goals are generally related to disability. People will set certain goals, to walk better, or to feel better. Because tango instruction can be so

easily measured to a person's ability, and the essence of the tango is walking, people easily perceive when meeting these goals.

6. Emotional and educational health: tango offers a way to learn new skills. The emotional responses are facilitated by tango music and enhanced by the dance. It is a specific activity in the brain related to the sensory-motor integration and to pleasant emotions. These can be enhanced by performing tango-like moves while listening to music. It also seems that tango music improves the release of testosterone, this response being seemingly increased when dancing tango music, both in males and in females (McKinley, 2015).

3. The brainwaves and the registering of these

The wireless headset Bluetooth MindSet™ features brainwaves reading technology and translation of the mental states.

The Mindset headset resembles a pair of headphones with a distinct difference - a single arm mounted on the electrode, that connects to the user's forehead and to the ear lobe. The electrode reads the electrical potentials on the surface of the skin, induced by the activity of the neurons in the frontal lobe of the user's brain. Different "mental states" of the users - for example, their level of concentration and relaxation - can be deciphered from brainwaves patterns. This information can be transmitted to a variety of PC-based applications for entertainment, health, wellness, education and training.

The MindSet reports the mental state of the wearer as “eSense” mindfulness and NeuroSky meditation algorithms. It also captures the brainwave signals between 0 - 70Hz, and it provides information about the brainwaves level: Delta, Theta, Alpha, Beta, Gamma and EEG of the user (Covert, 2009). It should be noted that the software of the "MindWave Mobile 2" device displays the results in colour, where each colour or shade corresponds to a brainwave.

The colours are as follows:

- Delta 0-4 Hz – red
- Theta 4-8 Hz – orange
- Low Alpha 8-10 Hz – yellow
- High Alpha 10-12 Hz – green
- Low Beta 12-18 Hz – turquoise
- High Beta 18-30 Hz – blue
- Low Gamma 30-50 Hz – purple
- High Gamma 50-70 Hz – fuchsia.

According to Dr. Matthias Jacobi, the brainwaves can be classified and characterized as follows:

1. **Delta (0 – 4 Hz)** The lowest frequencies are Delta. These are less than 4 Hz and occur during deep sleep and in some abnormal processes. They tend to be the highest in amplitude, and the slowest of waves.
2. **Theta (4 – 8 Hz)** Theta activity has a frequency between 4 and 8 Hz and is classified as a "slow" activity. It is considered to be related to creativity, intuition, dreaming and imagination, and it is a storehouse for memories, emotions, and sensations. Theta waves are powerful during internal focus, meditation, prayer, and spiritual awareness. They reflect the state between waking and sleep, and they refer to the subconscious mind. They are also normal during sleep. Theta is believed to reflect the activity in the limbic system and in hippocampal regions. When Theta rhythm seems to be functioning normally, it mediates and/or promotes adaptive and complex behaviors, such as learning and memory.
3. **Alpha (8 – 12 Hz)** Alpha waves are between 8 and 12 Hz. A good production of healthy Alpha promotes mental inventiveness, contributes to the ability to coordinate mentally, and improves the general sense of relaxation and fatigue. In this state, one can move quickly and efficiently to fulfill any task that is within reach. When Alpha is prominent, most people feel calm. Alpha seems to merge the conscious into the subconscious. It is the major rhythm observed in normal relaxed adults - it is present for most of the life. Alpha rhythms are reported to be derived from the white matter in the brain. The white matter can be considered the part of the brain that connects all the parts with each other. Alpha brainwaves have been linked to extroversion, creativity and mental work. Alpha is one of the most important frequencies of the brain for the learning and use of the information.
4. **Beta (12 – 30 Hz)** Beta activity is a "fast" activity. It has a frequency between 12 and 30 Hz. This reflects the synchronized active brain tissue. It is generally considered a normal rhythm, and it is the dominant rhythm in those who are attentive or anxious or who have open eyes. The state of most of the brain is that when we have our eyes open, we are listening and thinking in order to solve analytical problems, that of judgment, decision making, and processing of the information about the world around us.
5. **Gamma (30 – 70 Hz)** It is the only frequency group found in every part of the brain. When the brain must process simultaneously information from different areas, it is assumed that the 40 Hz activity strengthens the areas required for simultaneous processing. (Jacobi, 2002)

4. Research methodology and conduct

The subjects of the research were 40 people, forming two major groups:

1. non-dancers of Argentine tango
2. Argentine tango dancers

In the group of Argentine tango dancers there were social dancers, as well as professional dancers (performers), instructors and tango DJ's.

