

Modèles mathématiques et computationnels dans la chanson

Analyse de la musique VI – Les formes de la musique populaire

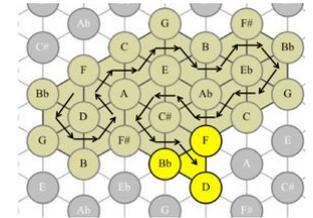
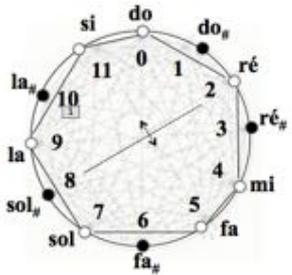
(partie III)

Moreno Andreatta

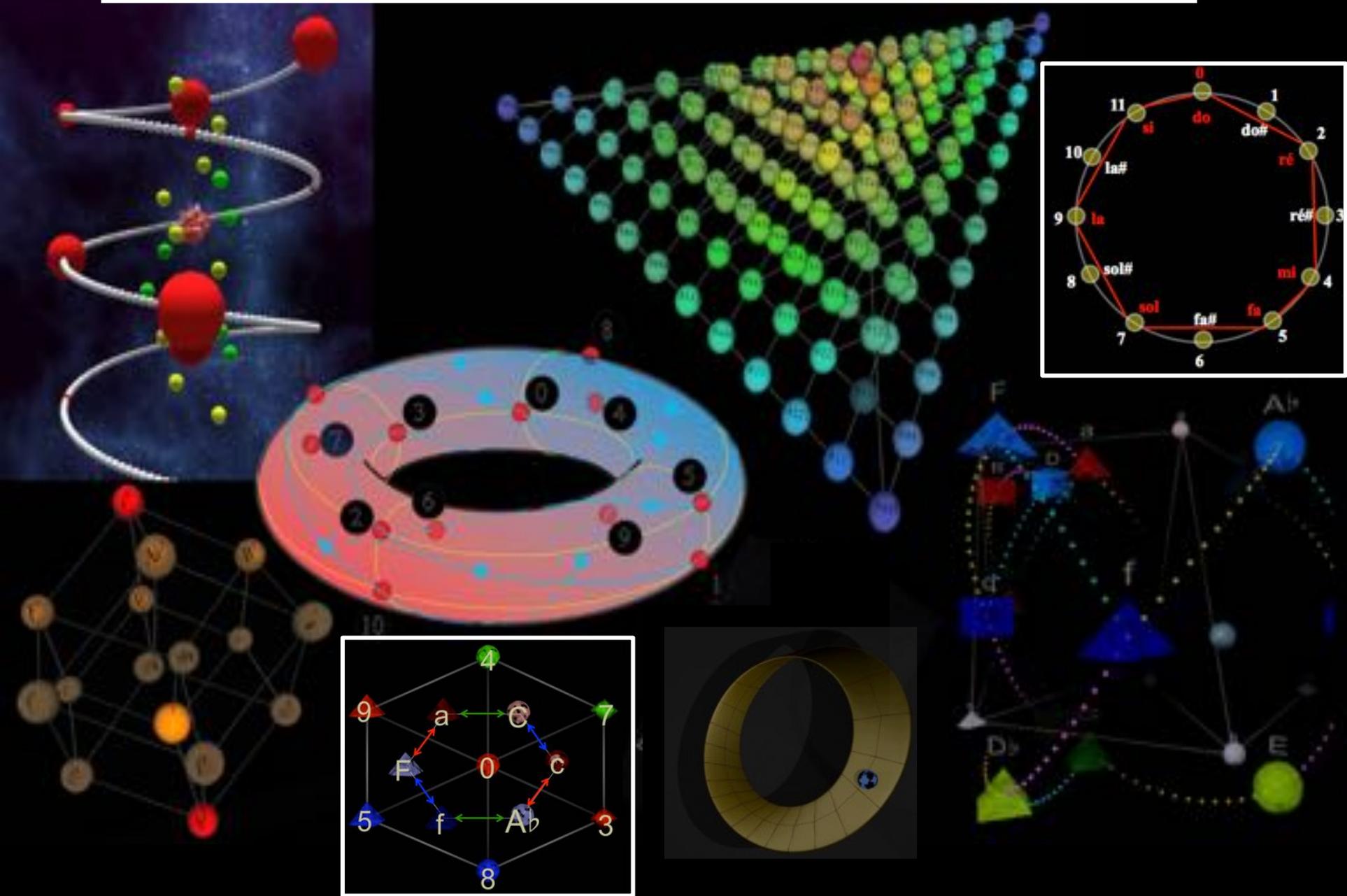
Equipe Représentations Musicales

IRCAM / CNRS UMR 9912 / Sorbonne Université

IRMA & GREAM, Université de Strasbourg



La galaxie des modèles géométriques au service de la musique

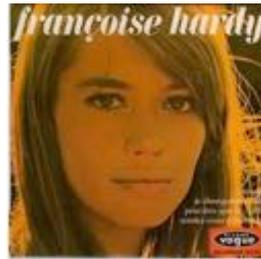


Une chanson permutationnelle

Se telefonando, 1966 (Maurizio Costanzo/Ennio Morricone) / Mina



(min. 0'53'')

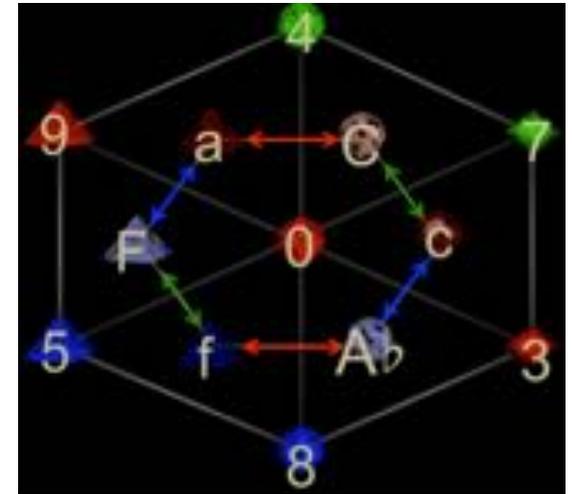


Je changerais d'avis,
(Françoise Hardy)



Ennio Morricone

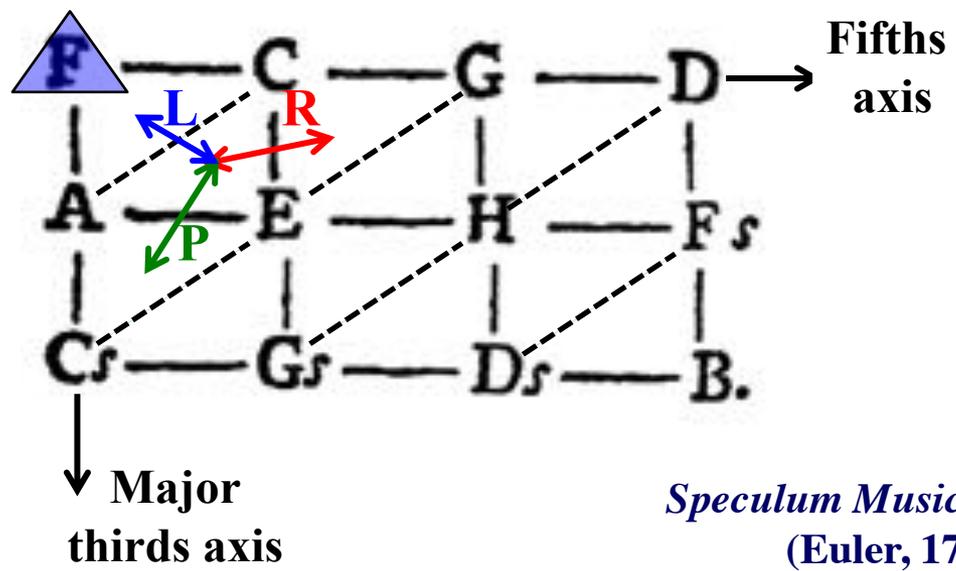
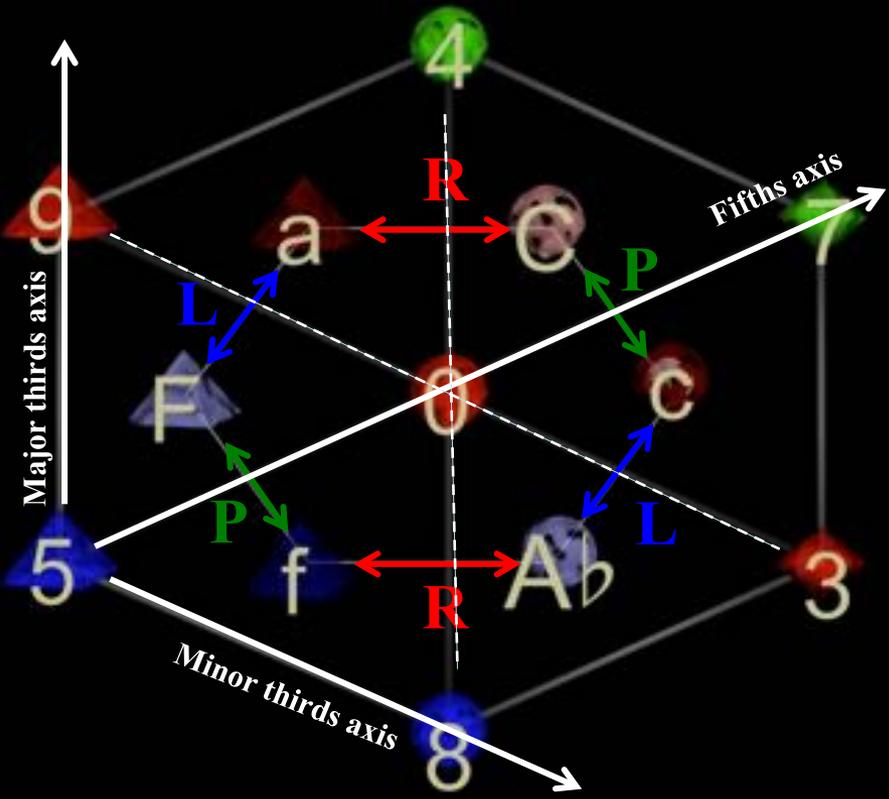
L'espace harmonique



C	c	C#	c#	D	d
E_b	e _b	E	e	F	f
F#	f#	G	g	G#	g#
A	a	B_b	b _b	B	b

Chord enumeration

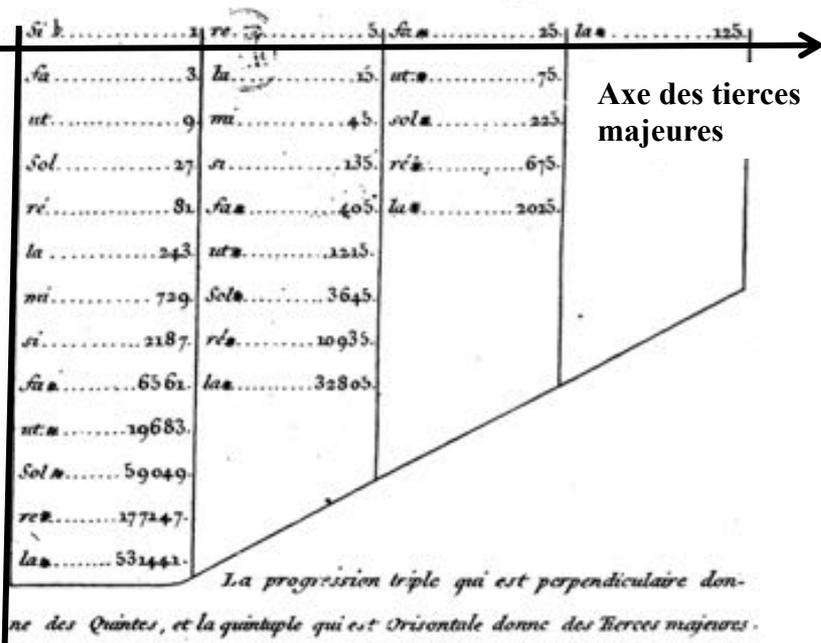
Le Tonnetz (ou nid musical d'abeilles)



Speculum Musicum
(Euler, 1773)

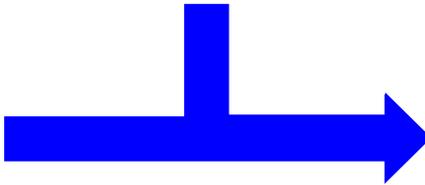
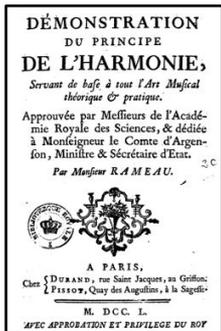
Les origines ramistes du *Tonnetz* (selon Henri Pousseur)

PROGRESSIONS TRIPLES ET QUINTUPLES



« Un réseau, au sens entendu ici, est une distribution de note [...] selon plusieurs (pour commencer deux) axes qui se caractérisent chacun comme une chaîne d'un seul et même intervalle »

« Applications Analytiques de la 'technique des réseaux' », *Revue belge de Musicologie*, Vol. 52, pp. 247-298, 1998

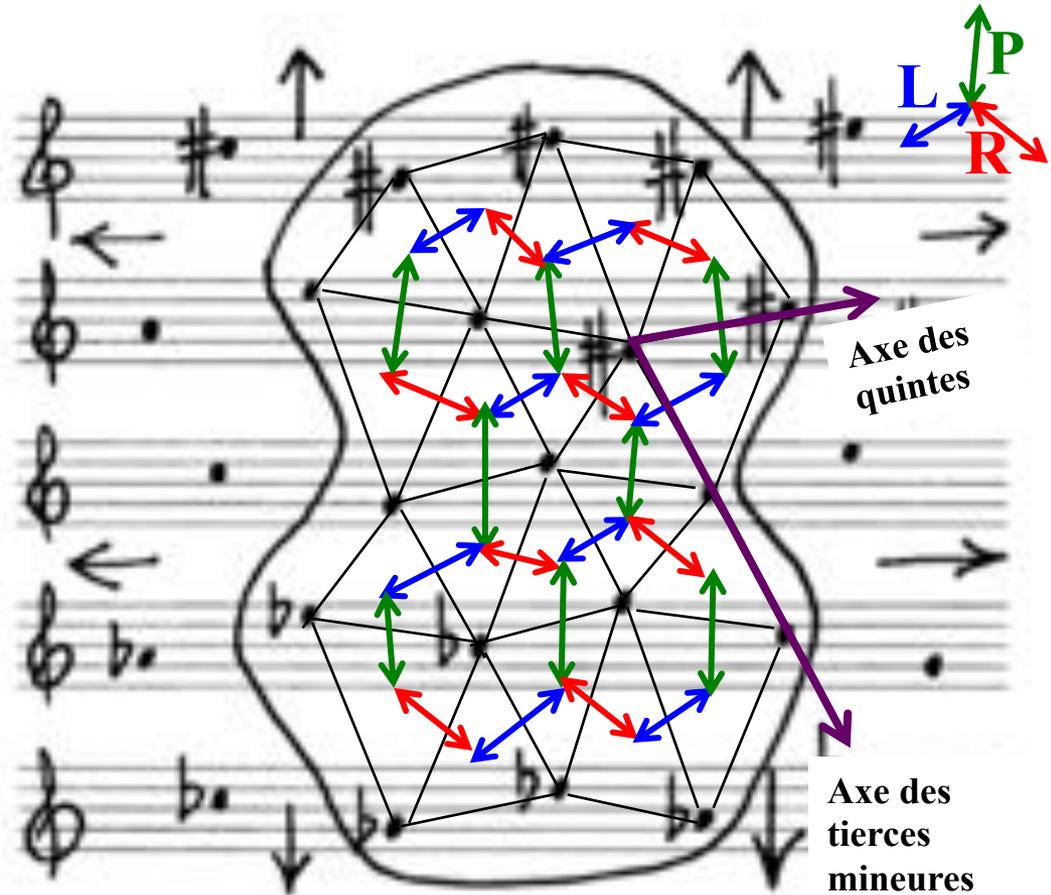


- J.-Ph. Rameau, *Démonstration du principe de l'harmonie*, 1750

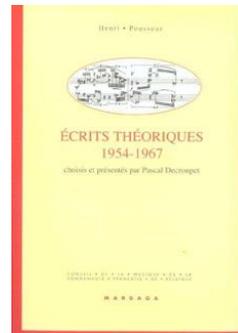
Les origines ramistes du *Tonnetz* (selon Henri Pousseur)

« Il ne faut toutefois pas oublier que le principe même de la méthode réside dans la volonté de construire le lavis de telle sorte que les relations musicales élémentaires effectives, donc ‘en-temps’, (analysées ou composées, mélodiques ou accordiques) soient les plus **serrées** possibles, s’expriment principalement entre notes **voisines** du réseau, dans un sens ou dans l’autre.

Ajoutons encore que l’on peut passer de certains réseaux à certains autres en faisant simplement ‘basculer’ les axes [...] ce qui modifie les rapports de proximité structurelle entre les notes et donc la hiérarchie de leurs intervalles ».



- Henri Pousseur, « L'apothéose de Rameau. Essai sur la question harmonique, *Musiques Nouvelles. Revue d'esthétique*, 21, 105-172, 1968
- Henri Pousseur, « Applications Analytiques de la 'technique des réseaux' », *Revue belge de Musicologie*, Vol. 52, pp. 247-298, 1998





Two Dimensions

Traditional Chordal Space

© Gilles Baroin 2011



Gilles Baroin

➔ www.mathemusic.net

Harmonic Progressions

In Paolo Conte

Sotto le Stelle del Jazz

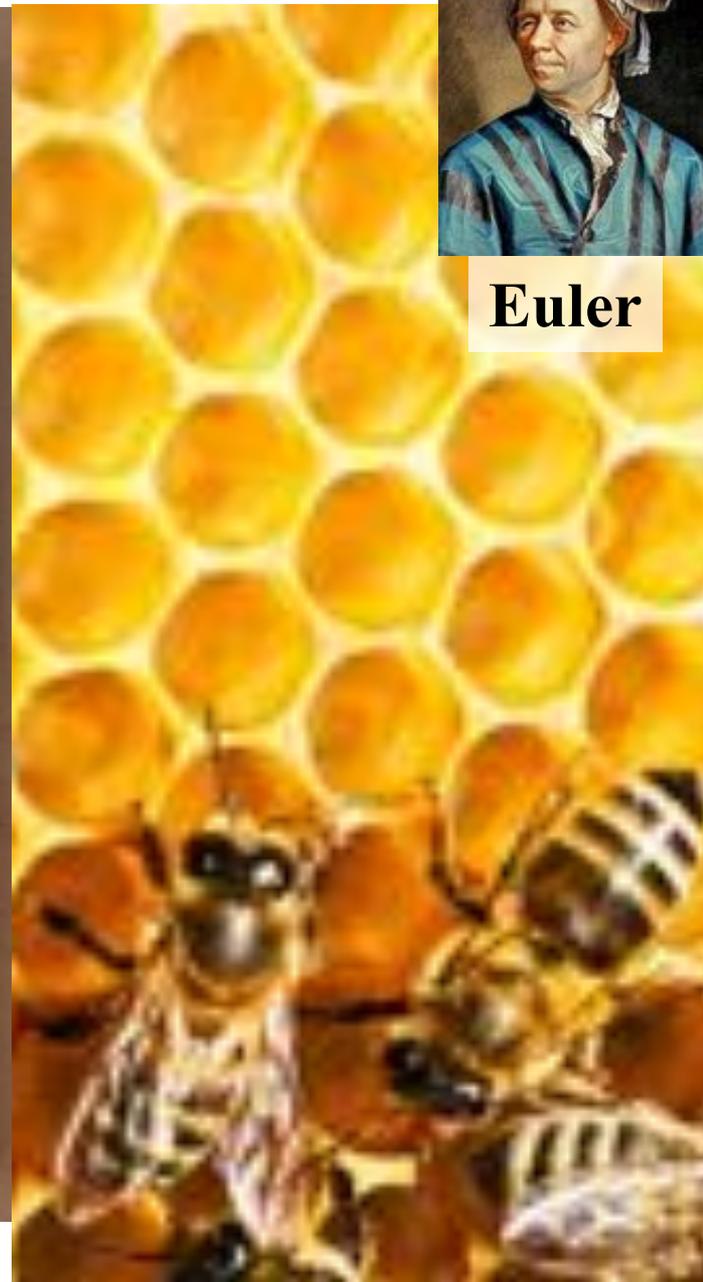
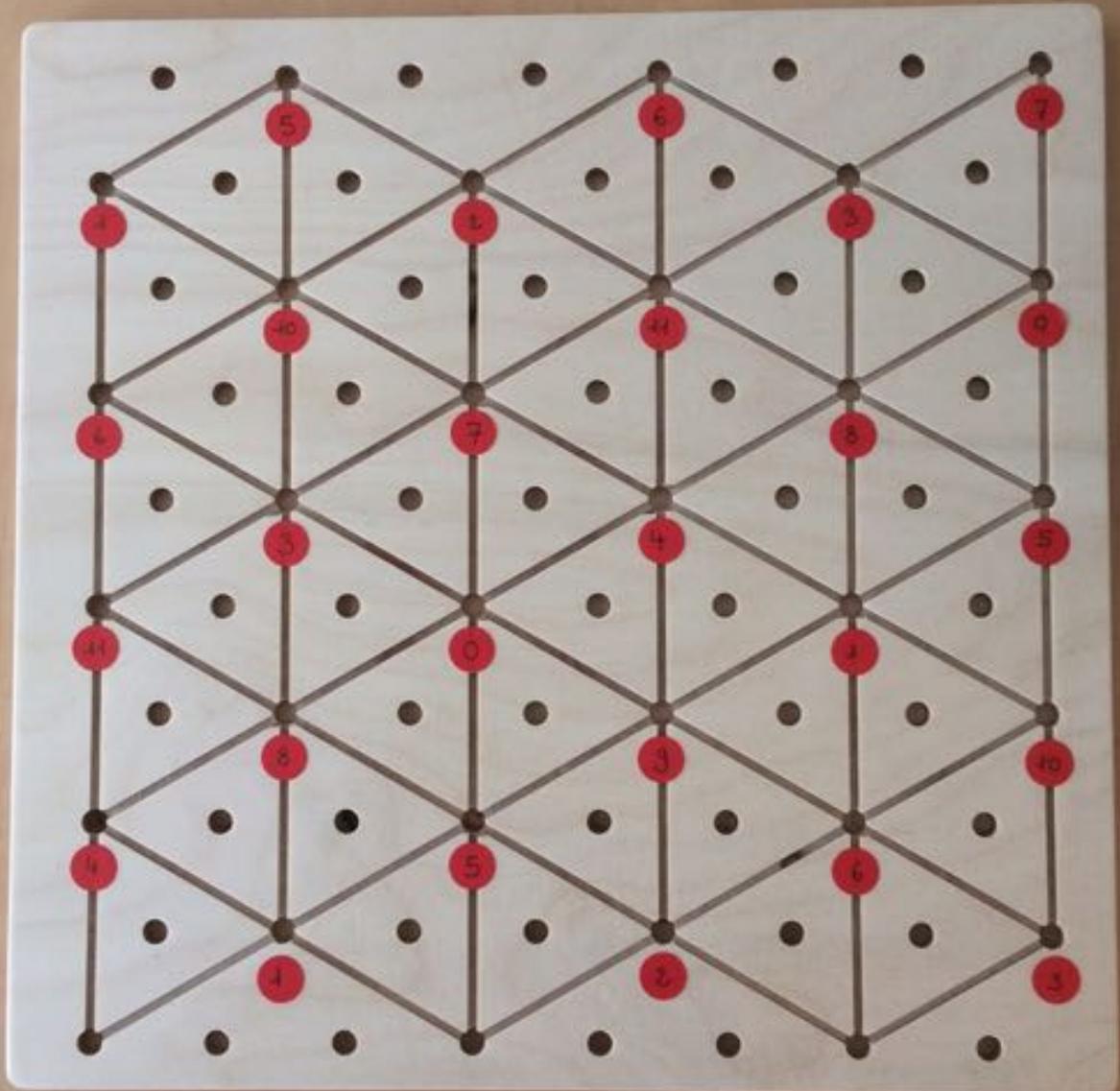


