

Musique et oralité

- L'improvisation -

Cinquième partie



Moreno Andreatta

IRMA & ITI CREA, Université de Strasbourg

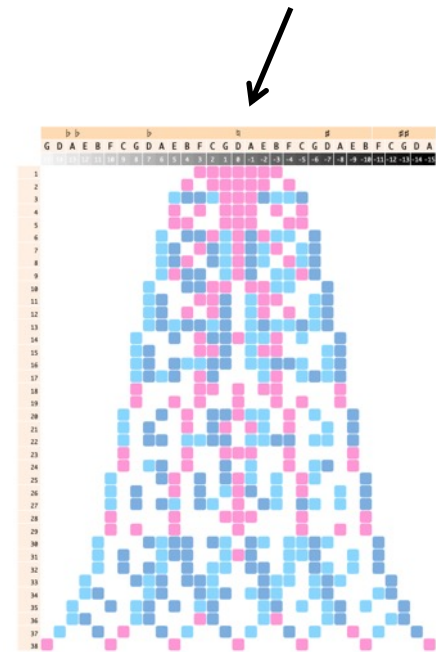
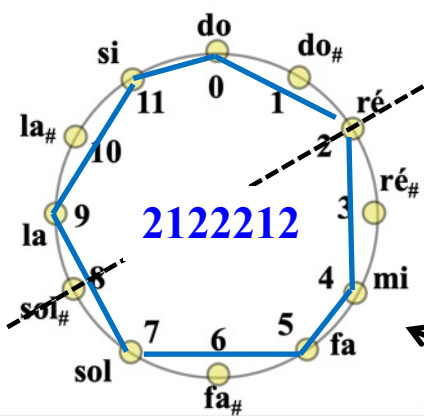
Equipe Représentations Musicales

IRCAM / CNRS UMR 9912 / Sorbonne Université



Modèles computationnels de l'improvisation classique et jazz

Les sept modes diatoniques et la symétrie du ré



Cloche diatonique
(66 échelles = 462 modes)

cyclic permutations

TABLE I
Comparison of M = 7, L = 12 patterns for pitch (scales) and rhythm (time-lines)

pattern	pitch domain name and notation (in C)	rhythm domain notation	examples from West Africa	references
1. 2212221	major scale (Ionian) CDEFGAB	♪ ♪ ♪ ♪ ♪ ♪ ♪	Ewe (Atsiabek , Sogba, Atsia) also Yoruba	Jones (1959), C. K. Ladzekpo, S. K. Ladzekpo and Pantaleoni, Locke
2. 2122212	Dorian CDE ^b FGAB ^b	♪ ♪ ♪ ♪ ♪ ♪ ♪	Bemba—Northern Rhodesia	Jones (1965), (Ekwueme)
3. 1222122	Phrygian CD ^b E ^b FGA ^b B ^b	♪ ♪ ♪ ♪ ♪ ♪ ♪	—	—
4. 2221221	Lydian CDEF [#] GAB	♪ ♪ ♪ ♪ ♪ ♪ ♪	Ga-Adangme (common) also common Haitian pattern, Akan (Ab fo)	C. K. Ladzekpo, Combs (1974), R. Hill, Asiamana
5. 2212212	Mixolydian CDEFGAB ^b	♪ ♪ ♪ ♪ ♪ ♪ ♪	Yoruba sacred music from Ekiti	King
6. 2122122	Aeolian CDE ^b FGA ^b B ^b	♪ ♪ ♪ ♪ ♪ ♪ ♪	Ashanti (Ab fo , Mpre)	Koetting
7. 1221222	Locrian CD ^b E ^b FG ^b A ^b B ^b	♪ ♪ ♪ ♪ ♪ ♪ ♪	Ghana*	Nketia (1963a)
8. 2121222	(#2 Locrian) CDE ^b FG ^b A ^b B ^b	♪ ♪ ♪ ♪ ♪ ♪ ♪	Ashanti (Asedua)	C. K. Ladzekpo
9. 2112123	— CDD [#] EF [#] GA	♪ ♪ ♪ ♪ ♪ ♪ ♪	Akan (juvenile song)	Nketia (1963b)

* clap pattern
† mute stroke on bell

J. Pressing, "Cognitive isomorphisms between pitch and rhythm in world musics: West Africa, the Balkans and Western tonality", *Studies in Music*, 17, 1983, p. 38-61

➔ Julien Junod, « Les cloches diatoniques : un atlas visuel et sonore des modes microtonaux », Actes de Journées d'Informatique Musicale, Strasbourg, 26-28 octobre 2020

La cloche diatonique : un atlas interactif des modes

[Accueil](#) [Navigation](#) [Aide](#)

Noms, notes ou intervalle

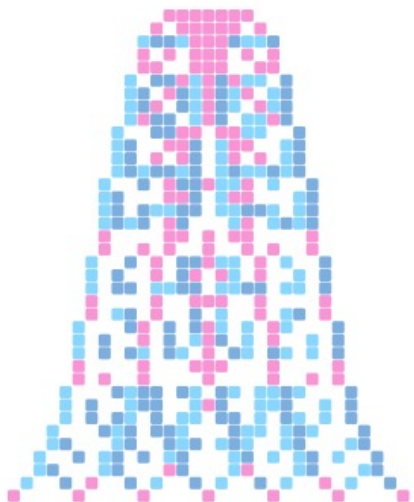
➔ <http://www.cloche-diatonique.ch/>

La cloche diatonique est un système de représentation graphique et numérique des échelles et des modes musicaux. Ce catalogue systématique met en évidence les relations suivantes :

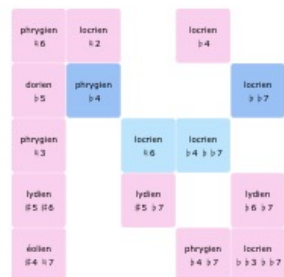
Les 66 échelles sont classées en fonction de leur éloignement progressif à l'échelle diatonique, les modes usuels étant regroupés autour de ce dernier ;

Les 462 modes heptatoniques sont regroupés en 31 familles, ordonnées de la plus "claire" à la plus "sombre", et plus de 5000 exemples sonores sont disponibles au format MIDI ;

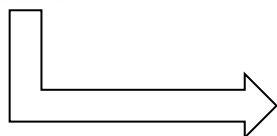
Pierre Audétat a imaginé cette construction en 2006 pour explorer les gammes heptatoniques du tempérament égal. L'universalité de la démarche a pu être vérifiée par son application à d'autres tempéraments. Des cloches microtonales et macrotonales sont également consultables.



Modes usuels



[À propos](#) [Contact](#)



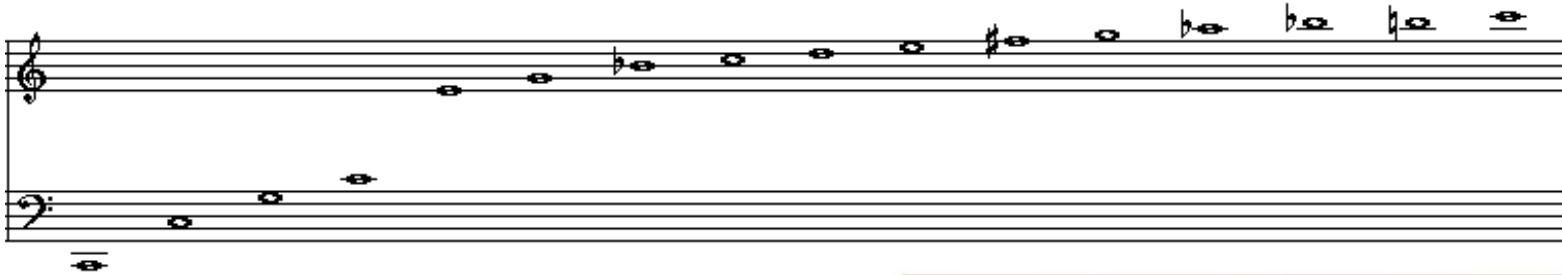
	b		♮							#	
	mi b	si b	fa	do	sol	ré	la	mi	si	fa #	do #
	5	4	3	2	1	0	-1	-2	-3	-4	-5
diatonique			lydien	ionien	mixolydien	dorien	éolien	phrygien	locrien		
mineur mélodique		lydien #5		lydien b7	ionien b3	mixolydien b6	phrygien ♮6	locrien ♮2		locrien b4	
mineur harmonique		lydien #2	ionien #5		dorien #4	éolien ♮7	phrygien ♮3	locrien ♮6			locrien b4 b b7
majeur harmonique	lydien #2 #5			lydien b3	ionien b6	mixolydien b2	dorien b5		phrygien b4	locrien b b7	
unitonique sensible	lydien #5 #6		lydien #5 b7		lydien b6 b7	ionien b2 b3	locrien ♮2 ♮3		locrien ♮2 b4		locrien b b3 b4
double harmonique	lydien #2 #6	ionien #2 #5			éolien #4 ♮7	ionien b2 b6	mixolydien b2 b5			phrygien b4 b b7	locrien b b3 b b7

Les six échelles principales du jazz et ses modes associés

	♭		♮							♯	
	mi ♭	si ♭	fa	do	sol	ré	la	mi	si	fa ♯	do ♯
	5	4	3	2	1	0	-1	-2	-3	-4	-5
diatonique			lydien	ionien	mixolydien	dorien	éolien	phrygien	locrien		
mineur mélodique		lydien ♯5		lydien ♭7	ionien ♭3	mixolydien ♭6	phrygien ♮6	locrien ♮2		locrien ♭4	
mineur harmonique		lydien ♯2	ionien ♯5		dorien ♯4	éolien ♮7	phrygien ♮3	locrien ♮6			locrien ♭4 ♭♭7
majeur harmonique	lydien ♯2 ♯5			lydien ♭3	ionien ♭6	mixolydien ♭2	dorien ♭5		phrygien ♭4	locrien ♭♭7	
unitonique sensible	lydien ♯5 ♯6		lydien ♯5 ♭7		lydien ♭6 ♭7	ionien ♭2 ♭3	locrien ♮2 ♮3		locrien ♮2 ♭4		locrien ♭♭3 ♭4
double harmonique	lydien ♯2 ♯6	ionien ♯2 ♯5			éolien ♯4 ♮7	ionien ♭2 ♭6	mixolydien ♭2 ♭5			phrygien ♭4 ♭♭7	locrien ♭♭3 ♭♭7

La « Negative/Symmetric Harmony » (de Jacob Collier/Steve Coleman)

La série des harmoniques supérieurs

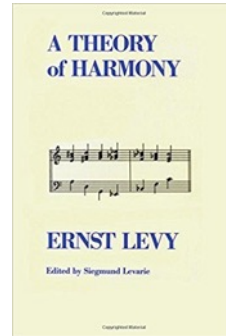


"The raw material of theories are facts. The raw materials of musical theory is music. **Music** is not, as some contemporary acousticians would like us to believe, 'something that happens in the air.' It is something that, first and last, **happens in the soul.**"



La série (imaginaire) des harmoniques inférieurs

- Ernst Lévy, *A Theory of Harmony*, Albany, New York, 1985
- Jacob Collier, « Negative Harmony » (vidéos online)
- Steve Coleman, « Symmetrical Movement Concept » (online)



**Ernst Lévy
(1895-1981)**



Steve Coleman



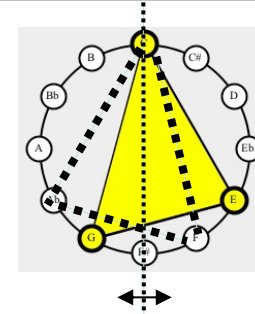
C. Corea, J. Collier & H. Hancock

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La série des harmoniques supérieurs

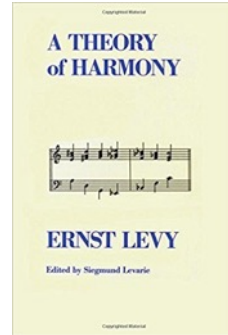


C
↓
Fm



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Ernst Lévy
(1895-1981)

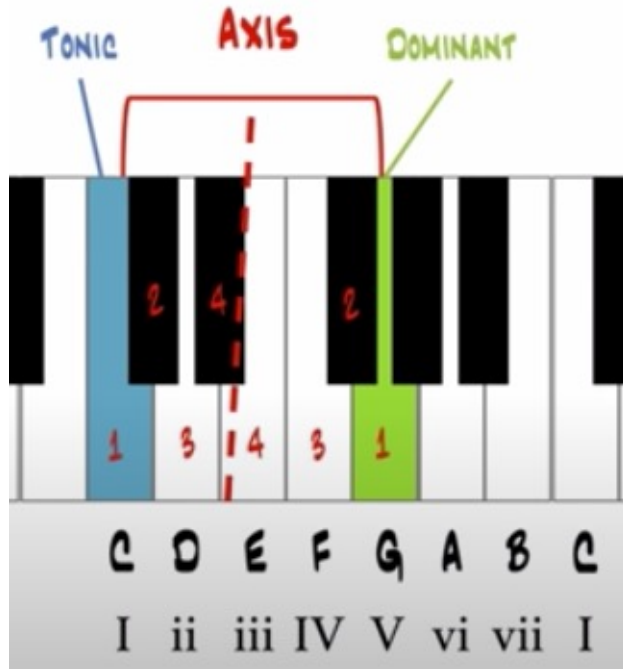


Steve Coleman



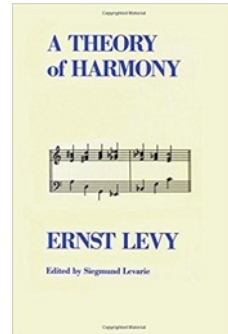
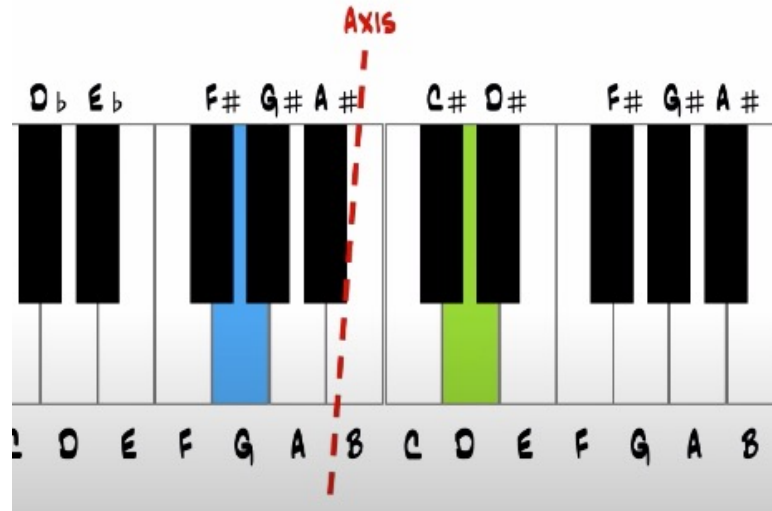
C. Corea, J. Collier & H. Hancock

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L'axe de symétrie dépend de la tonalité !

G MAJOR



Ernst Lévy
(1895-1981)



Steve Coleman

Paul Croteau, What is Negative Harmony?

https://www.youtube.com/watch?v=_kiMNwqc39c&ab_channel=PaulCroteau

Paul Croteau, Negative Harmony - Is It A Thing?

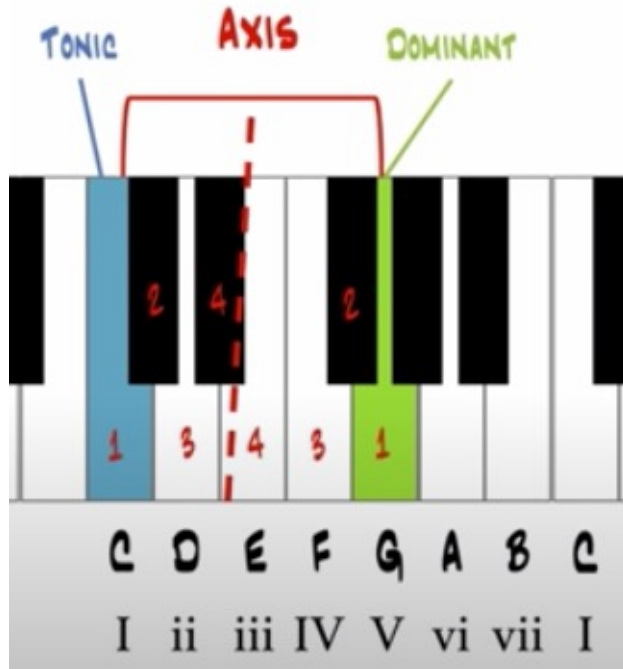
https://www.youtube.com/watch?v=eBW5gab0_xs

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C. Corea, J. Collier & H. Hancock

La « Negative/Symmetric Harmony » (de Jacob Collier/Steve Coleman)



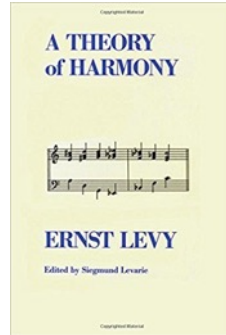
G = 392.00 Hz

E = 329.63 Hz

327.32 Hz

E^b = 311.13 Hz

C = 261.63 Hz



Ernst Lévy
(1895-1981)



