

# Formal analysis of musical rhythm in Flamenco

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# Enrique Morente – La Aurora de Nueva York (Federico García Lorca)



[https://www.youtube.com/watch?v=K0wOir-29fY&list=RDK0wOir-29fY&start\\_radio=1](https://www.youtube.com/watch?v=K0wOir-29fY&list=RDK0wOir-29fY&start_radio=1)



A – C – B – D – B – E – A

A

La aurora de Nueva York tiene  
cuatro columnas de cieno  
y un huracán de negras palomas  
que chapotean las aguas podridas.

8, 11.  
(Irregular)

The dawn of New York has  
four columns of mud  
and a hurricane of black doves  
that moisten the rotten waters.

B

La aurora de Nueva York gime  
por las inmensas escaleras  
buscando entre las aristas  
nardos de angustia dibujada.

The dawn of New York moans  
in the huge stairs  
looking among the edges  
for spikenards painted with anguish.

C

La aurora llega y nadie la recibe en su boca  
porque allí no hay mañana ni esperanza posible.  
A veces las monedas en enjambres furiosos  
taladran y devoran abandonados niños.

The dawn arrives and nobody receives it in his mouth  
because there is no possible tomorrow or hope there.  
Sometimes, coins in enraged swarms  
drill and devour forsaken children.  
The first to get out understand with their bones

D

Los primeros que salen comprenden con sus huesos  
que no habrá paraíso ni amores deshojados;  
saben que van al cieno de números y leyes,  
a los juegos sin arte, a sudores sin fruto.

14 syllables  
(Alejandrinos  
7+7)

that there will be no paradise or loves of torn-out leaves;  
they know they go to the slime of numbers and laws.

E

La luz es sepultada por cadenas y ruidos  
en impúdico reto de ciencia sin raíces.  
Por los barrios hay gentes que vacilan insomnes  
como recién salidas de un naufragio de sangre.

Light is buried by chains and noises  
in an immodest challenge of rootless science.  
In the neighborhoods there are people who vacillate  
sleepless  
like just saved from a bloody shipwreck.

# Enrique Morente – La Aurora de Nueva York (Federico García Lorca) Chords



[https://www.youtube.com/watch?v=K0wOir-29fY&list=RDK0wOir-29fY&start\\_radio=1](https://www.youtube.com/watch?v=K0wOir-29fY&list=RDK0wOir-29fY&start_radio=1)



A – C – B – D – B – E – A

A

La aurora de Nueva York tiene  
cuatro columnas de cieno  
y un huracán de negras palomas  
que chapotean las aguas podridas.

Dm7 – Bbmaj7 – E7b9 - A7b9 (only first A)  
F – Am – Bb7 – A7 b9

B

La aurora de Nueva York gime  
por las inmensas escaleras  
buscando entre las aristas  
nardos de angustia dibujada.

Fm – Fm/C – Bbm7 – C7b9  
Dm7 – E7b9 – Bb7 – A7b9

C

La aurora llega y nadie la recibe en su boca  
porque allí no hay mañana ni esperanza posible.  
A veces las monedas en enjambres furiosos  
taladran y devoran abandonados niños.

Dm7 – C7 – Bb7 - A7b9  
F – Am – Bb7

D

Los primeros que salen comprenden con sus huesos  
que no habrá paraíso ni amores deshojados;  
saben que van al cieno de números y leyes,  
a los juegos sin arte, a sudores sin fruto.

E

La luz es sepultada por cadenas y ruidos  
en impúdico reto de ciencia sin raíces.  
Por los barrios hay gentes que vacilan insomnes  
como recién salidas de un naufragio de sangre.

# Enrique Morente – La Aurora de Nueva York

**MORENTE**  
&  
LAGARTIJA NICK  
en  
**OMEGA**  
con  
VICENTE AMIGO ★ CAÑIZARES ★ M.A. CORTÉS ★ MONTOYITA  
EL PAQUETE ★ J.A. SALAZAR ★ ISIDRO MUÑOZ ★ TOMATITO  
CANTANDO A FEDERICO GARCÍA LORCA Y LEONARD COHEN

**OMEGA**  
30ª ANIVERSARIO  
KIKI  
**MORENTE**  
&  
LAGARTIJA NICK  
con la colaboración especial  
ANTONIO REY, JESÚS CARMONA Y  
ÁNGELES TOLEDANO

2026 Tour

Barcelona Jazz Fest

Noches del Botánico

# Enrique Morente – La Aurora de Nueva York

**MORENTE**  
&  
LAGARTIJA NICK  
en  
**OMEGA**  
con  
VICENTE AMIGO ★ CAÑIZARES ★ M.A. CORTÉS ★ MONTOYITA  
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CANTANDO A FEDERICO GARCÍA LORCA Y LEONARD COHEN