For a good conduct of the research, the setting of concrete objectives can offer a constant progress in the collection and processing of information. The research objectives are as follows:

1. Establish a sample of study sample, which will analyze a group of Argentine tango dancers, and a group of social and professional dancers.
2. Preset the songs used in the research.
3. Design a "Questionnaire", wherein all subjects declare their tango experience, and their agreement for the use of the collected data.
4. Conduct tests on the subjects using the "**MindWave Mobile 2**" device, offering the best conditions to the participants.
5. Synthesize the results collected in tables and graphs, for a comparative analysis.
6. Process and analyze the obtained results.
7. Elaborate the conclusions and recommendations following the scientific work.

All research subjects were tested using the "**MindWave Mobile 2**" device, which recorded the brainwaves during the listening of the 5 main songs; respectively, the ones chosen (favourite tunes) by the Argentine tango dancers, both during the listening and during the dance. In addition to the five preset songs, the experienced dancers had the opportunity to choose a favourite song as song number 6.

The recording of brain waves in both categories took place in a comfortable and quiet environment, offering the opportunity to listen to the songs both in sitting and in lying position. Based on the same songs, the experienced dancers were measured with the device also during the dance.

The list of the five main songs includes the following tunes:

1. Francisco Canaro Orchestra - *Nobleza de arrabal* - instrumental - 1927 – tango;
2. Juan d'Arienzo Orchestra - *Milonga vieja milonga* - instrumental - 1937 – milonga;
3. Rodolfo Biagi Orchestra - *Lagrimas y sonrisas* - instrumental - 1941 – waltz;
4. Osvaldo Pugliese Orchestra - *El encopao* - instrumental - 1985 – tango;
5. Astor Piazzolla Orchestra - *Libertango* - instrumental - 1947 – tango.

5. Tables, figures

In Table 1 (Brainwaves in Hz - 40 subjects - 5 songs - listening), the frequency values in Hz of all participants in this study are recorded, for each particular music, divided into columns, according to the 5 main preset songs, both for dancers and non-dancers, during static listening