Steve Coleman

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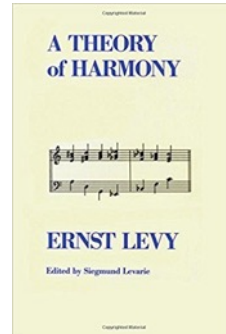
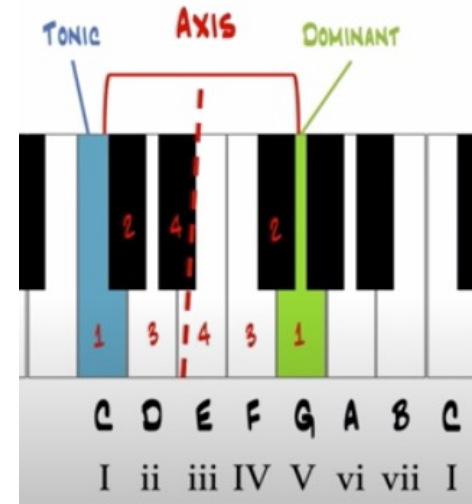
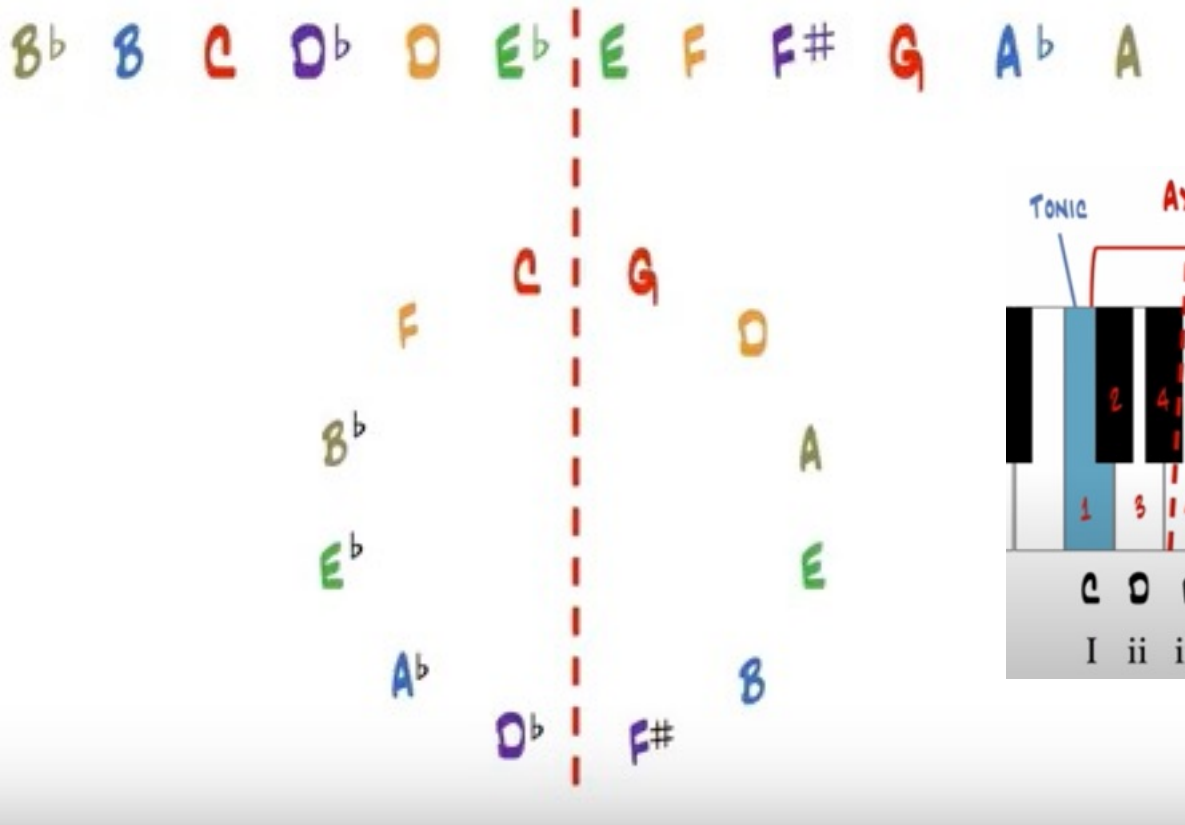
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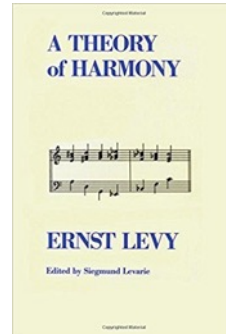
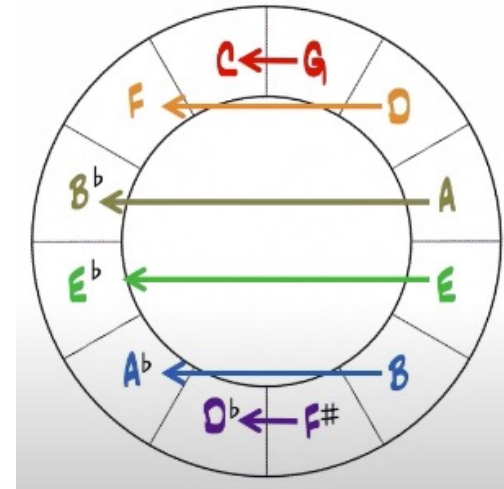
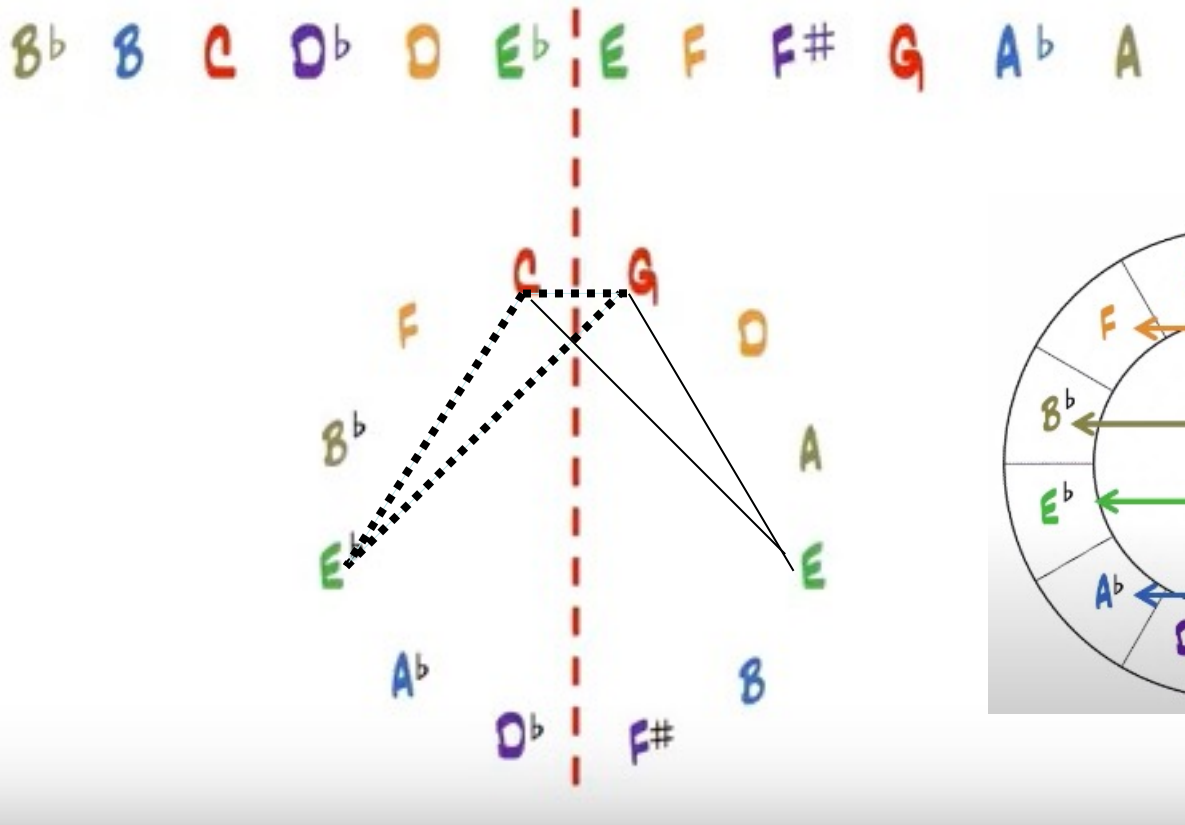
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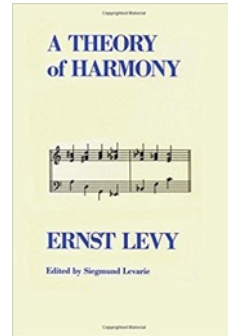
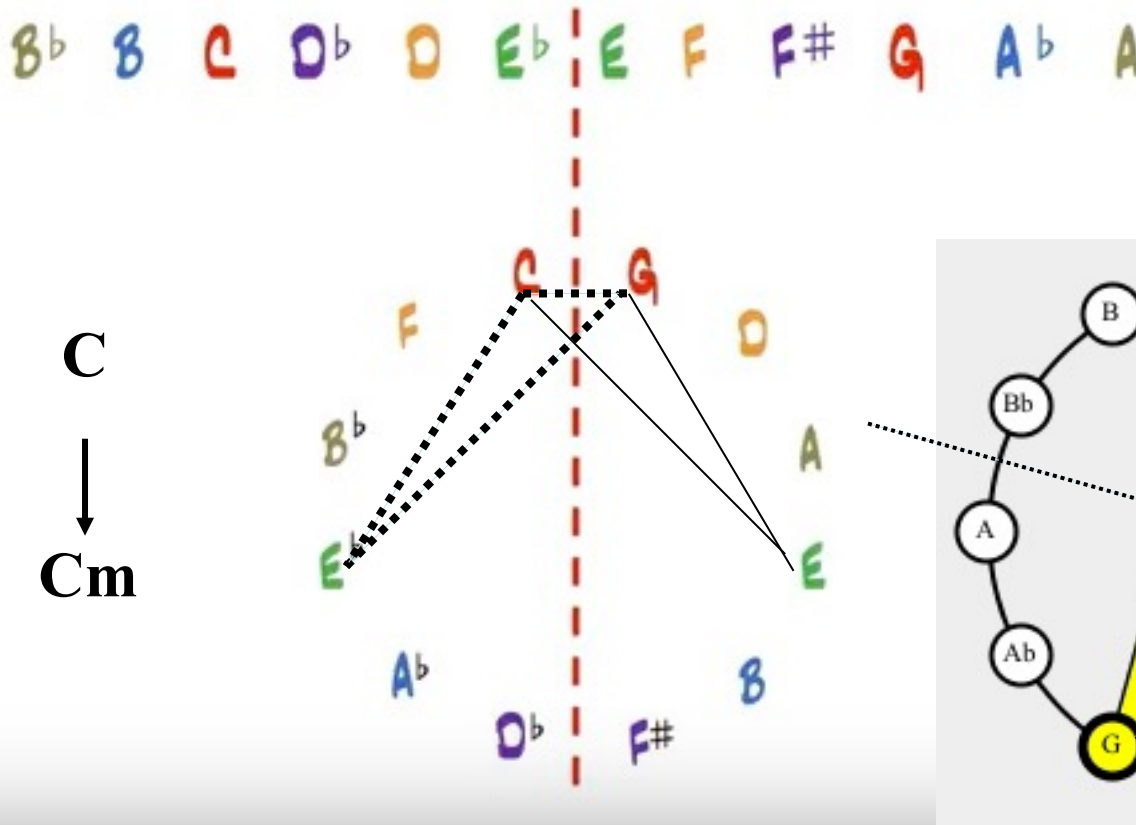
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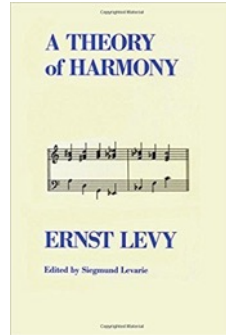
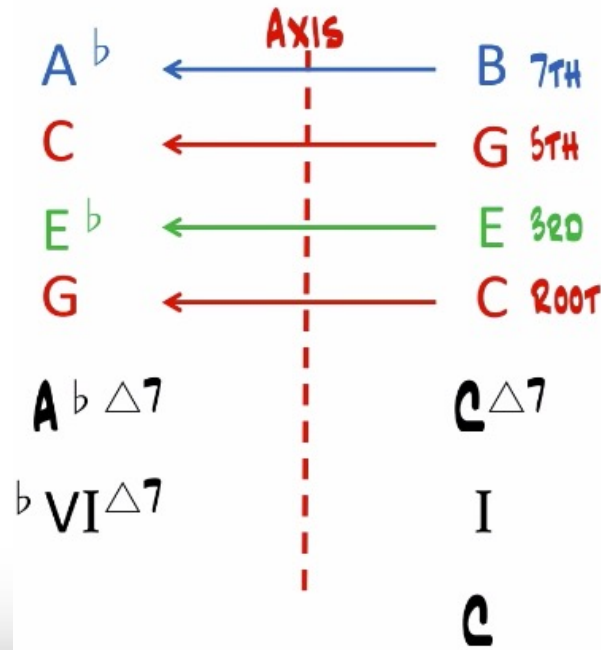
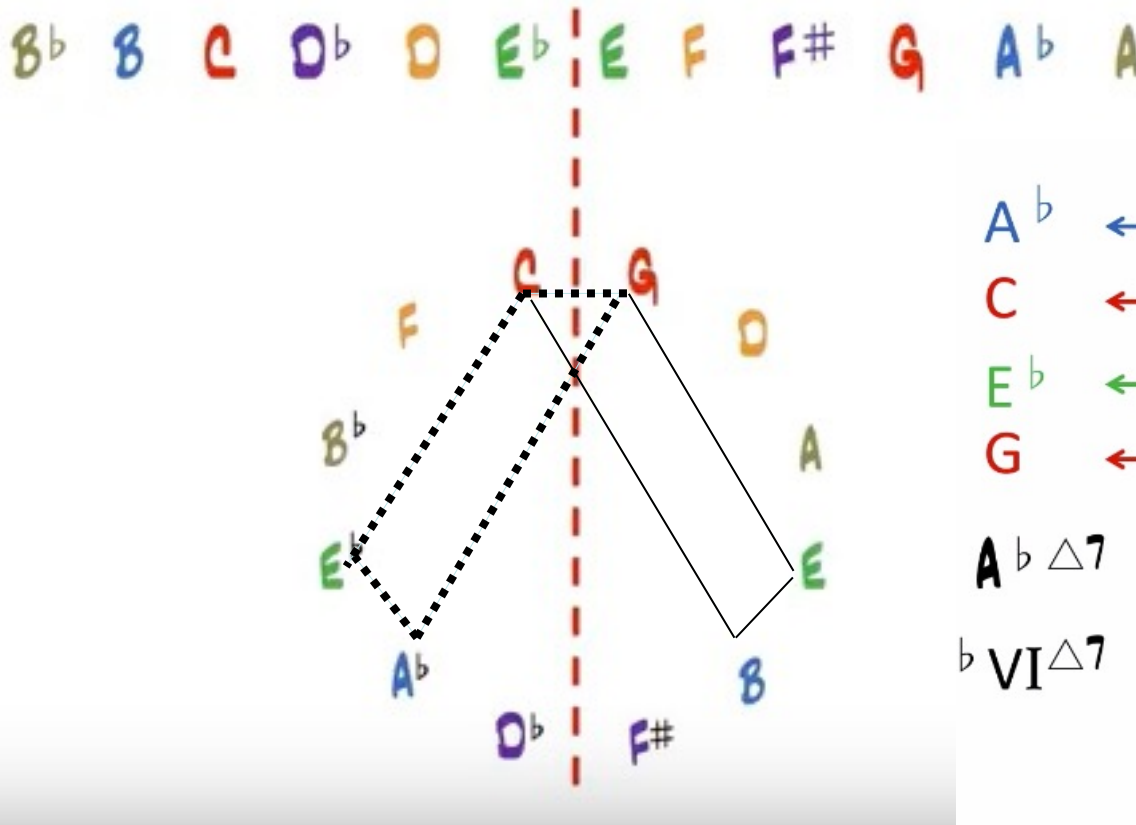
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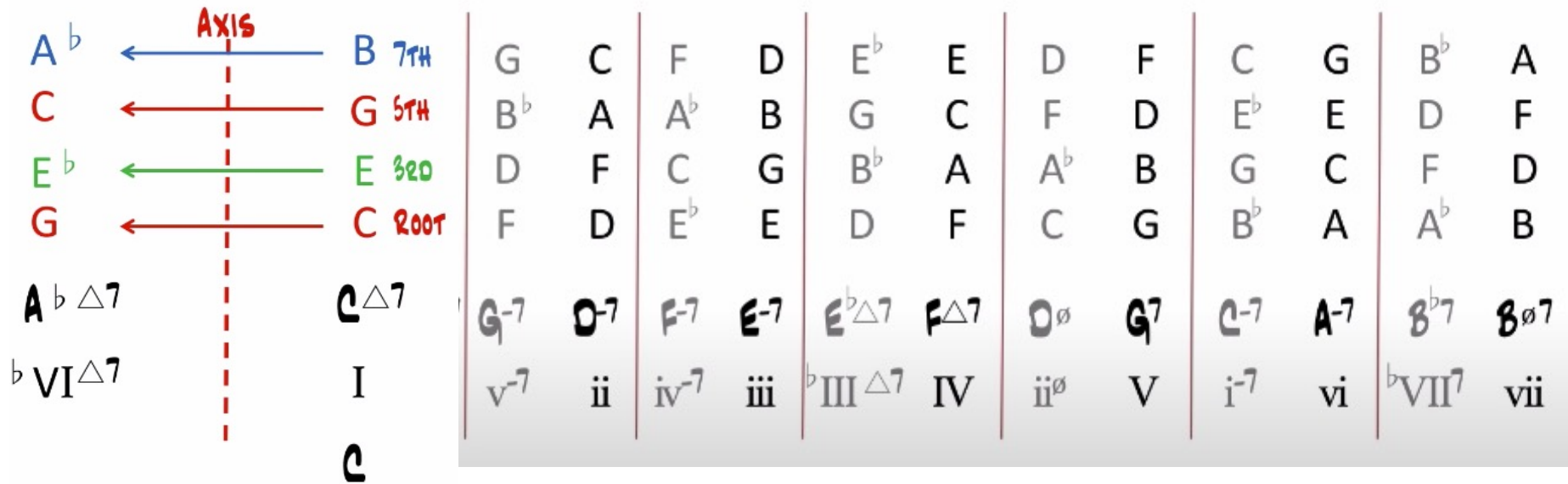
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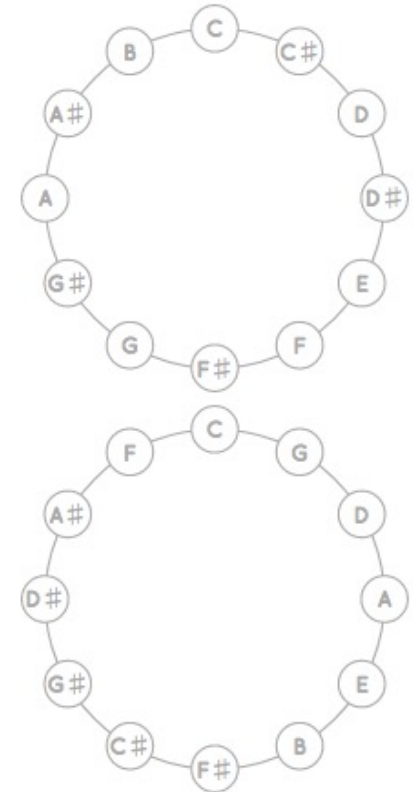
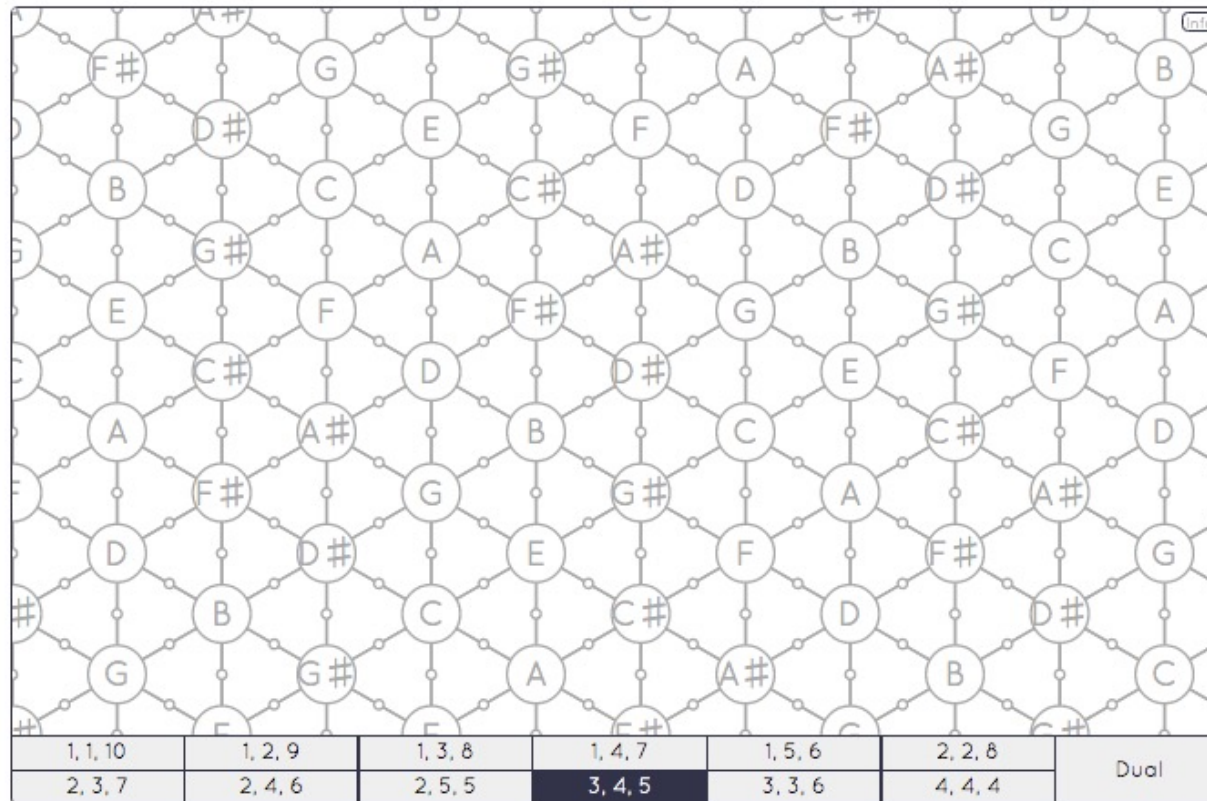
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C. Corea, J. Collier & H. Hancock