*Supervision Moreno Andreatta
Modelisation Gilles Baroin 2016*

Le *Tonnetz* ou nid d'abeilles musical



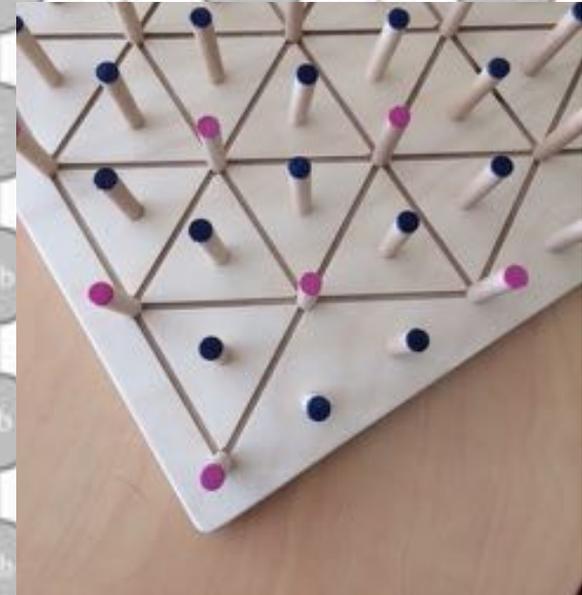
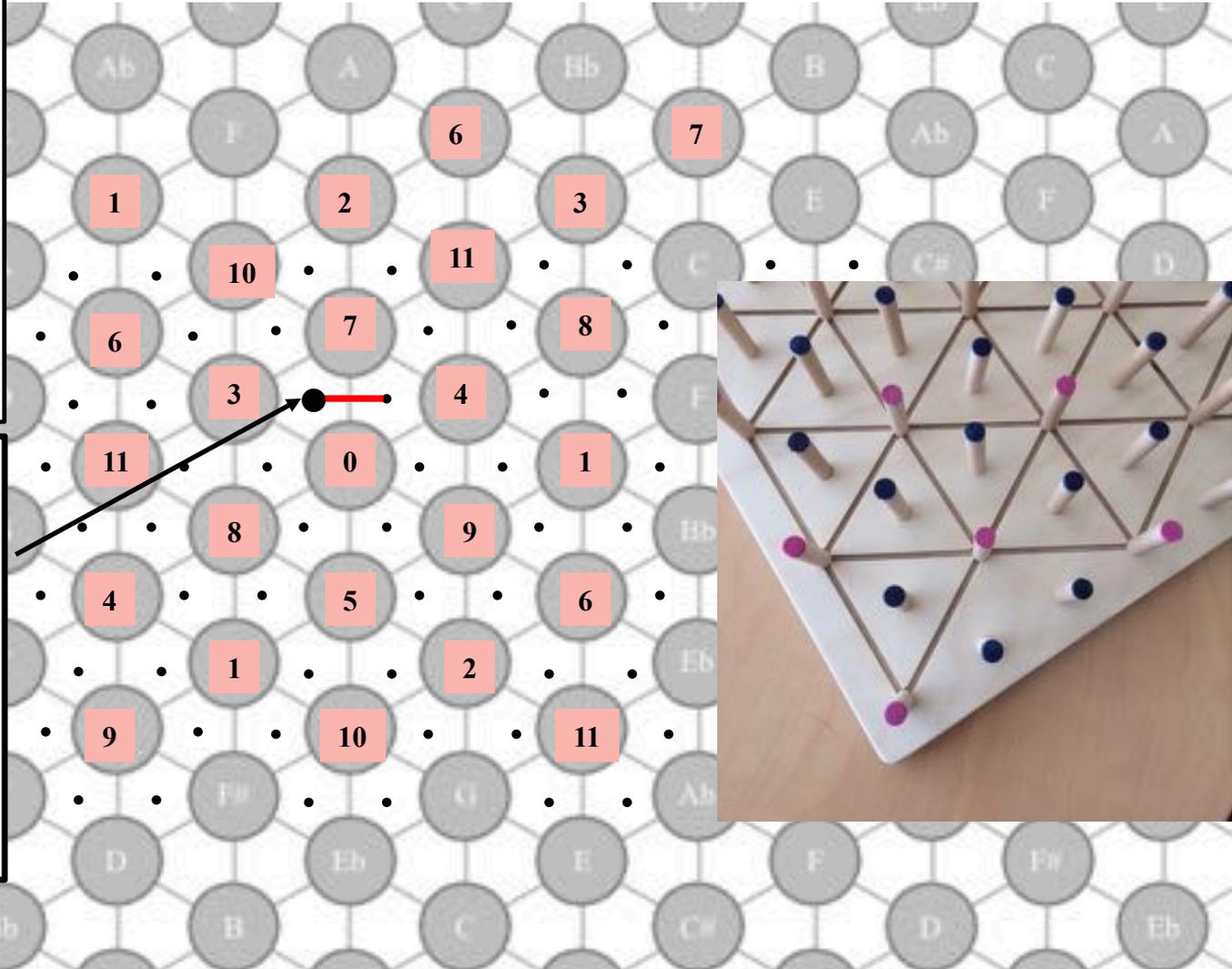
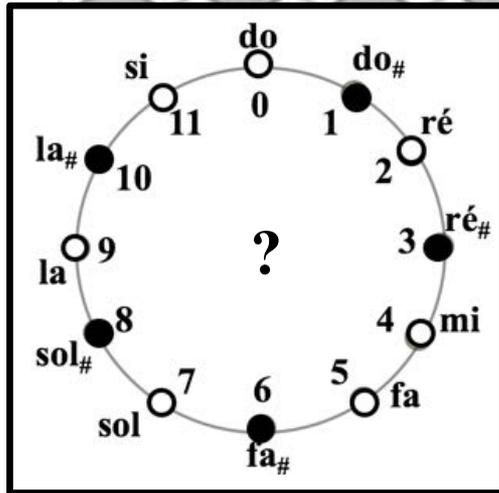
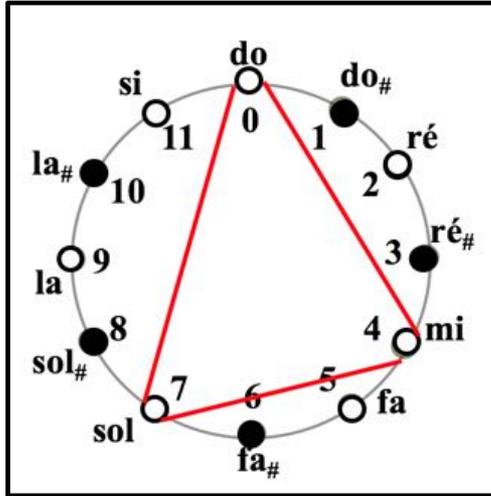
Euler



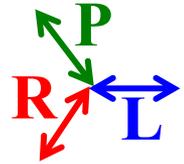
➔ Demo avec *Hexachord*

A vous de jouer...

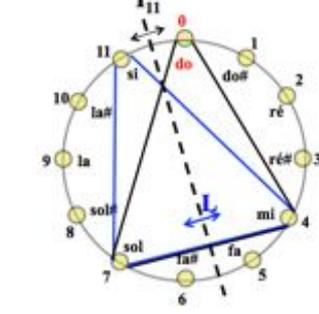
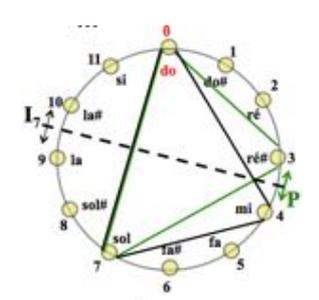
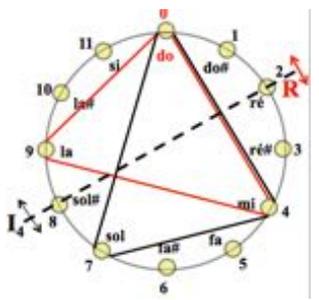
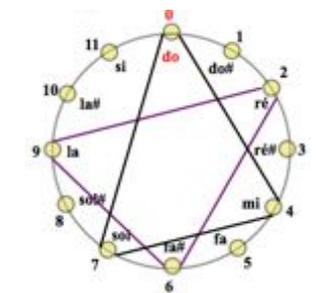
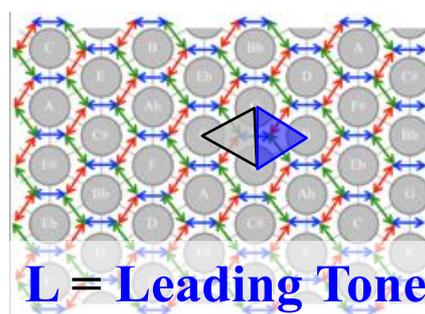
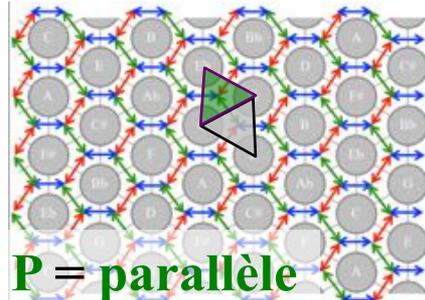
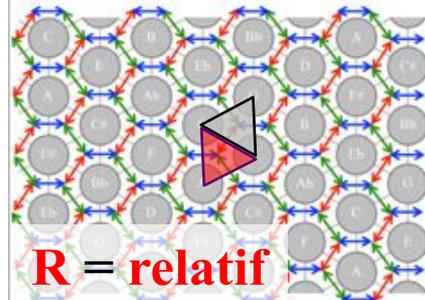
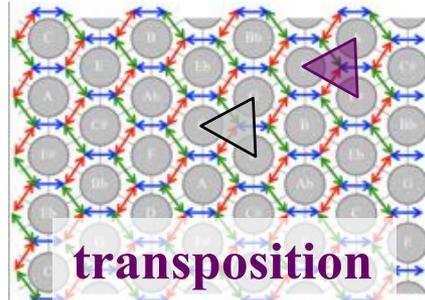
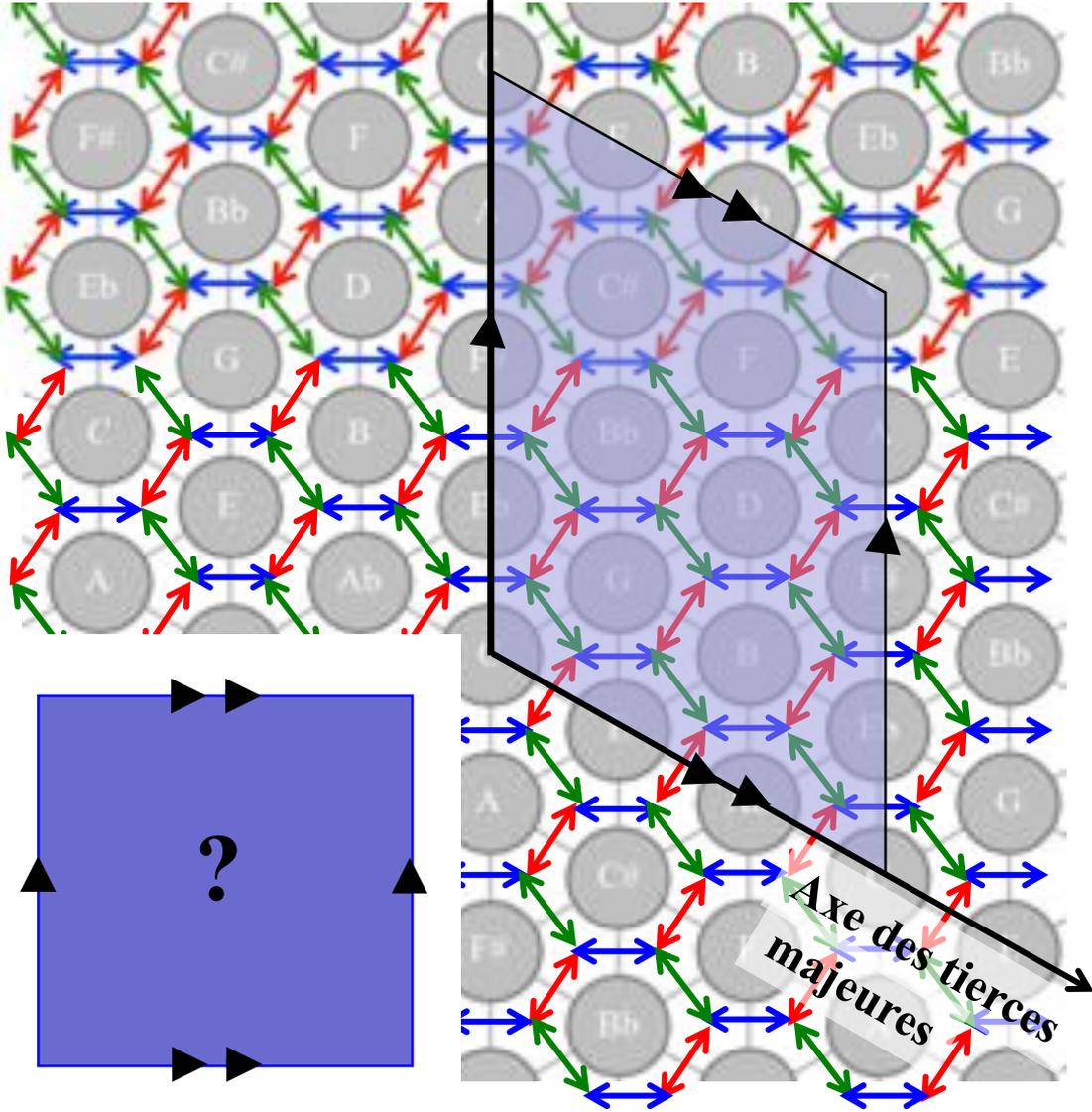
Et le point noir symétrique au précédent ?



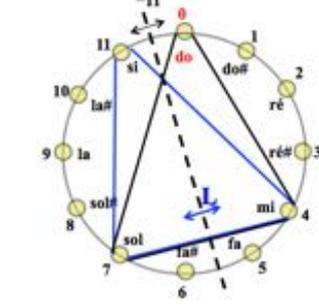
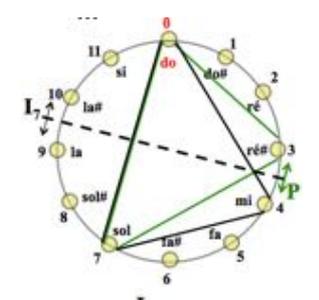
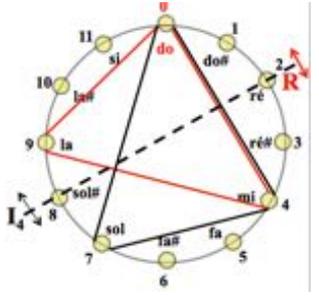
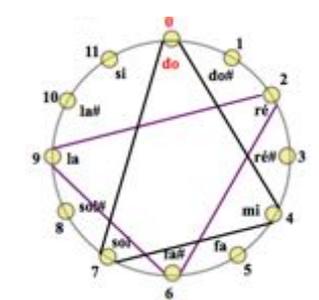
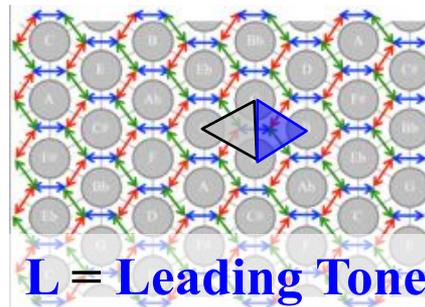
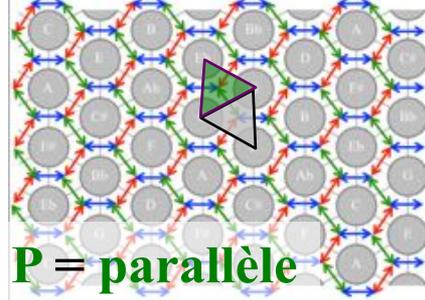
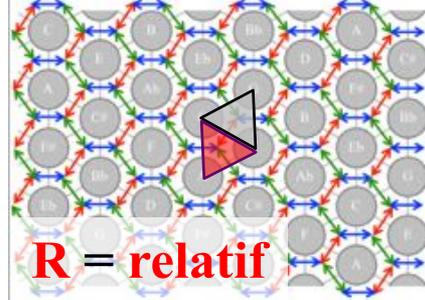
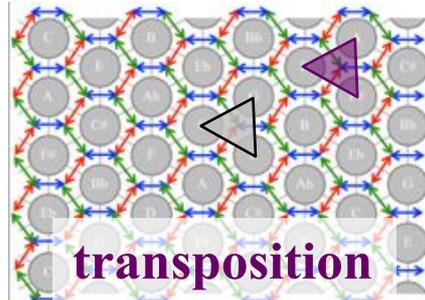
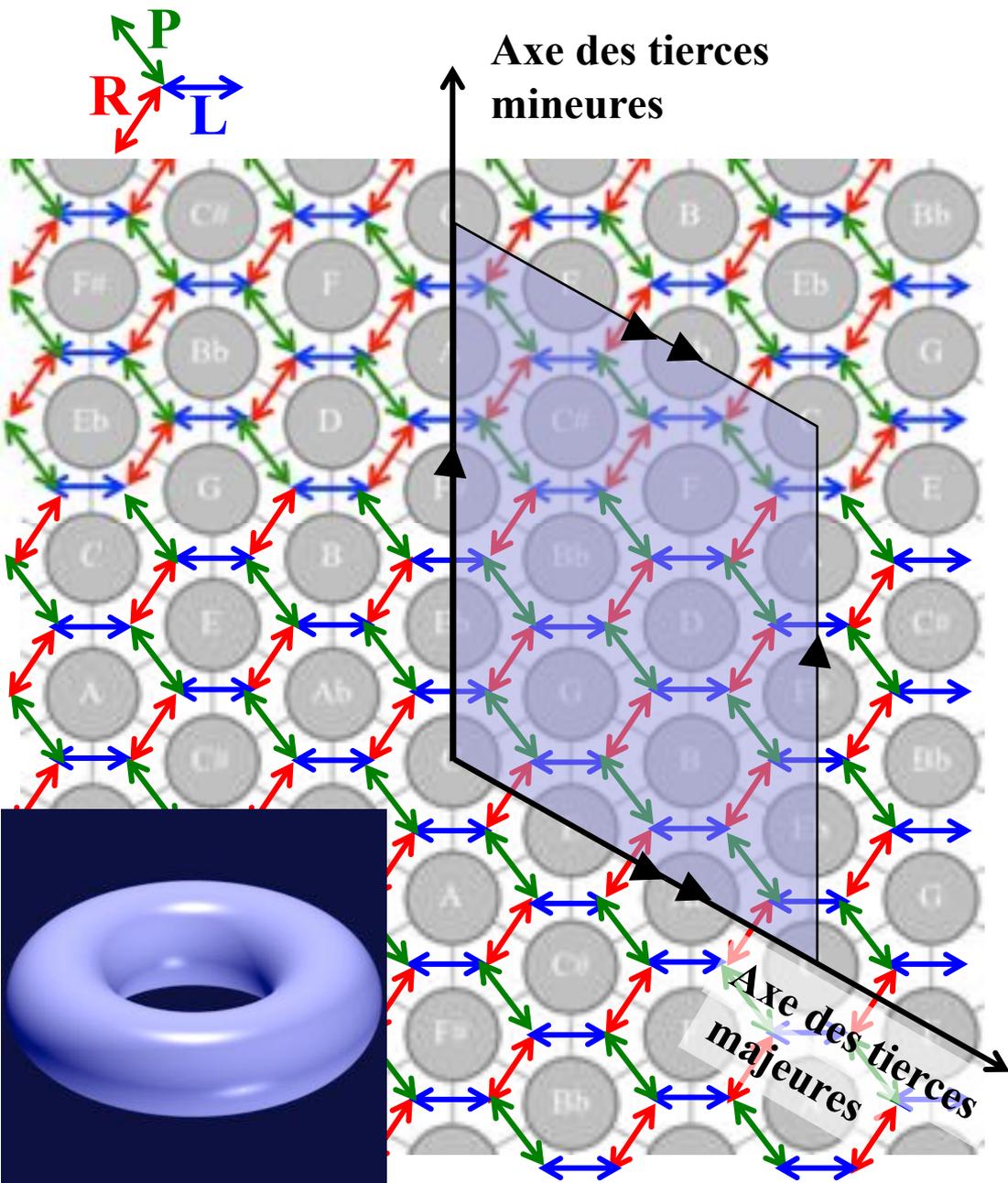
Quelle topologie se cache dans le *Tonnetz* ?



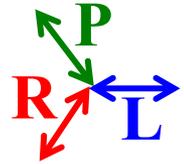
Axe des tierces mineures



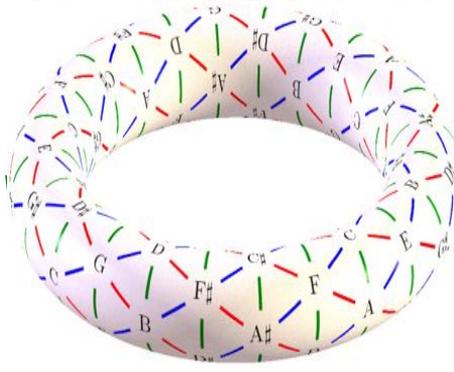
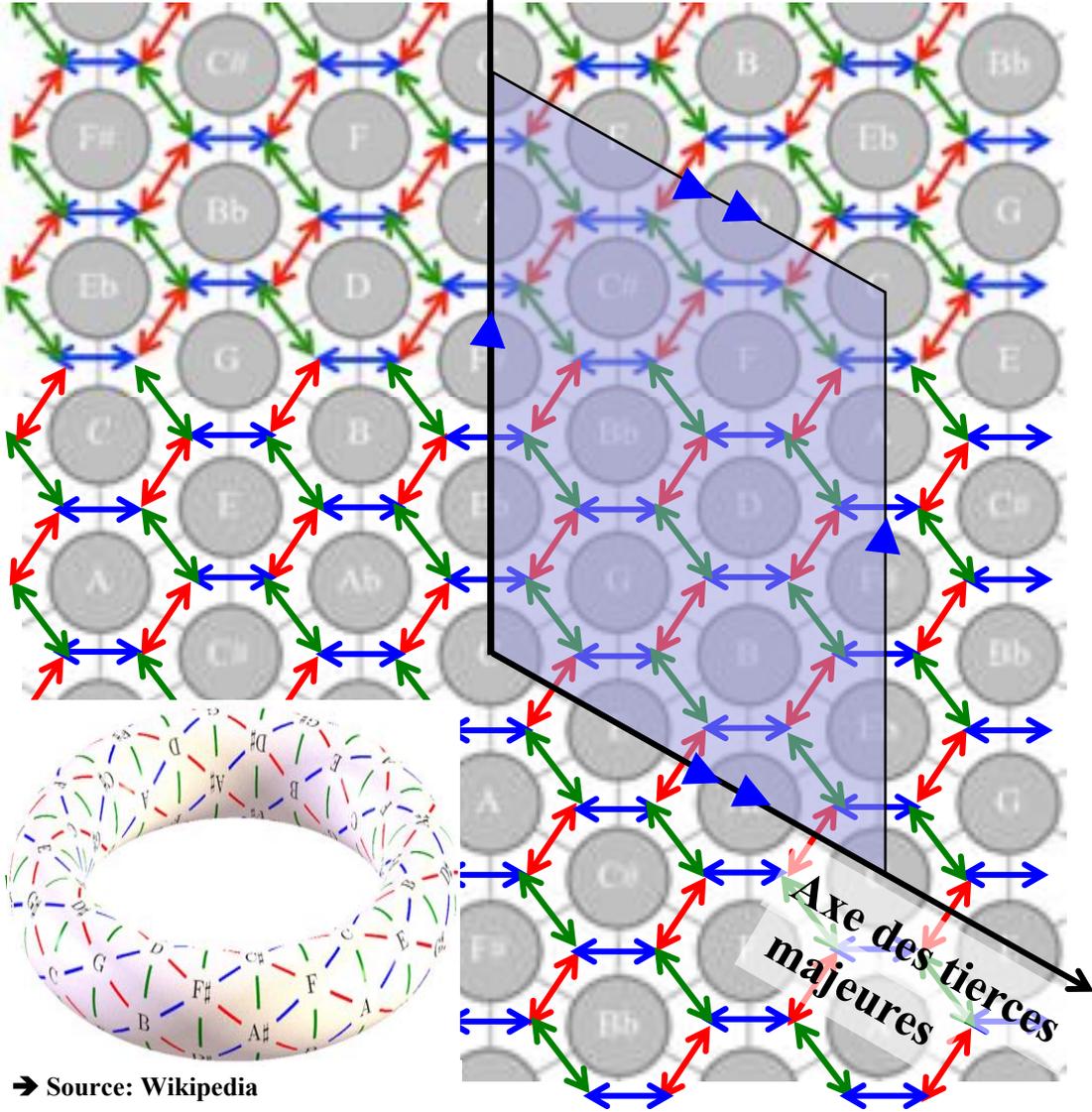
Quelle topologie se cache dans le *Tonnetz* ?