Name	Dancer	F. Canaro	J. d' Arienzo	R. Biagi	O .Pugliese	A. Piazzola
HCP	Dancer	10-12 Hz	12-18 Hz	10-12 Hz	10-12 Hz	50-70 Hz
KCS	Dancer	30-50 Hz	4-8 Hz	12-18 Hz	30-50 Hz	8-10 Hz
NG	Dancer	10-12 Hz	18-30 Hz	4-8 Hz	50-70 Hz	30-50 Hz
FCS	Dancer	10-12 Hz	10-12 Hz	8-10 Hz	30-50 Hz	18-30 Hz
DC	Dancer	50-70 Hz	4-8 Hz	0-4 Hz	50-70 Hz	30-50 Hz
MOU	Dancer	18-30 Hz	18-30 Hz	30-50 Hz	50-70 Hz	0-4 Hz
MA	Dancer	10-12 Hz	10-12 Hz	10-12 Hz	10-12 Hz	50-70 Hz
MP	Dancer	10-12 Hz	4-8 Hz	10-12 Hz	10-12 Hz	4-8 Hz
JA	Dancer	10-12 Hz	8-10 Hz	4-8 Hz	8-10 Hz	10-12 Hz
MG	Dancer	10-12 Hz	18-30 Hz	50-70 Hz	10-12 Hz	18-30 Hz
LI	Dancer	10-12 Hz	8-10 Hz	4-8 Hz	8-10 Hz	50-70 Hz
SM	Dancer	4-8 Hz	4-8 Hz	4-8 Hz	10-12 Hz	4-8 Hz
AR	Dancer	4-8 Hz	8-10 Hz	8-10 Hz	4-8 Hz	50-70 Hz
SD	Dancer	10-12 Hz	10-12 Hz	50-70 Hz	30-50 Hz	30-50 Hz
GM	Dancer	18-30 Hz	0-4 Hz	4-8 Hz	50-70 Hz	12-18 Hz
SDC	Dancer	18-30 Hz	4-8 Hz	50-70 Hz	50-70 Hz	10-12 Hz
CW	Dancer	8-10 Hz	8-10 Hz	10-12 Hz	10-12 Hz	0-4 Hz
CDC	Dancer	50-70 Hz	30-50 Hz	50-70 Hz	10-12 Hz	8-10 Hz
CVG	Dancer	30-50 Hz	30-50 Hz	4-8 Hz	8-10 Hz	4-8 Hz
ED	Dancer	50-70 Hz	10-12 Hz	12-18 Hz	8-10 Hz	50-70 Hz
MRL	Non-dancer	4-8 Hz	10-12 Hz	10-12 Hz	12-18 Hz	8-10 Hz
DCA	Non-dancer	10-12 Hz	8-10 Hz	10-12 Hz	4-8 Hz	10-12 Hz
DL	Non-dancer	8-10 Hz	4-8 Hz	4-8 Hz	4-8 Hz	8-10 Hz
LA	Non-dancer	10-12 Hz	10-12 Hz	10-12 Hz	10-12 Hz	10-12 Hz
DCA	Non-dancer	18-30 Hz	50-70 Hz	8-10 Hz	4-8 Hz	4-8 Hz
AGC	Non-dancer	10-12 Hz	10-12 Hz	18-30 Hz	10-12 Hz	10-12 Hz
COM	Non-dancer	50-70 Hz	10-12 Hz	4-8 Hz	12-18 Hz	50-70 Hz
IJ	Non-dancer	4-8 Hz	4-8 Hz	50-70 Hz	4-8 Hz	4-8 Hz
AMC	Non-dancer	8-10 Hz	4-8 Hz	8-10 Hz	50-70 Hz	4-8 Hz
KG	Non-dancer	10-12 Hz	4-8 Hz	10-12 Hz	8-10 Hz	12-18 Hz
KL	Non-dancer	30-50 Hz	50-70 Hz	10-12 Hz	50-70 Hz	10-12 Hz
AM	Non-dancer	8-10 Hz	10-12 Hz	10-12 Hz	8-10 Hz	4-8 Hz
II	Non-dancer	18-30 Hz	8-10 Hz	8-10 Hz	18-30 Hz	0-4 Hz

Name	Dancer	F. Canaro	J. d' Arienzo	R. Biagi	O .Pugliese	A. Piazzola
MC	Non-dancer	12-18 Hz	10-12 Hz	4-8 Hz	10-12 Hz	4-8 Hz
BL	Non-dancer	8-10 Hz	50-70 Hz	12-18 Hz	12-18 Hz	8-10 Hz
CSOM	Non-dancer	50-70 Hz	50-70 Hz	50-70 Hz	12-18 Hz	30-50 Hz
TE	Non-dancer	4-8 Hz	30-50 Hz	30-50 Hz	50-70 Hz	50-70 Hz
CSJ	Non-dancer	10-12 Hz	4-8 Hz	10-12 Hz	12-18 Hz	12-18 Hz
LP	Non-dancer	4-8 Hz	0-4 Hz	10-12 Hz	0-4 Hz	8-10 Hz
LN	Non-dancer	4-8 Hz	12-18 Hz	10-12 Hz	12-18 Hz	4-8 Hz

Table 1. *Brainwaves in Hz - 40 subjects - 5 songs - listening*

In Table 2 (Brainwaves in Hz – 20 subjects – 5 songs – dance), compared to the previous table, only the values of the experienced dancers during the dance are displayed, during the five main songs. The table is divided in columns as well, and based on the five main songs.