Harmonie négative dans l'environnement *Tonnetz*

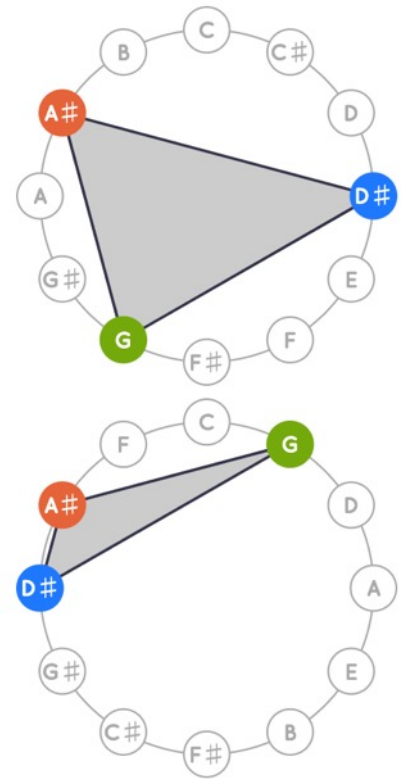
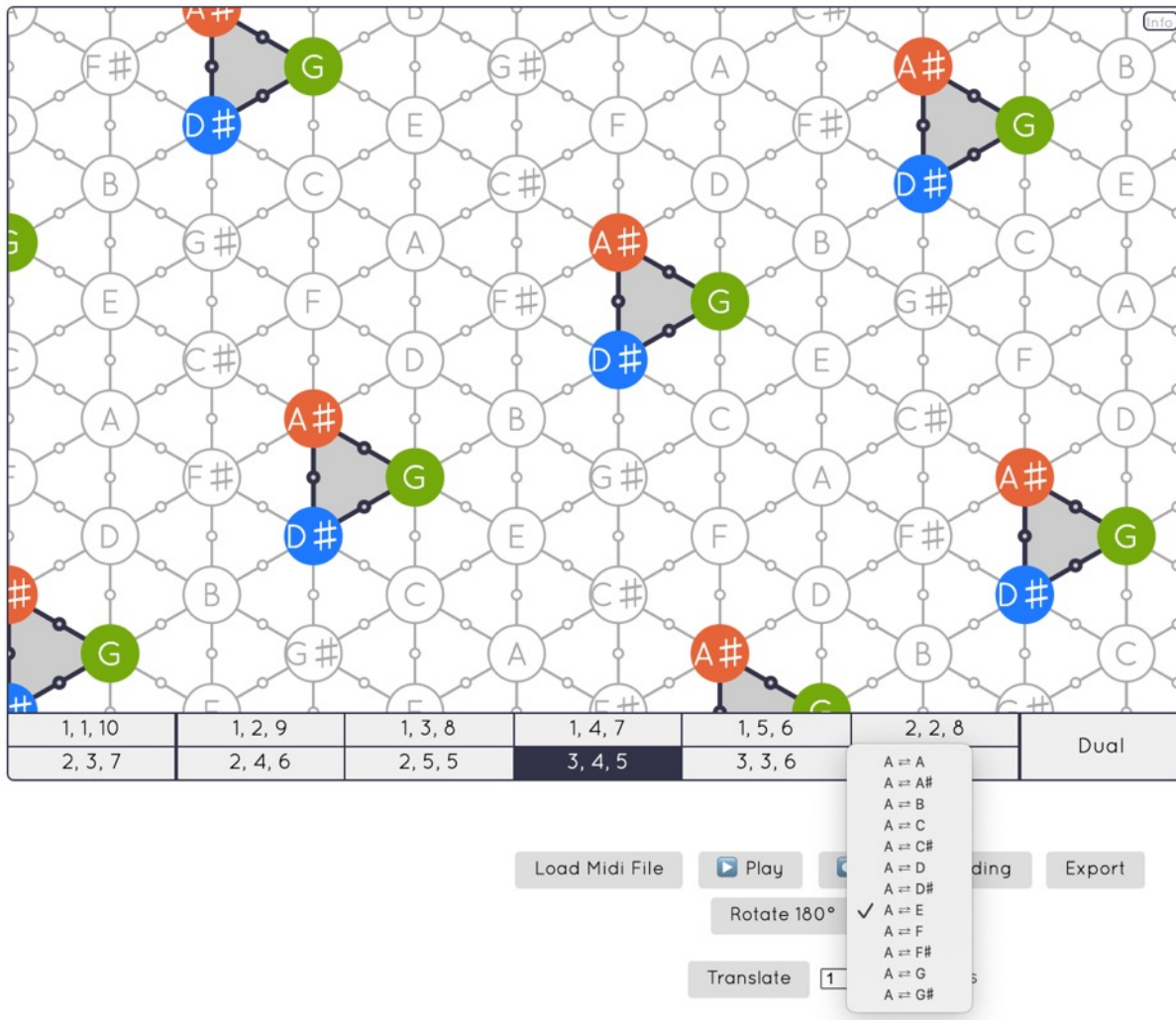


➔ <https://guichaoua.gitlab.io/web-hexachord/>

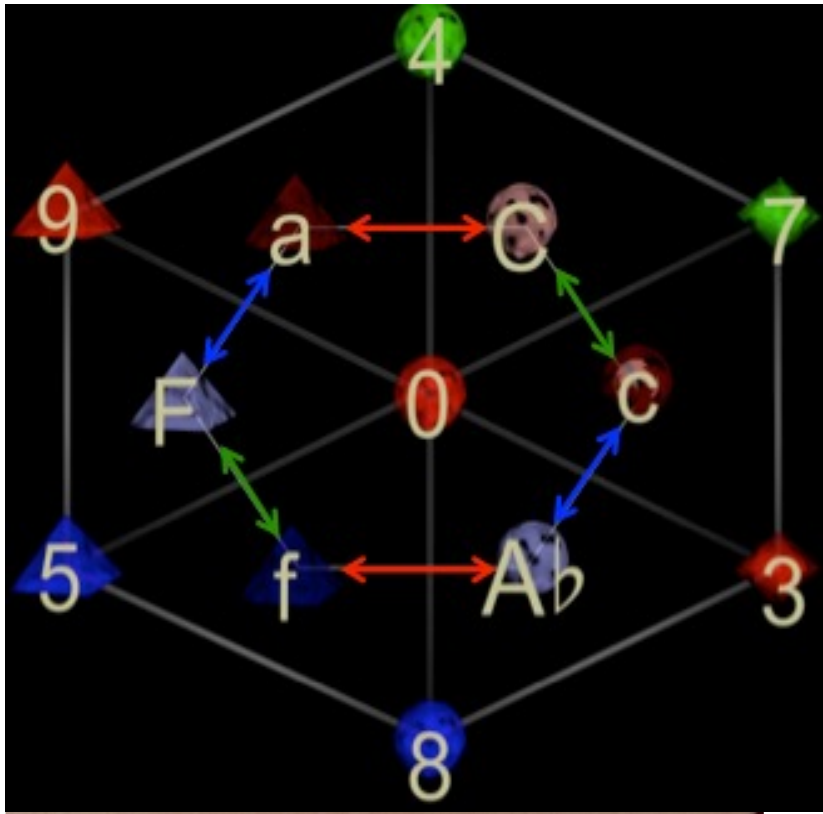


Exemple : harmonie négative de *Your Song* (E. John)

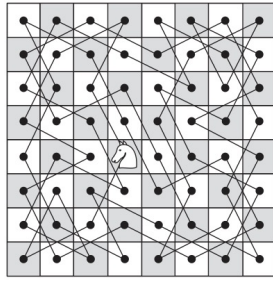
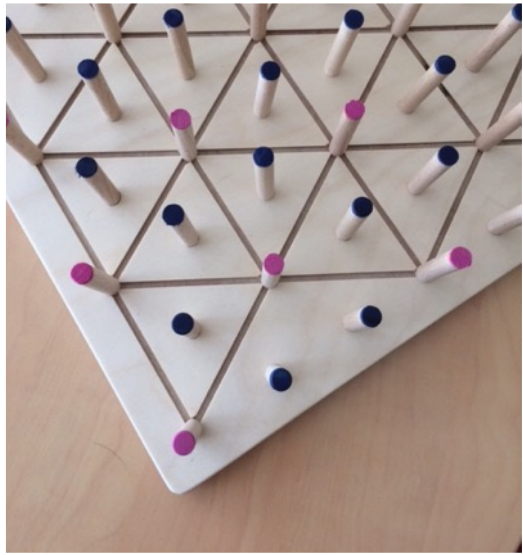
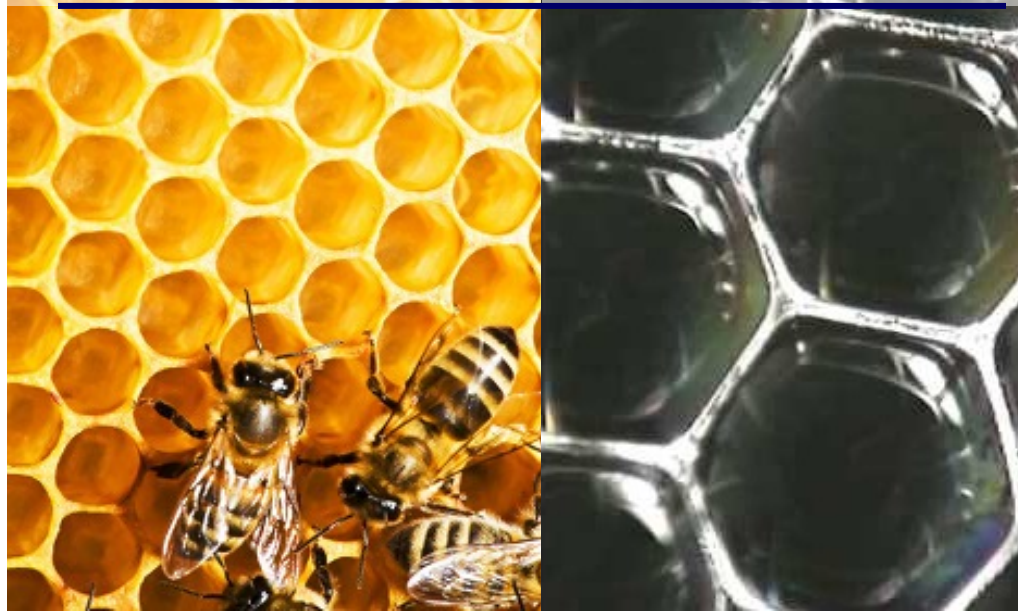
THE TONNETZ ONE KEY - MANY REPRESENTATIONS



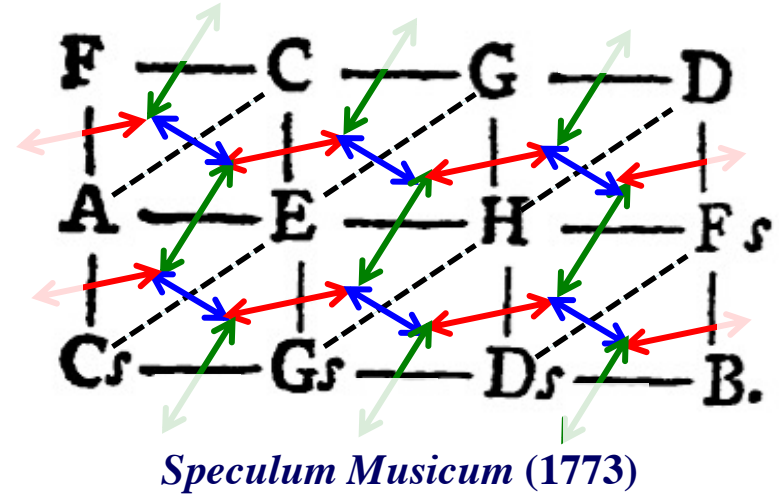
➔ <https://morenoandreatta.com/software/>



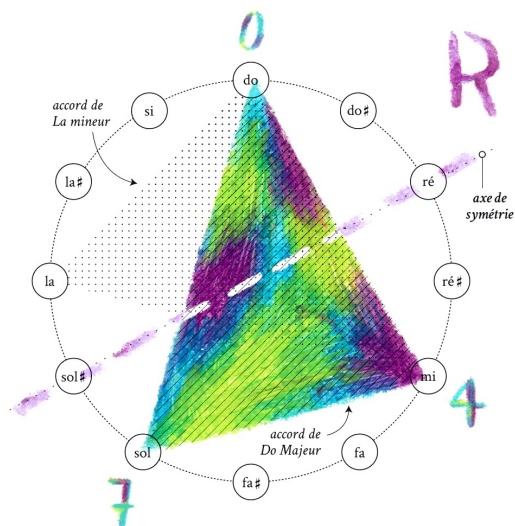
Le Tonnetz (ou nid musical d'abeilles)



Leonhard Euler



Les trois symétries néo-riemanniennes

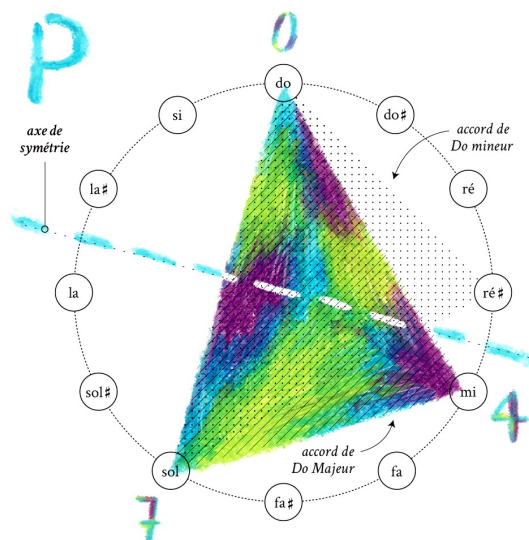


R = RELATIF

C majeur



A mineur

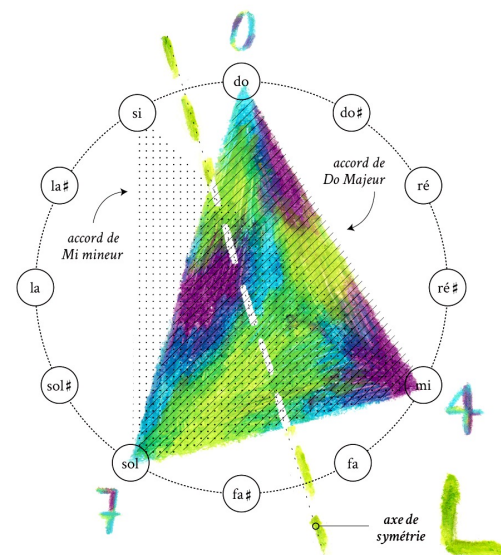


P = PARALLÈLE

C majeur



C mineur



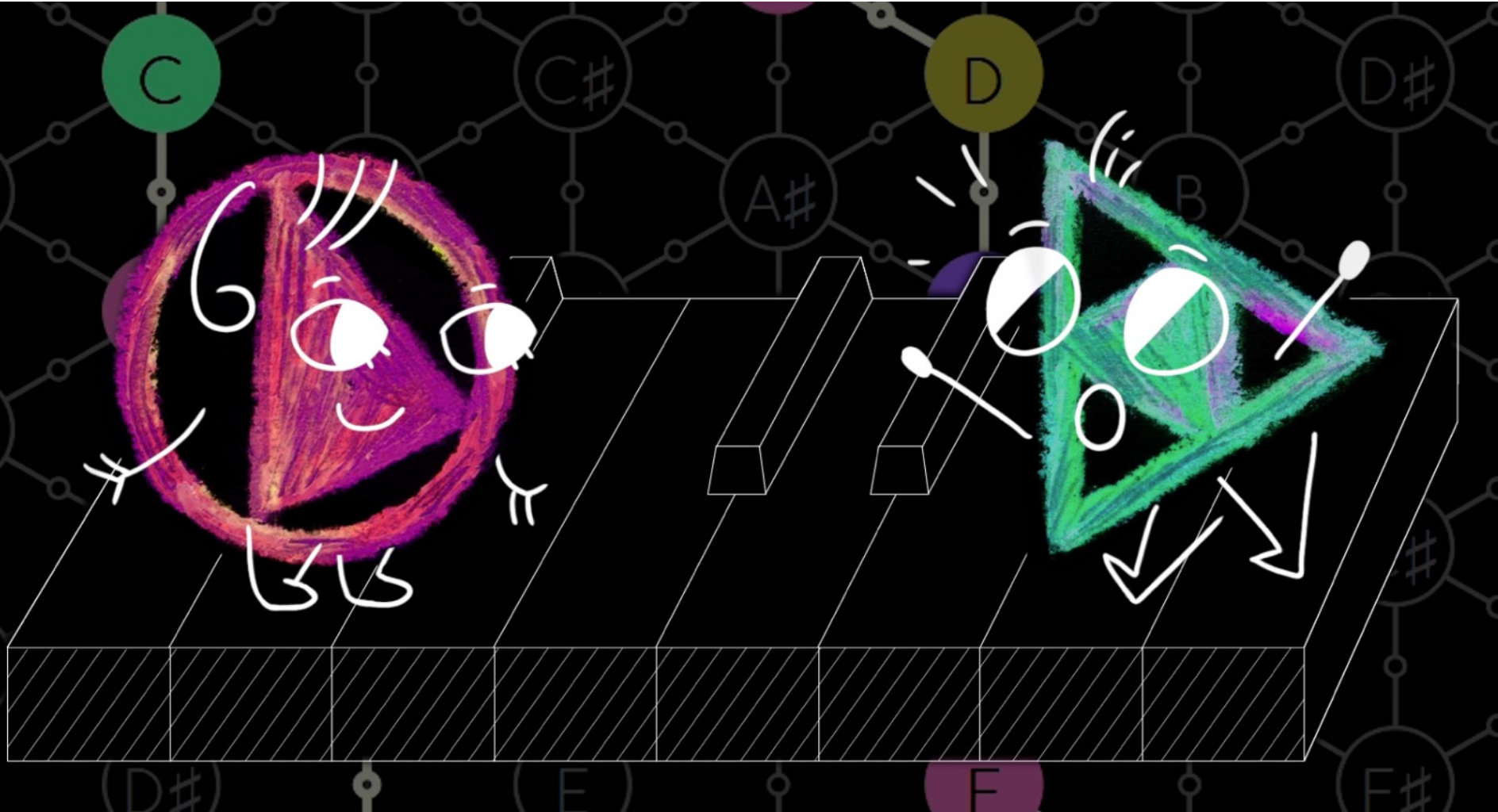
**L = LEADING-TONE
(EXCHANGE)**

C majeur



E mineur

« Musique et mathématiques »: a pedagogical film

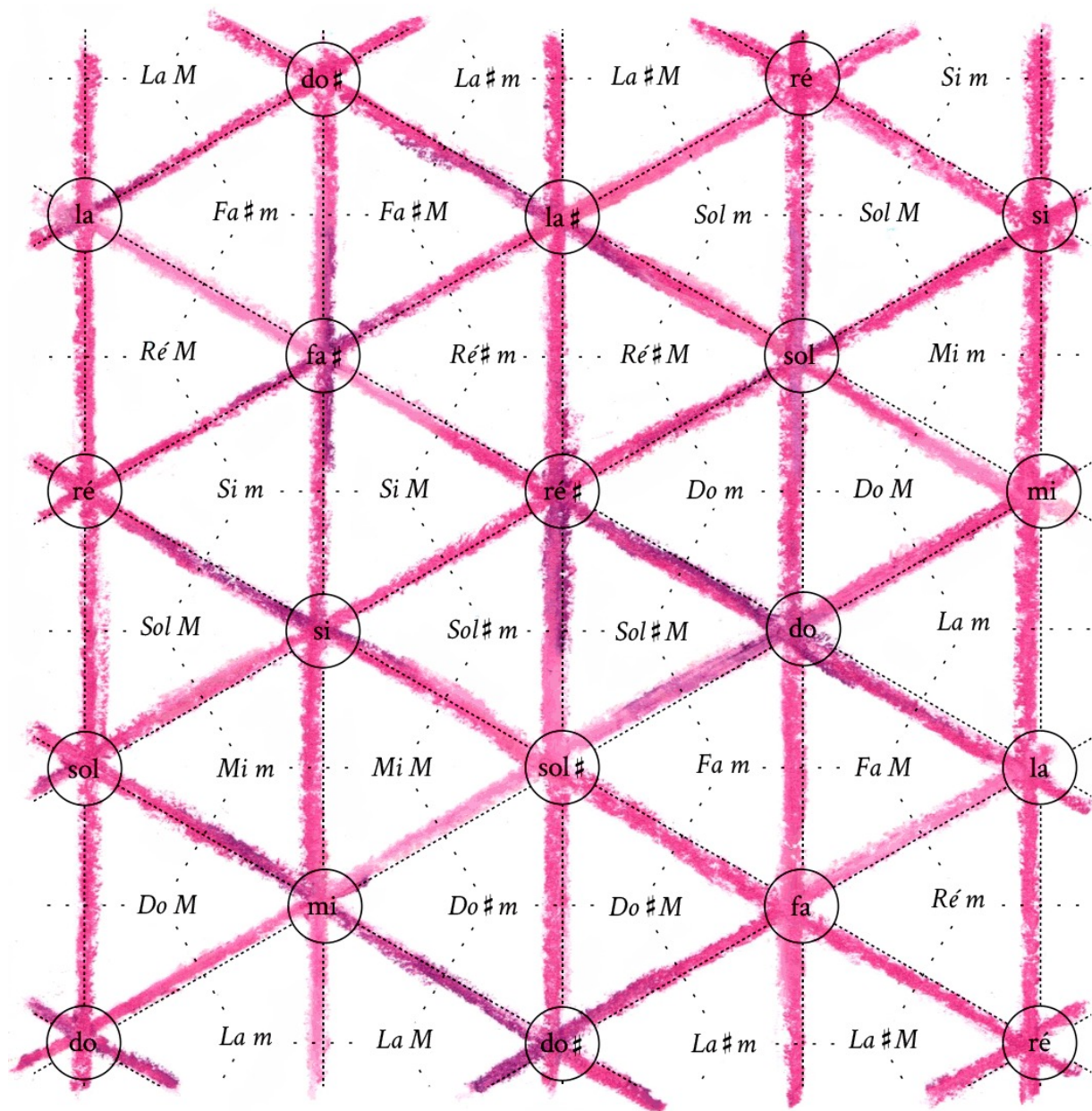
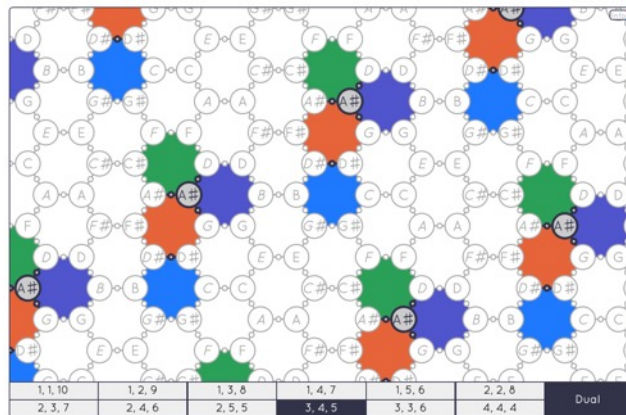