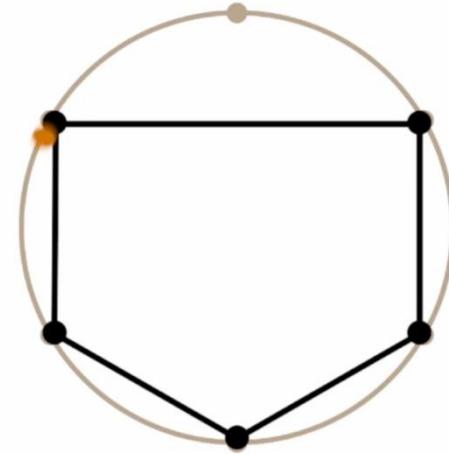
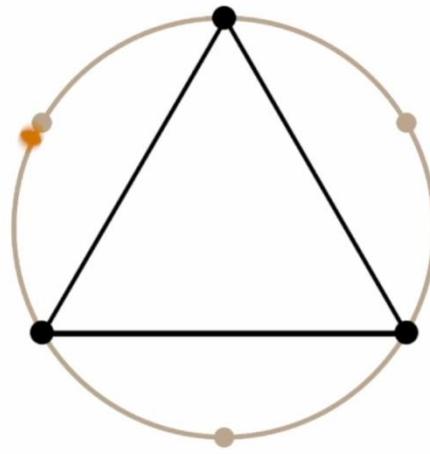
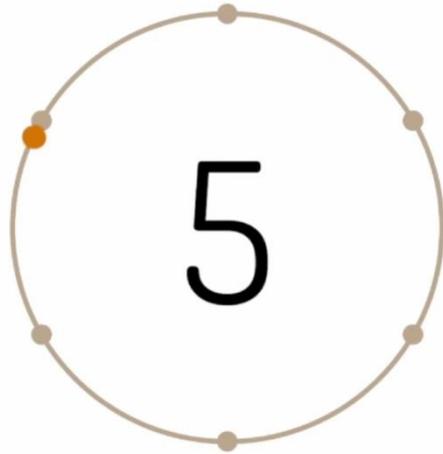
Mario Montoya – “Montoyita”

He studied recently at UCM (my university) and he plays with us!



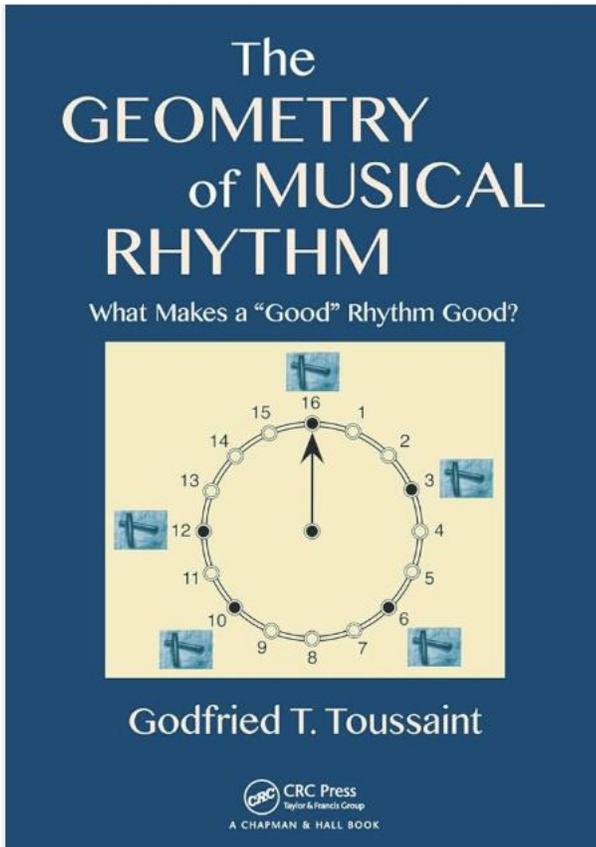
# BULERÍAS

205 BPM



# The Geometry of Musical Rhythm (2013)

## Godfried Toussaint (1944-2019)



- Easy, digestible book
- Computer scientist
- Flamenco – Fandango
- Methods to visualize rhythmic transformations + how to tell if a rhythm is Good mathematically



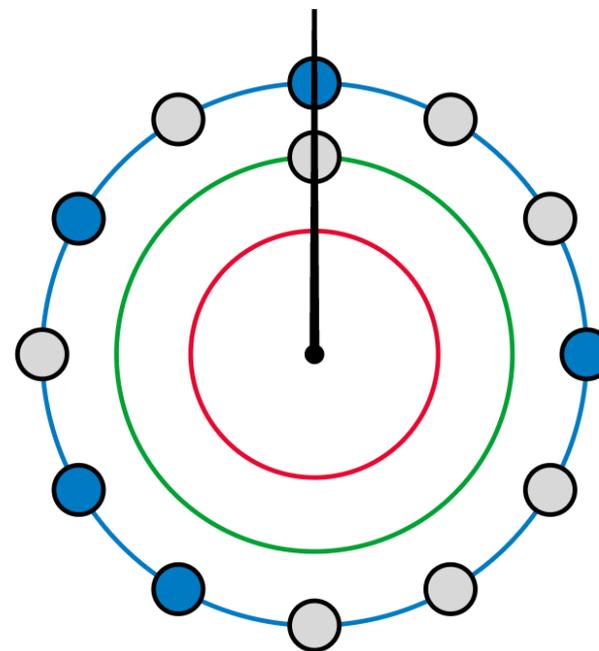
# Enrique Morente – La Aurora de Nueva York



The album cover for 'Omega' by Enrique Morente &amp; La Gartija Nick. The title 'MORENTE' is at the top in large black letters. Below it is '&amp;' and 'LAGARTIJA NICK'. The word 'en' is in small letters, followed by 'OMEGA' in large red letters. Below that, it says 'con' followed by a list of names: VICENTE AMIGO ★ CAÑIZARES ★ M.A. CORTÉS ★ MONTOYITA ★ EL PAQUETE ★ J.A. SALAZAR ★ ISIDRO MUÑOZ ★ TOMATITO. At the bottom, it says 'CANTANDO A FEDERICO GARCÍA LORCA Y LEONARD COHEN'.