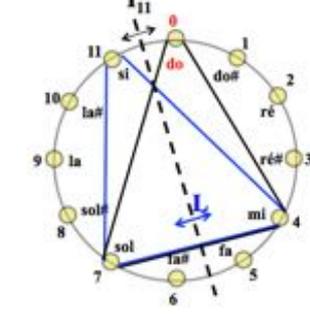
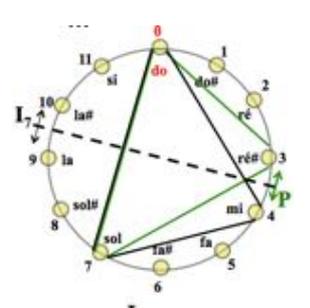
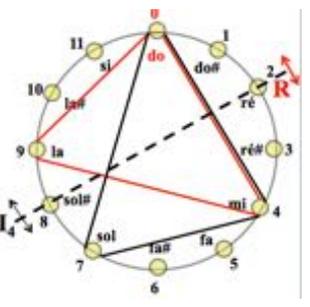
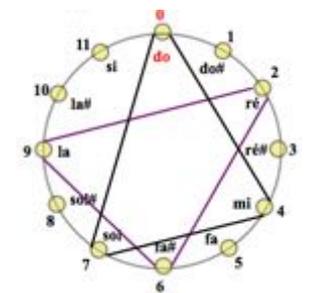
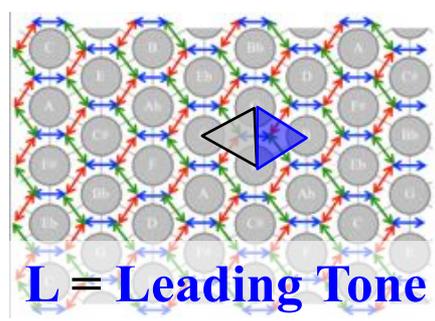
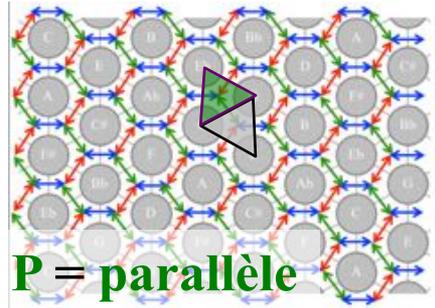
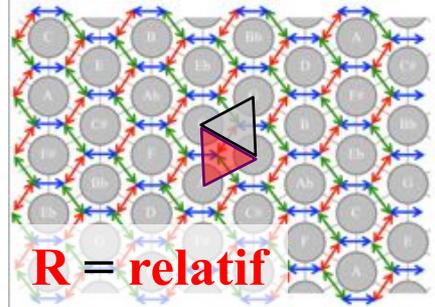
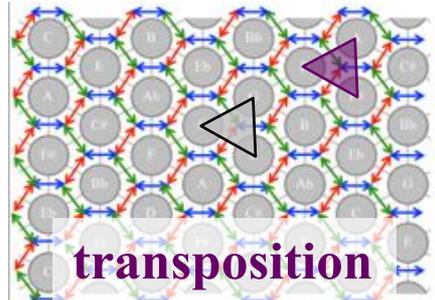
Quelle topologie se cache dans le *Tonnetz* ?



Axe des tierces mineures

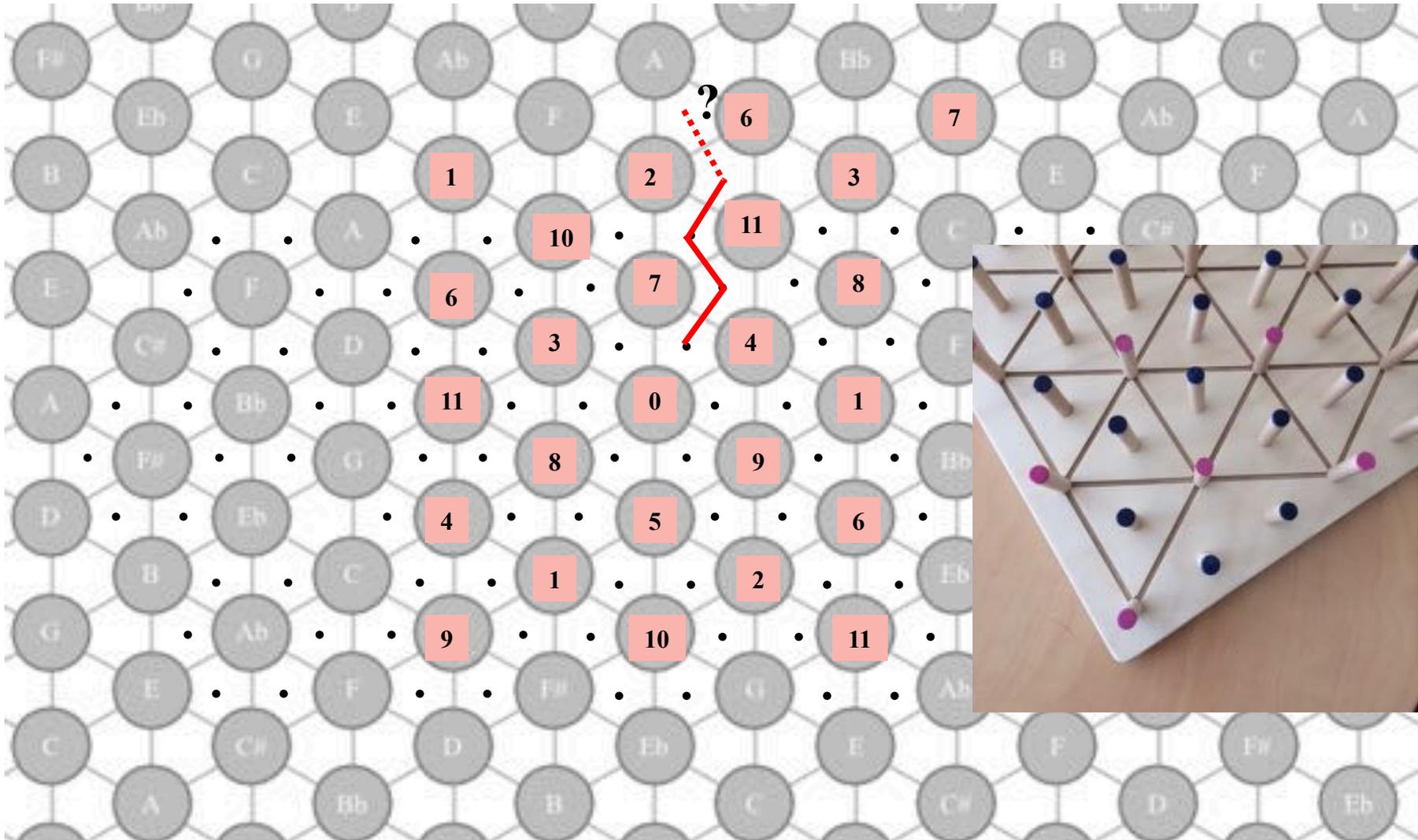


→ Source: Wikipedia



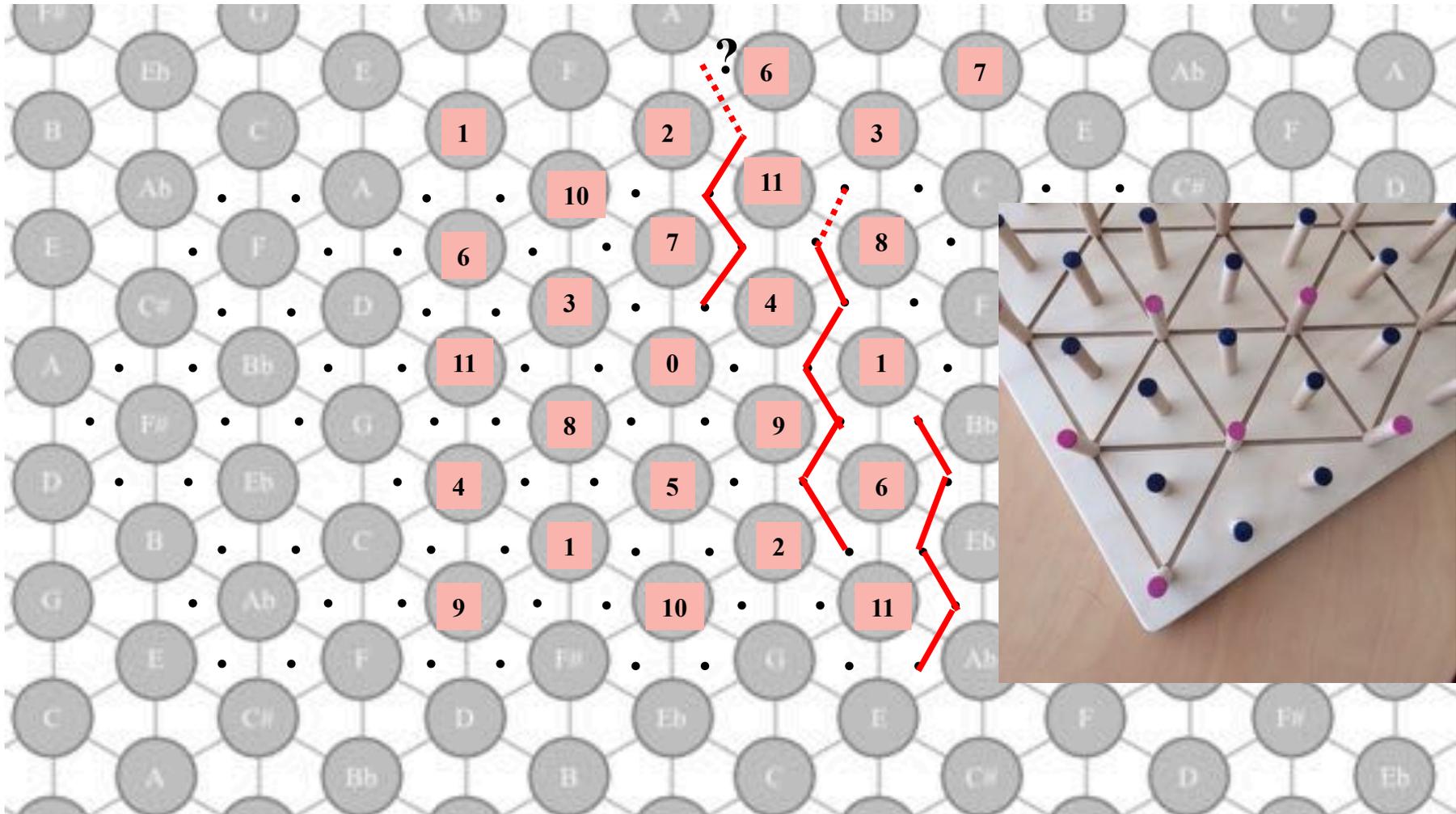
Dessine-moi un zig-zag...

Do maj → Do min → La_b maj → Fa min → Fa maj → La min → Do maj



Dessine-moi un zig-zag...

Do maj → Mi - → Sol maj → Si - → Ré maj → Fa# - → La maj → Do# - →
→ Mi maj → Sol# - → Si maj → Ré# - → Fa# maj → Si_b - → Ré_b maj → Fa - →
→ La_b maj → Do - → Mi_b maj → Sol - → Si_b maj → Ré - → Fa maj → La - → Do maj





MAGIC IN THE AIR

Sol

Ré

La

Si-

Feel the magic in the air. Allez, allez, allez

Levez les mains en l'air. Allez, allez, allez
(x2)

(x4 avec toutes les voix)

Ré
Comme d'habitude on est calés

La **Si-**
Comme toujours ça va aller

Sol **Ré**
On sème l'ambiance à gogo

La **Si-**
Tous ensemble on fait le show

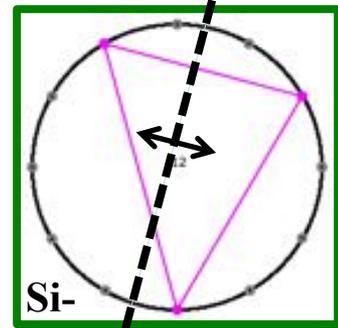
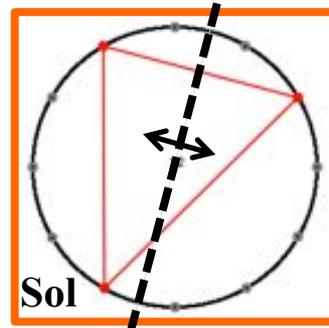
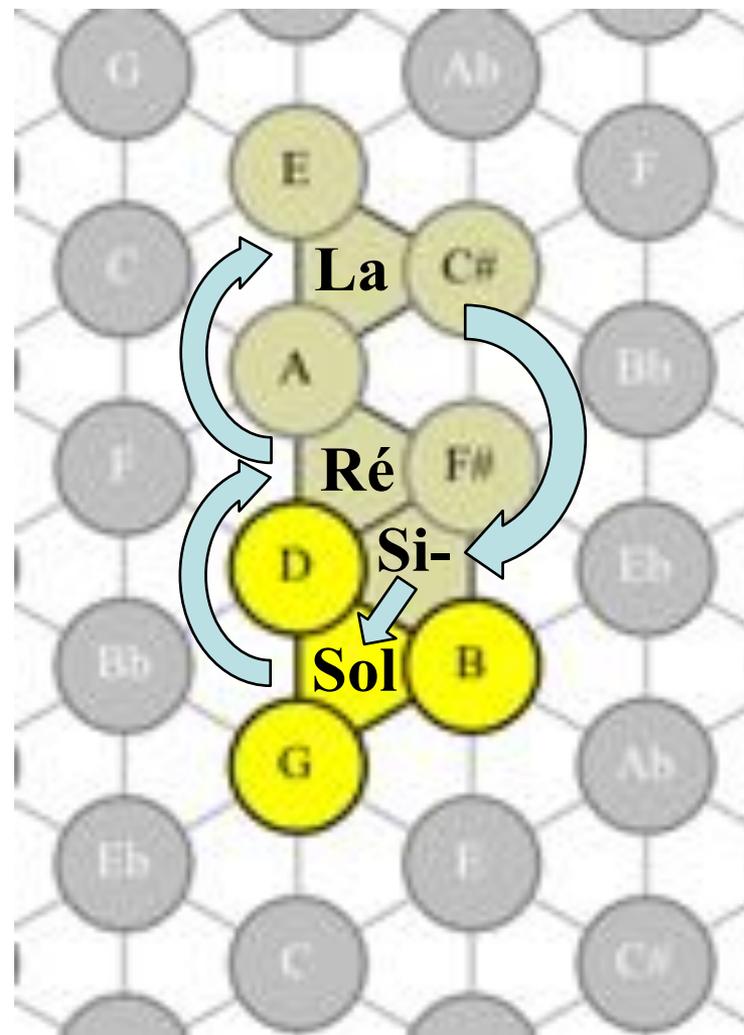
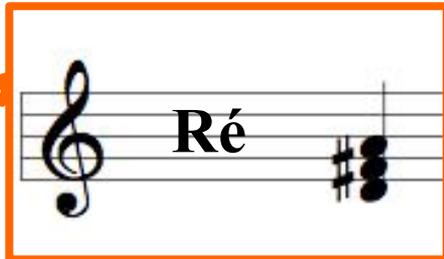
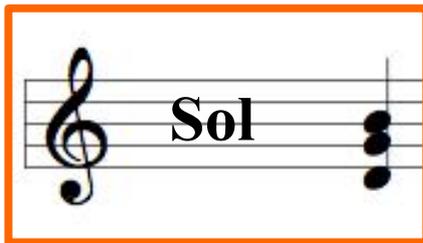
Sol **Ré**
On t'invite à la magie Y'a pas de raccourci

La **Si-**
Oublie tes soucis Viens faire la folie

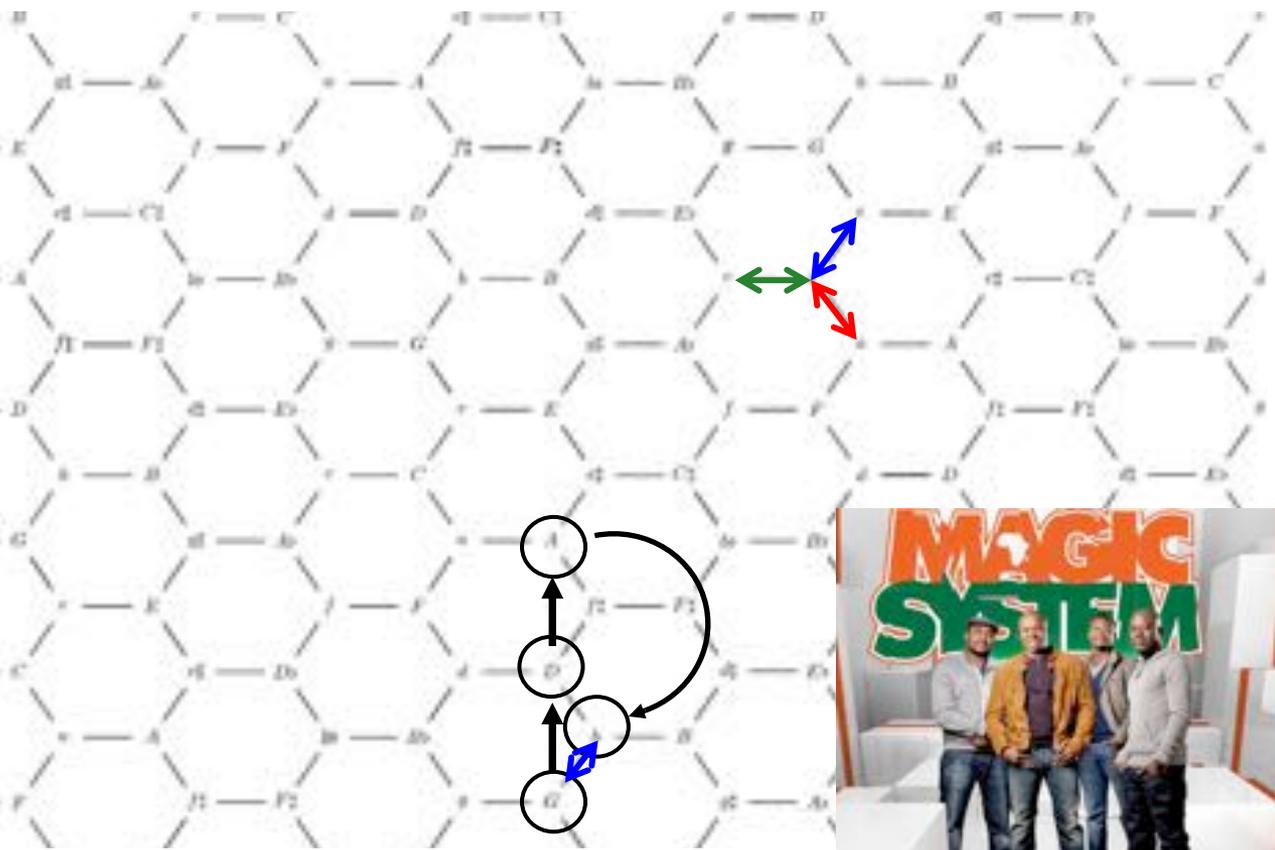
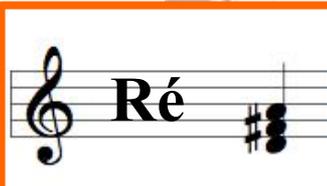
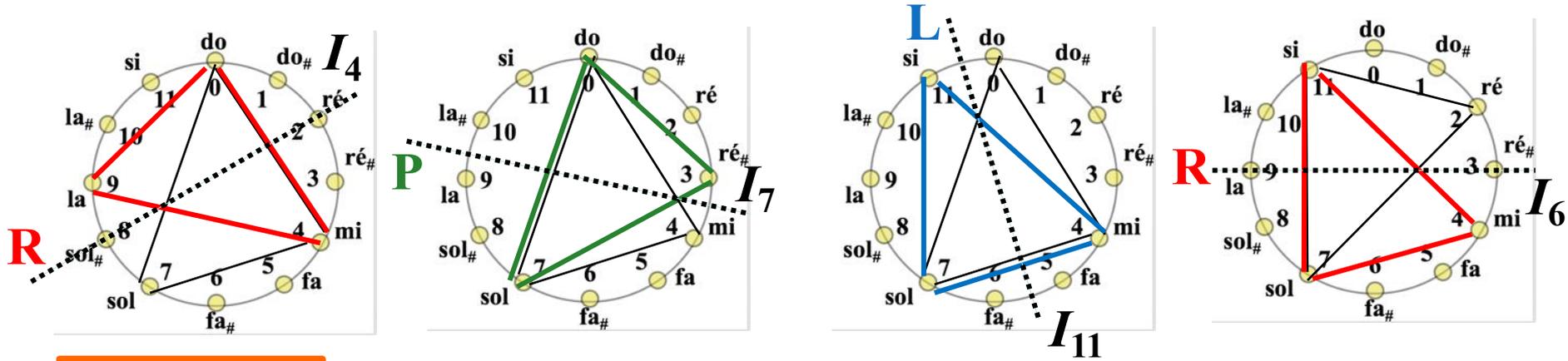
Sol **Ré**
On t'invite à la magie Y'a pas de raccourci