➔ www.morenoandreatta.com

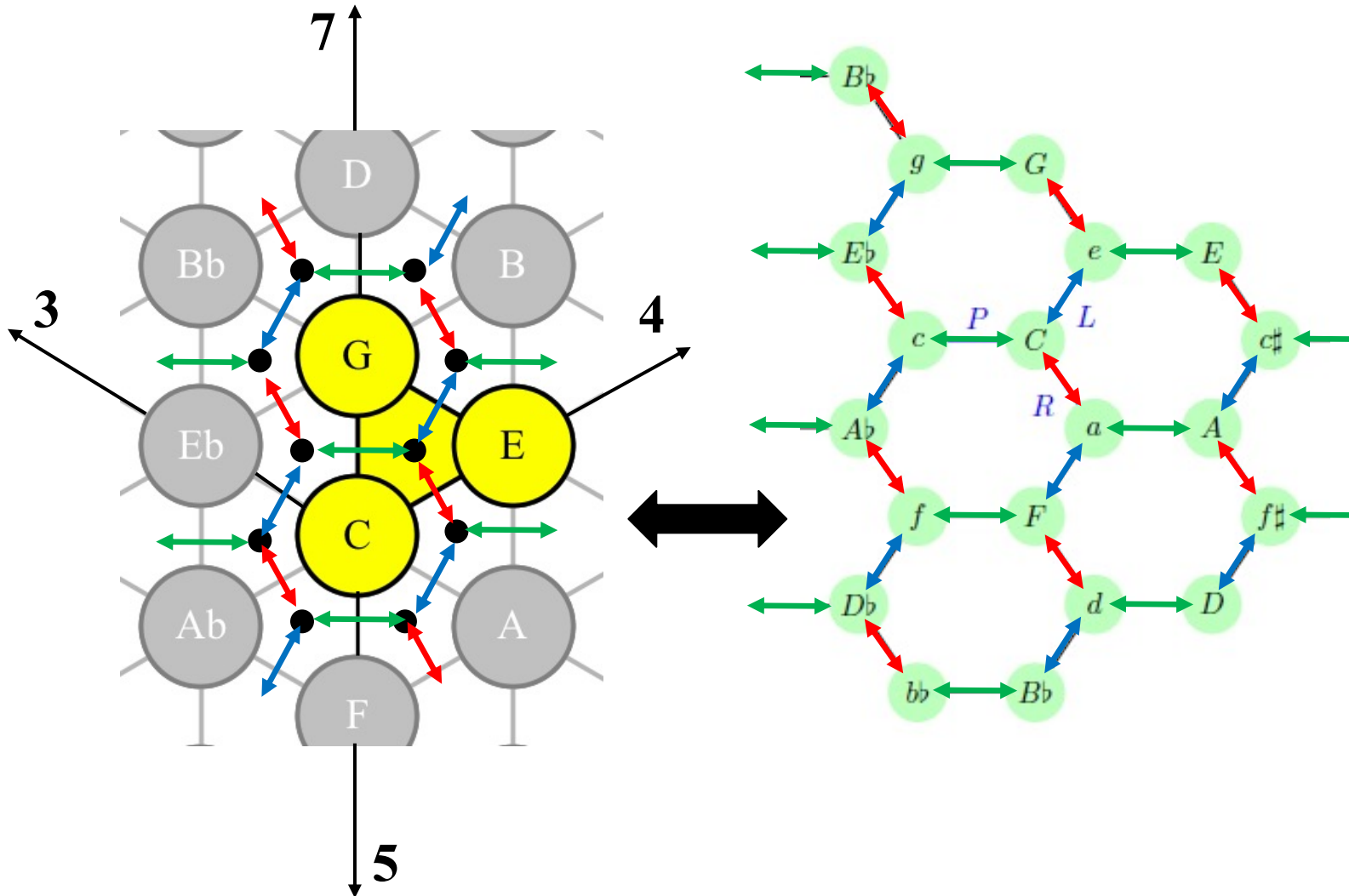


AuDiMATH
AUTOUR DE LA DIFFUSION
DES MATHÉMATIQUES

1, 1, 10	1, 2, 9	1, 3, 8	1, 4, 7	1, 5, 6	2, 2, 8	Dual
2, 3, 7	2, 4, 6	2, 5, 5	3, 4, 5	3, 3, 6	4, 4, 4	

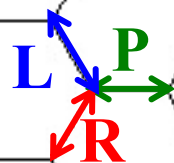


Construction du maillage hexagonal à partir du Tonnetz



Un cycle et ses extensions

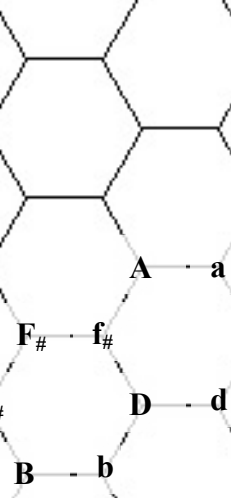
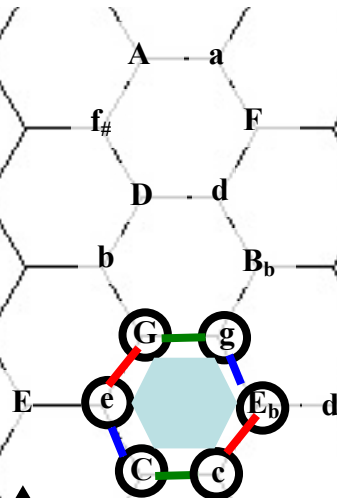
C-c-Eb-g-G-e-C → [PRLPRL]



Axe des quintes

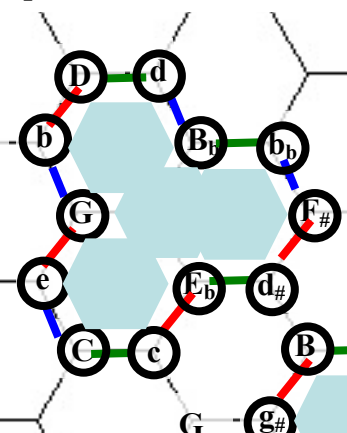
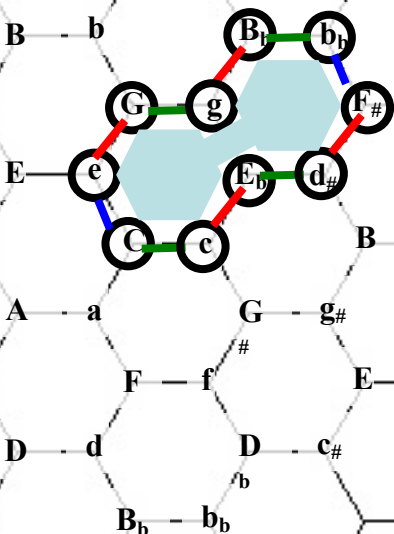


quartes

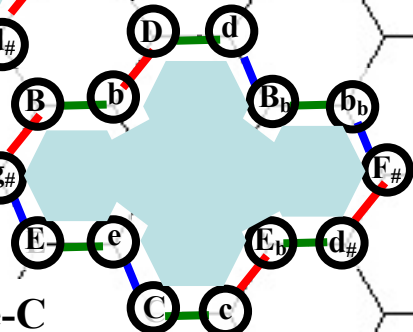


C-c-Eb-d#-F#-b_b-B_b-g-G-e-C
[PRPRLPRPRL]

C-c-Eb-d#-F#-b_b-B_b-d-D-b-G-e-C
[PRPRLPLPRLRL]



C-c-Eb-d#-F#-b_b-B_b-d-D-b-B-g#-E-e-C
[PRPRLPLPRPRLPL]

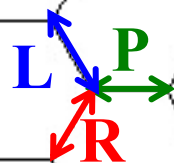


Un cycle, ses extensions et ses modulations

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]

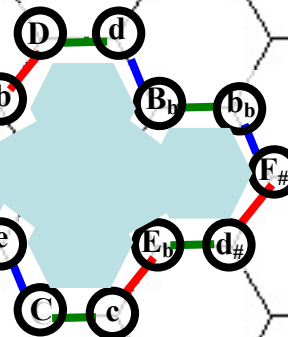
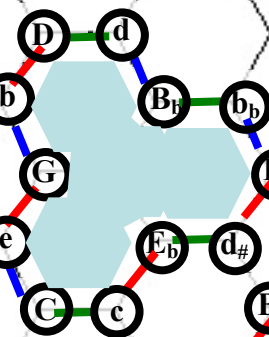
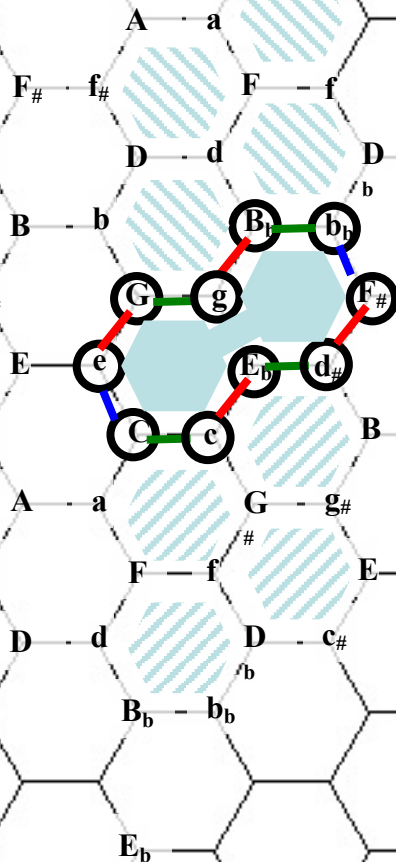
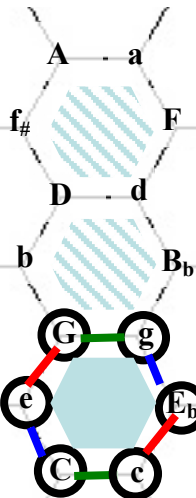
C-c-Eb-g-G-e-C $\xrightarrow{\text{quarte}}$ F-f-G#-c-C-a-F
[PRLPRL]



Axe des quintes



quartes



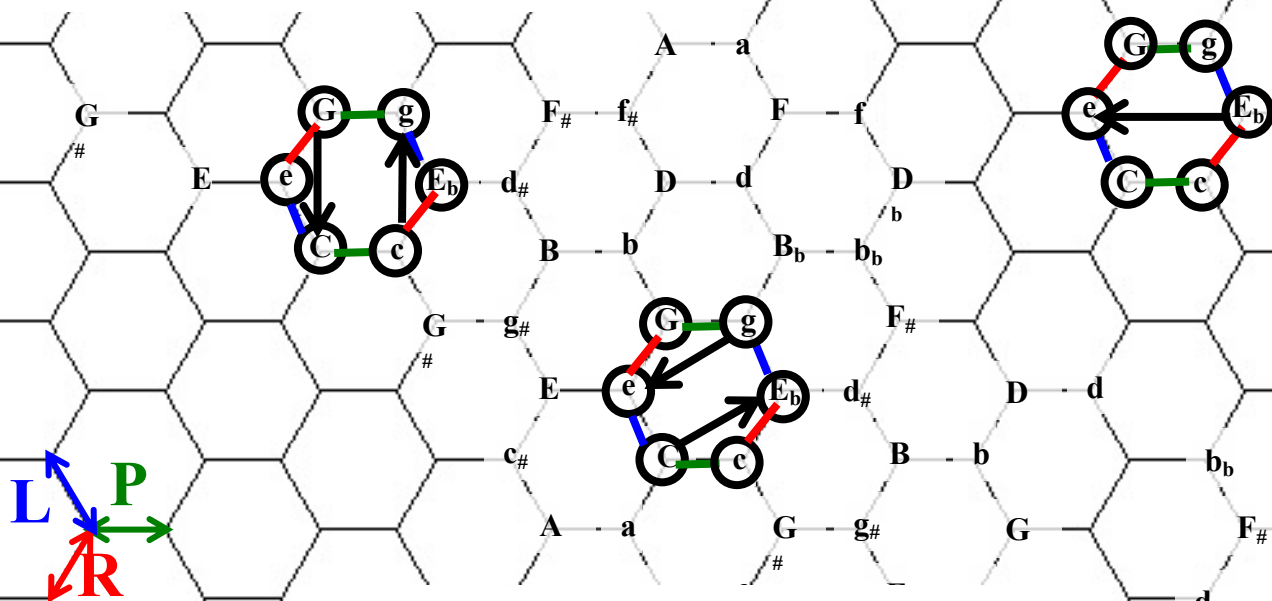
Un cycle et ses raccourcis...

C-c-E_b-g-G-e-C → [PRLPRL]

C-c-----g-G---C → [P(RL)P(RL)]

C-c-E_b-g-G-e-C → [PRLPRL]

C-c-E_b-----e-C → [PR(LPR)L]



C-c-E_b-g-G-e-C → [PRLPRL]

C-----E_b-g-----e-C → [(PR)L(PR)L]

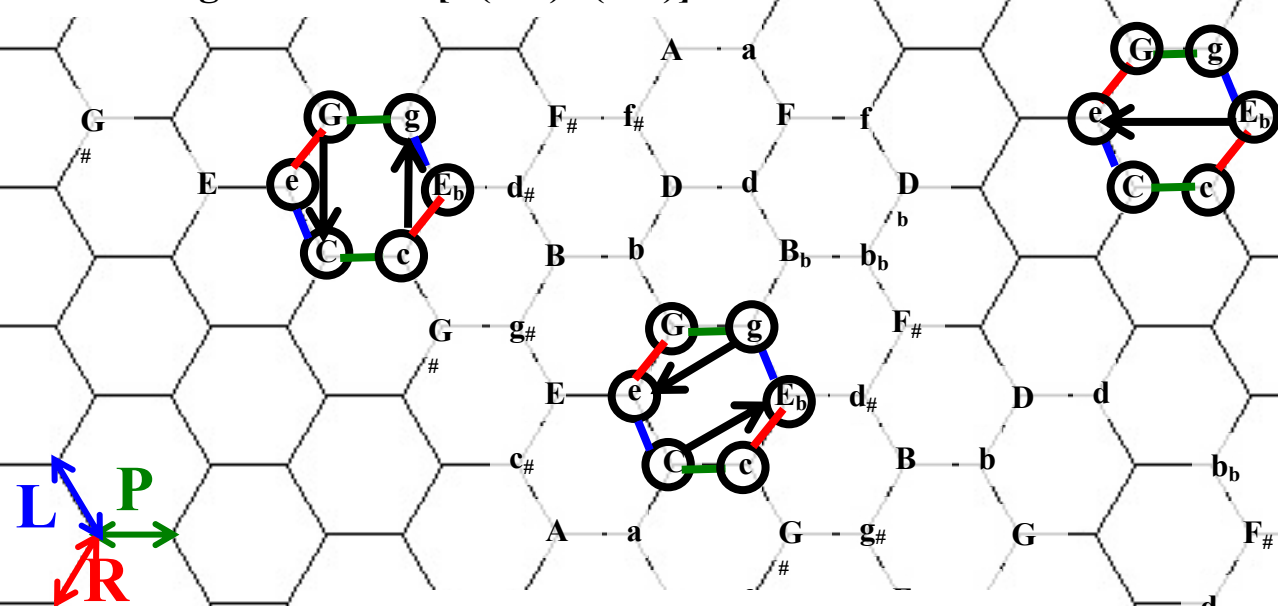
Un cycle et ses raccourcis...