## THE RHYTHM CIRCLE

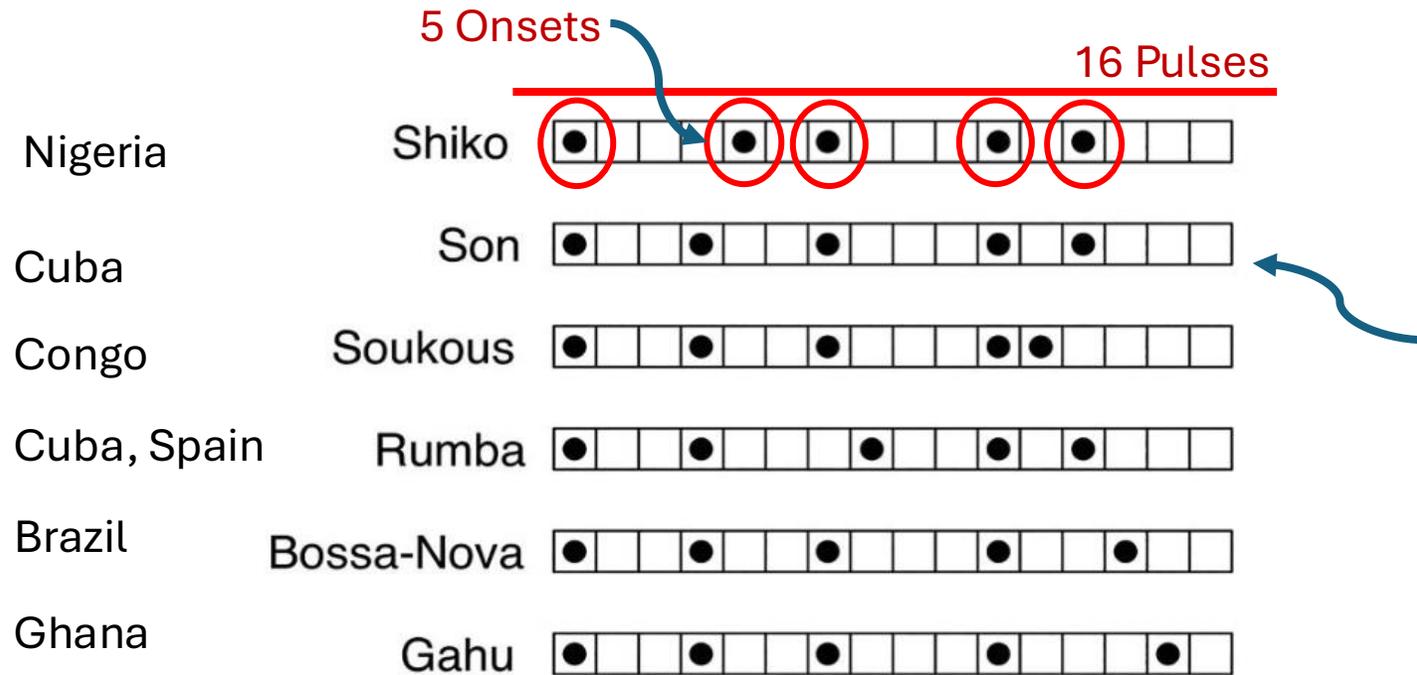


# Visualize and represent Rhythms



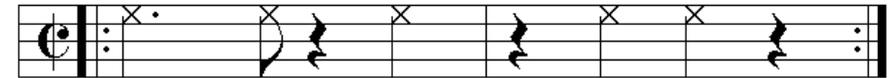
## Box notation

Yoruba Andabo – El Necio



## Clave Son

3-2 son clave in two measures of 2/2



2-3 son clave in two measures of 2/2

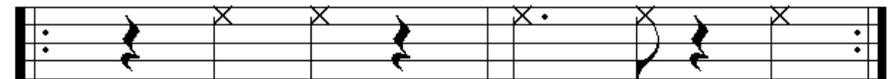


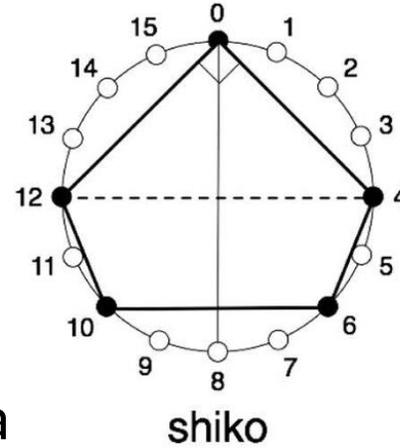
FIGURE 7.1 The six distinguished timelines with five onsets and 16 pulses.