Name	Years of dancing	F. Canaro	J. d' Arienzo	R. Biagi	O .Pugliese	A. Piazzola
HCP	8	4-8 Hz	8-10 Hz	8-10 Hz	12-18 Hz	8-10 Hz
KCS	6	10-12 Hz	8-10 Hz	8-10 Hz	50-70 Hz	4-8 Hz
NG	2	4-8 Hz	4-8 Hz	10-12 Hz	10-12 Hz	10-12 Hz
FCS	2	8-10 Hz	4-8 Hz	4-8 Hz	4-8 Hz	4-8 Hz
DC	3	4-8 Hz	4-8 Hz	10-12 Hz	4-8 Hz	8-10 Hz
MOU	2	10-12 Hz	4-8 Hz	30-50 Hz	10-12 Hz	8-10 Hz
MA	2	8-10 Hz	4-8 Hz	10-12 Hz	4-8 Hz	10-12 Hz
MP	14	8-10 Hz	50-70 Hz	8-10 Hz	10-12 Hz	4-8 Hz
JA	20	50-70 Hz	4-8 Hz	8-10 Hz	8-10 Hz	10-12 Hz
MG	14	8-10 Hz	8-10 Hz	4-8 Hz	10-12 Hz	4-8 Hz
LI	12	8-10 Hz	4-8 Hz	10-12 Hz	8-10 Hz	8-10 Hz
SM	8	8-10 Hz	4-8 Hz	4-8 Hz	4-8 Hz	8-10 Hz
AR	10	4-8 Hz	8-10 Hz	4-8 Hz	4-8 Hz	4-8 Hz
SD	15	10-12 Hz	8-10 Hz	8-10 Hz	8-10 Hz	4-8 Hz
GM	7	4-8 Hz	8-10 Hz	4-8 Hz	4-8 Hz	4-8 Hz
SDC	9	4-8 Hz	4-8 Hz	4-8 Hz	4-8 Hz	4-8 Hz
CW	9	4-8 Hz	10-12 Hz	50-70 Hz	8-10 Hz	4-8 Hz
CDC	8	4-8 Hz	8-10 Hz	10-12 Hz	4-8 Hz	8-10 Hz
CVG	10	10-12 Hz	10-12 Hz	12-18 Hz	8-10 Hz	4-8 Hz
ED	13	8-10 Hz	8-10 Hz	4-8 Hz	8-10 Hz	4-8 Hz

Table 2. *Brainwaves in Hz – 20 subjects – 5 songs – dance*

Before coming to the results and the interpretation of the collected values, in Table 3 (Favorite songs - orchestras, listening and dancing) we display the figures for the 20 experienced dancers while listening to their favorite songs, required by them, both during static listening and while dancing with a partner.

Name	Favourite orchestra	Listening	Dancing
HCP	Anibal Troilo Orchestra	50-70 Hz	4-8 Hz
KCS	Juan d'Arienzo Orchestra	4-8 Hz	8-10 Hz
NG	Juan d'Arienzo Orchestra	18-30 Hz	10-12 Hz
FCS	Edgardo Donato Orchestra	10-12 Hz	30-50 Hz
DC	Juan d'Arienzo Orchestra	50-70 Hz	10-12 Hz
MOU	Anibal Troilo Orchestra	50-70 Hz	10-12 Hz
MA	The Tango Project	10-12 Hz	4-8 Hz
MP	Anibal Troilo Orchestra	4-8 Hz	10-12 Hz
JA	Anibal Troilo Orchestra	10-12 Hz	8-10 Hz
MG	Juan d'Arienzo Orchestra	10-12 Hz	8-10 Hz
LI	Juan d'Arienzo Orchestra	10-12 Hz	4-8 Hz
SM	Osvaldo Pugliese Orchestra	50-70 Hz	50-70 Hz
AR	Lucio Demare Orchestra	10-12 Hz	8-10 Hz
SD	Fulvio Salamanca Orchestra	18-30 Hz	4-8 Hz
GM	Juan d'Arienzo Orchestra	30-50 Hz	4-8 Hz
SDC	Fulvio Salamanca Orchestra	10-12 Hz	50-70 Hz
CW	Hugo Diaz Orchestra	8-10 Hz	10-12 Hz
CDC	Juan d'Arienzo Orchestra	30-50 Hz	8-10 Hz
CVG	Carlos di Sarli Orchestra	18-30 Hz	10-12 Hz
ED	Juan d'Arienzo Orchestra	10-12 Hz	18-30 Hz

Table 3. *Favourite songs-orchestras. Listening and dancing*

Based on Fig. 1 (The most frequent frequencies by number of subjects) and Table 4 (The most frequent frequencies by number of subjects), we can conclude that, out of the 40 subjects, during the static listening of the 5 main songs, the average brain stimulation was at a high Alpha level, between 10 and 12 Hz, in a total of 53 cases, followed by a Theta frequency of 4 - 8 Hz, in a number of 40 cases.