C-c-E_b-g-G-e-C → [PRLPRL]

C-c-----g-G---C → [P(RL)P(RL)]

C-c-E_b-g-G-e-C → [PRLPRL]

C-c-E_b-----e-C → [PR(LPR)L]



C-c-E_b-g-G-e-C → [PRLPRL]

C-----E_b-g-----e-C → [(PR)L(PR)L]

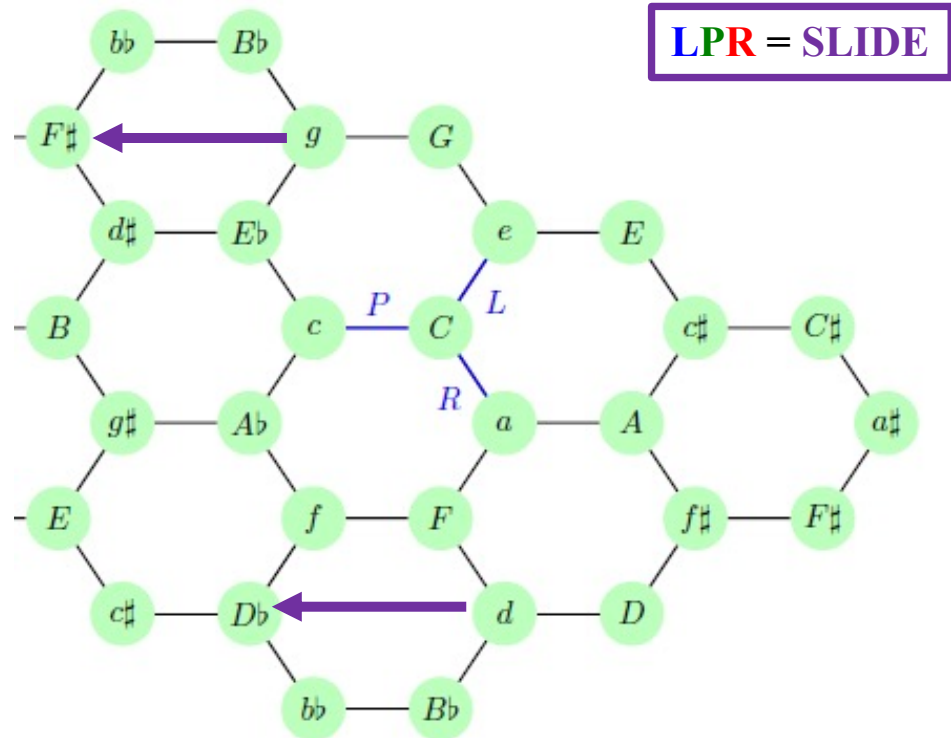
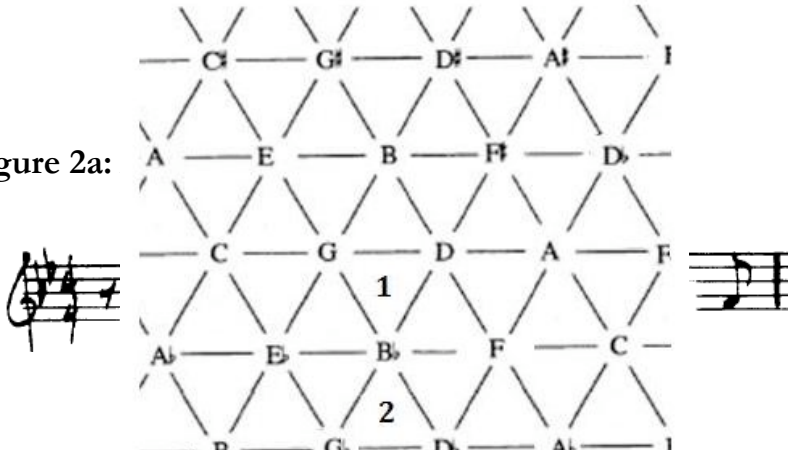
A Neo-Riemannian Approach to Jazz Analysis

Sara B.P. Briginshaw
Queen's University, Canada

Figure 2c: *Mm. 5-6 of 'The Girl from Ipanema.'*¹⁸



Figure 2a:

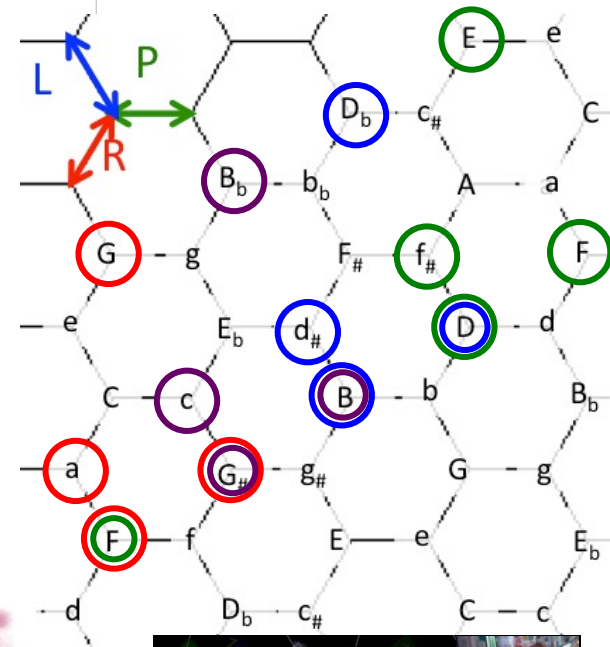
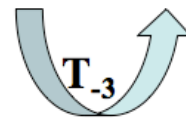
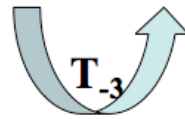
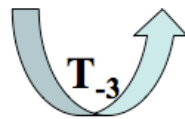
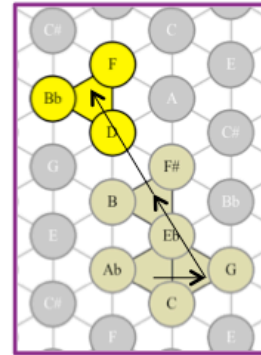
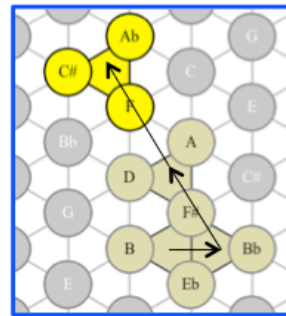
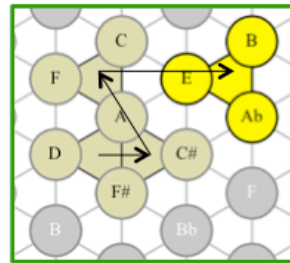
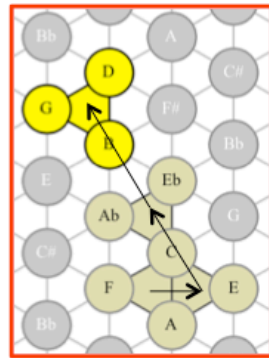


Symétries dans la musique de Frank Zappa

Fa **la_m** **La_b** **Sol** **Re** **fa_{#m}** **Fa** **Mi** **Si** **la_{#m}** **Re** **Re_b** **La_b** **do_m** **Si** **Si_b**



LPR = SLIDE



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



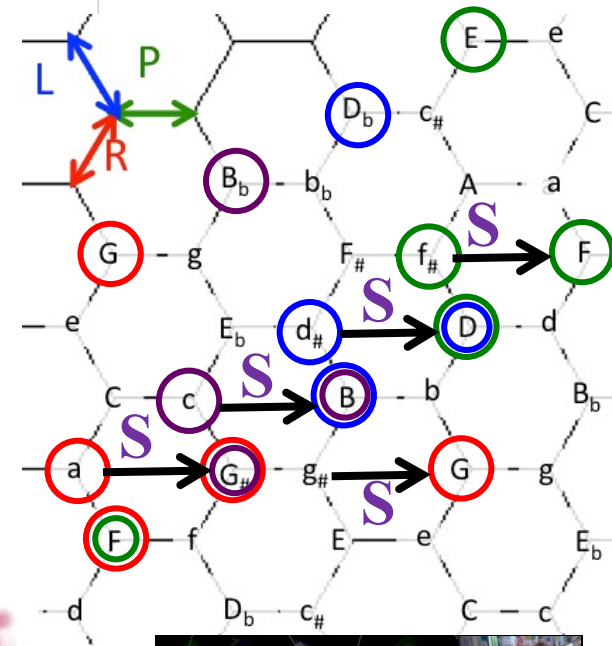
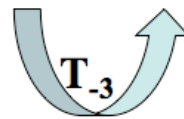
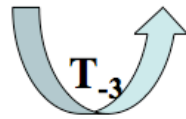
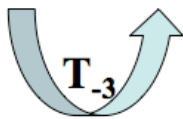
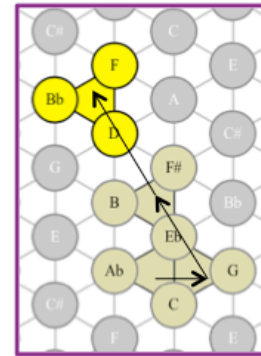
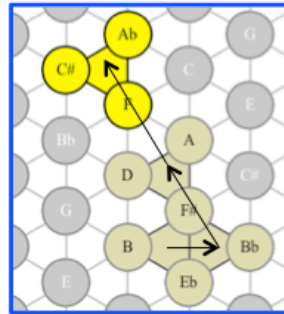
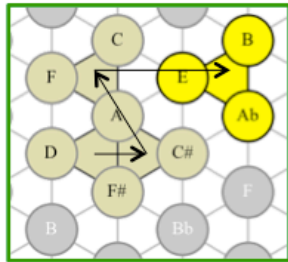
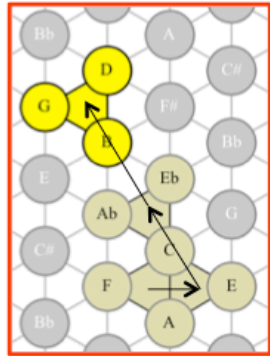
➔ www.mathemusic.net

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



LPR = SLIDE



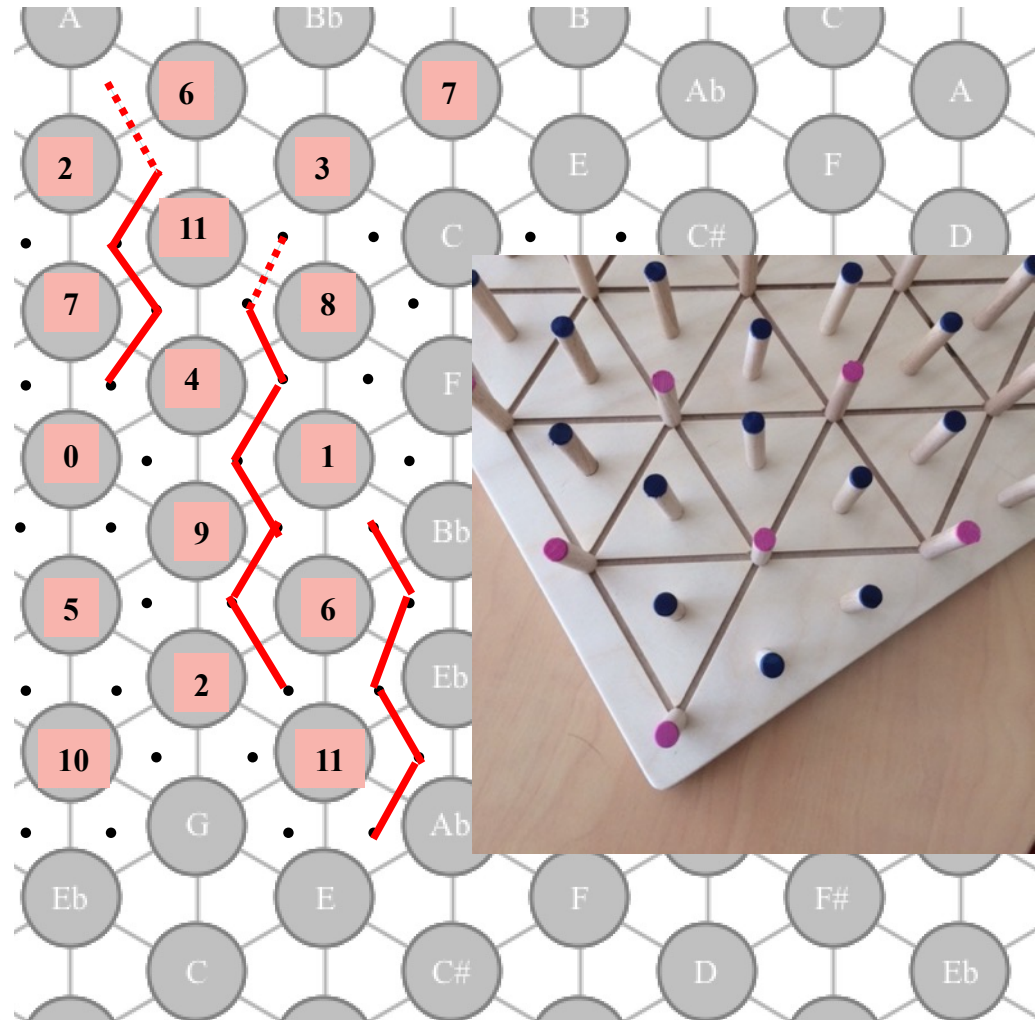
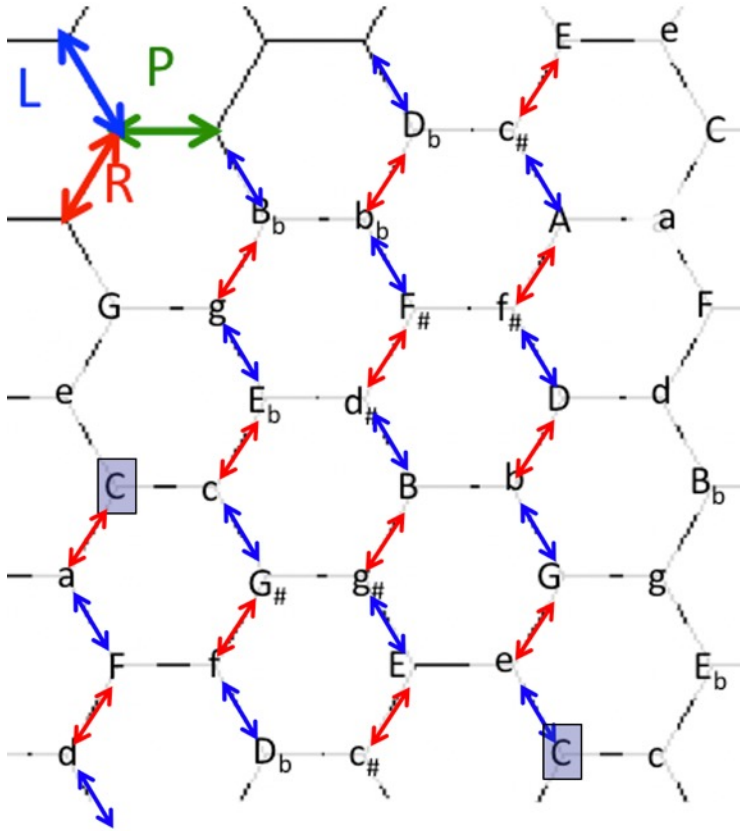
« Easy Meat » - 1981 (Frank Zappa)
min. 1'44" – 2'39"



➔ www.mathemusic.net

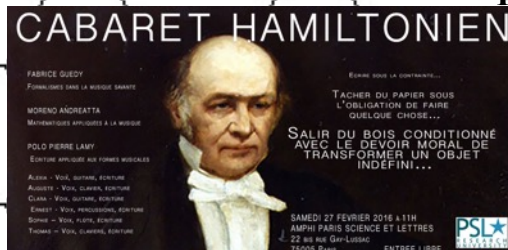
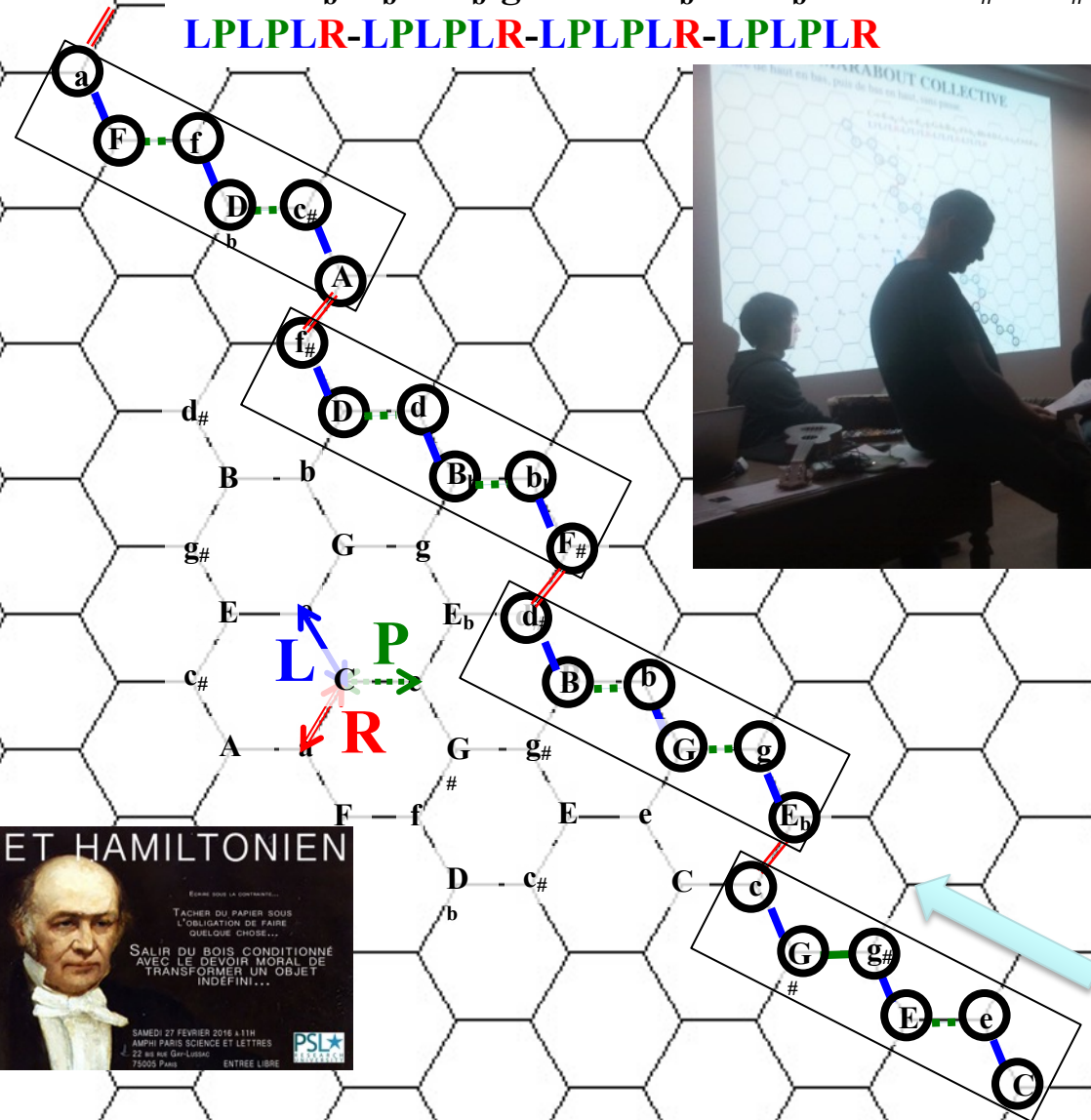
Dessine-moi un zig-zag...