La **Si-**
Oublie tes soucis Oh oh oh oh oh oh

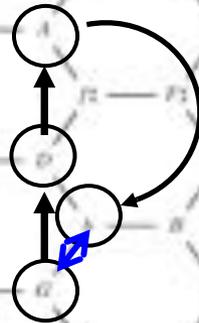
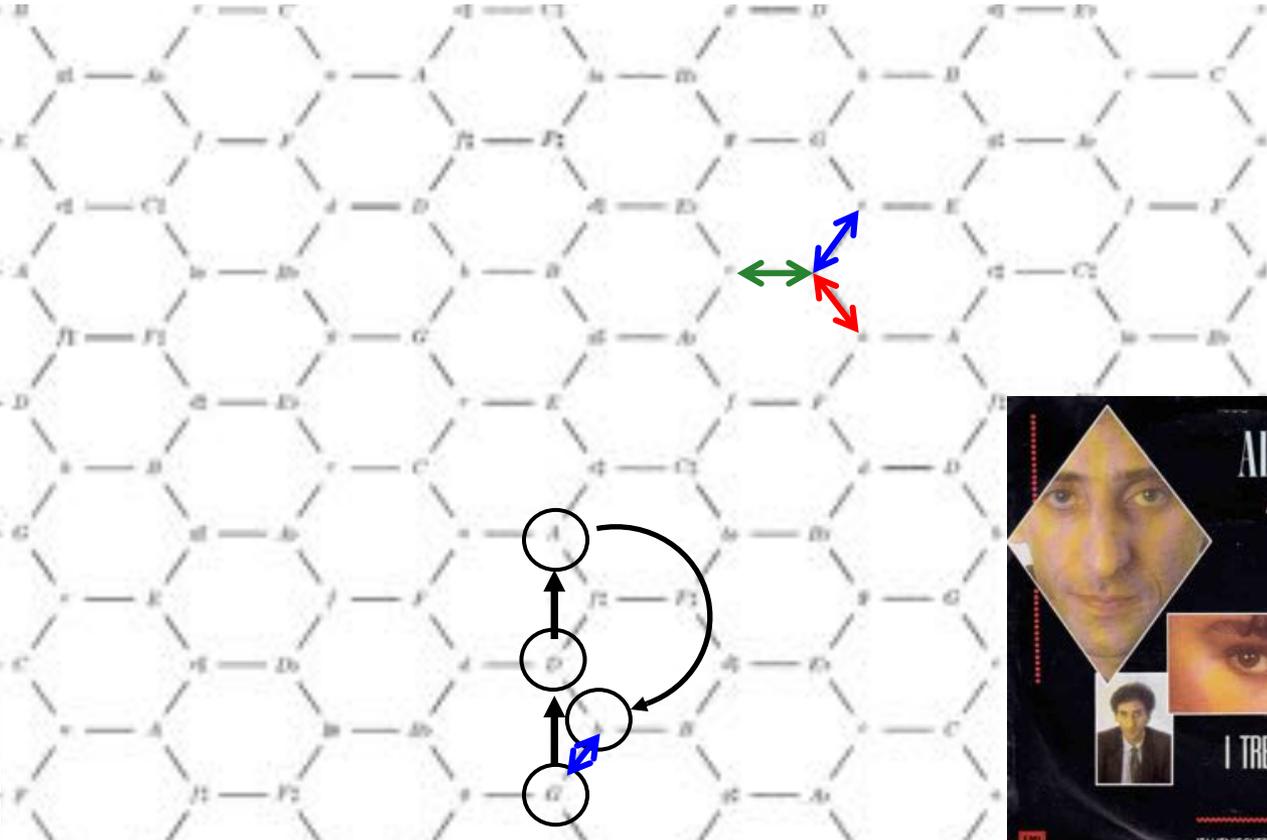
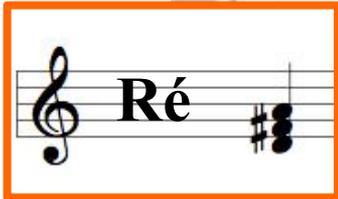
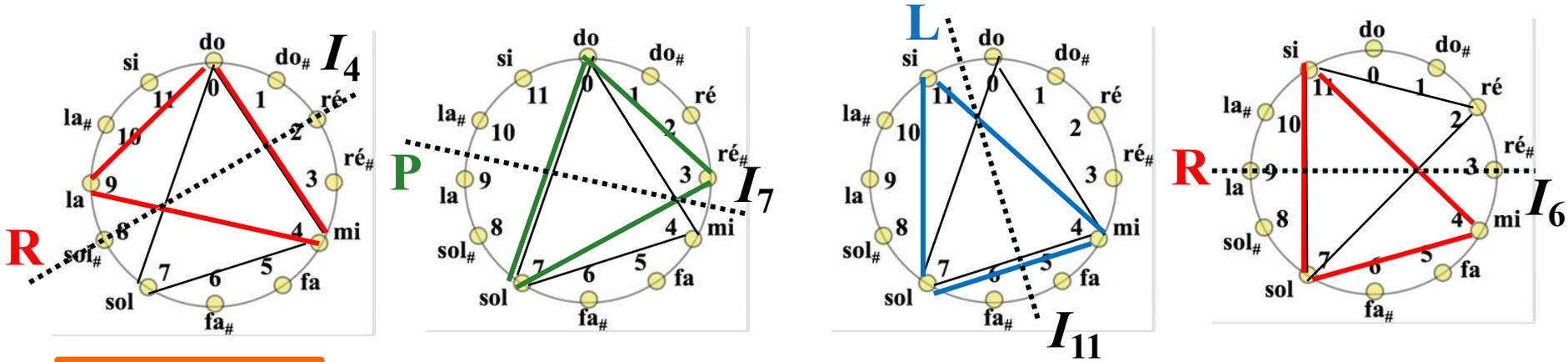
Sol
Feel the magic in the air ...



Quelques exemples analytiques



Quelques exemples analytiques



Comptine d'un autre été

Amelie - Large Version

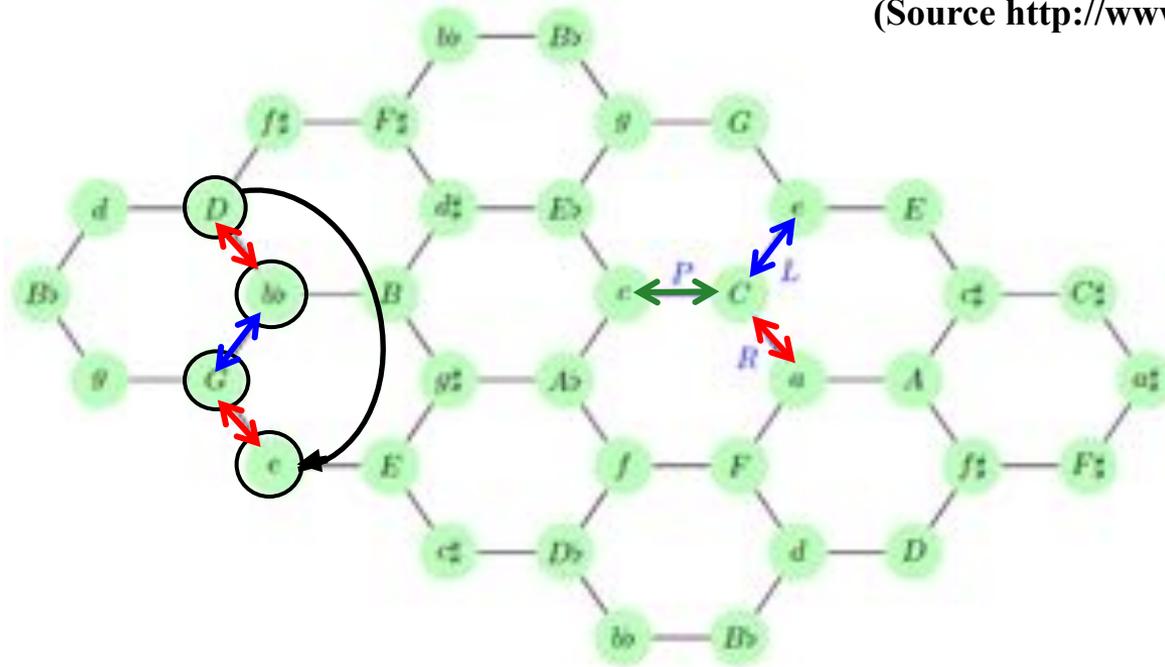


Yann Tiersen

Em $\xrightarrow{?}$ G $\xrightarrow{?}$ Bm $\xrightarrow{?}$ D $\xrightarrow{?}$ Em

Musical notation for the first system of the piece. It features a grand staff with a treble clef and a key signature of one sharp (F#). The time signature is 4/4. The bass line consists of a steady eighth-note accompaniment. The treble line contains four whole rests, indicating that the melody is not yet written in this section.

Musical notation for the second system of the piece. It features a grand staff with a treble clef and a key signature of one sharp (F#). The time signature is 4/4. The bass line continues with the same eighth-note accompaniment. The treble line contains a melody starting with a fermata on the first note, followed by eighth-note patterns and a final note with a fermata.



Comptine d'un autre été

Amelie - Large Version



Em $\xrightarrow{\text{R}}$ G $\xrightarrow{\text{L}}$ Bm $\xrightarrow{\text{R}}$ D $\xrightarrow{\text{RLR}}$ Em

Mise en évidence des symétries dans la musica pop

- Guy Capuzzo, "Neo-Riemannian Theory and the Analysis of Pop-Rock Music", Music Theory Spectrum 26(2), p. 177-199, 2004

Synthesizer

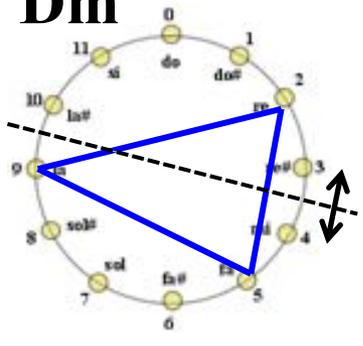
D- \leftrightarrow RP F- \leftrightarrow L Db+ \leftrightarrow RP Bb+ \leftrightarrow L

Séquence **RPLRPL**

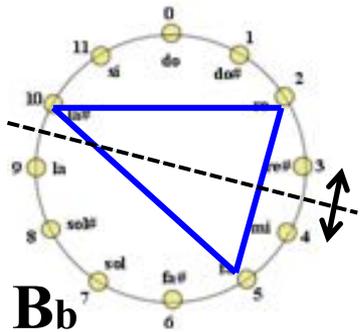
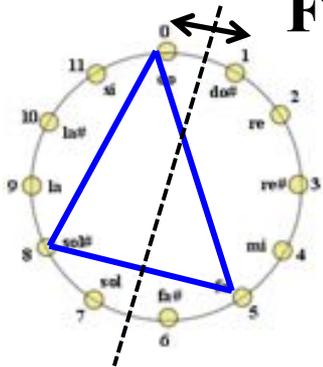


Shake the disease - 1985
(Depeche Mode) – min. 2'17"

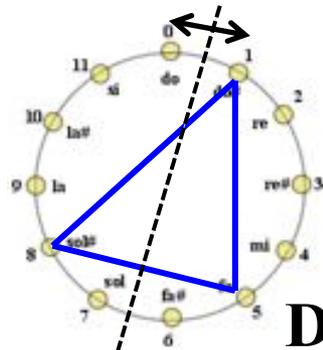
Dm



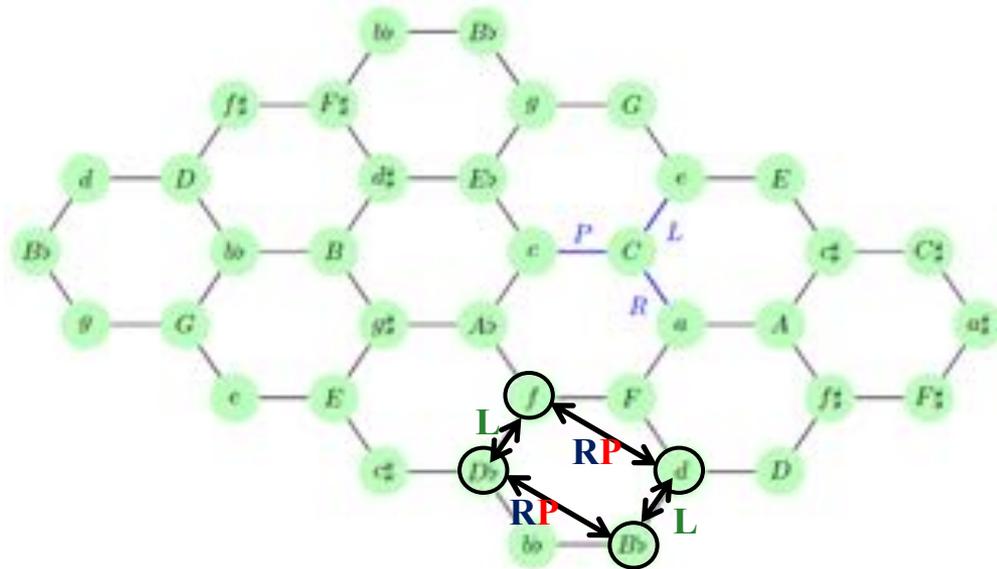
Fm



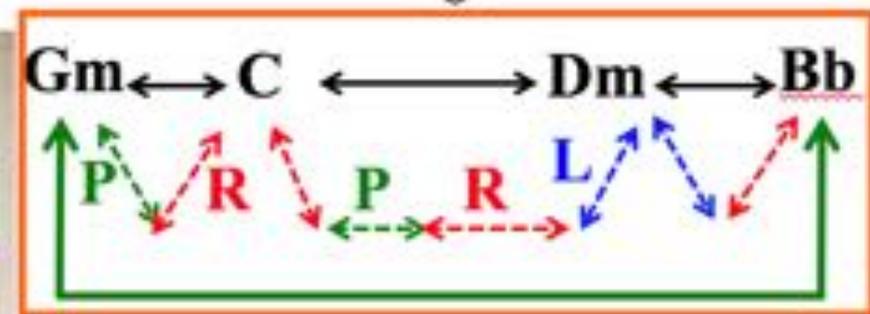
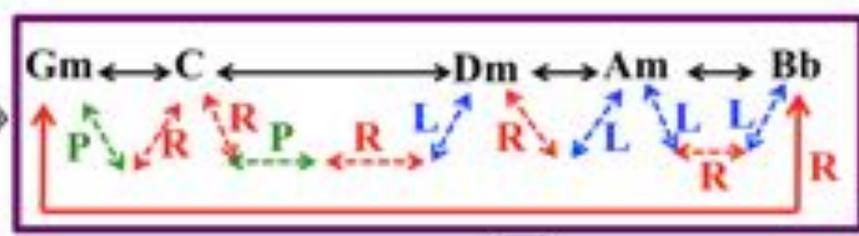
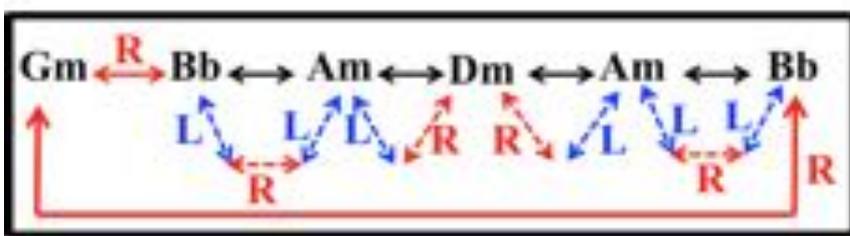
Bb



Db



(Source <http://www.mathsintheair.org/>)



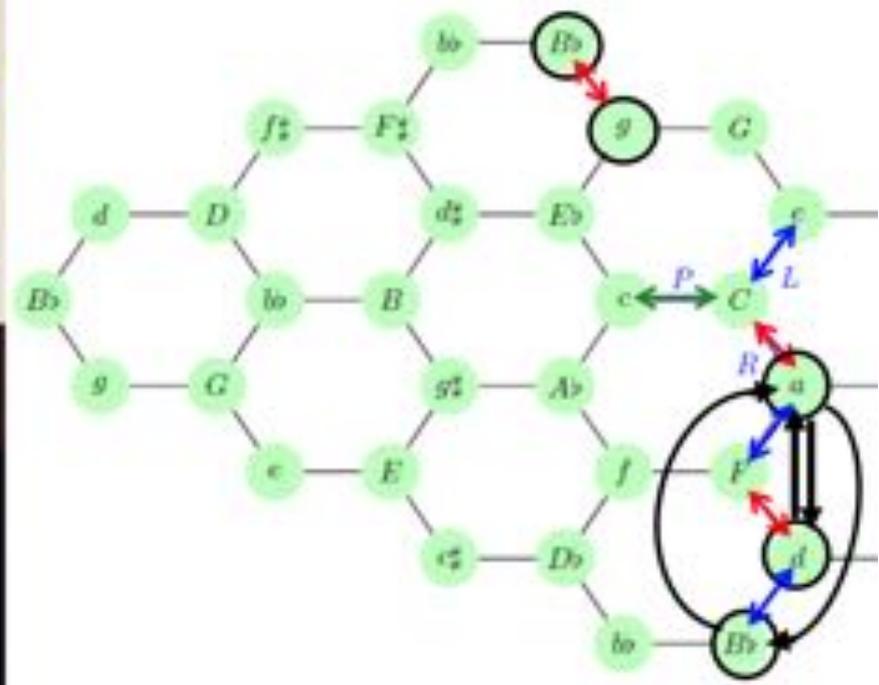
MON APACHE

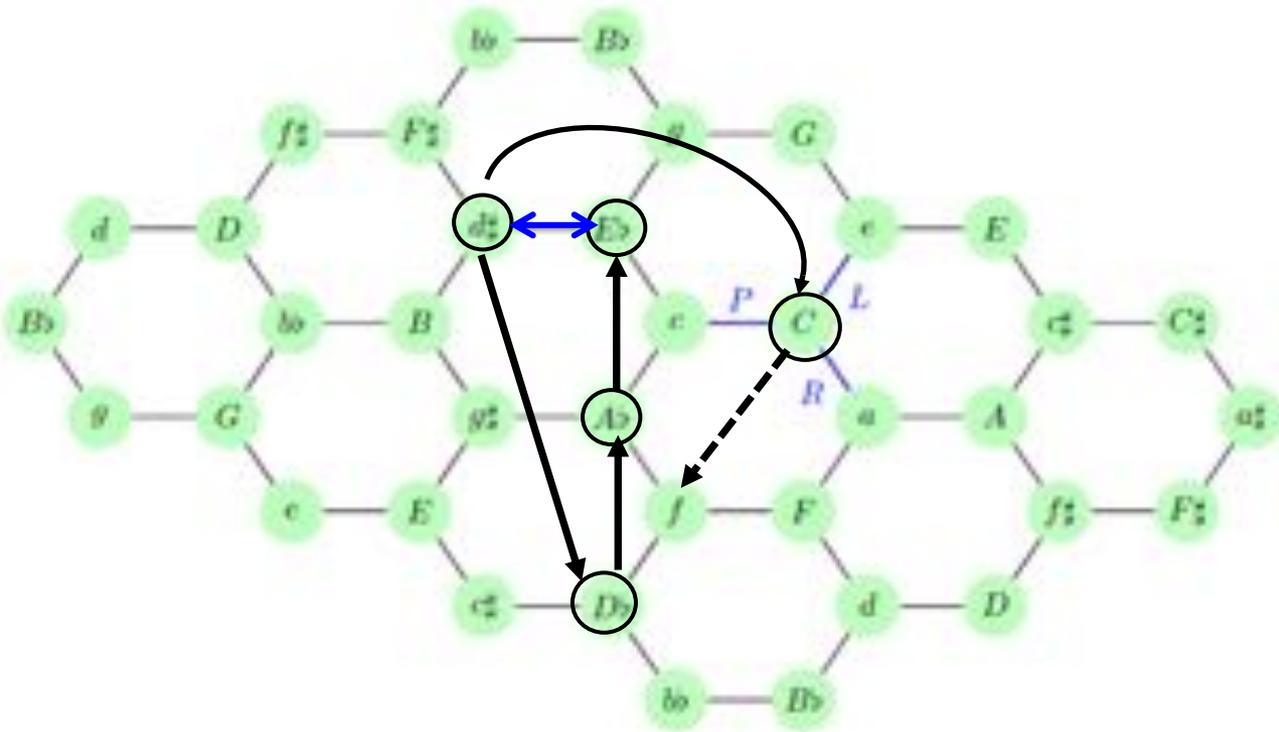
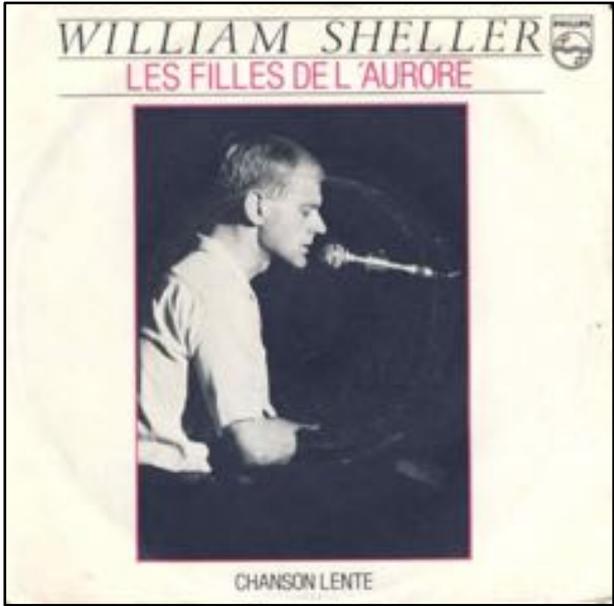
(L'Amour, l'Aléa)

Cette promesse, c'est de l'air que tu caches en attendant les apaches et leurs centaures	D'où vient la soie de ton ventre et d'où vient l'ardeur de ces beaux ilans que tu défends	les vaisseaux logés au creux de ta peau couleur d'encre	O mon moule amazone tu nous quittes et l'éto se fait autonome black light, white heat
O mon moule arlope dans les flancs et leurs reflets roux d'enfance dort un cyclope	Où voit les flets noirs de cendre	Une flèche en plein cœur un ciel à la dérive et je meurs de nous survivre	Une flèche en plein cœur un ciel à la dérive et je meurs de nous survivre
		un arceau sur la grève de nouveau enfin libre et je crève de nous survivre	un arceau sur la grève de nouveau enfin libre et je crève de nous survivre
		Cette leur plus encore tu la caches en attendant les apaches et leurs introns.	Cette promesse c'est de l'air que tu caches en attendant les apaches
			Cette promesse c'est de l'air que tu caches moi je l'attends. Mon apache

LOVE

Julien Doré





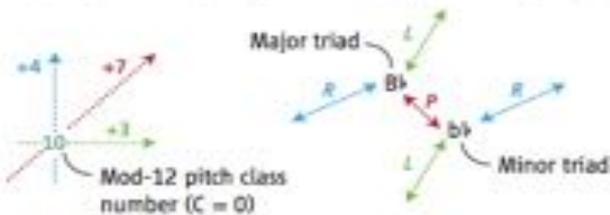
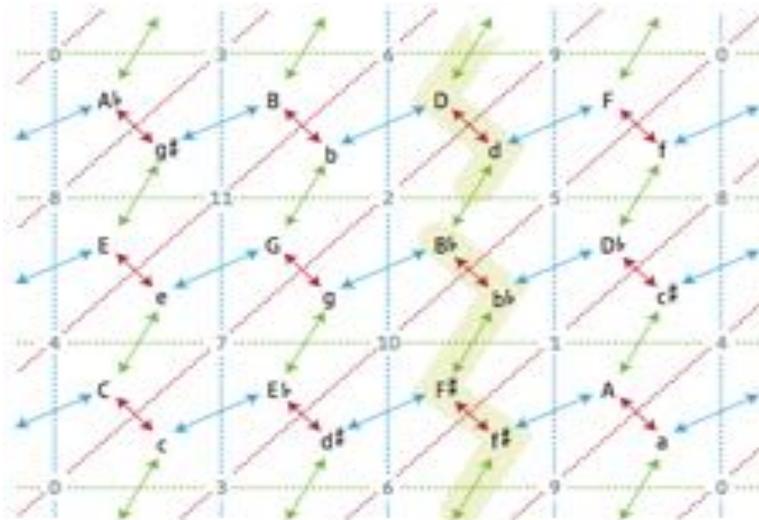
min. 0'33''

Logique tonale *versus* logique spatiale ?