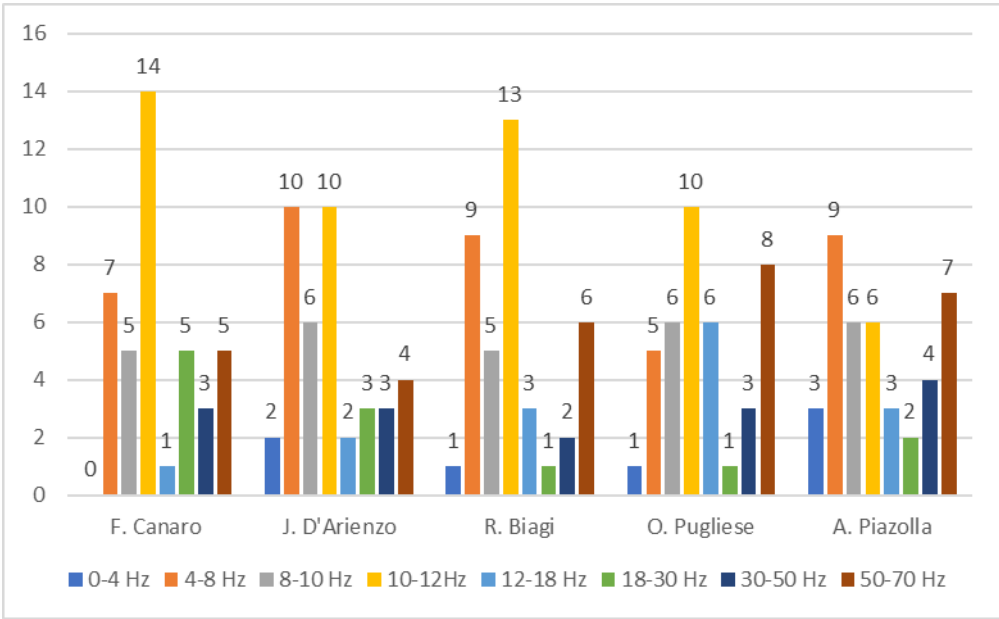

Fig. 1. *Most frequent frequencies, by the number of subjects*

Range	F. Canaro	J. d'Arienzo	R. Biagi	O. Pugliese	A. Piazolla
0-4 Hz	0	2	1	1	3
4-8 Hz	7	10	9	5	9
8-10 Hz	5	6	5	6	6
10-12Hz	14	10	13	10	6
12-18 Hz	1	2	3	6	3
18-30 Hz	5	3	1	1	2
30-50 Hz	3	3	2	3	4
50-70 Hz	5	4	6	8	7

Table 4. *Most frequent frequencies, by the number of subjects*

The conclusions of the values recorded during the dance, according to Figure 2. (The frequencies most commonly encountered during the dance, by number of dancers) and Table 5. (The frequencies most commonly encountered during the dance, by the number of dancers), represent a major uniformity during the dance, because in all orchestras the most common brain waves were Theta, between 4 and 8 Hz.

Only while dancing on the favorite songs did the frequencies increase from Theta

to high Alpha, 10 - 12 Hz, which to a large extent confirmed the fact that the subjects really chose a favorite song.