**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**



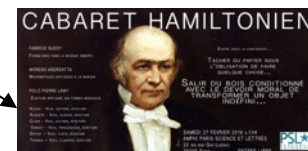
Progressions harmoniques et cycles hamiltoniens

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



Les 28 progressions hamiltoniennes avec périodicité

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--PRPRPLRL
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--PRPLRPR
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--PRPLRLRL
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--LRPRPLRL
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--RPRPRPRL
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--RPRPLRLP
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--RPRPLRL
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--RLRPRPRL
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



Le Blé en Herbe



Listing complet à l'adresse :

http://repmus.ircam.fr/_media/moreno/list_hamiltonian_cycles_bigo_andreatta_2016.pdf

Progressions harmoniques sans périodicité interne

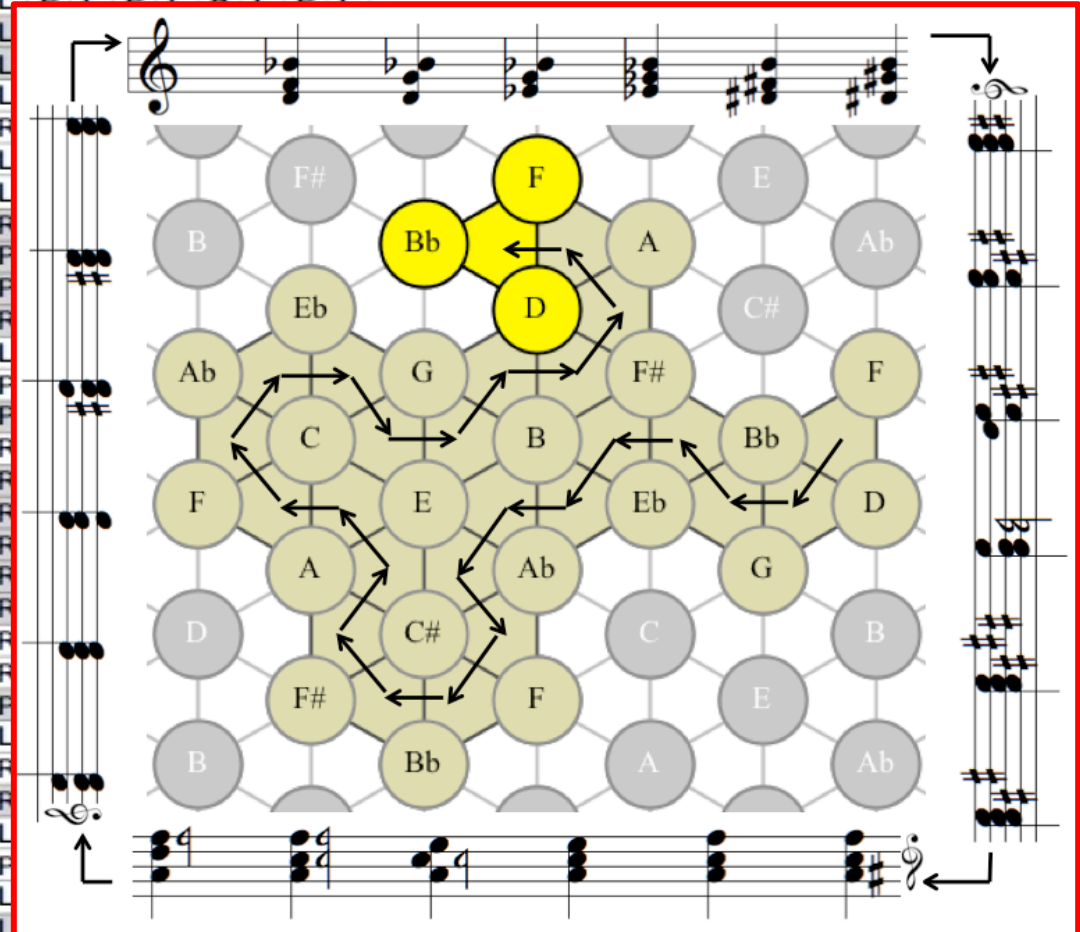
ACTIONS

Math'n'pop

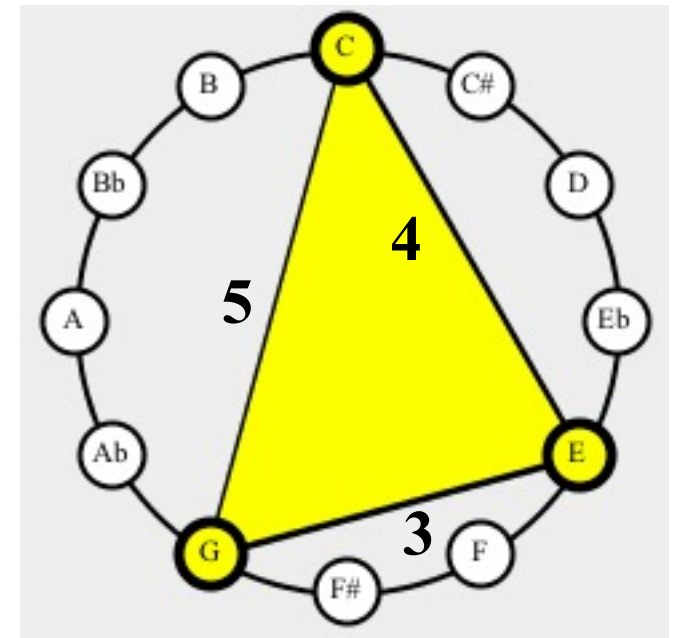
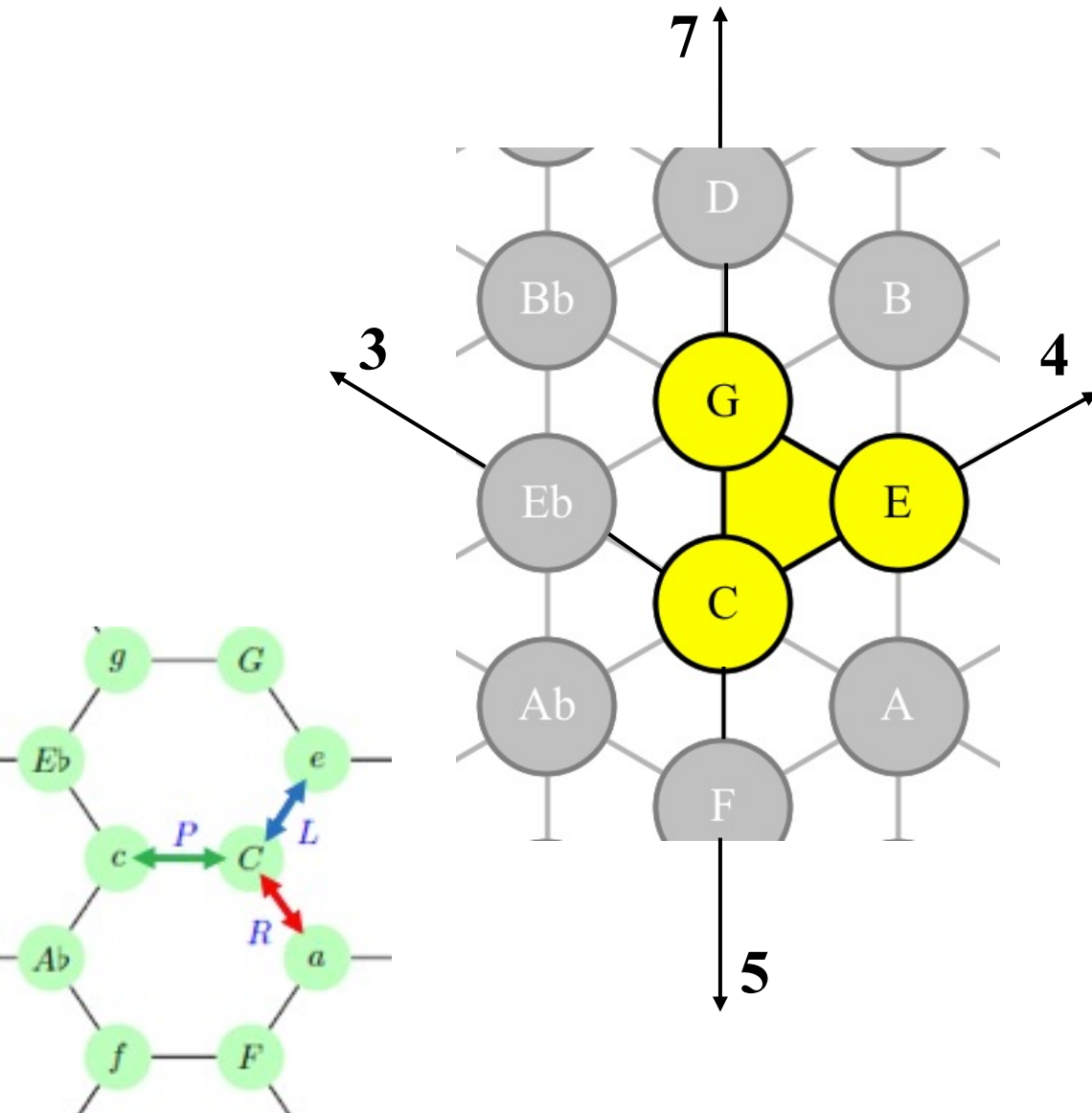
Aprile (d'après Gabriele D'Annunzio)



#41	L	R	L	R	L	R	L	R	L	R	L	R	L	R	L	R	L	R	L	R
#62	L	P	L	P	L	R	L	P	L	P	L	R	L	P	L	P	L	R	L	P
#13	P	L	R	L	P	L	P	L	R	L	P	L	P	L	R	L	P	L	P	L
#4	P	L	P	L	R	L	P	L	P	L	R	L	P	L	P	L	P	L	P	L
#58	L	P	L	P	L	R	P	L	P	L	P	R	P	L	P	L	P	L	P	L
#19	P	R	L	P	L	P	L	R	P	L	P	L	P	R	P	L	P	L	P	L
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#27	P	L	P	L	P	R	L	P	L	P	L	R	P	L	P	L	P	L	P	L
#21	P	R	P	L	P	L	P	R	L	P	L	P	L	R	P	L	P	L	P	L
#8	P	L	P	R	P	L	P	L	P	R	L	P	L	P	L	P	L	P	L	P
#30	P	L	P	L	P	R	P	L	P	L	P	R	L	P	L	P	L	P	L	P
#22	P	R	P	L	P	L	P	R	P	L	P	L	P	R	L	P	L	P	L	P
#10	P	L	P	R	P	L	P	L	P	R	P	L	P	L	P	L	P	L	P	R
#31	P	L	P	L	P	R	P	L	P	L	P	R	P	L	P	L	P	L	P	L
#9	P	L	R	P	L	P	L	P	R	P	L	P	L	P	R	P	L	P	R	P
#6	P	L	P	L	R	P	L	P	L	P	R	P	L	P	L	P	L	P	L	P
#33	P	R	P	R	P	R	L	R	P	R	P	R	P	R	P	R	L	P	R	L
#44	L	R	P	R	P	R	P	R	L	R	P	R	P	R	P	R	P	R	P	R
#40	P	R	L	R	P	R	P	R	P	R	L	R	P	R	P	R	P	R	P	R
#38	P	R	P	R	L	R	P	R	P	R	P	R	L	R	P	R	L	R	P	R
#34	P	R	P	R	L	R	L	R	P	R	P	R	L	R	L	R	P	R	L	R
#42	L	R	P	R	P	R	L	L	R	P	R	P	R	L	R	P	R	L	R	P
#43	L	R	L	R	P	R	P	R	L	R	L	R	P	R	P	R	L	R	P	R
#39	P	R	L	R	L	R	P	R	P	R	L	R	L	R	P	R	L	R	P	R
#50	L	R	L	P	L	R	L	P	R	L	R	L	P	L	R	L	P	L	R	P
#37	P	R	L	R	L	P	L	R	L	P	R	L	R	L	P	L	R	L	P	L
#25	P	L	R	P	R	L	R	L	P	L	R	L	P	R	L	P	R	L	P	R
#16	P	R	P	L	R	P	R	L	R	L	P	L	R	L	P	R	L	P	R	L
#23	P	L	P	R	P	L	R	P	R	L	R	L	P	L	R	L	P	L	R	L
#1	P	L	R	P	L	P	R	P	L	R	P	R	L	R	L	P	R	L	R	L
#59	L	P	L	R	P	L	P	R	P	L	R	P	R	L	R	L	P	R	L	R
#48	L	R	L	P	L	R	P	L	P	R	P	L	R	P	L	R	P	L	R	P
#18	P	R	L	R	L	P	L	R	P	L	P	R	P	L	R	P	R	L	R	L
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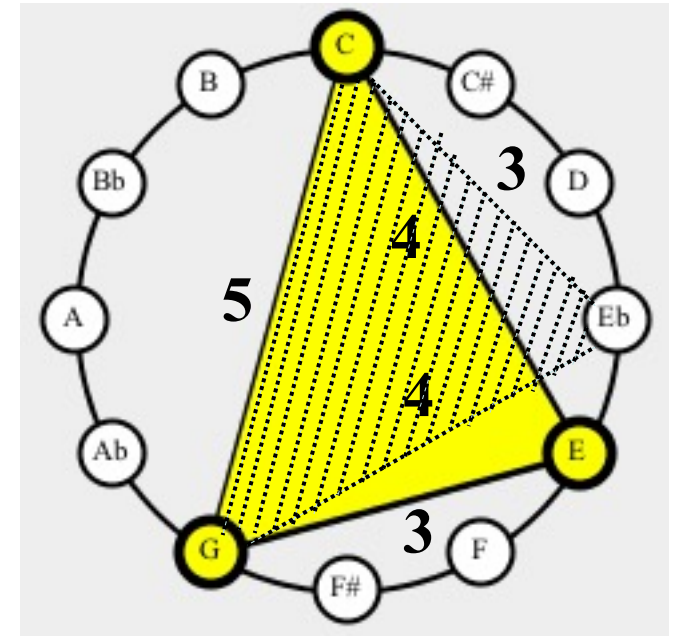
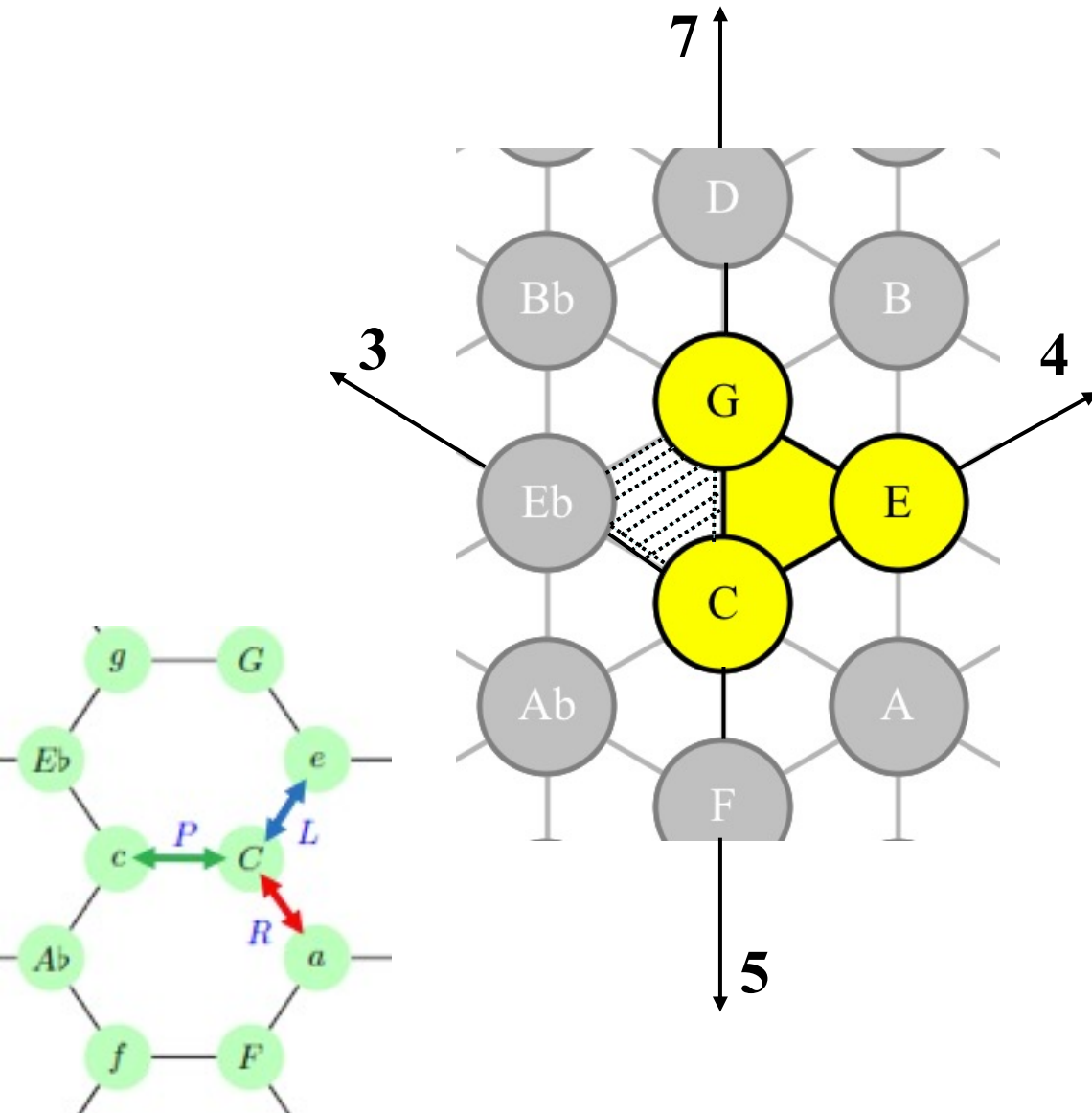


Du *Tonnetz* aux *Tonnetze*



$$(4,3,5) \longleftrightarrow (3,4,5)$$

Du *Tonnetz* aux *Tonnetze*



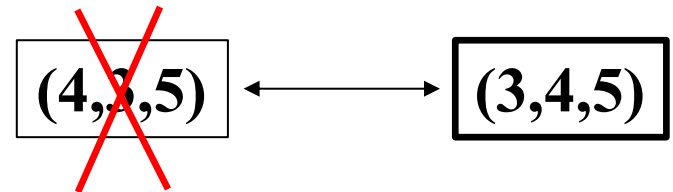
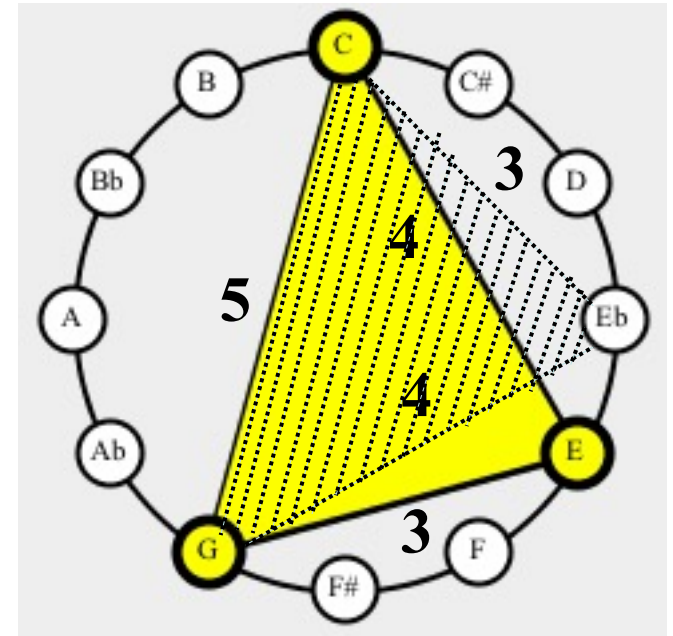
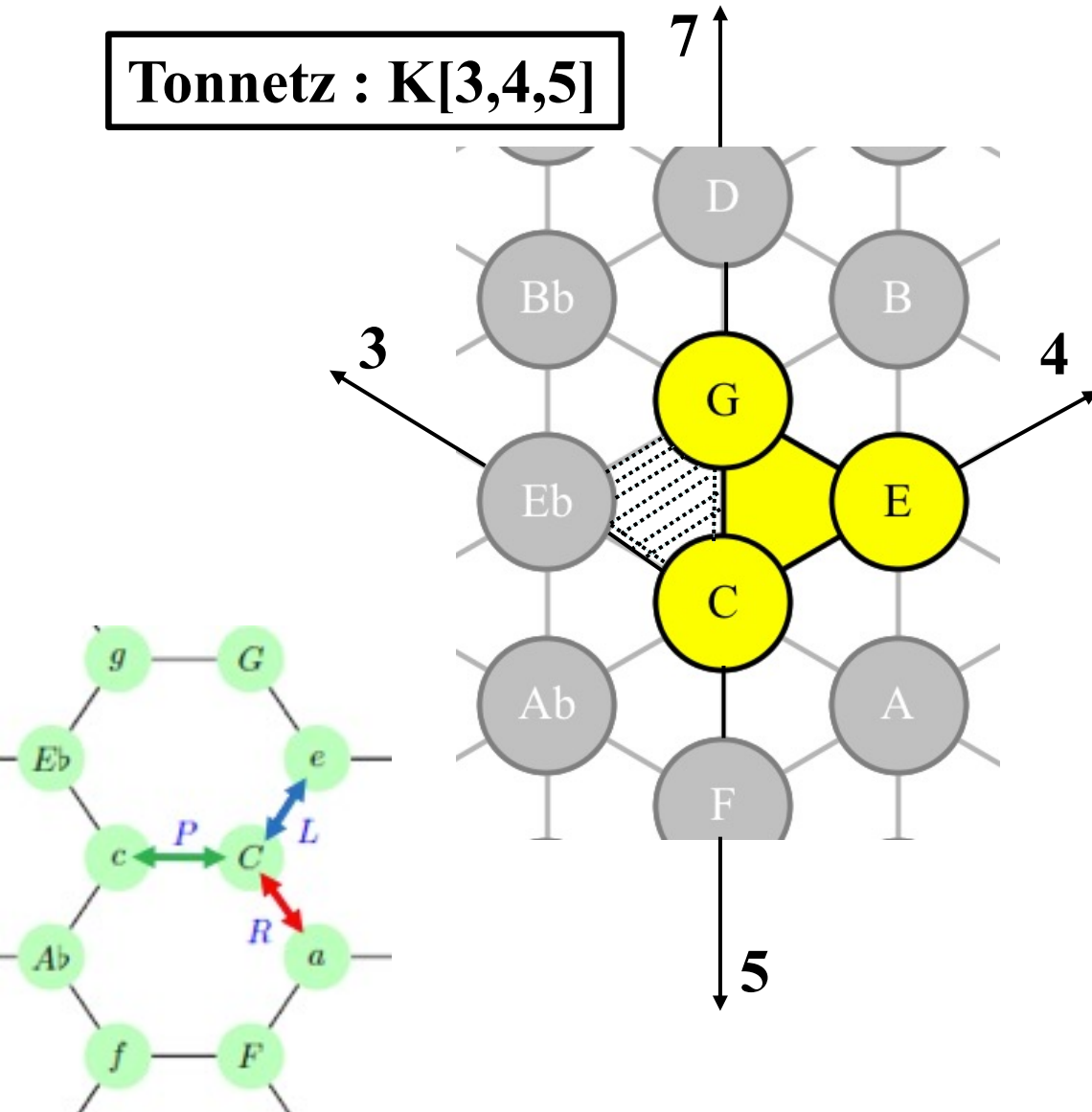
$(4,3,5)$