[https://www.youtube.com/watch?v=GKDo2qCKKT4&list=RDGKDo2qCKKT4&start\\_radio=1](https://www.youtube.com/watch?v=GKDo2qCKKT4&list=RDGKDo2qCKKT4&start_radio=1)

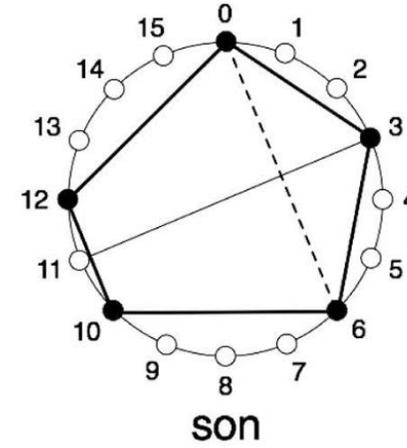
# Visualize and represent Rhythms

Convex polygon notation  
Cycle  
Distance revealed

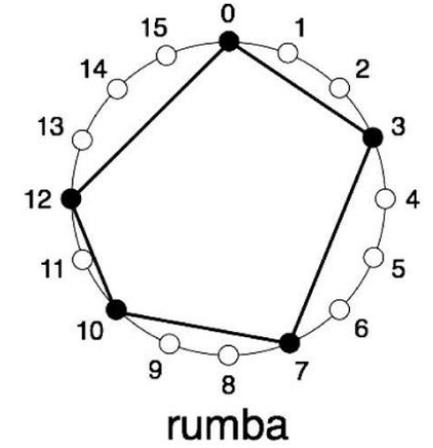
Muñequitos de Matanzas – La Gitana



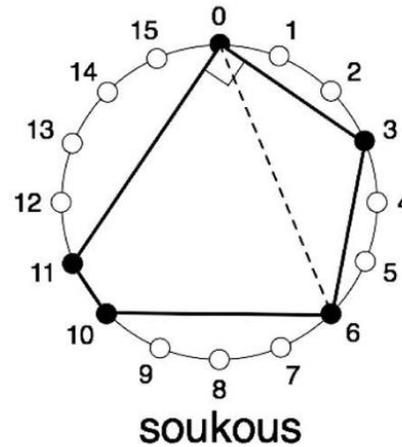
shiko



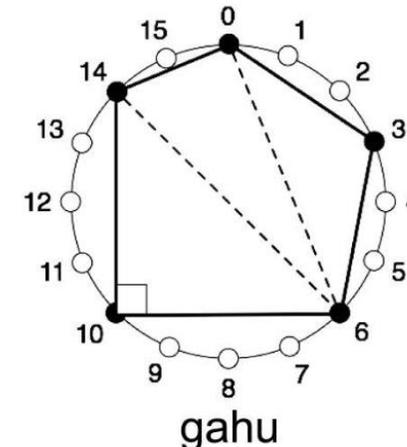
son



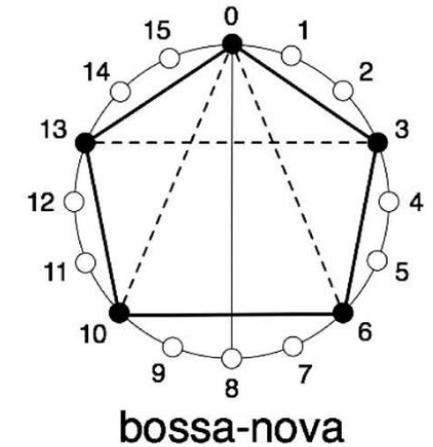
rumba



soukous



gahu



bossa-nova

Afrocuban timelines

# Visualize and represent Rhythms

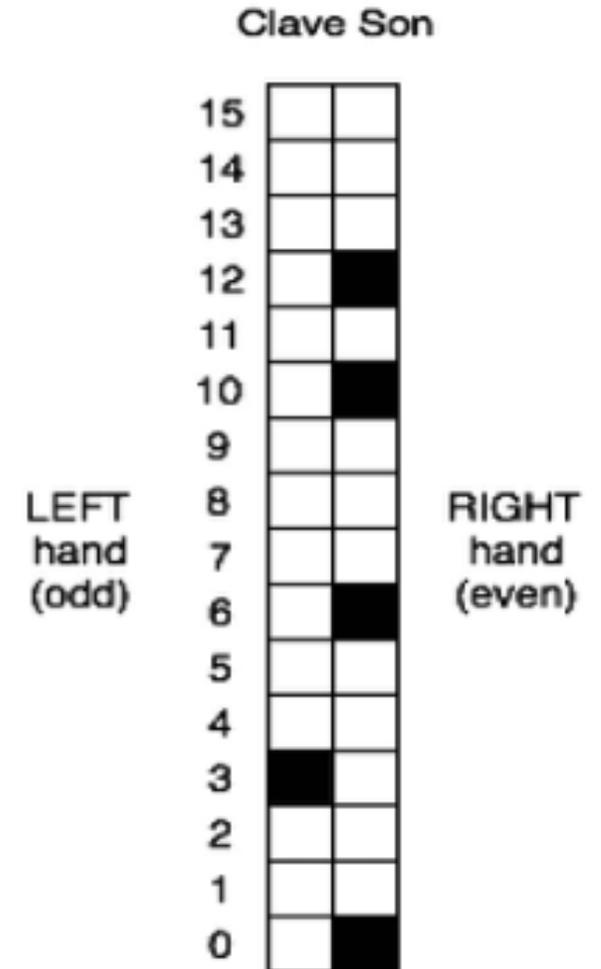
Alternating-hands box notation:

**2-3 or 3-2?**



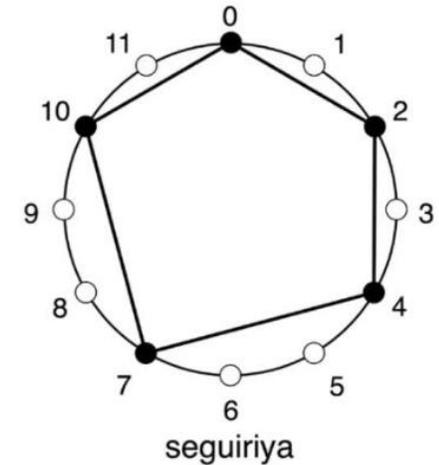
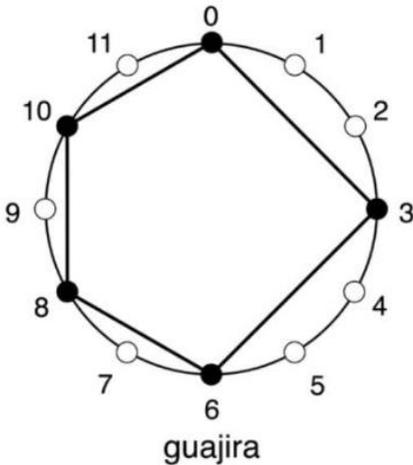
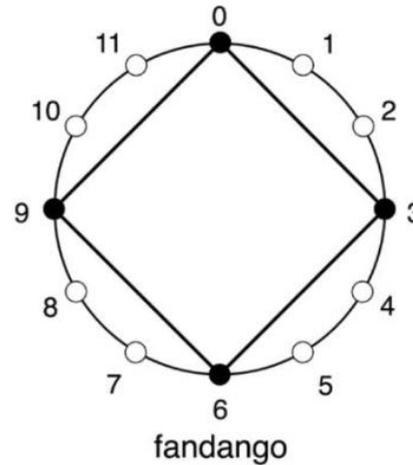
Willie Colón and Rubén Blades – Buscando Guayaba

[https://www.youtube.com/watch?v=dL2v2hjYxc0&list=RDdL2v2hjYxc0&start\\_radio=1](https://www.youtube.com/watch?v=dL2v2hjYxc0&list=RDdL2v2hjYxc0&start_radio=1)



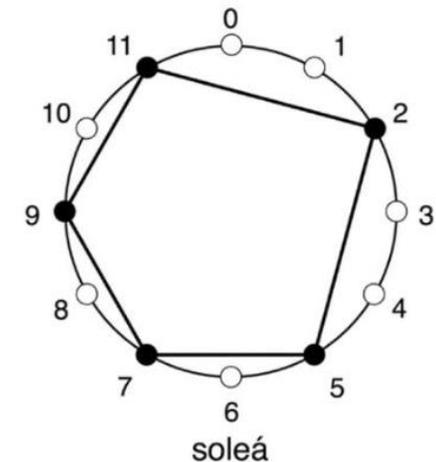
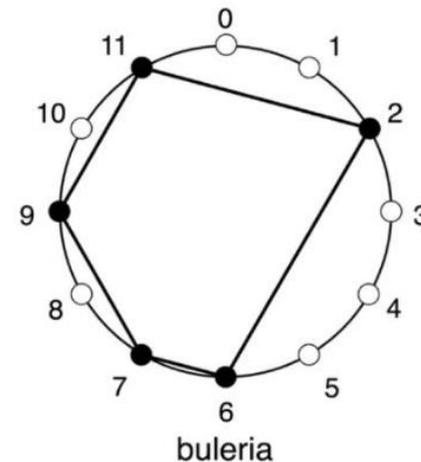
# Visualize and represent Rhythms - Flamenco

“The most important rhythm in nearly all flamenco music is the underlying metric pattern used, or **compás** as it is called in Spain, which is often played by hand clapping, and is always felt in an embodied manner by the musician or dancer, even when it is not sounded.”  
(Toussaint 2013, p. 278)



Pepe Marchena - Mi mulata está abusando

Which one is this?



**Palos**

# Visualize and represent Rhythms - Flamenco

“The clergyman, brother of one of my ancestors, was born in 1706 into a family of agricultural owners who had a comfortable position. He had been chosen for an ecclesiastical career, while another of his brothers was dedicated to the family business and the third, my ancestor, held public jobs. But his vocation should not be too strong; He was “a young man with a cheerful and simple temper” and “a great friend of fandangos” to the point that “although he had not seen it at dances, he performed it with great enthusiasm and ease before becoming a senior in any audience.” Curiously, this is the first mention of fandango in Huelva, as stated by Juan Francisco Canterla González in his work “Coplas, bailes y fandangos en los confines de Andalucía. 1680-1808”. The truth is that, in the afternoons, he used to go to Nicolás Calvo's house, right in front of the Church, to have chocolate and biscuits with one of his daughters. His hobby must have gotten worse, so he was accused and imprisoned in Seville for a few months, although in the end he was acquitted, although it is likely that this episode was the cause of his father's death in 1736.” (My dad, studying genealogy of our family)