- Guy Capuzzo, "Neo-Riemannian Theory and the Analysis of Pop-Rock Music", Music Theory Spectrum 26(2), p. 177-199, 2004

The image displays a musical score for the song "Easy Meat" by Frank Zappa. The score is written for a synthesizer and features a series of chords and time signatures. The chords are labeled as follows: G+, A+, F+, A-, Ab+, G+, D+, F#-, F+, E+, B+, D#-, D+, C#+, A#+, C-, B+, B#+, E+, B+, F#-, C#+, F#+, A+, E+, and E-. The time signatures are 5/3, 6/4, 5/3, 5/3, 6/4, 5/3, and D.C. al Fine. The score is divided into two sections by a dashed green line, with the second section starting with a "Fine" marking.

« Easy Meat » - 1981 (Frank Zappa)

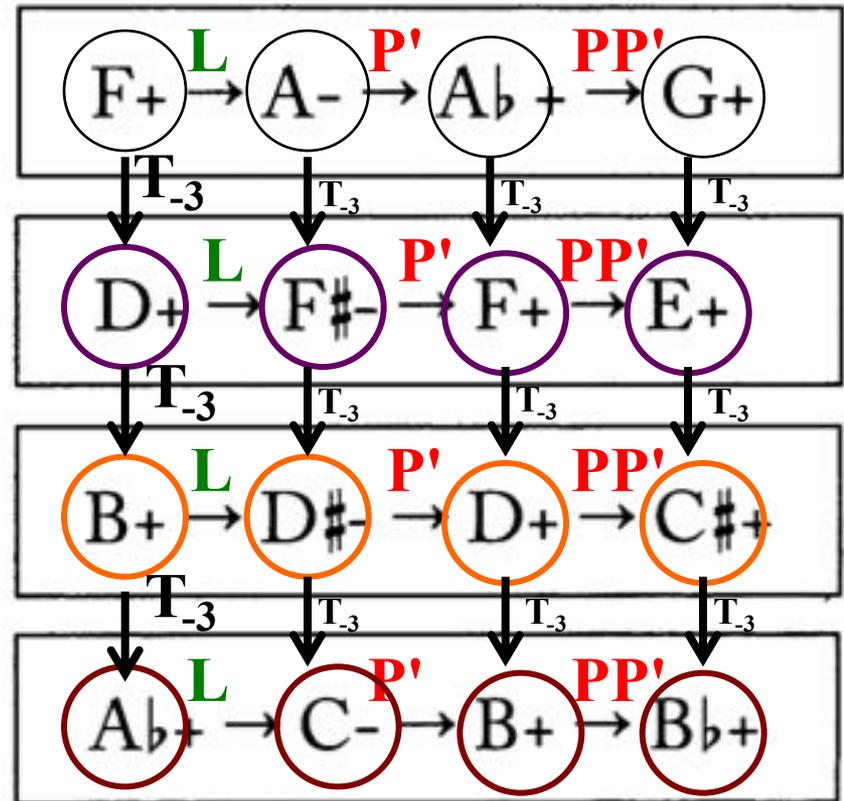
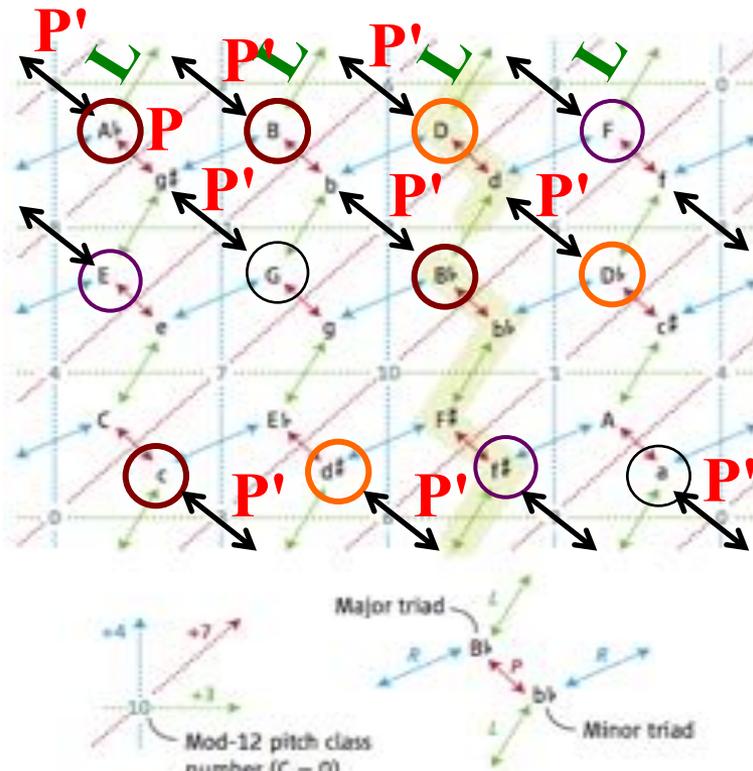


Logique tonale *versus* logique spatiale ?

- Guy Capuzzo, "Neo-Riemannian Theory and the Analysis of Pop-Rock Music", Music Theory Spectrum 26(2), p. 177-199, 2004

« Easy Meat » - 1981 (Frank Zappa)

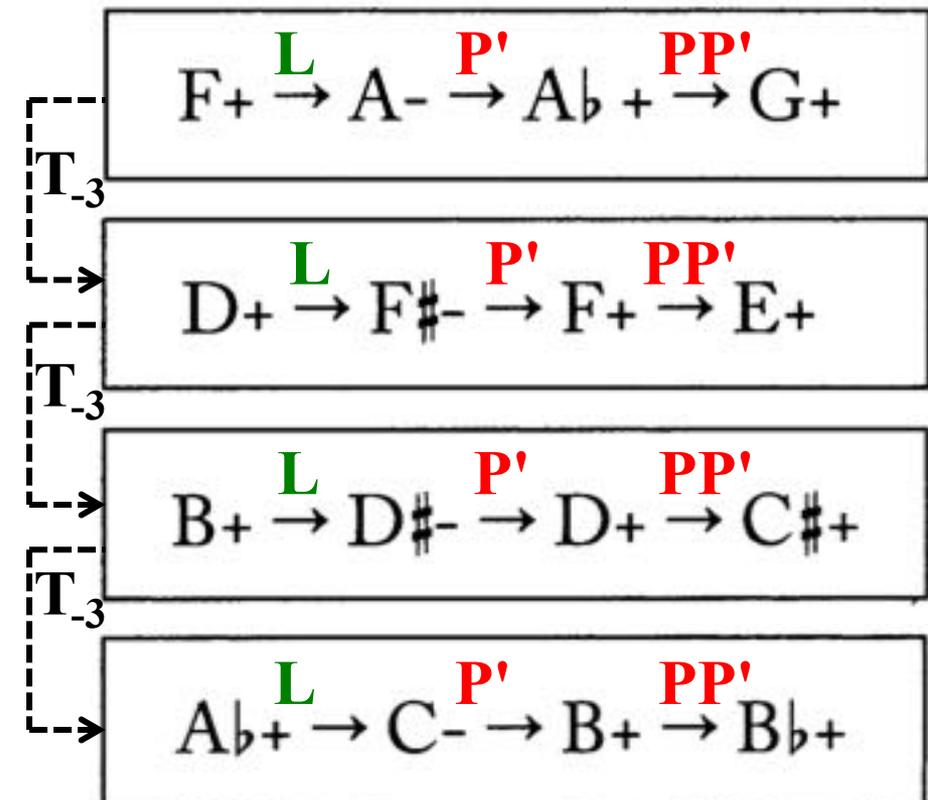
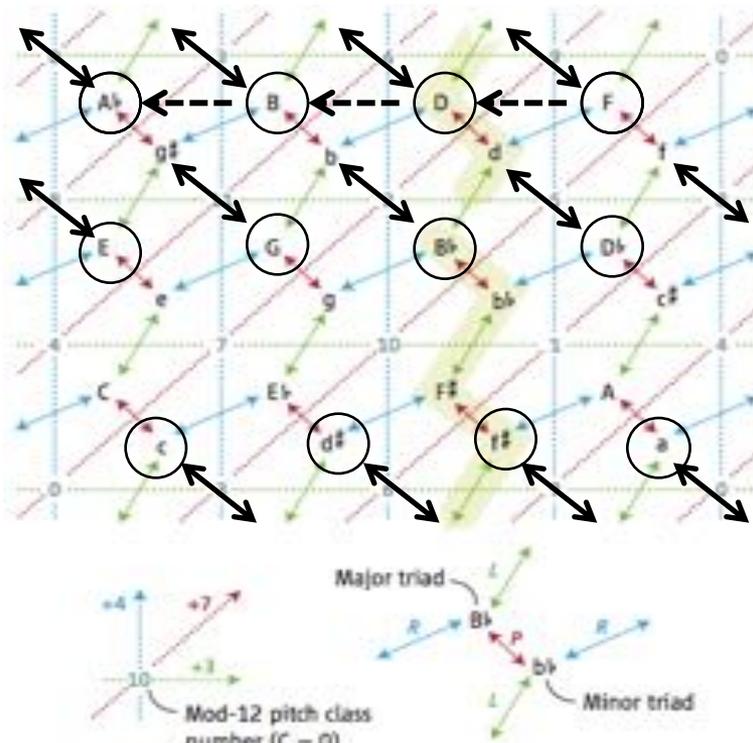
The image shows a musical score for the song "Easy Meat" by Frank Zappa. The score is written for synthesizer and includes chord diagrams for the left hand. The chords are labeled with Riemannian notation: $G+$, $A+$, $F+$, $A-$, $A\flat+$, $G+$, $D-$, $F-$, $F+$, $E-$, $E+$, $B+$, $F-$, $C+$, $F+$, $A+$, $E+$, $E-$. The score is annotated with Riemannian labels: L (green), P' (red), and PP' (red). The score is divided into sections: "Fine" and "D.C. al Fine".



Logique tonale *versus* logique spatiale ?

- Guy Capuzzo, "Neo-Riemannian Theory and the Analysis of Pop-Rock Music", Music Theory Spectrum 26(2), p. 177-199, 2004

« Easy Meat » - 1981 (Frank Zappa)



Le SLIDE chez Depeche Mode

- Guy Capuzzo, "Neo-Riemannian Theory and the Analysis of Pop-Rock Music", Music Theory Spectrum 26(2), p. 177-199, 2004

Synthesizer

D- **RP** F- **L** Db+ **RP** Bb+ **L**

Séquence **RPLRPL**=S²



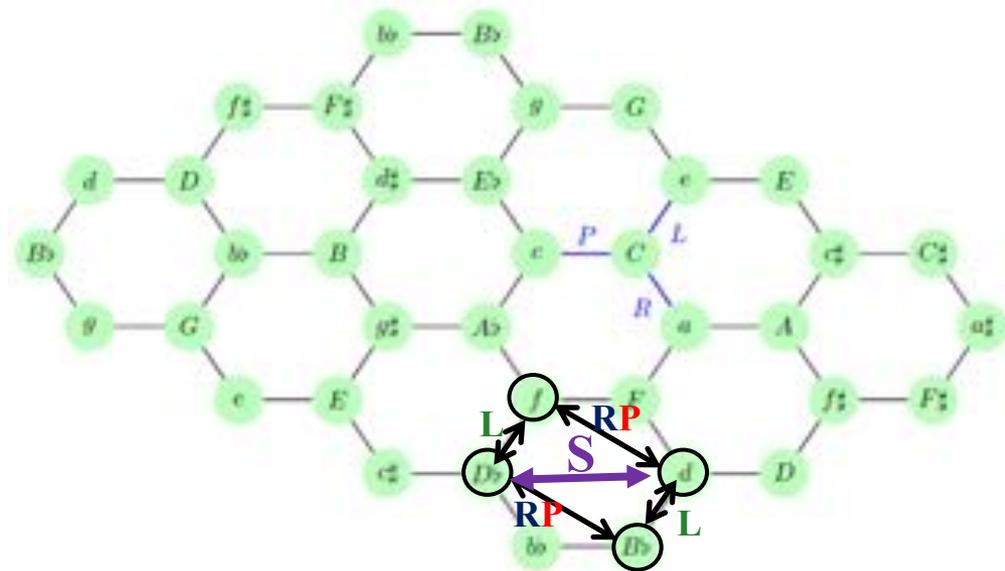
Shake the disease - 1985
(Depeche Mode) – min. 2'17"

Dm

Fm

Bb

Db

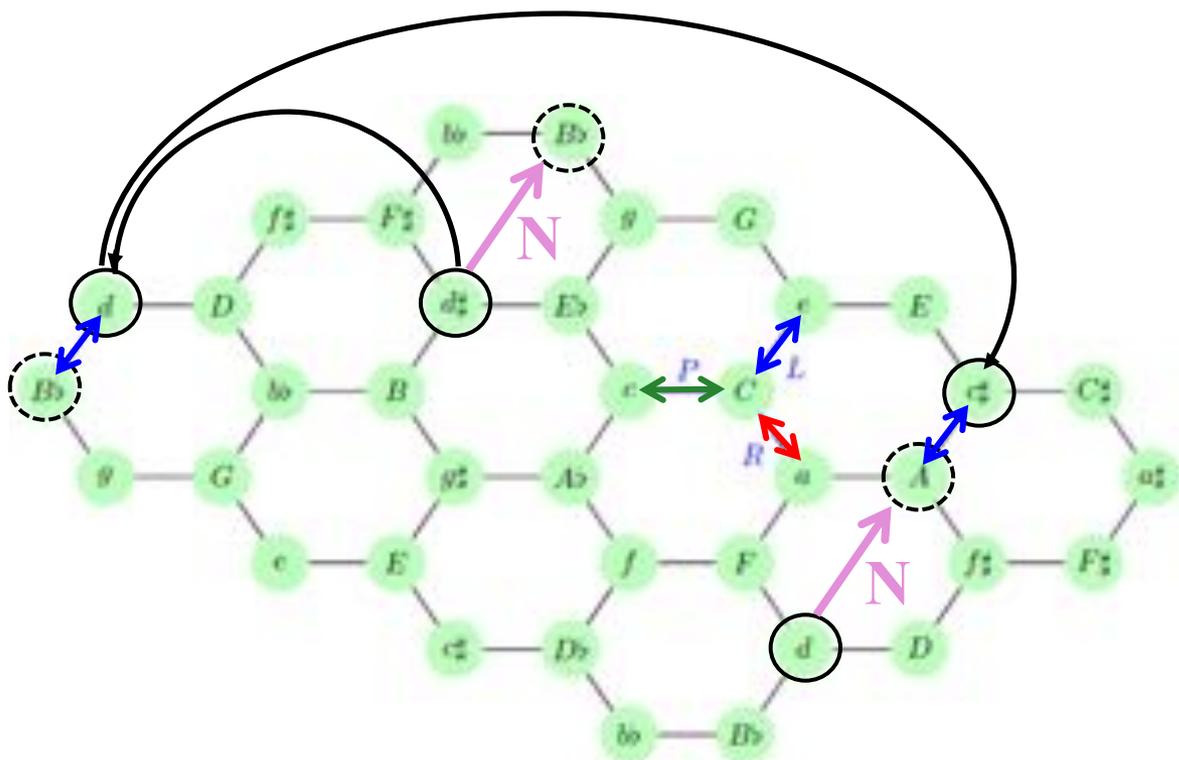


(Source <http://www.mathsintheair.org/>)

L'opérateur **N** comme *Nebenverwandt*

Arrangement : Alberto D'Este
(CD en préparation)

ANTEFATTO 01:30
(L. Mello / M. Andreatta)



$d^\#$
↓
 B_b
↓
 d
↓
 A
↓
 $C^\#$

non ci saranno stelle già sfinite
a raccontare stanche i nostri inizi
non ci saranno immagini sfuocate
dell'alba fatta dolce degli abbracci

NL

non ci saranno frasi come lame
e baci di un raccolto più prezioso
non sagome di vetro a cancellare
la schiuma del tuo volto che compare

NL

nel mio respiro fragile d'argilla
non ci sarà la notte a distanziare
la brace dei tuoi angoli di labbra
la luce che nel tuo danzare brilla

Reitérations de l'opérateur *Nebenverwandt*

Arrangement : Alberto D'Este
(CD en préparation)

FRANGIFLUTTI 01:29
(L. Mello / M. Andreatta)

Nel rifrangere i nostri cuori,
– gente nata che esige cura –
sono stato tra i meno bravi
nella tua favola insicura.

↓ RLPL

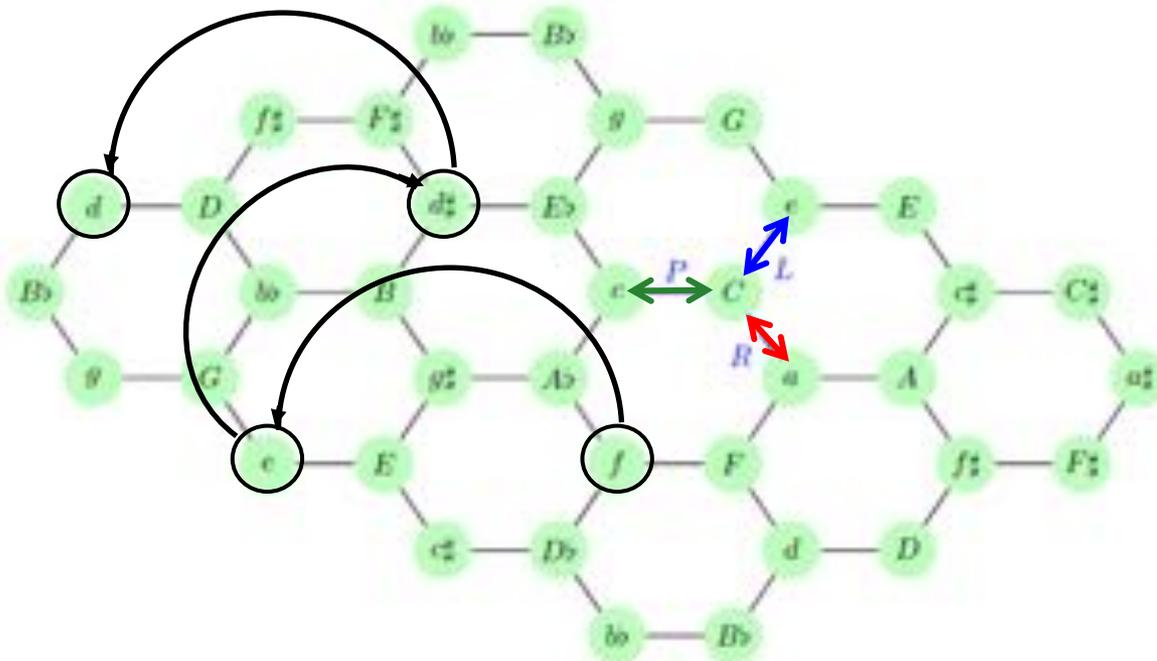
Ora è tardi lo so oramai
venti freddi come una fiaba
però tengo a cantare il canto
Eva sola che resta maga.

↓ RLPL

Eva cenno di ribellione
Eva fascio pronto all'addio
Eva donna che sa parlare
Al silenzio fatto d'oblio.

↓ RLPL

Sai parole da incatenare
sai sorridere per piacere
sai scappare senza tornare
sai ferire e sai far l'amore.



Reitérations de l'opérateur *Nebenverwandt*

Arrangement : Alberto D'Este
(CD en préparation)

FRANGIFLUTTI 01:29
(L. Mello / M. Andreatta)

Nel rifrangere i nostri cuori,
– gente nata che esige cura –
sono stato tra i meno bravi
nella tua favola insicura.



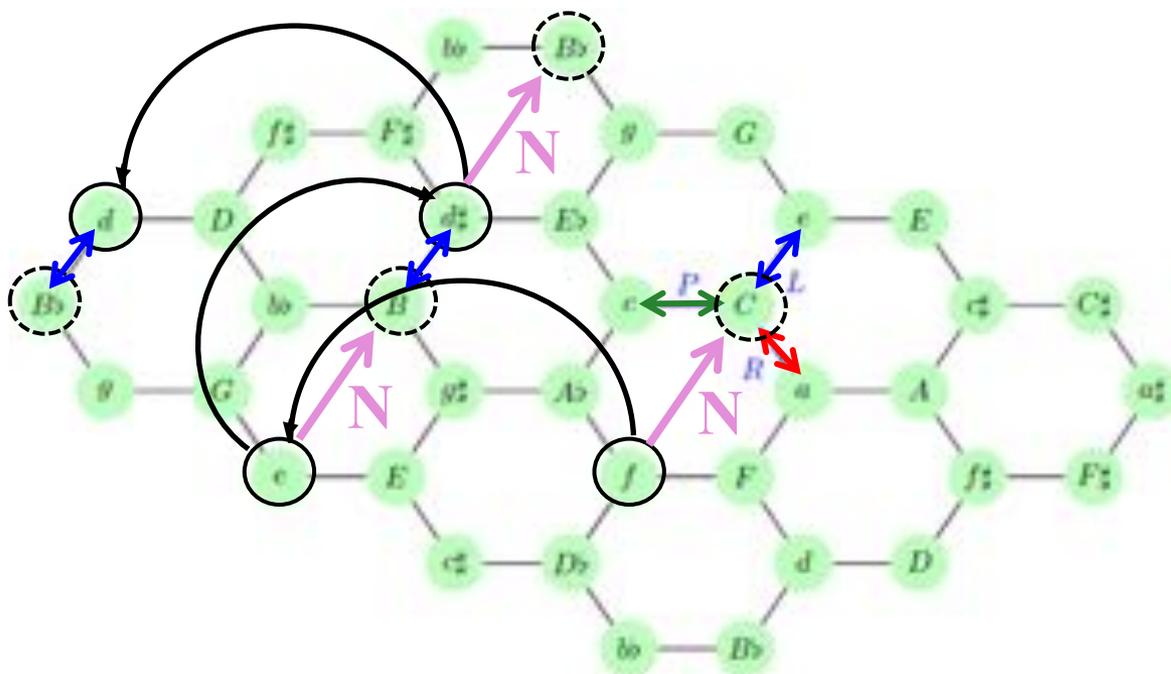
Ora è tardi lo so oramai
venti freddi come una fiaba
però tengo a cantare il canto
Eva sola che resta maga.



Eva cenno di ribellione
Eva fascio pronto all'addio
Eva donna che sa parlare
Al silenzio fatto d'oblio.



Sai parole da incatenare
sai sorridere per piacere
sai scappare senza tornare
sai ferire e sai far l'amore.