$\longleftrightarrow$

$(3,4,5)$

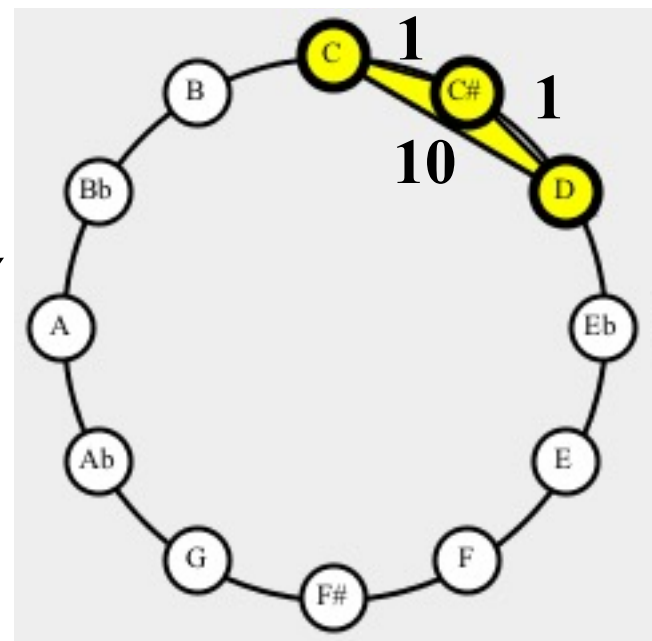
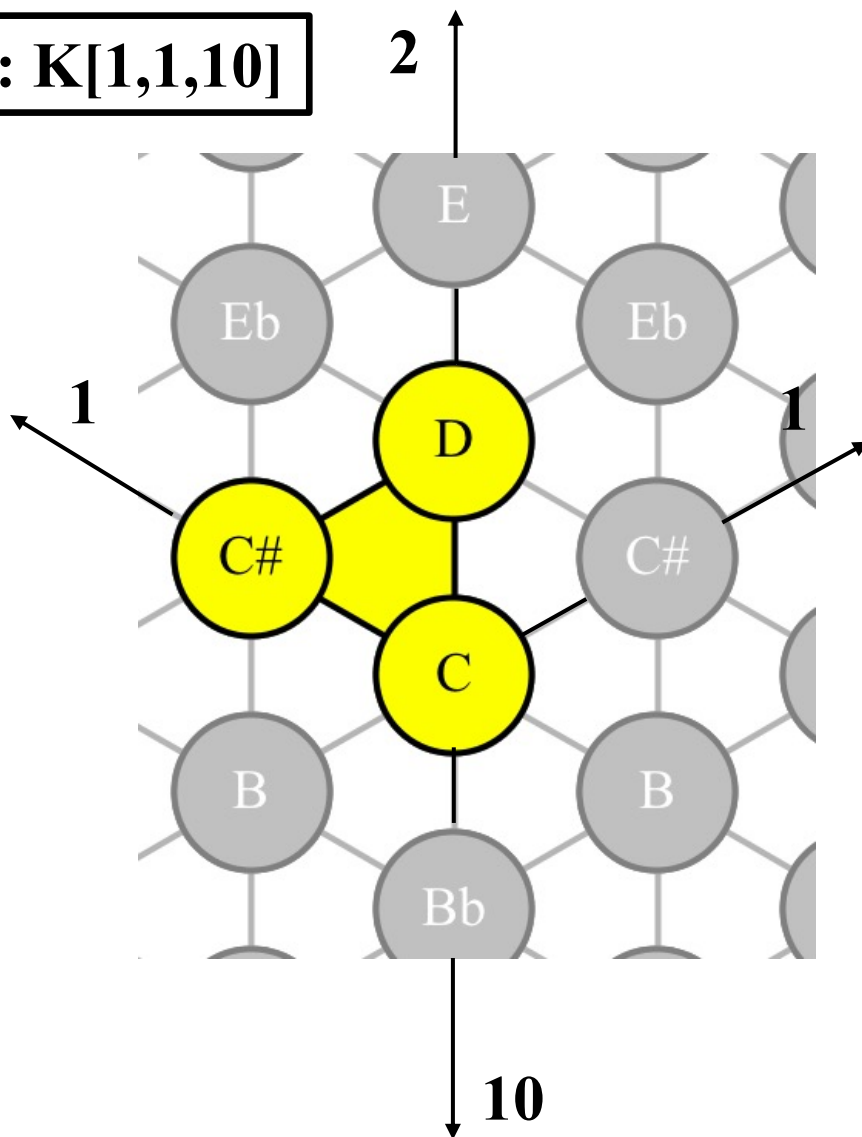
Du Tonnetz aux Tonnetzze

Tonnetz : K[3,4,5]



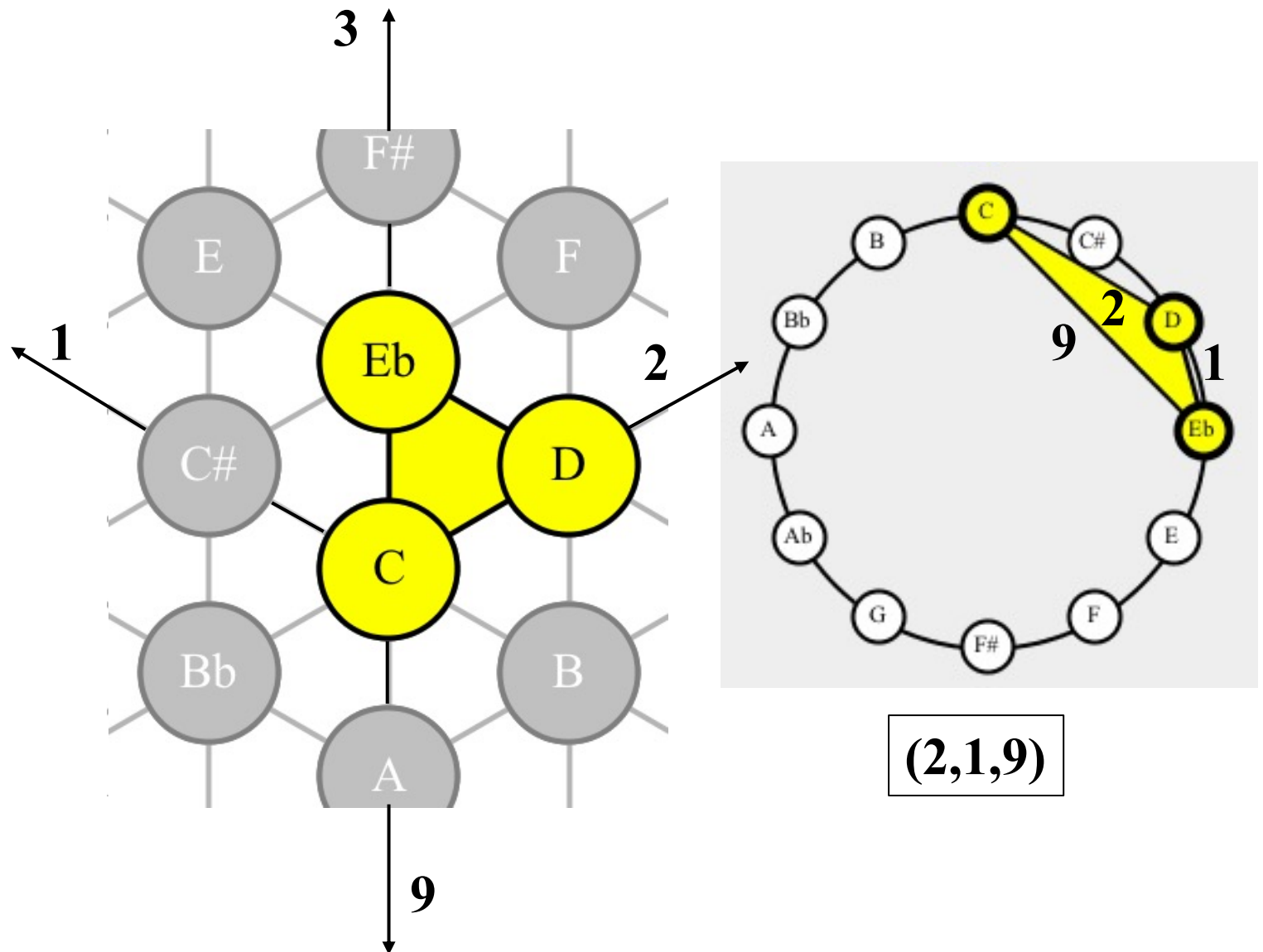
Du *Tonnetz* aux *Tonnetze*

Tonnetz : $K[1,1,10]$

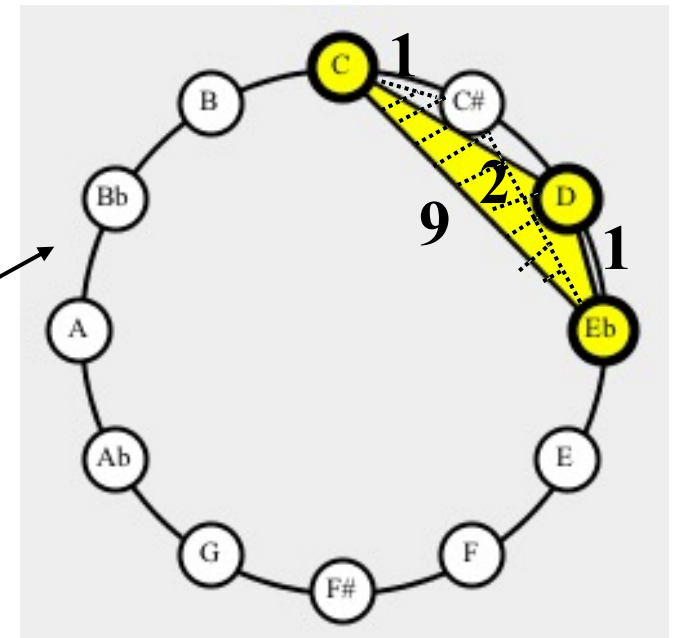
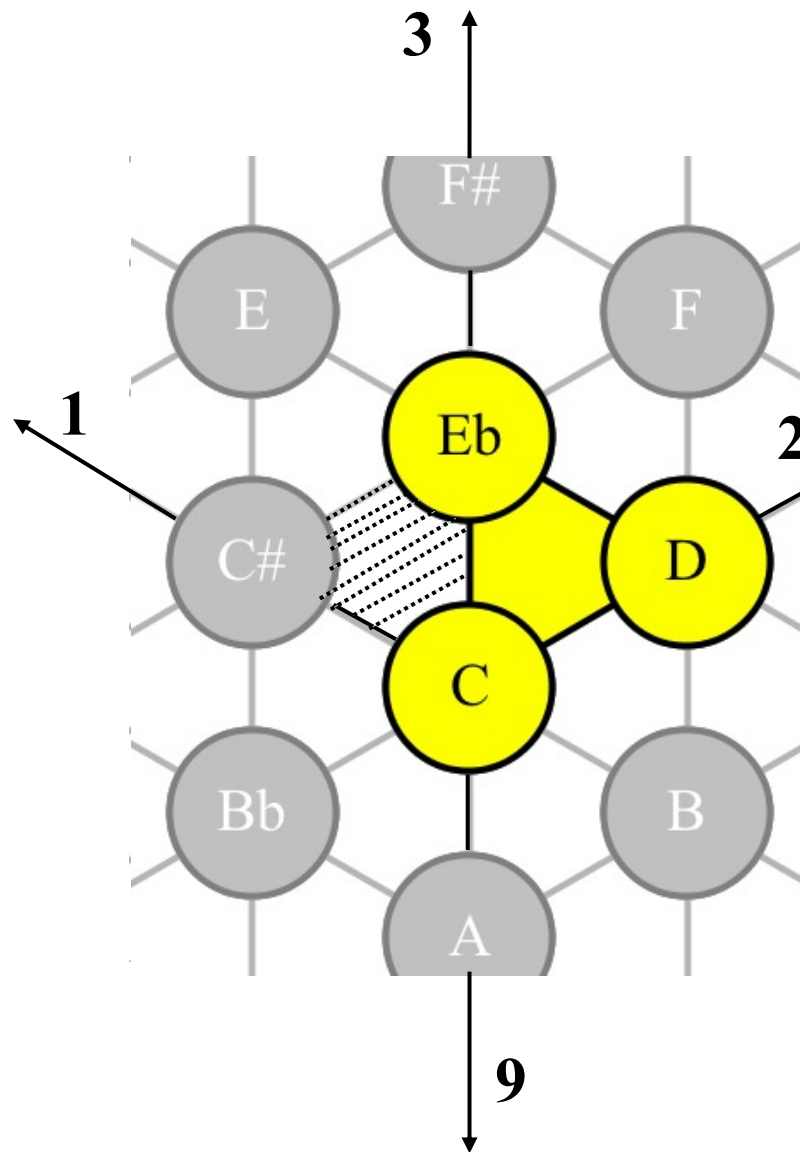


$(1,1,10)$

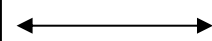
Du *Tonnetz* aux *Tonnetze*



Du *Tonnetz* aux *Tonnetze*



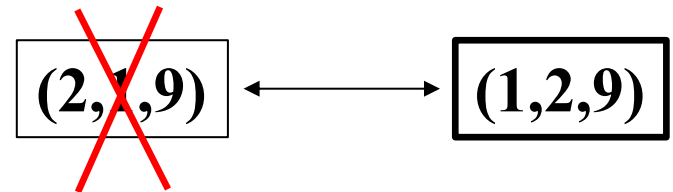
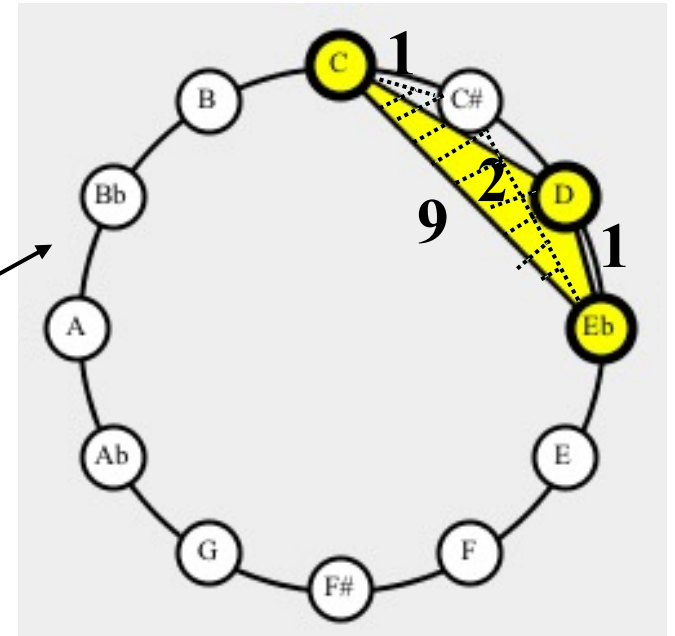
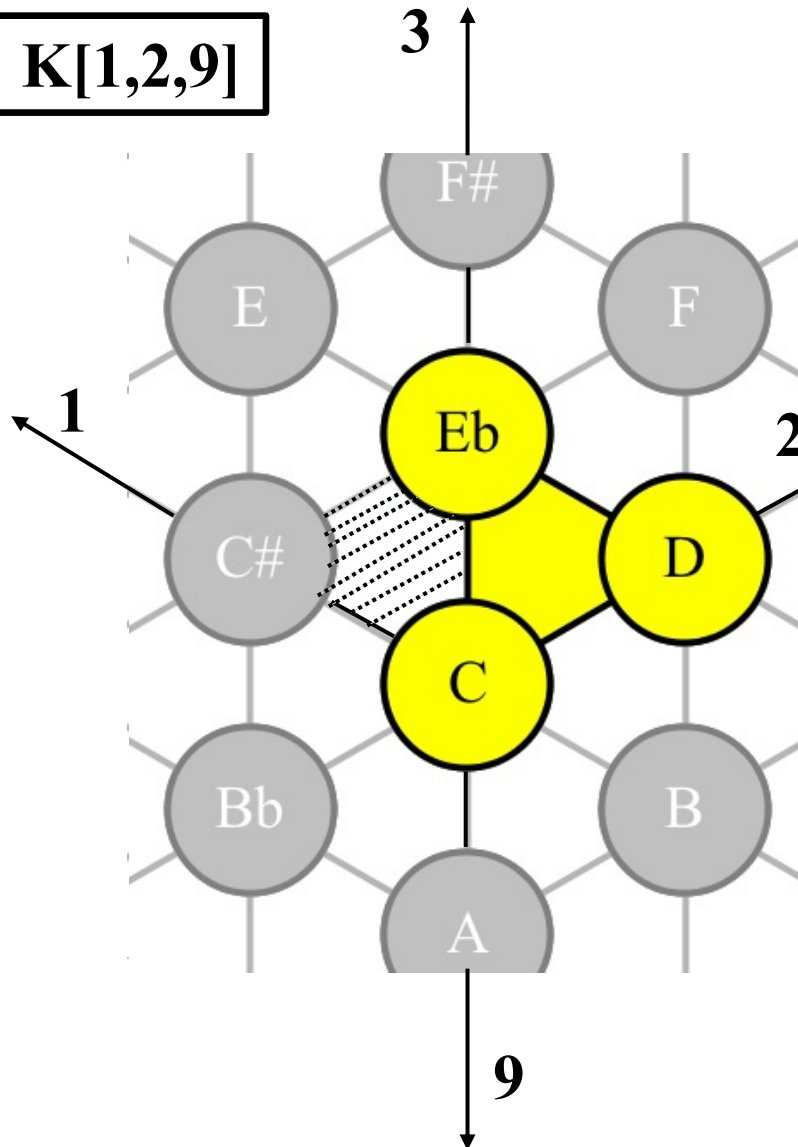
(2,1,9)



(1,2,9)

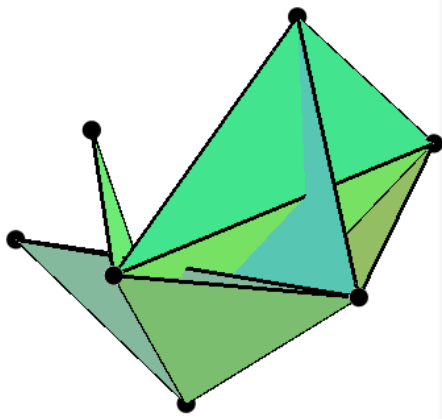
Du Tonnetz aux Tonnetze

Tonnetz : $K[1,2,9]$

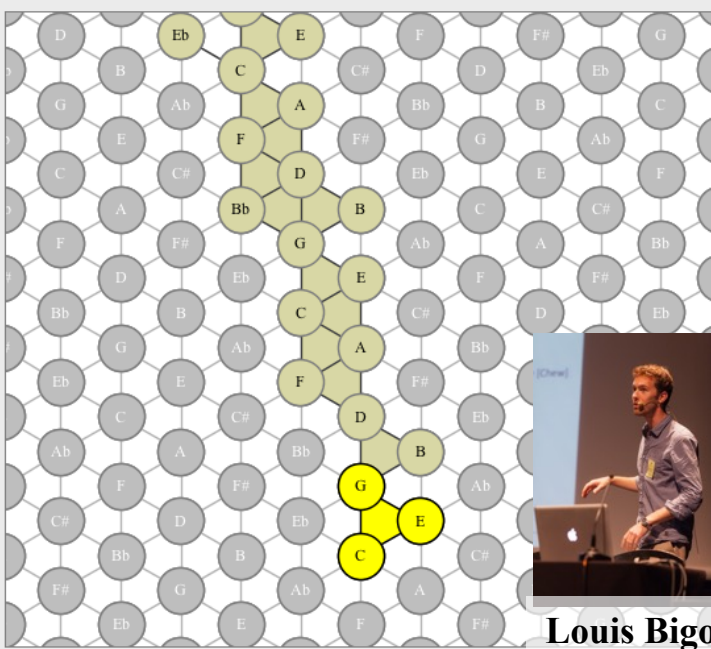


Choix de l'espace de représentation dans *Hexachord*

Plex Viewer



Tonnetz : K[3,4,5]