gradually deepen, so do its languid powers revive ; each house pours forth its occupants to swell the concourse on the Alameda, or, as here, to form groups, who slowly saunter up and down the principal streets ; the buzz of conversation is mingled with the cries of water-sellers, or the whining accents of beggary ; in every café or neveria are to be seen the citizens, with coffee-cups or ices before them ; and on entering one, your ears are stunned with the fierce conflict of political argument. Presently, on passing the mouth of a by-street, you stop to listen to the drumming of a guitar, and the click of the castanets by which it is accompanied. The sounds announce a street tertulia : the old folks have brought out chairs before their doors, and sit in luxurious ease, contemplating three or four couple of mozas and their gallants, who are dancing the **fandango** with indefatigable zeal in the middle of the street. From this national spectacle you are diverted by hearing the quick rattle of sundry fans, and, turning round, encounter the gaze of two or three señoritas : they have detected a stranger, and now adopt this plan of attracting his attention ; they are desirous of seeing his face—perhaps of being seen themselves. As they approach with the unspeakably graceful step of Andalusia, their dark eyes bend inquiring but soft glances,

Murray, R. D., (1849), *The Cities and Wilds of Andalusia*, London: Richard Bentley, p. 198.

# Visualize and represent Rhythms - Flamenco

José Suárez “El  
Torombo” (bailaor)



“Life is mathematics... This madness led me to this. (...) For the small stones to grow, the big ones have to die. That’s art. (...) The first thing is this [ternary]. (...) Then you eat the others (art is not subtracting, you digest it). It’s different sensations you learn.”

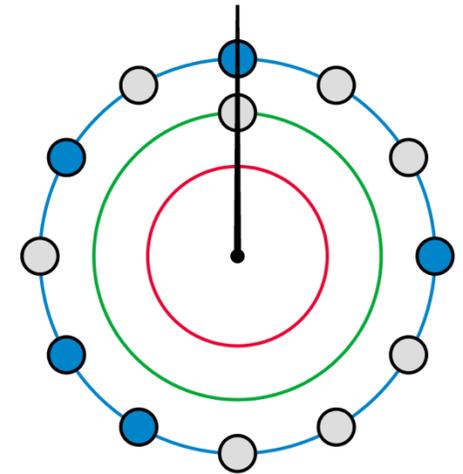
Demonstration of the 12/8  
in Flamenco

<https://www.youtube.com/watch?v=Vjzq3aP2zFY>

# Pienso en tu mirá - Rosalía



## THE RHYTHM CIRCLE

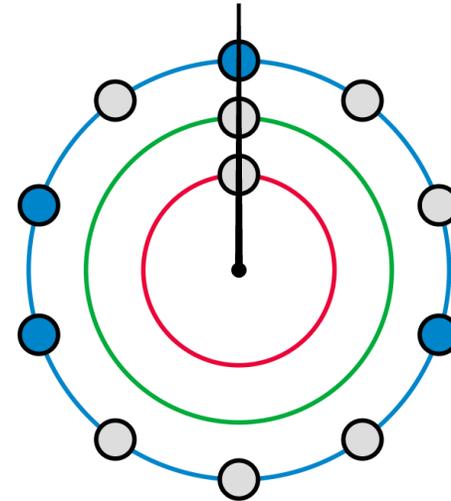
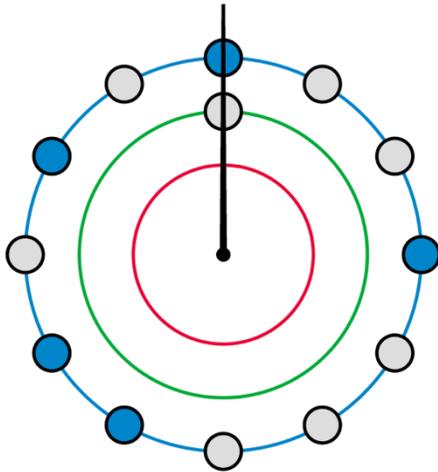


[https://www.youtube.com/watch?v=p\\_4coiRG\\_BI&list=RDp\\_4coiRG\\_BI&start\\_radio=1](https://www.youtube.com/watch?v=p_4coiRG_BI&list=RDp_4coiRG_BI&start_radio=1)

# Pienso en tu mirá - Rosalía

Chorus: 12 – 12 - 10

  
**THE RHYTHM CIRCLE**





# Rosalía – Pienso en tu mirá

**Me da miedo cuando sale',  
sonriendo pa' la calle  
Porque todos pueden ve'  
los hoyuelitos que te  
salen**

I'm scared when you go out,  
smiling at the street  
Because everyone can see the  
dimples that appear on your  
cheeks

Y del aire cuando pasa,  
por levantarte el cabello  
Y del oro que te viste  
por amarrarse a tu cuello  
Y del cielo y de la luna, que  
tú quieras mirarlos  
Hasta del agua que bebes  
cuando te moja los labios

And the air when it passes,  
lifting your hair  
And the gold you wear around  
your neck  
And the sky and the moon,  
that you want to look at  
Even the water you drink when  
it wets your lips

**Pienso en tu mirá',  
tu mirá' clavá'  
es una bala en el pecho  
(x3)**

I think about your gaze, your  
piercing gaze is like a bullet in  
the chest (x3)