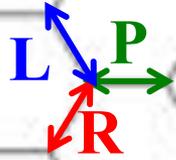


Un cycle, ses extensions et ses modulations

C-c-Eb-g-G-e-C → [PRLPRL]

C-c-Eb-g-G-e-C $\xrightarrow{\text{quinte}}$ G-g-Bb-d-D-b-G
[PRLPRL]

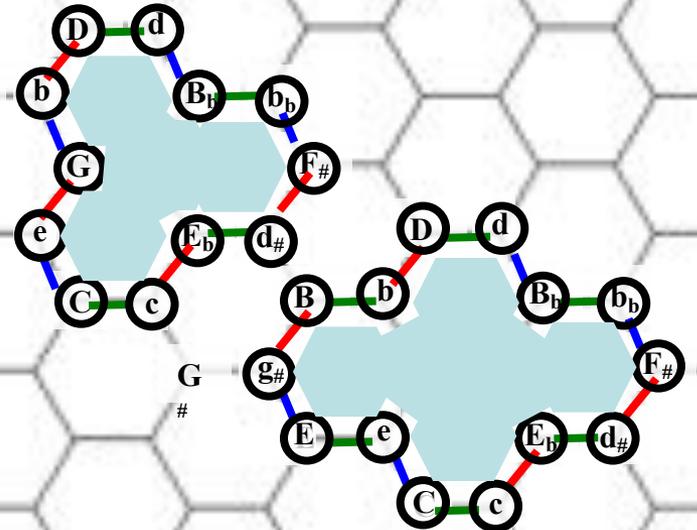
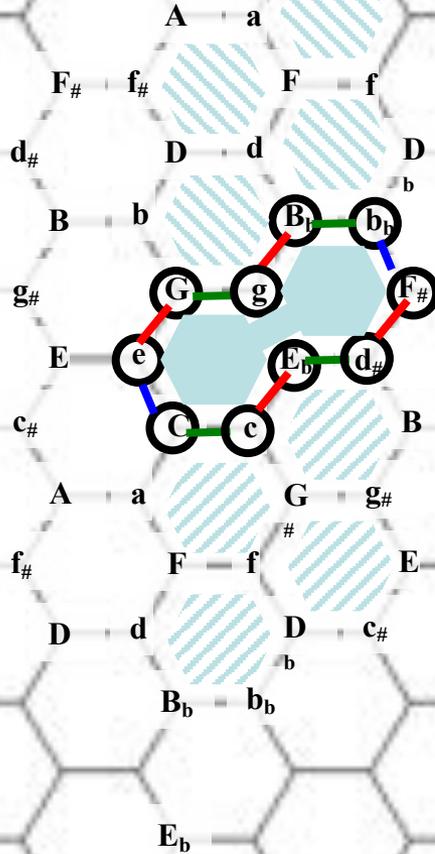
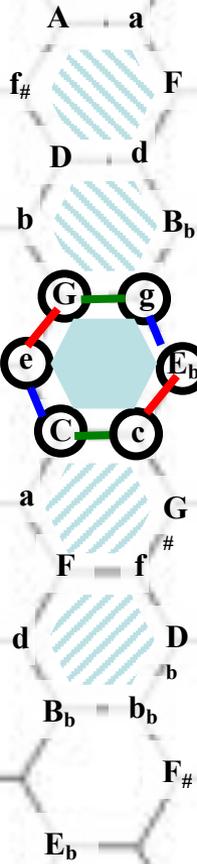
C-c-Eb-g-G-e-C $\xrightarrow{\text{quarte}}$ F-f-G#-c-C-a-F
[PRLPRL]



Axe des quintes



quartes



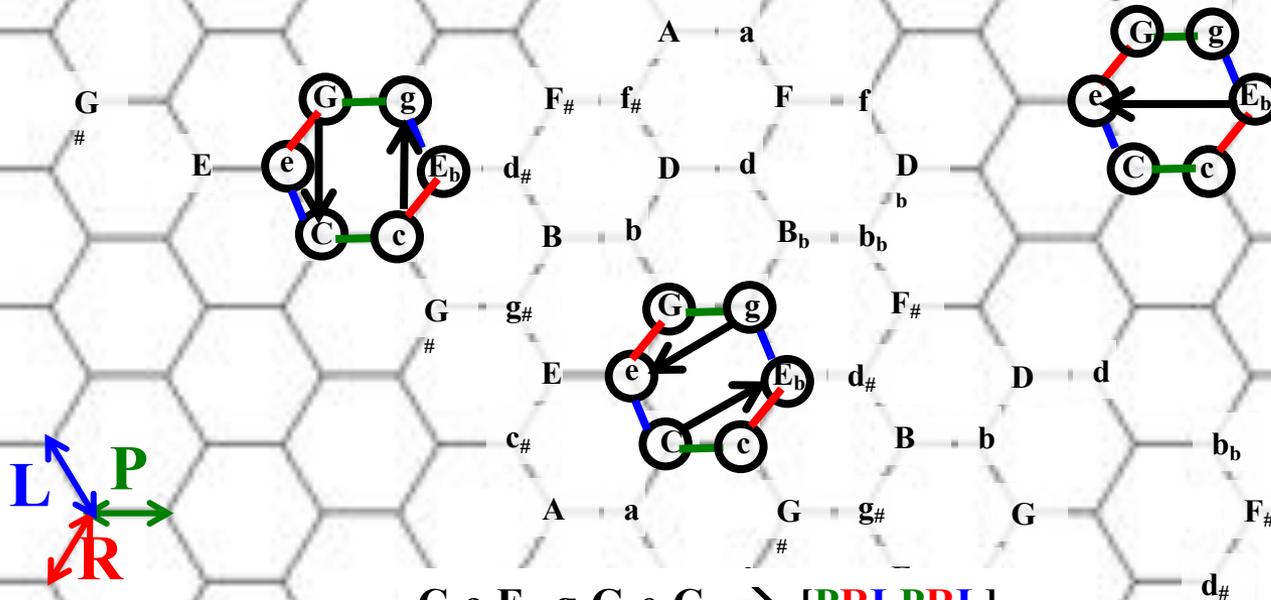
Un cycle et ses raccourcis...

$C-c-E_b-g-G-e-C \rightarrow [PRLPRL]$

$C-c-----g-G---C \rightarrow [P(RL)P(RL)]$

$C-c-E_b-g-G-e-C \rightarrow [PRLPRL]$

$C-c-E_b-----e-C \rightarrow [PR(LPR)L]$



$C-c-E_b-g-G-e-C \rightarrow [PRLPRL]$

$C-----E_b-g-----e-C \rightarrow [(PR)L(PR)L]$

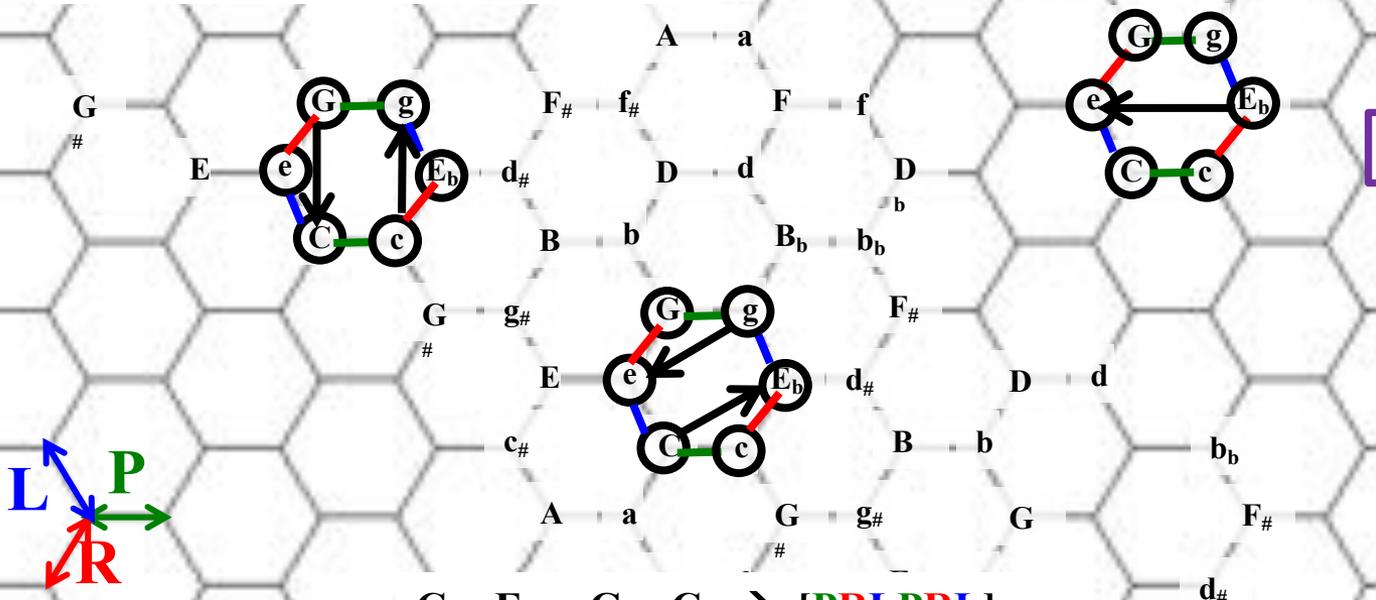
Un cycle et ses raccourcis...

$C-c-E_b-g-G-e-C \rightarrow [PRLPRL]$

$C-c-----g-G---C \rightarrow [P(RL)P(RL)]$

$C-c-E_b-g-G-e-C \rightarrow [PRLPRL]$

$C-c-E_b-----e-C \rightarrow [PR(LPR)L]$



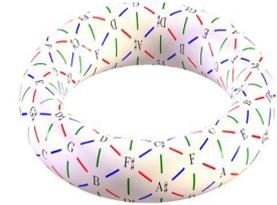
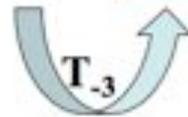
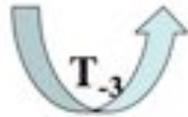
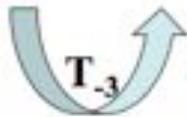
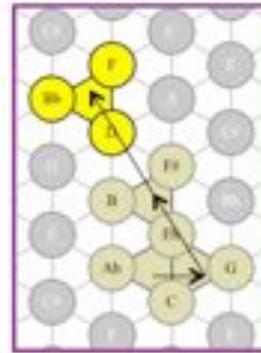
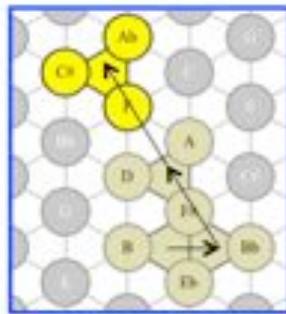
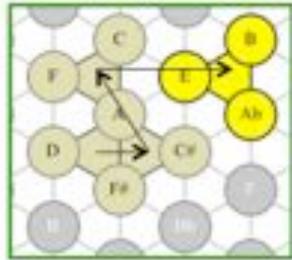
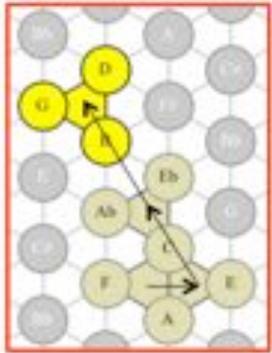
LPR = SLIDE

$C-c-E_b-g-G-e-C \rightarrow [PRLPRL]$

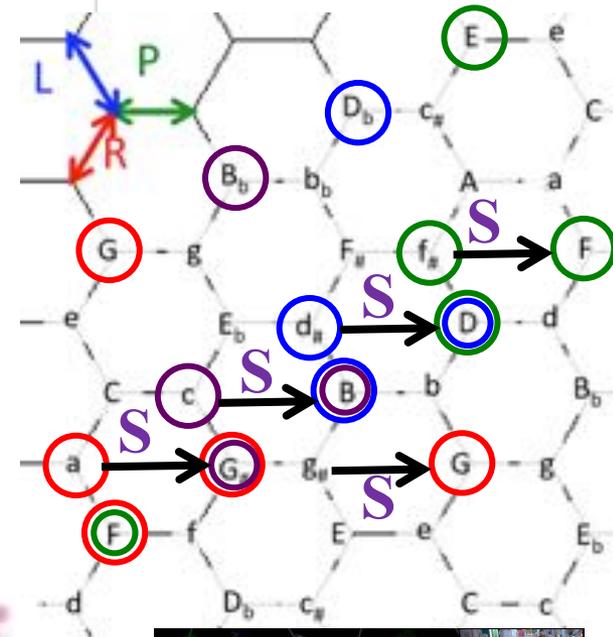
$C-----E_b-g-----e-C \rightarrow [(PR)L(PR)L]$

Le SLIDE chez Zappa

Fa la_m La_b Sol Re $fa\#_m$ Fa Mi Si $la\#_m$ Re Re_b La_b do_m Si Si_b



→ Source: Wikipedia



« Easy Meat » - 1981 (Frank Zappa)
min. 1'44" – 2'39"



→ www.mathemusic.net

Harmonic Progressions

In Paolo Conte

Il Regno del Tango



M.Andreatta G.Baroin
www.MatheMusic.net 2016

Les zig-zag du *Nebenverwandt* chez Paolo Conte

IL REGNO DEL TANGO (Paolo Conte)



Non son neanche del paese

ho una valigia di carton

sono vestito, sì in borghese,

ma dentro c'è il bandoneon...

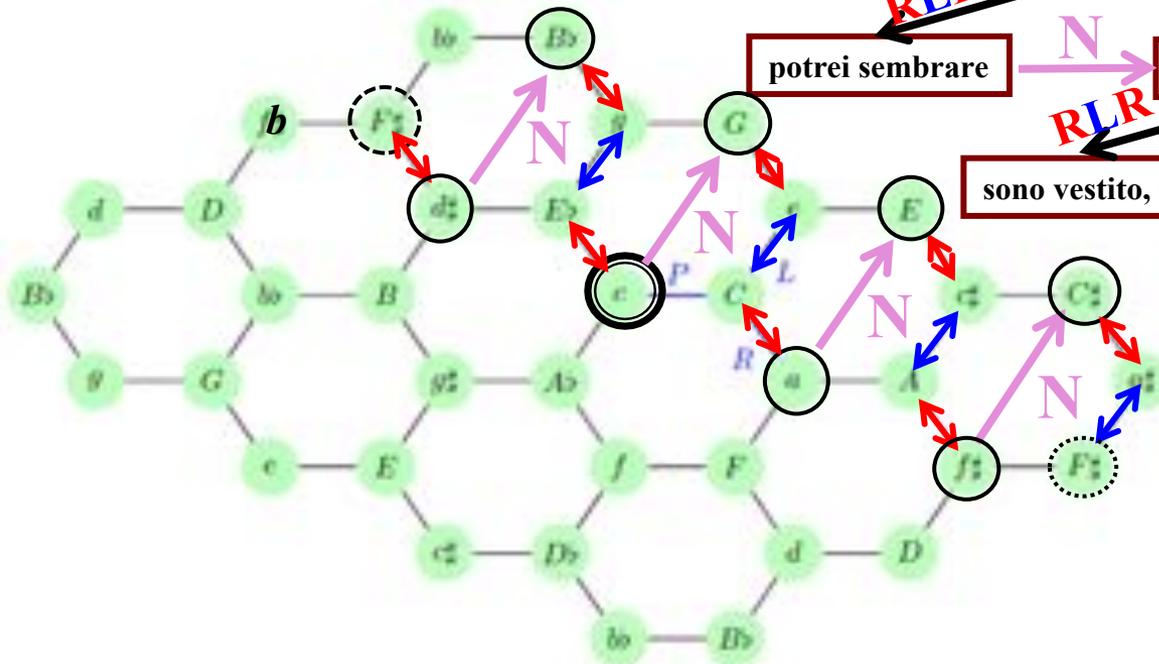
potrei sembrare in borghese,

sono vestito, sì un ragioniere,

anche un geometra potrei,

ma un tango sento io gridare

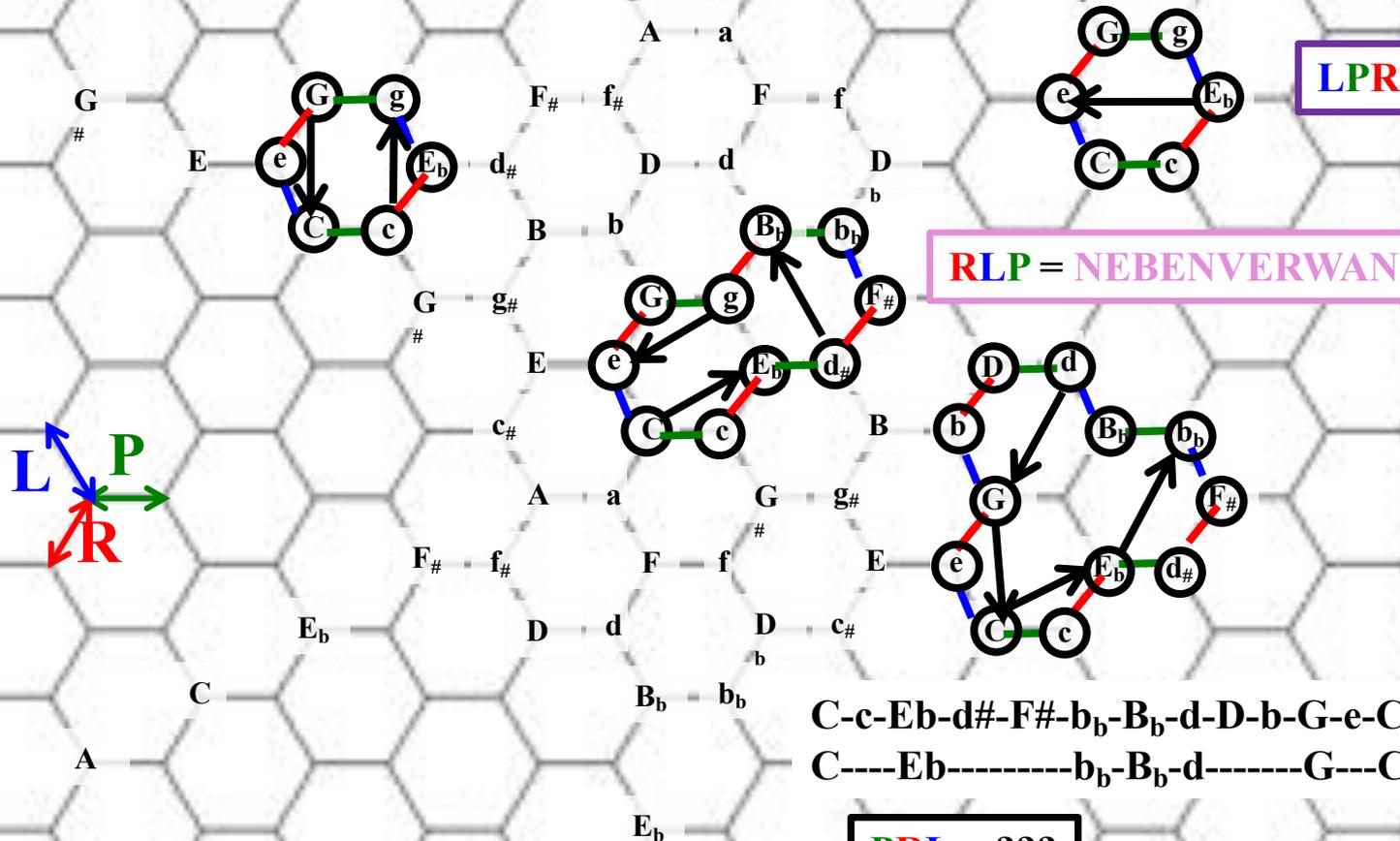
in fondo ai sentimenti miei



Un cycle, ses raccourcis et ses nouvelles opérations

C-c-E_b-g-G-e-C → [PRLPRL]

C-c-----g-G---C → [P(RL)P(RL)]



LPR = SLIDE

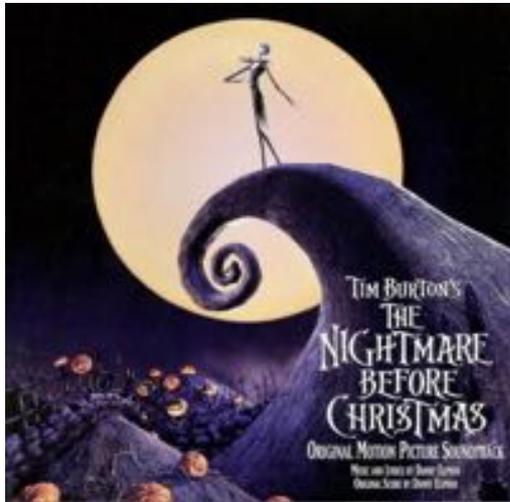
RLP = NEBENVERWANDT

PRL = ???

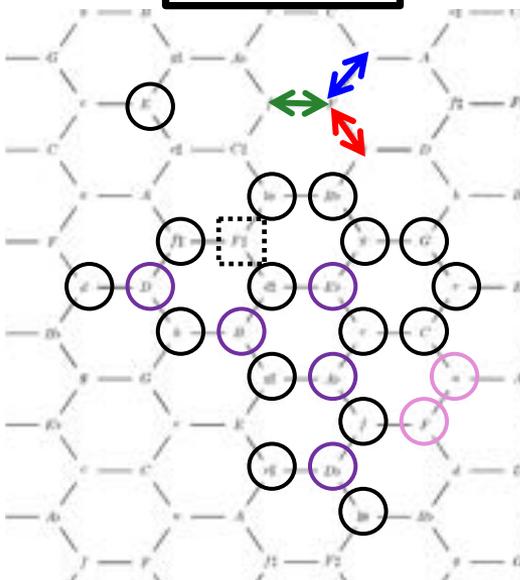
C-c-E_b-d#-F#-b_b-B_b-d-D-b-G-e-C

C-----E_b-----b_b-B_b-d-----G---C

Chansons et compositions qui modulent beaucoup...



PRL = ???



C Cm C# C#m D Dm Eb Ebm
 E Em F Fm F# F#m G Gm
 Ab Abm Am Bb Bbm B Bm

F#m
 Say it once, say it twice,
 Take a chance, Roll the dice

Dm Bm
 Ride with the moon in the dead of night

F#m Dm F#m Dm F#m
 Every body scream, everybody scream,

Cm D7 Em
 In our town of Hallowe'en!

I am the clown with the tear away face
 Here in a flash, and gone without a trace

Em
 I am the who, when you call 'who's there?'

C#m
 I am the wind running through your hair

Ebm
 I am the shadow on the moon at night,
 Bm Abm
 filling your dreams to the brim with fright!

Fm Dm
 This is Hallowe'en, this is Hallowe'en!

Bm Gm
 Hallowe'en, Hallowe'en, Hallowe'en, Hallowe'en!

C#m G7/C#
 Tender lumpings everywhere,
 C#m
 Life's no fun, without a good scare

B
 That's our job but we're not mean,
 C#m A7
 In our town of Hallowe'en

Abm E Abm
 In this town, don't we love it now?

Bm C#7 F#m
 Everyone's waiting for the next surprise

Am F/A Am
 Skeleton Jack might catch you in the back

Cm D7 Gm Bbm
 and scream like a banshee make you jump out of your skin!

F#m
 This is Hallowe'en, won't you please

Ebm
 make way for a very special guy?

Bbm
 Our man Jack is king of the pumpkin patch

F#m Ebm
 Everyone hail to the pumpkin king

Dm
 This is Hallowe'en, This is Hallowe'en

Bbm Gm
 Hallowe'en, Hallowe'en, Hallowe'en Hallowe'en!

Gm Eb Gm Eb
 In this town, we call home

m D7 Gm
 Everyone hail to the pumpkin song.