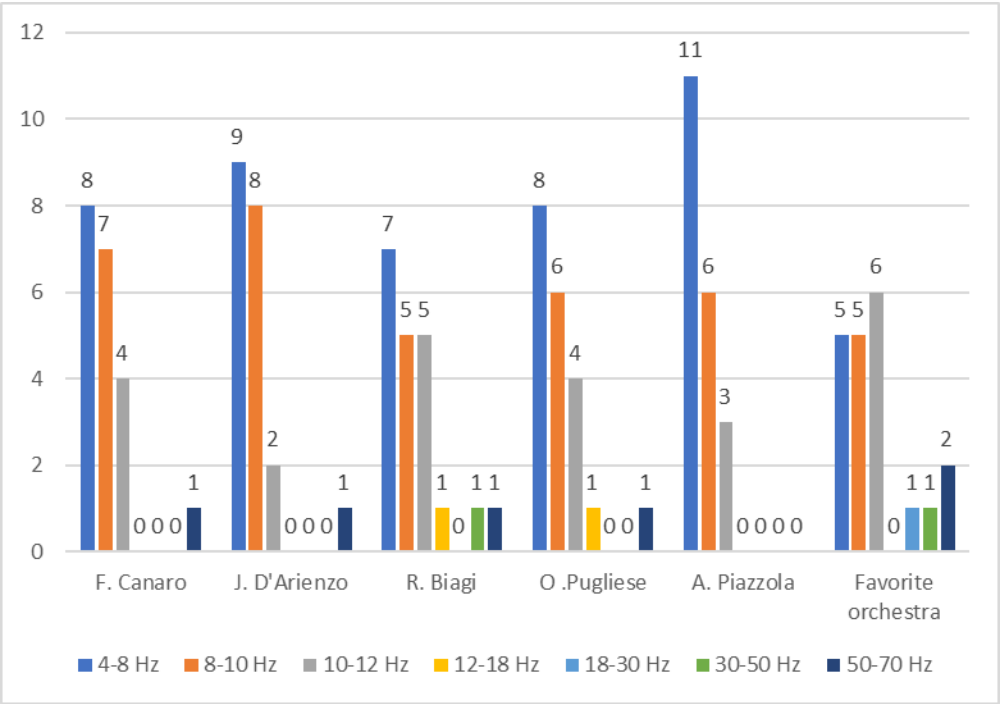

Fig. 2. *Frequencies most commonly encountered during the dance, by number of dancers*

Range	F. Canaro	J. d' Arienzo	R. Biagi	O .Pugliese	A. Piazzola	Favourite Orchestra
4-8 Hz	8	9	7	8	11	5
8-10 Hz	7	8	5	6	6	5
10-12 Hz	4	2	5	4	3	6
12-18 Hz	0	0	1	1	0	0
18-30 Hz	0	0	0	0	0	1
30-50 Hz	0	0	1	0	0	1
50-70 Hz	1	1	1	1	0	2

Table 5. *Frequencies most commonly encountered during the dance, by number of dancers*

6. Conclusions

Based on the research carried out using the "**MindWave Mobile 2**" device, the therapeutic effect of the Argentine tango, both physically and mentally, has been clearly demonstrated. Since tango can be considered a form of easy and accessible movement therapy, for any age category and not involving exaggerated physical exertion, endurance, or rigorous discipline for beginners, but at the same time, constantly practiced, tango leads to psycho-somatic improvements.

The **conclusions** of this research, following the carried-out testing, are a confirmation that Argentine tango music and dance really contributed to mental relaxation in adults.

The **dissemination of the results** are clear values of the brain frequencies for the 40 subjects, where the most common frequency was **high Alpha,** between 10 - 12 Hz, followed by **Theta** frequency between 4 - 8 Hz, during static listening.

During the dance, for the experienced dancers, the final results were again the same as during the static listening, only this time the dominant one for all 5 main songs is the **Theta frequency of 4 - 8 Hz**, followed by the **high Alpha** frequency between **10 - 12 Hz** for the favorite songs.

The high Alpha frequency of 10 - 12 Hz being one of the most important frequencies of the brain, the results indicate that Argentine tango has indeed a major impact on the human psyche, helping in rebalancing and fitting, through listening and/or dancing, within the physiological and mental norms. This frequency offering an increase in abstract thinking and in self-control, through relaxation, mental balance, inner peace and feeling of calm, without delimitations of the creativity, the brain delivers enough white material and connects all the parts with each other, while still actively processing the information. It goes without saying that the Alpha frequency seems to combine the conscious with the subconscious and to contribute significantly to the self-healing of the human body.

The Theta frequency between 4 - 8 Hz is also physiologically related to the healing and mental balance, setting the human body in a meditative and relaxed state with internal focus, which is often associated with creativity, intuition, dreaming and imagination. From the brain's point of view, this frequency also implicates more lobes.

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