**Pienso en tu mirá', pienso  
en tu mirá'**

I think about your gaze  
I think about your gaze

**Me da miedo cuando sale' (Eh),  
sonriendo pa' la calle  
Porque todos pueden ve' (Eh) los  
hoyuelitos que te salen (x2)**

I'm scared when you go out, smiling  
at the street  
Because everyone can see the  
dimples that appear on your cheeks

Tan bonita que amenaza, cuando calla' me  
da' miedo  
Tan fría como la nieve cuando cae desde el  
cielo  
Cuando sales por la puerta, pienso que no  
vuelves nunca  
Y si no te agarro fuerte, siento que será mi  
culpa

So beautiful that it's threatening,  
when you're quiet it scares me  
As cold as the snow when it falls from  
the sky  
When you walk out the door, I think  
you'll never come back  
And if I don't hold you tight, I feel like  
it will be my fault

**Pienso en tu mirá', tu mirá' clavá' es una  
bala en el pecho (x7)  
Pienso en tu mirá', pienso en tu mirá' (Pa'  
'trá')**

I think about your gaze, your gaze  
pierces like a bullet to the chest (x7)  
I think about your gaze  
I think about your gaze (Pa' 'trá')

**Me da miedo cuando sale', (Eh) sonriendo pa' la calle  
Porque todos pueden ve' (Eh) los hoyuelitos que te salen (x2)**

# Nuevo Flamenco - Rosalía



## Productores en la nueva escena de flamenco electrónico

FRANCISCO BETHENCOURT LLOBET

2020. *Cuadernos de Etnomusicología* N°15(2)

Palabras clave: productores, identidad, estudios de grabación, autenticidad, tecnología.

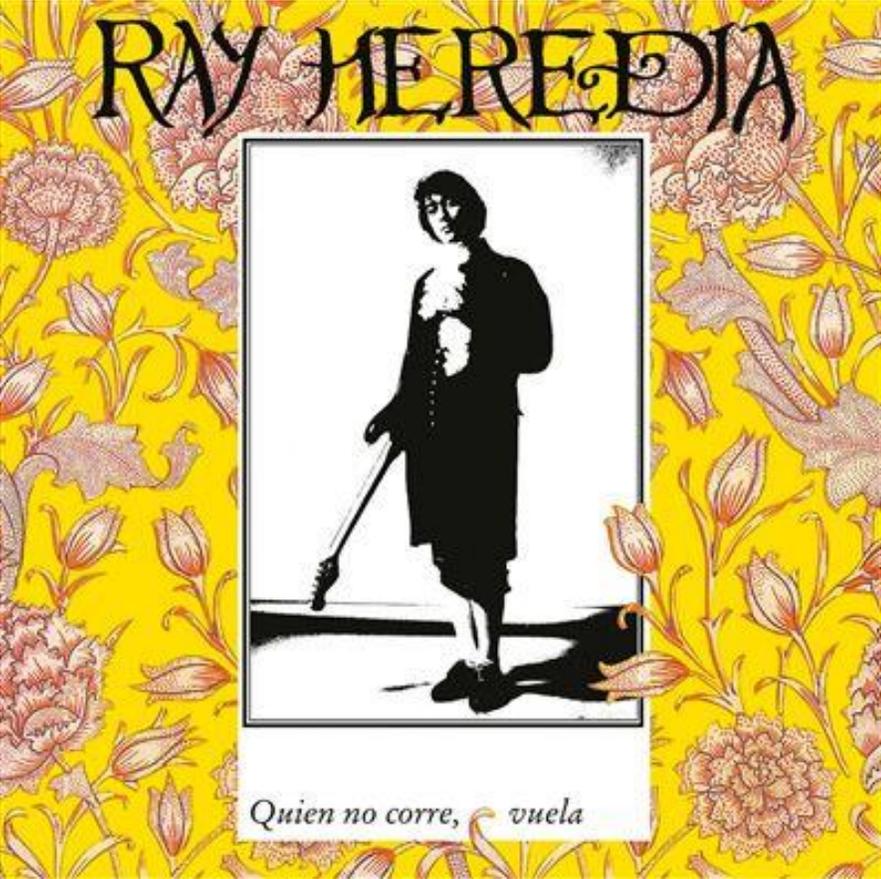
Keywords: *producers, recording studios, authenticity, technology.*

Cita recomendada:

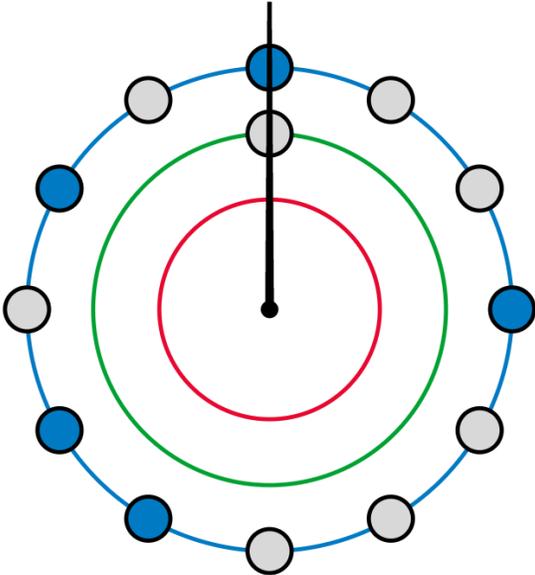
Bethencourt, Francisco. 2020. "Productores en la nueva escena de flamenco electrónico". *Cuadernos de Etnomusicología*. N°15(2). <URL> (Fecha de consulta dd/mm/aa)

Gómez Sánchez, Daniel. *Rosalía : intercambio cultural entre la cantante–compositora y su entorno creativo*. Dissertation, Complutense University of Madrid, 2024.