Symétries dans *Madeleine* de Paolo Conte

Pyribello *Medicament*

Lab→Réb/Fa→Sib⁷→Mib⁷/Réb

Chorus

Lab Réb/Fa Sib⁷ Mib⁷/Réb Si/Ré# Mi Do# Fa#

Re-La Sol Mi La Ré La# Ré Do# Mib



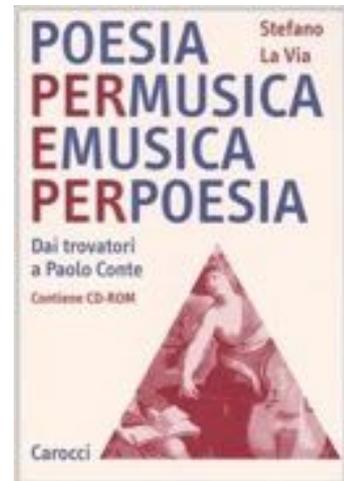
Lab→Réb/Fa→Sib⁷→Mib⁷/Réb

Si/Ré#→Mi→Do#→Fa#

Ré/La→Sol→Mi⁷→La⁷

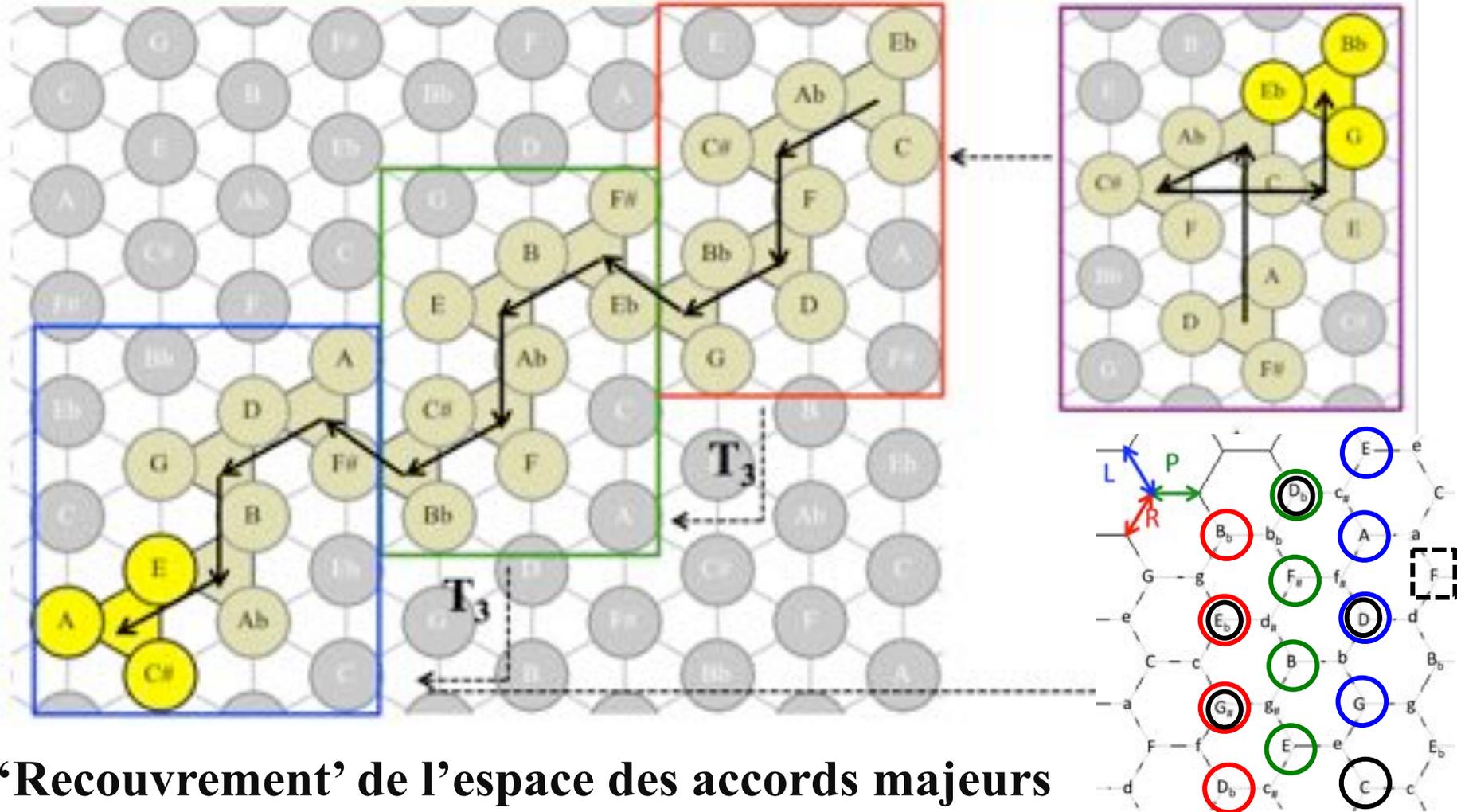
Ré→Lab⁷→Réb→Do⁷→Mib

S. La Via, Poesia per musica e musica per poesia. Dai trovatori a Paolo Conte, Carocci, 2006



Symétries dans *Madeleine* de Paolo Conte

La_b Re_b Si_b Mi_b Si Mi Re_b Fa_♯ Re Sol Mi La Re La_b Re_b Do Mi_b

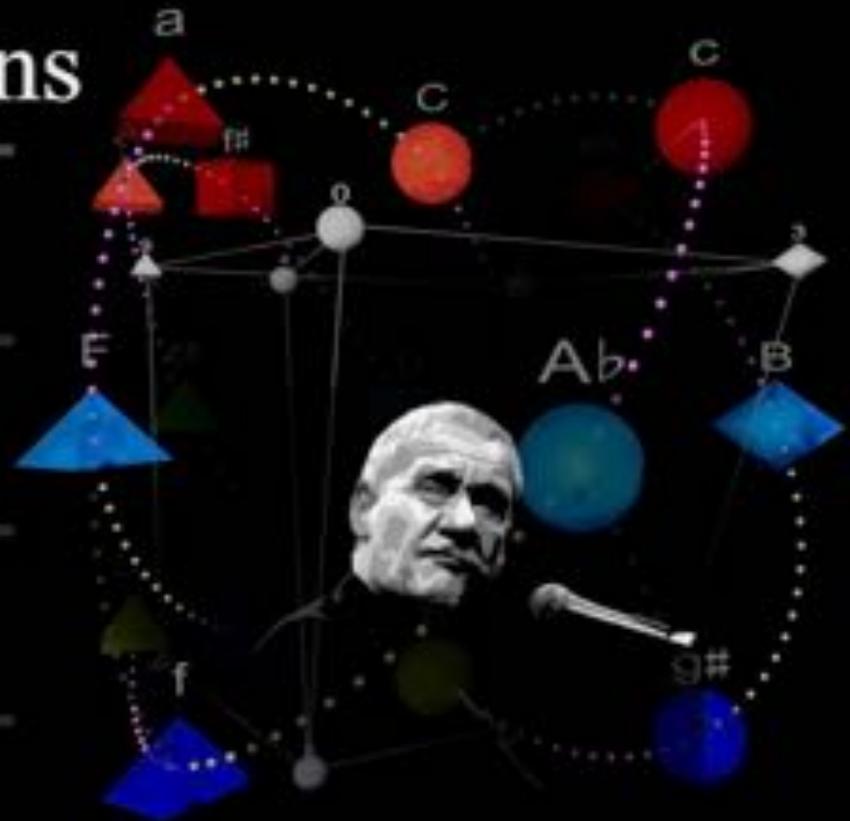


‘Recouvrement’ de l’espace des accords majeurs

Harmonic Progressions

In Paolo Conte

Madeleine



Supervision Moreno Andreatta
Modelisation Gilles Baroin 2016

La place de l'harmonie dans la musique de Paolo Conte

Manuela Furnari

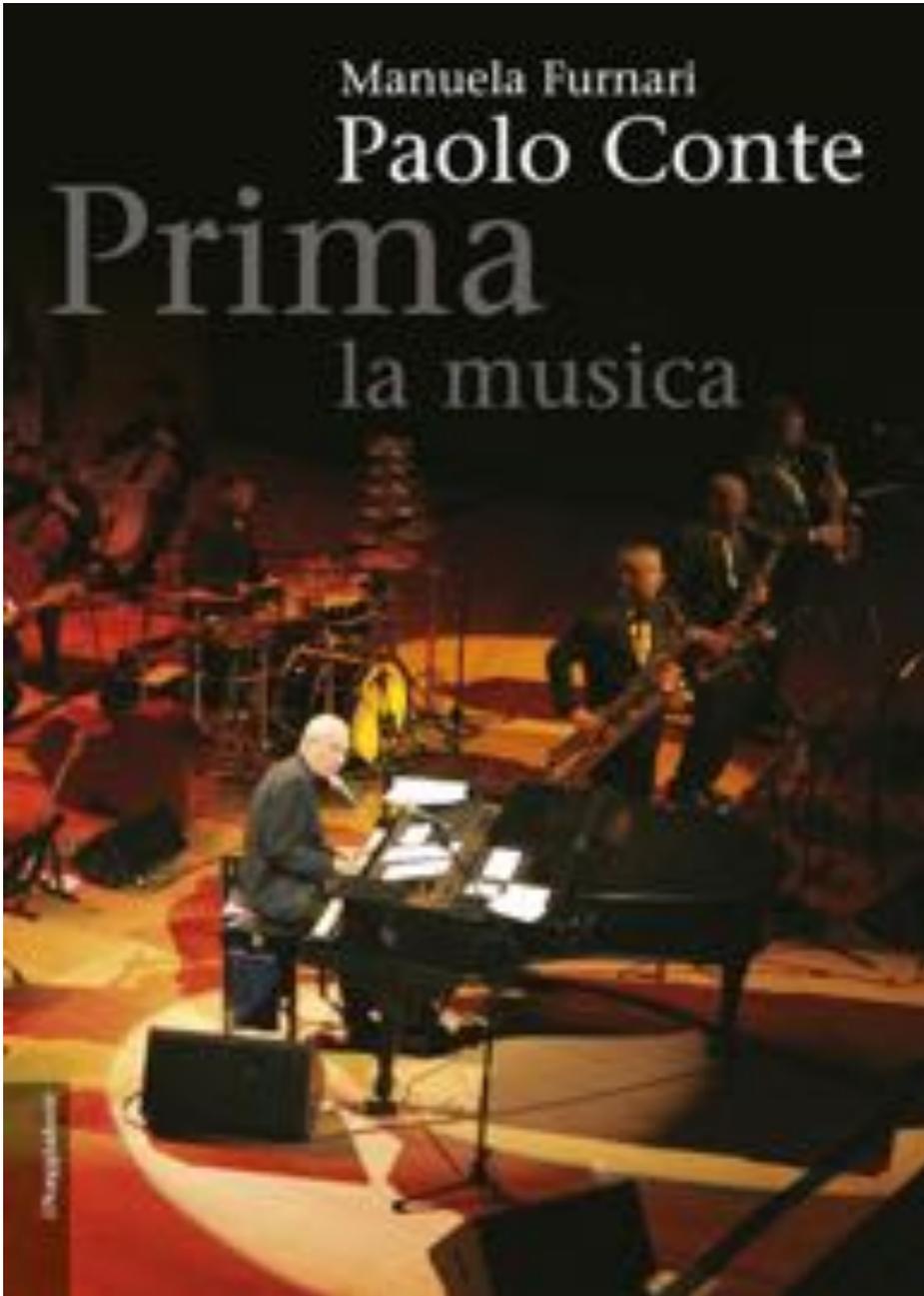
Paolo Conte

Prima

la musica

J'ai toujours déclaré de composer selon la vieille façon américaine, tout d'abord la musique et après les textes. Cette prééminence de la musique par rapport aux paroles ce n'est pas uniquement une question de méthode, c'est quelque chose de plus profond : c'est la technique de celui qui a la conviction que c'est la composition musicale à faire la page, à conduire en grande partie le jeu dynamique, ad exercer, en définitive, ses droits qui sont prioritaires d'un point de vue architectonique.

Ho sempre dichiarato di comporre secondo la vecchia maniera americana, **prima la musica, poi i testi**. Questa preminenza della musica rispetto alle parole non riguarda però semplicemente una questione di metodo, è qualcosa di più profondo: è la tecnica di chi ha la convinzione che sia la **composizione musicale** a "fare la pagina", a condurre in gran parte il gioco dinamico, a esercitare, in definitiva, i suoi diritti, che dal punto di vista architettonico sono prioritari.

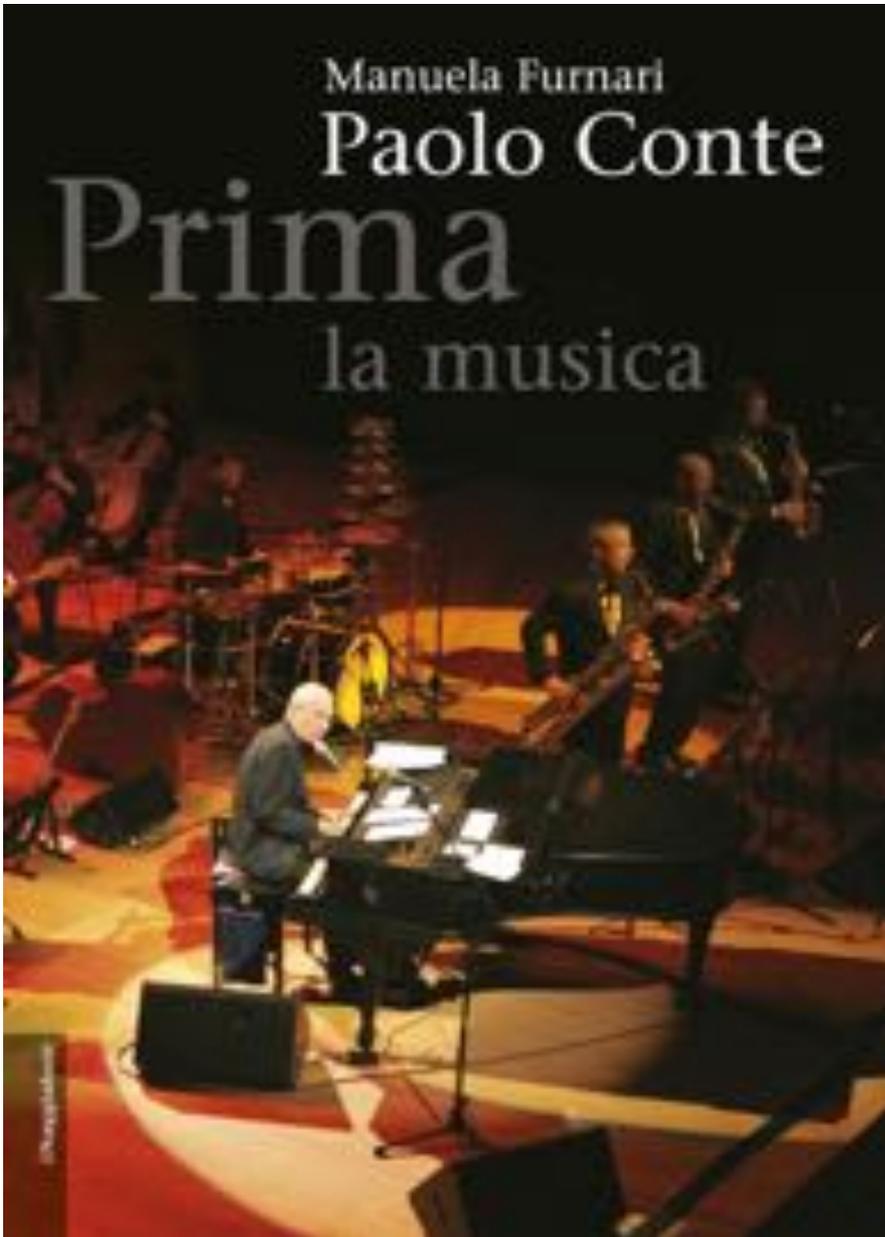


La place de l'harmonie dans la musique de Paolo Conte

Manuela Furnari
Paolo Conte
Prima
la musica

La composition musicale, avec son parcours harmonique, son dessein mélodique, les mouvements et les accords rythmiques, a une potentialité expressive intrinsèque, dans le sens qu'une musique mène avec elle une littérature entière : certaines cadences musicales appartiennent désormais à un code expressif, un code qui affecte également le choix des mots. Non seulement, les musiques ont des couleurs dans leurs fonds qui conditionnent aussi tout ce qui est le chromatisme de l'imaginaire à travers lequel, ensuite, je travaille sur les mots.

La **composizione musicale**, con il suo **percorso armonico**, il **disegno melodico**, le movenze e gli **accordi ritmici**, ha un'intrinseca potenzialità espressiva, nel senso che una musica si porta dietro, a sua volta, tutta una letteratura: certe cadenze musicali appartengono ormai a un codice espressivo e in questo codice le parole finiscono per cadere. Non solo, le musiche hanno dei colori nel loro fondo che condizionano anche tutto quello che è il **cromatismo dell'immaginazione** attraverso il quale, poi, lavoro sulle parole.



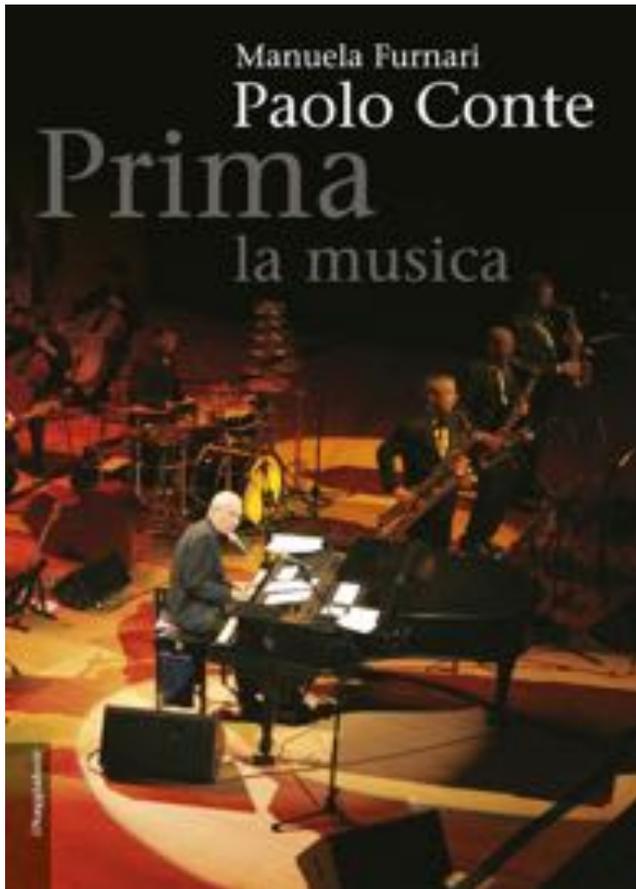
La place de l'harmonie dans la musique de Paolo Conte

Le fait d'écrire tout d'abord la musique et ensuite le texte m'oblige à un procédé emprunté du cinéma. **Une chanson** est peut-être plus cinéma que poésie ou musique : elle est le rêve de quelque chose qui aimerait se mouvoir. La promenade horizontale de l'harmonie.

Scrivere prima la musica e poi il testo mi obbliga ad un procedimento preso in prestito dal cinema. **Una canzone** è forse più cinema che poesia o musica: è il sogno di qualcosa che vorrebbe muoversi. La camminata orizzontale dell'armonia.

L'abilità de se mouvoir harmoniquement et enharmoniquement appartient à toute forme de musique. L'un des limites du jazz est celui d'insister toujours sur le même parcours harmonique. Je pense que l'oreille a besoin de s'éloigner de cette attention constante sur une tonalité

L'abilità nel muoversi armonicamente e enarmonicamente appartiene a tutta la musica. Uno dei limiti del jazz è quello di insistere sempre sullo stesso giro armonico. Io penso che l'orecchio dopo un po' [...] abbia bisogno di spostarsi [...] da questa continua attenzione sulla stessa tonalità.



Zig-zag et cycles hamiltoniens dans le Tonnetz

Le Blé en Herbe

(Polo/Moreno/Dieu)

Plonger comme un enfant, cheveux au vent

Sous l'océan du blé en herbe

Marée d'épis couleur d'amande

Qui tendent à caresser le ciel

Algues tendres de mille plages

Frôlant le ventre des nuages

Cheveux de pluie, dos de poissons

Qui frissonnent à l'unisson

Suivre le bord des continents

Dans l'océan du blé en herbe

Pêcher le corail du pavot

Dans le sang des coquelicots

Croiser matin dans l'herbe folle

Deux tourterelles qui s'envolent

Suivre les jeux des hirondelles

Sur le paysage éternel

Nager comme un enfant, cheveux au vent

Sous l'océan

Du blé en herbe

Marée de fruits au goût amer

Acide et salée comme la mer

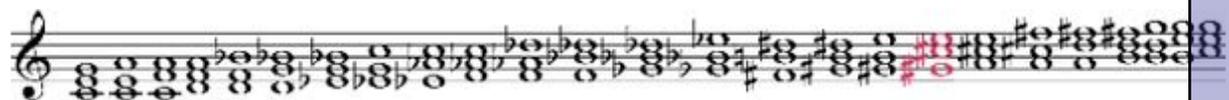
Vers l'îlot d'un petit village

Vers un château d'eau sur la plage

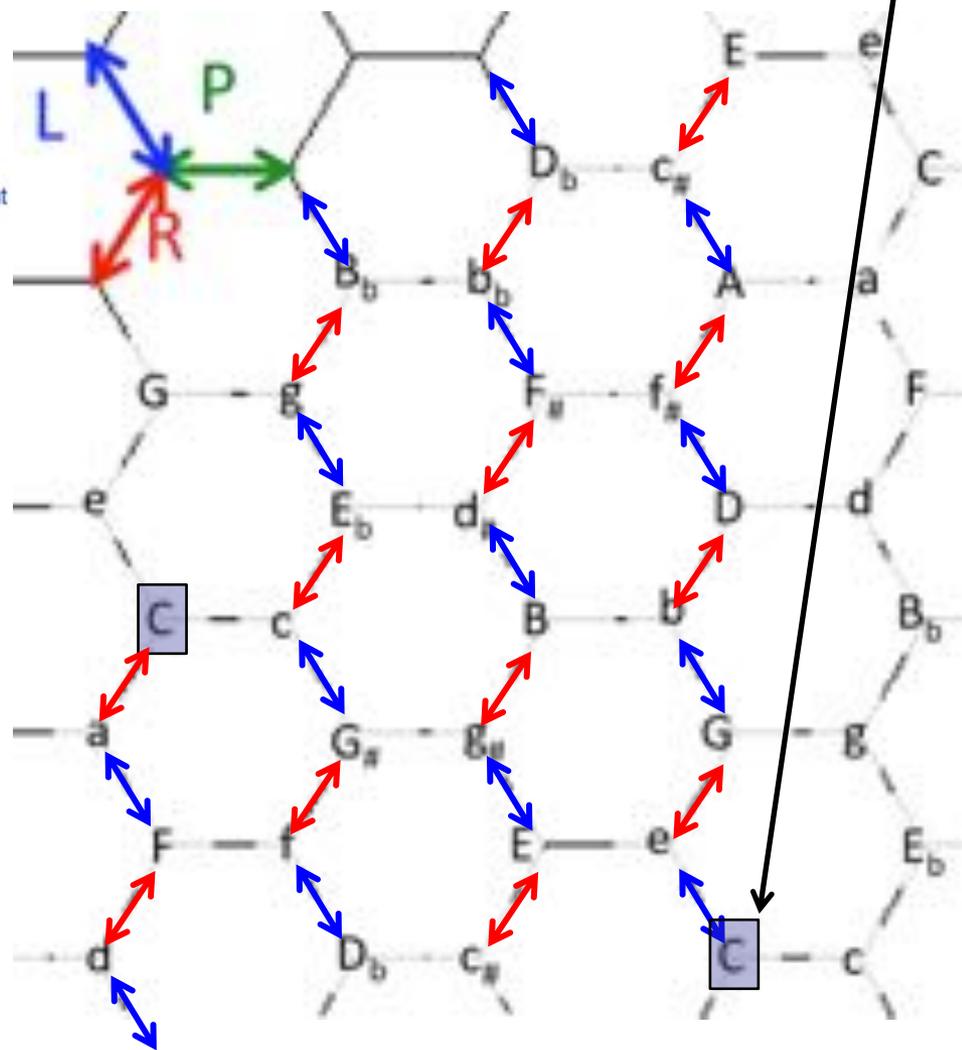
Quand tout s'éteint avant l'orage

Quand se lève le vent du large

Sur le blé vert



← time



Advertisement for 'CABARET HAMILTONIEN'. The image shows two men performing on stage. The text includes the names of the performers and the venue.