# Ray Heredia – Lo bueno y lo malo



## THE RHYTHM CIRCLE





# Ray Heredia – Lo bueno y lo malo

**Paso la vida pensando en lo bueno y lo malo**  
**Mi mente está triste me siento algo extraño**  
**Mi cuerpo se agota mi alma lo nota**  
**De ver en el mundo me tira de otra oca**  
**La loca envidia que trae la mentira**  
**Palabras tan falsas que por mi mente pasa,**  
**hoy pasa y yo...**

El tiempo se pasa y los años me cansan  
De ver la mentira que traen gente vana  
Mi tiempo está en vilo yo sé que me pasa  
Mentiras, palabras y todo es una falsa  
Hoy tengo un momento de ansias con ganas  
Quisiera decir lo que siento en mi alma  
La vida pasa, hoy pasa y yo...

**Y en mí, y en mí, y en mí**  
**En mi mundo nuevo lo voy a olvidar**  
**Las aventuras que he podido vivir**  
**En mí, y en mí, que yai que yai**  
**No aguanto más, mi historia es así**  
**Y en mí...**  
**Que por mi mente pasa, hoy pasa y yo...**

I spend my life thinking about the good and the bad  
My mind is sad, I feel somewhat strange  
My body is exhausted, my soul notices it  
Seeing lies from other mouths in the world  
The crazy envy that lies bring  
Such a false word that passes through my mind  
Today passes and me...

My time passes and the years tire me  
Seeing the lies that vain people bring  
My time is in suspense, I don't know what's happening to me  
Lies, words, everything is a farce  
I have a moment of worldly desires  
I wish to express what I feel in my soul  
That life passes, today passes.

And in me, and in me, and in me  
In my new world, I will forget you  
The adventures I have been able to live  
And in me, and in me  
I can't stand more stories like this  
...and in me.  
I spend my life thinking that life passes, today passes  
And I...

**Paso la vida pensando en lo bueno y lo malo**  
**Mi mente está triste me siento algo extraño**  
**Mi cuerpo se agota mi alma lo nota**  
**De ver en el mundo me tira de otra oca**  
**La loca envidia que trae la mentira**  
**Palabras tan falsas que por mi mente pasa, hoy pasa y yo...**

**Y en mí, y en mí y en mí**  
**En mi mundo nuevo lo voy a olvidar**  
**Las aventuras que he podido vivir**  
**En mí, y en mí, que yai que yai**  
**No aguanto más, mi historia es así**  
**Y en mí...**

Paso la vida pensando...  
Que la vida pasa, hoy pasa...  
Paso la vida pensando...  
Que la vida pasa, hoy pasa...  
Paso la vida pensando...  
Que la vida pasa, hoy pasa y yo...

# Further Analysis

- **Díaz-Báñez, J. M., Gómez, F., Toussaint, G. T., & Rappaport, D.** (2004). *Análisis filogenético del compás flamenco*. In *Actas del Congreso de la Sociedad Matemática Mexicana* (pp. 1-10).

Splits tree with directed permutation (Hamming) distances between different palos, all of the same distance

Ancestral rhythm as the rhythm of the fandango de Huelva is right in the centre of the tree.

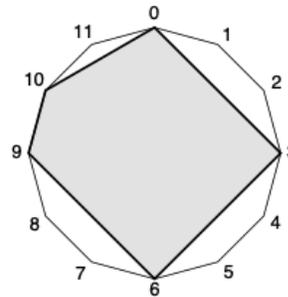


Figura 7: El ritmo “ancestral” .

# Further Analysis

- **Díaz-Báñez, J. M., Gómez, F., Toussaint, G. T., & Rappaport, D.** (2004). *Análisis filogenético del compás flamenco*. In *Actas del Congreso de la Sociedad Matemática Mexicana* (pp. 1-10).
- **Hoffman, M., & Engl, C.** (2018). *Rhythmic similarity: Computational models and applications*. *Journal of New Music Research*, 47(4), 291-307. <https://doi.org/10.xxxx/jnmr.2018.147286>
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# Further references

Box Notation

Convex Polygon notation (Rhythm circle)

Of a Rhythm of your choice of one of the options

And reflection... Is it symmetrical, how many onsets does it have, do I like it, does it resemble any other rhythm...?

“Bulería popular” – Antonio de la Malena

“X LAS NIÑAS - Alegrías “– Ángeles Toledano

“Fandangos de Huelva – Ya no va mi niña” – Carmen Linares

# 08/03/2026 – Silvia Pérez Cruz in Paris for Women's Day



Ángeles Toledano  
María José Llergo  
Silvia Pérez Cruz  
Rocío Molina  
Antonia Jiménez  
Miriam Méndez  
Rosario Montoya

Many More!

<https://www.youtube.com/watch?v=TwLiZqr-oKI>

Thanks for your attention!!

Email me at [rosamg06@ucm.es](mailto:rosamg06@ucm.es) if you have any questions 😊