FABRICE QUÉDY
Formalises dans la musique savante

MORENO ANDREATTI
Mentoratrices appliquées à la musique

POLO PIERRE LAMY
Écriture appliquée aux formes musicales

Alexis - Voix, guitare, écriture
Augustin - Voix, claviers, écriture
Clara - Voix, guitare, écriture
Emilie - Voix, mandoline, écriture
Séverine - Voix, alto, écriture
Thomas - Voix, claviers, écriture

Écrire sous la contrainte...
TACHER DU PAPIER SOUS
L'OBLIGATION DE FAIRE
QUELQUE CHOSE...

SALIR DU BOIS CONDITIONNÉ
AVEC LE DEVOIR MORAL DE
TRANSFORMER UN OBJET
INDEFINI...

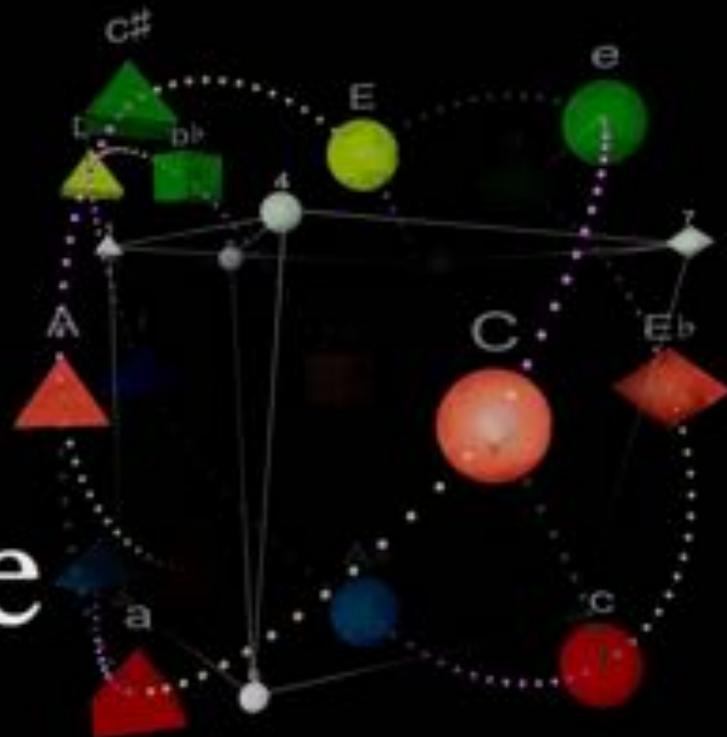
SAMEDI 27 FEVRIER 2016 A 11H
AMPHI PARIS SCIENCE ET LETTRES
22 rue de St-Louis
75005 Paris

ENTREE LIBRE

PSL PARIS SCIENCE ET LETTRES

Beethoven and the Hypersphere

(and the Tonnetz)



Gilles Baroin 2016
www.MatheMusic.net

→ www.mathemusic.net

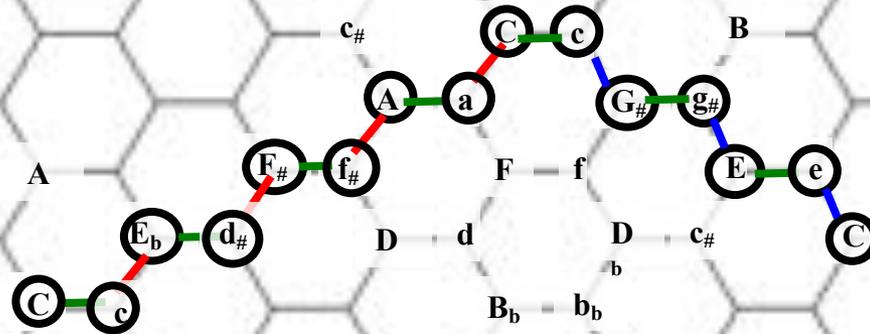
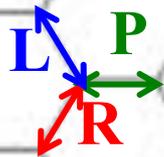
Deux zig-zag non hamiltoniens

1. C-Am-A-F#m-F#-Ebm-Eb-Cm-C

RPRPRP

2. C-Em-E-G#m-G#-Cm-C

LPLPLP



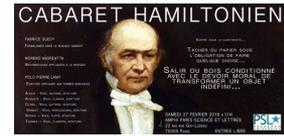
La collection des 28 cycles hamiltoniens « redondants »

1. C-Cm-Ab-Abm-E-C#m-A-Am-F-Fm-C#-Bbm-F#-F#m-D-Dm-Bb-Gm-Eb-Ebm-B-Bm-G-Em--PLPLRL
2. C-Cm-Ab-Fm-C#-C#m-A-Am-F-Dm-Bb-Bbm-F#-F#m-D-Bm-G-Gm-Eb-Ebm-B-Abm-E-Em--PLRLPL
3. C-Cm-Eb-Ebm-F#-F#m-A-C#m-E-Em-G-Gm-Bb-Bbm-C#-Fm-Ab-Abm-B-Bm-D-Dm-F-Am--PRPRRLR
4. C-Cm-Eb-Ebm-F#-Bbm-C#-C#m-E-Em-G-Gm-Bb-Dm-F-Fm-Ab-Abm-B-Bm-D-F#m-A-Am--PRPRLRPR
5. C-Cm-Eb-Ebm-F#-Bbm-C#-Fm-Ab-Abm-B-Bm-D-F#m-A-C#m-E-Em-G-Gm-Bb-Dm-F-Am--PRPRLRLR
6. C-Cm-Eb-Gm-Bb-Bbm-C#-C#m-E-Em-G-Bm-D-Dm-F-Fm-Ab-Abm-B-Ebm-F#-F#m-A-Am--PRLRPRPR
7. C-Cm-Eb-Gm-Bb-Bbm-C#-Fm-Ab-Abm-B-Ebm-F#-F#m-A-C#m-E-Em-G-Bm-D-Dm-F-Am--PRLR
8. C-Cm-Eb-Gm-Bb-Dm-F-Fm-Ab-Abm-B-Ebm-F#-Bbm-C#-C#m-E-Em-G-Bm-D-F#m-A-Am--PRLRLRPR
9. C-Em-E-Abm-Ab-Cm-Eb-Gm-G-Bm-B-Ebm-F#-Bbm-Bb-Dm-D-F#m-A-C#m-C#-Fm-F-Am--LPLPLR
10. C-Em-E-Abm-B-Ebm-Eb-Gm-G-Bm-D-F#m-F#-Bbm-Bb-Dm-F-Am-A-C#m-C#-Fm-Ab-Cm--LPLRLP
11. C-Em-G-Gm-Bb-Bbm-C#-C#m-E-Abm-B-Bm-D-Dm-F-Fm-Ab-Cm-Eb-Ebm-F#-F#m-A-Am--LRPRPRPR
12. C-Em-G-Gm-Bb-Bbm-C#-Fm-Ab-Cm-Eb-Ebm-F#-F#m-A-C#m-E-Abm-B-Bm-D-Dm-F-Am--LRPRRLR
13. C-Em-G-Gm-Bb-Dm-F-Fm-Ab-Cm-Eb-Ebm-F#-Bbm-C#-C#m-E-Abm-B-Bm-D-F#m-A-Am--LRPR
14. C-Em-G-Bm-B-Ebm-Eb-Gm-Bb-Dm-D-F#m-F#-Bbm-C#-Fm-F-Am-A-C#m-E-Abm-Ab-Cm--LRLPLP
15. C-Em-G-Bm-D-Dm-F-Fm-Ab-Cm-Eb-Gm-Bb-Bbm-C#-C#m-E-Abm-B-Ebm-F#-F#m-A-Am--LRLRPRPR
16. C-Em-G-Bm-D-F#m-A-C#m-E-Abm-B-Ebm-F#-Bbm-C#-Fm-Ab-Cm-Eb-Gm-Bb-Dm-F-Am--LR
17. C-Am-A-F#m-F#-Ebm-Eb-Cm-Ab-Fm-F-Dm-D-Bm-B-Abm-E-C#m-C#-Bbm-Bb-Gm-G-Em--RPRPRRL
18. C-Am-A-F#m-F#-Ebm-B-Abm-Ab-Fm-F-Dm-D-Bm-G-Em-E-C#m-C#-Bbm-Bb-Gm-Eb-Cm--RPRPRLRP
19. C-Am-A-F#m-F#-Ebm-B-Abm-E-C#m-C#-Bbm-Bb-Gm-Eb-Cm-Ab-Fm-F-Dm-D-Bm-G-Em--RPRPRLRL
20. C-Am-A-F#m-D-Bm-B-Abm-Ab-Fm-F-Dm-Bb-Gm-G-Em-E-C#m-C#-Bbm-F#-Ebm-Eb-Cm--RPRLRPRP
21. C-Am-A-F#m-D-Bm-B-Abm-E-C#m-C#-Bbm-F#-Ebm-Eb-Cm-Ab-Fm-F-Dm-Bb-Gm-G-Em--RPRL
22. C-Am-A-F#m-D-Bm-G-Em-E-C#m-C#-Bbm-F#-Ebm-B-Abm-Ab-Fm-F-Dm-Bb-Gm-Eb-Cm--RPRLRLRP
23. C-Am-F-Fm-C#-C#m-A-F#m-D-Dm-Bb-Bbm-F#-Ebm-B-Bm-G-Gm-Eb-Cm-Ab-Abm-E-Em--RLPLPL
24. C-Am-F-Dm-D-Bm-B-Abm-Ab-Fm-C#-Bbm-Bb-Gm-G-Em-E-C#m-A-F#m-F#-Ebm-Eb-Cm--RLRPRPRP
25. C-Am-F-Dm-D-Bm-B-Abm-E-C#m-A-F#m-F#-Ebm-Eb-Cm-Ab-Fm-C#-Bbm-Bb-Gm-G-Em--RLRPRRL
26. C-Am-F-Dm-D-Bm-G-Em-E-C#m-A-F#m-F#-Ebm-B-Abm-Ab-Fm-C#-Bbm-Bb-Gm-Eb-Cm--RLRP
27. C-Am-F-Dm-Bb-Gm-G-Em-E-C#m-A-F#m-D-Bm-B-Abm-Ab-Fm-C#-Bbm-F#-Ebm-Eb-Cm--RLRLRPRP
28. C-Am-F-Dm-Bb-Gm-Eb-Cm-Ab-Fm-C#-Bbm-F#-Ebm-B-Abm-E-C#m-A-F#m-D-Bm-G-Em--RL



BALLADE MARABOUT COLLECTIVE

A lire de haut en bas, puis de bas en haut, sans pause.



C-e-E-a_b-A_b-c-E_b-g-G-b-B-e_b-F_#-b_b-B_b-d-D-f_#-A-c_#-C_#-f-F-a
LPLPLR-LPLPLR-LPLPLR-LPLPLR

↓
 Lassitudes enfantines
 Enfantine arithmétique
 Arithmétique enchantée
 Chante le flot de nos vies

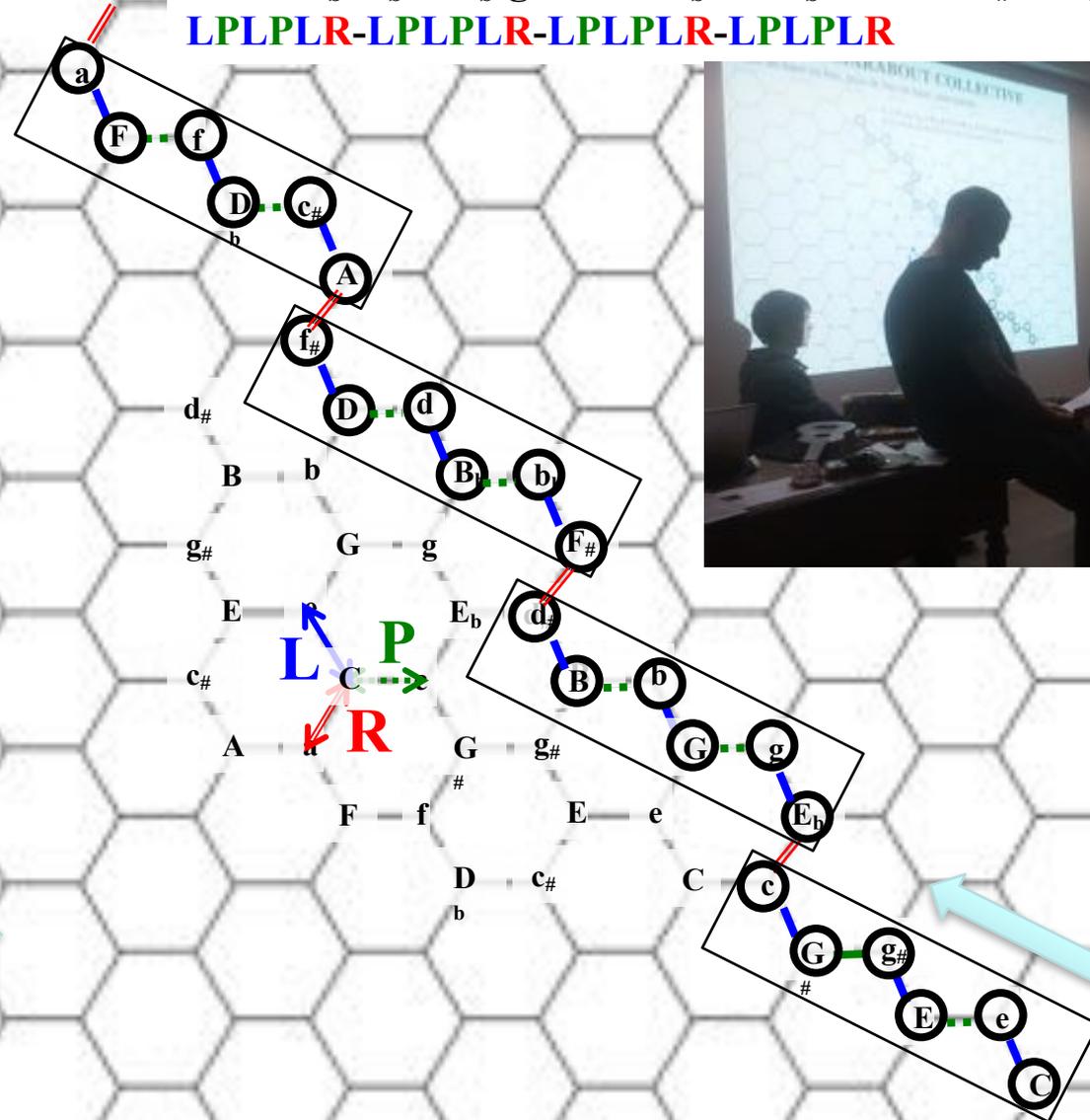
La dorure d'un matin
 D'un matin tombé du lit
 D'un lit bleu décoloré
 Colorié comme un oiseau

Miséreux trappeur des bois
 Dans les bois poison mortel
 Mortel ennui qui te scie
 Qui te scie jusques au sang

Si tu crois, pense à ta tombe
 Ta tombe est à profaner
 Fanée comme une fleur morte
 Morte qui pourras rêver

Silencieux miroirs des cimes
 Décimes tes vains espoirs
 Poire juteuse presque pourrie
 Risques-toi à te goûter

↑
 Fabrique un monde arc en ciel
 Ton ciel est plein de lueurs
 De lueurs et de clameurs
 Meurs comme crèvent les chiens



Cycles hamiltoniens avec périodicité interne

8. C-Cm-Eb-Gm-Bb-Dm-F-Fm-Ab-Abm-B-Ebm-F#-Bbm-C#-C#m-E-Em-G-Bm-D-F#m-A-Am--PRLRLRPR
9. C-Em-E-Abm-Ab-Cm-Eb-Gm-G-Bm-B-Ebm-F#-Bbm-Bb-Dm-D-F#m-A-C#m-C#-Fm-F-Am--LPLPLR
10. C-Em-E-Abm-B-Ebm-Eb-Gm-G-Bm-D-F#m-F#-Bbm-Bb-Dm-F-Am-A-C#m-C#-Fm-Ab-Cm--LPLRLP
11. C-Em-G-Gm-Bb-Bbm-C#-C#m-E-Abm-B-Bm-D-Dm-F-Fm-Ab-Cm-Eb-Ebm-F#-F#m-A-Am--LRPRRPR
12. C-Em-G-Gm-Bb-Bbm-C#-Fm-Ab-Cm-Eb-Ebm-F#-F#m-A-C#m-E-Abm-B-Bm-D-Dm-F-Am--LRPRRLR

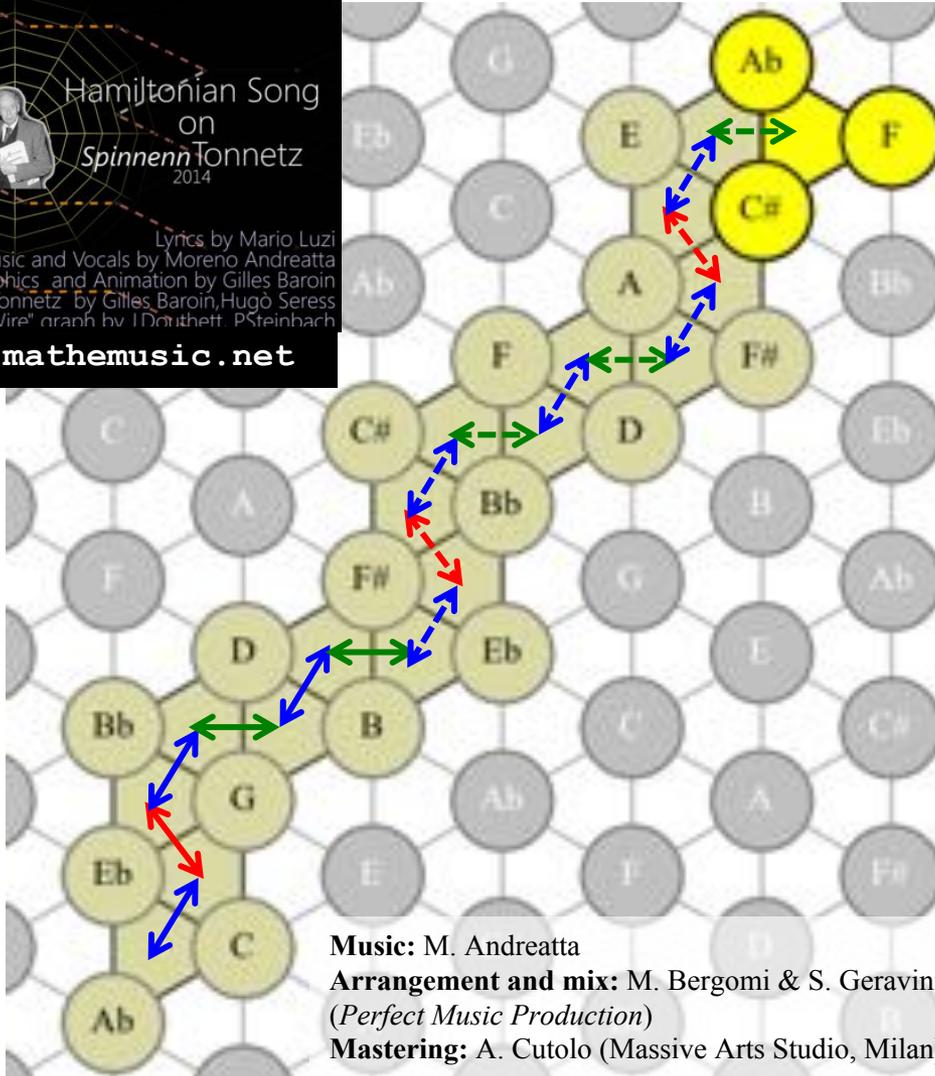
L P L P L R ...
 P L P L R L ...
 L P L R L P ...
 P L R L P L ...

L R L P L P ...
 R L P L P L ...

Luzi
 Hamiltonian Song
 on
 SpinnennTonnetz
 2014
 Lyrics by Mario Luzi
 Music and Vocals by Moreno Andreatta
 Graphics and Animation by Gilles Baroin
 SpinnenTonnetz by Gilles Baroin, Hugò Seres
 Original "Chicken Wire" graph by IDruthett, PSteinhach

<http://www.mathemusic.net>

min. 1'02"



Music: M. Andreatta
 Arrangement and mix: M. Bergomi & S. Geravini
 (Perfect Music Production)
 Mastering: A. Cutolo (Massive Arts Studio, Milan)

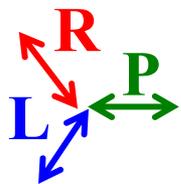
La sera non è più la tua canzone
 (Mario Luzi, 1945, in *Poesie sparse*)

La sera non è più la tua canzone,
 è questa roccia d'ombra traforata
 dai lumi e dalle voci senza fine,
 la quiete d'una cosa già pensata.

Ah questa luce viva e chiara viene
 solo da te, sei tu così vicina
 al vero d'una cosa conosciuta,
 per nome hai una parola ch'è passata
 nell'intimo del cuore e s'è perduta.

Caduto è più che un segno della vita,
 riposi, dal viaggio sei tornata
 dentro di te, sei scesa in questa pura
 sostanza così tua, così romita
 nel silenzio dell'essere, (compiuta).

L'aria tace ed il tempo dietro a te
 si leva come un'arida montagna
 dove vaga il tuo spirito e si perde,
 un vento raro scivola e ristagna.



Luzi



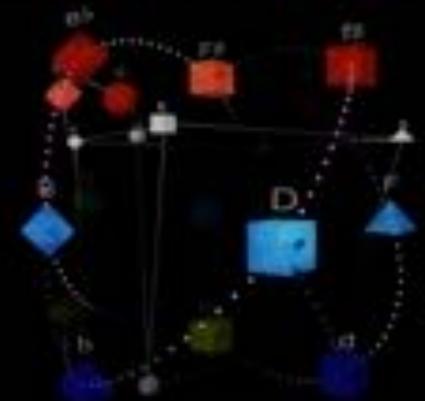
Hamiltonian Song
on
Spinnennetz
2014

Lyrics by Mario Luzi
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Graphics and Animation by Gilles Baroin
SpinnenNetz by Gilles Baroin, Hugò Seress
Original "Chicken Wire" graph by J.Douthett, P.Steinbach

Aprile

Hamiltonian Song

Mathemusical
2D & 4D Visualizations



Composition, Performance: Moreno Andreatta

Hyperspheres & Animations: Gilles Baroin

Spinnen-Tonnetz: Hugò Seress & G.B

Lyrics by Gabriele D'Annunzio

www.MatheMusic.net



G. D'Annunzio
(1863-1938)

➔ www.mathemusic.net