InfoBox

Tempo: **bwv0281.mid**

0 10 20

Play Stop

Select midi file

Chromatic complexes: **K[2,3,7]** Heptatonic complexes: **CM**

Trace off Harmonization ON

Display graph

Vertical compactness

compactness dimension complexes dimension

2-compactness **2**

compute compactness

absolute compactness

Path Transformation

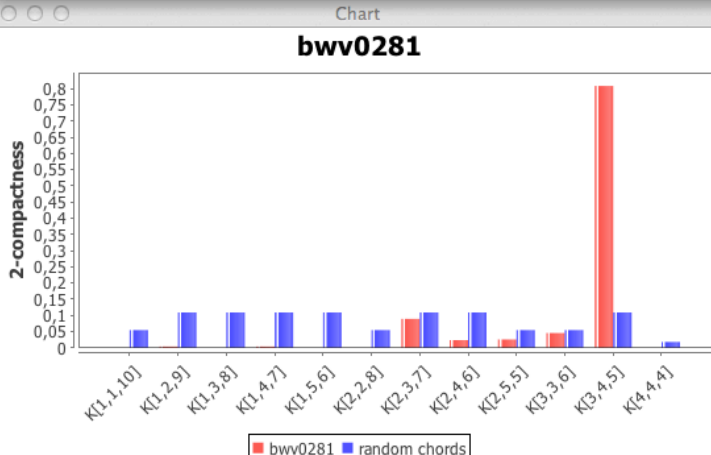
Origin complex: **K[3,4,5]** Destination complex: **K[3,4,5]**

Rotation: 0 North translation: 0 North-east translation: 0

Path Transformation

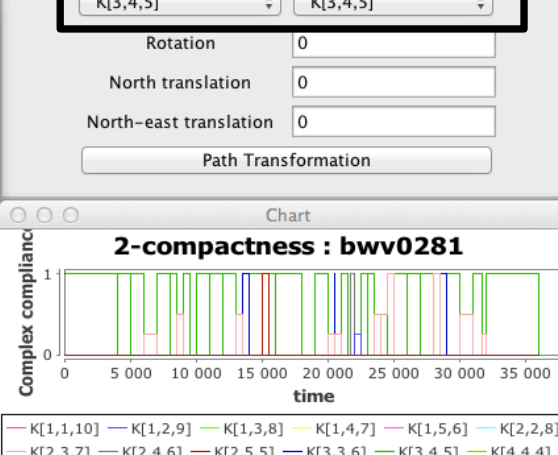
Chart

bwv0281



Complex compliance

2-compactness : bwv0281

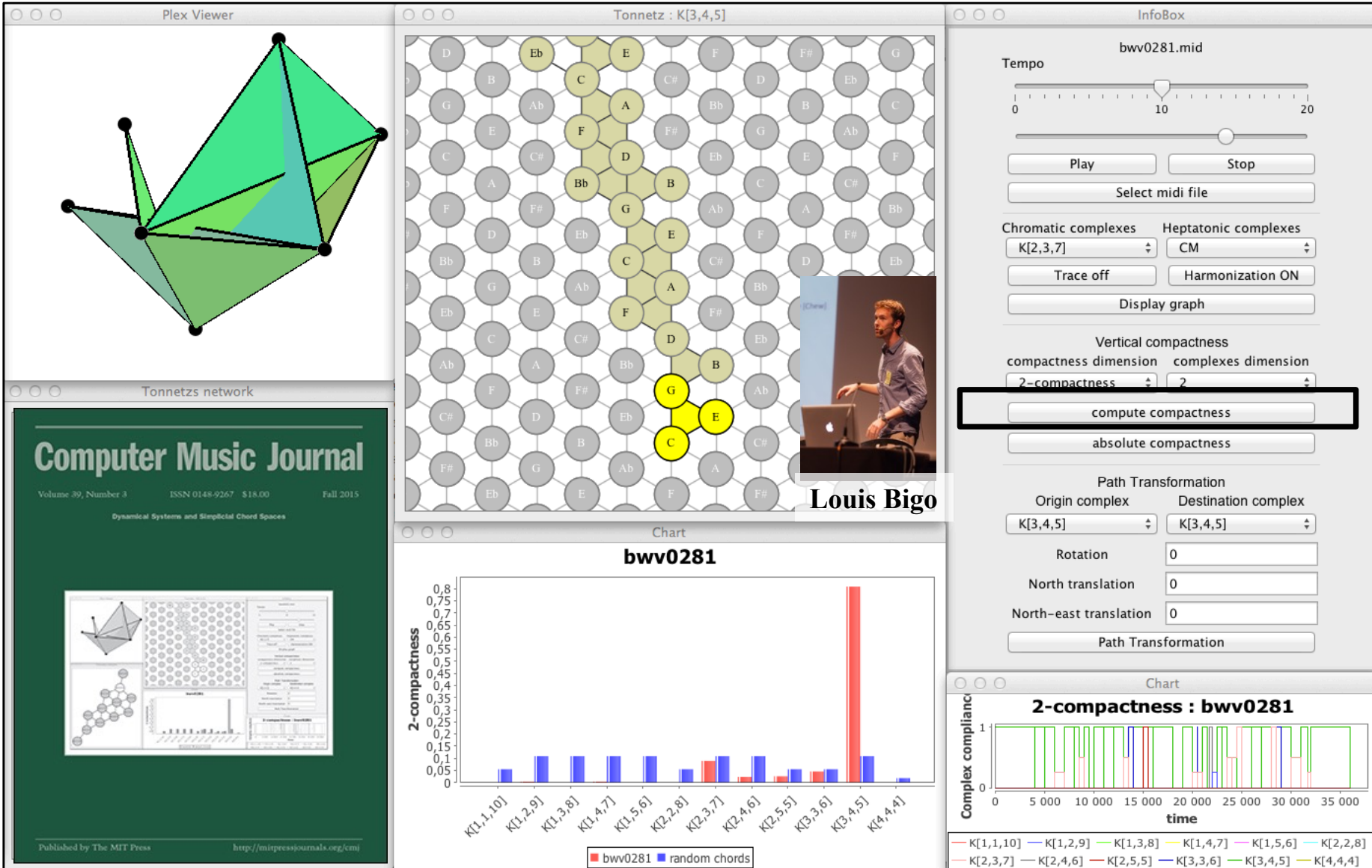


Published by The MIT Press <http://mitpressjournals.org/cmj>

→ <http://www.lacl.fr/~lbigo/hexachord>

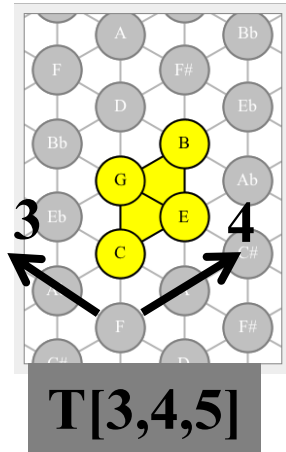
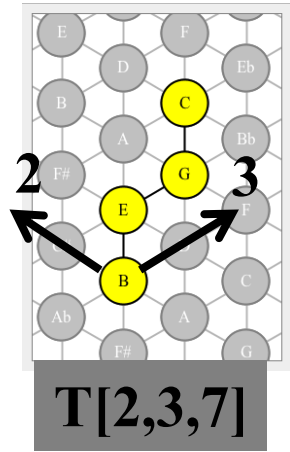
DEMO

Hexachord et le problème de la classification stylistique

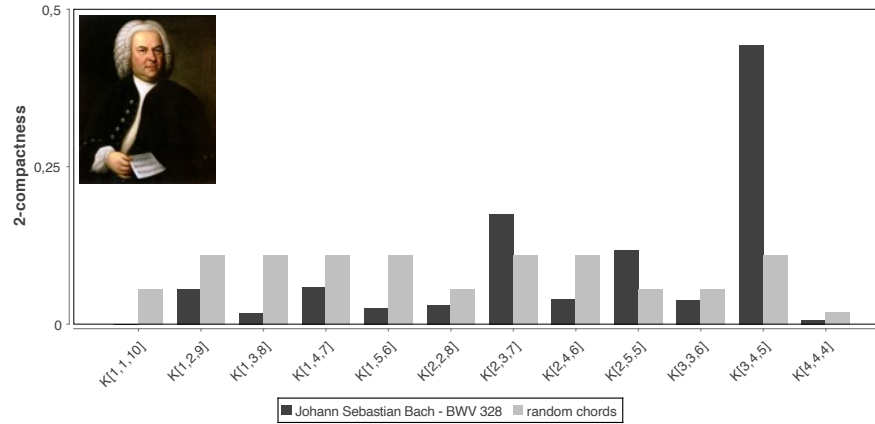


➔ <http://www.lacl.fr/~lbigo/hexachord>

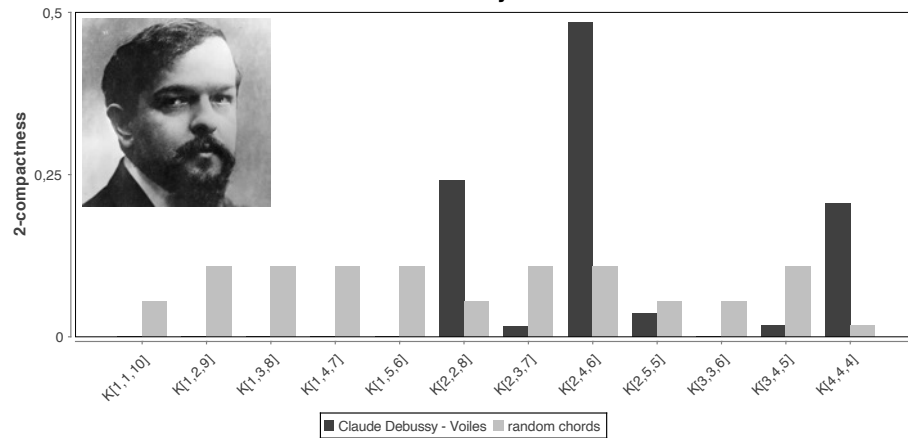
Le caractère spatial du « style musical »



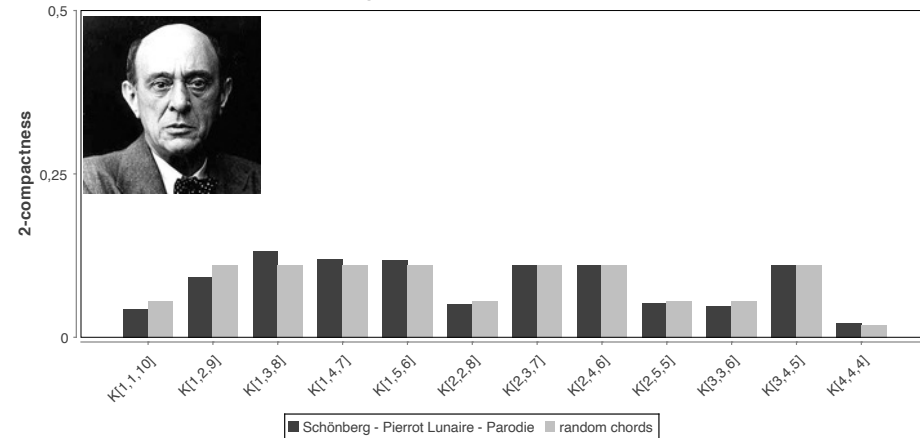
Johann Sebastian Bach - BWV 328

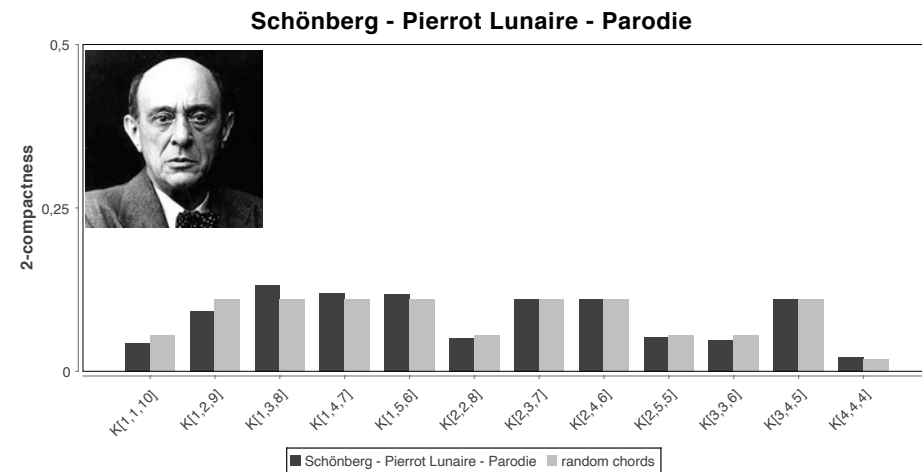
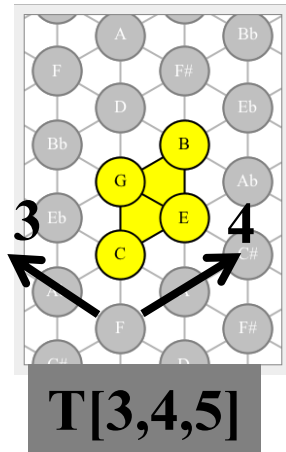


Claude Debussy - Voiles



Schönberg - Pierrot Lunaire - Parodie





Approches néoriemanniennes à l'analyse du jazz

Nota Bene: Canadian Undergraduate Journal of Musicology

Volume 5 | Issue 1

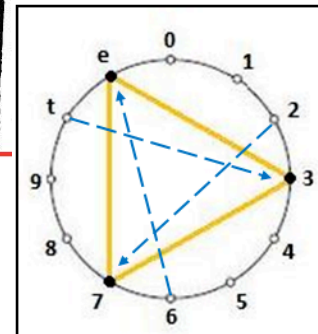
Article 5

A Neo-Riemannian Approach to Jazz Analysis

Sara B.P. Briginshaw
Queen's University, Canada

Figure 12: *The embellished Augmented Cycle from mm. 1-7 of Coltrane's 'Giant Steps.'*⁶²

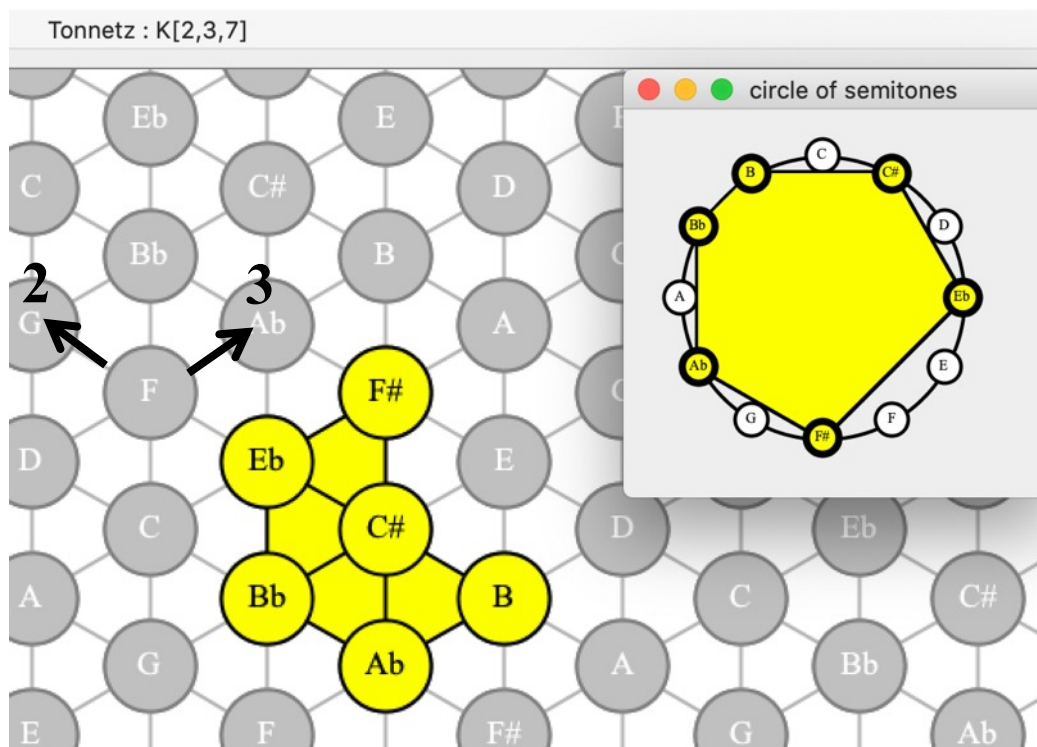
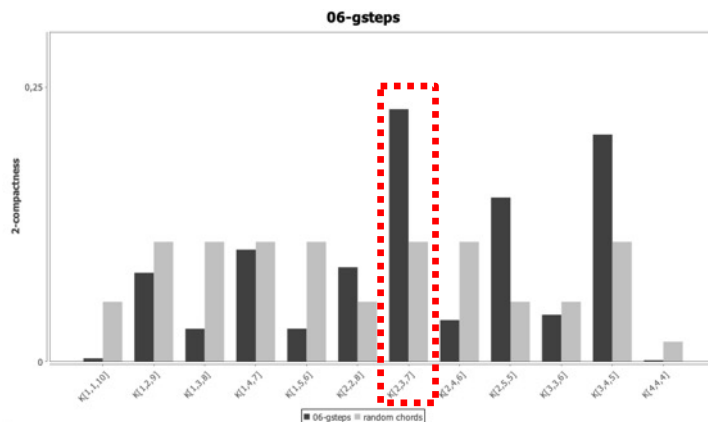
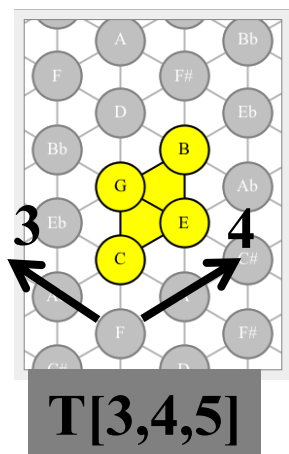
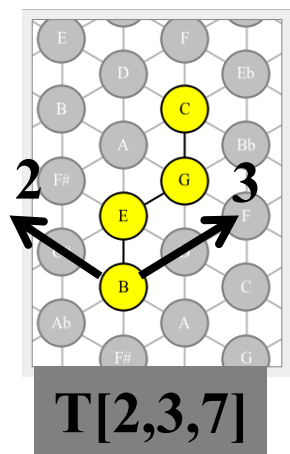
B - D7 | G - Bb7 | Eb ... F#7 | B ||



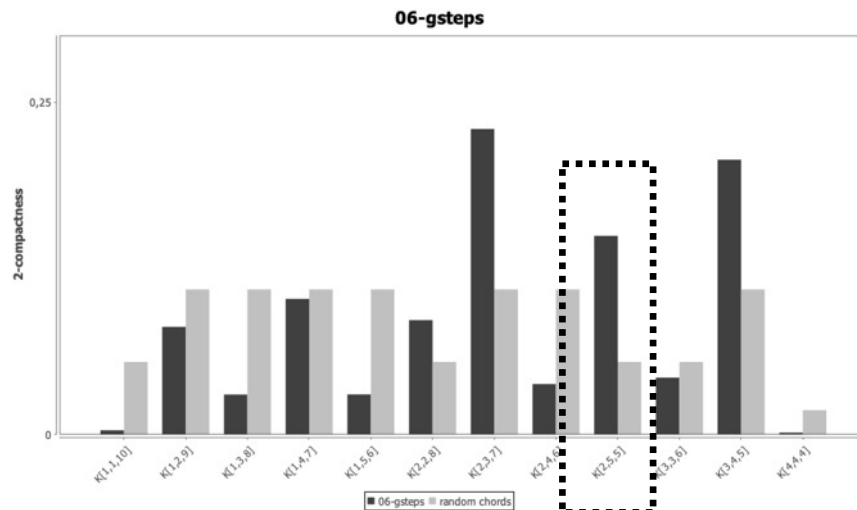
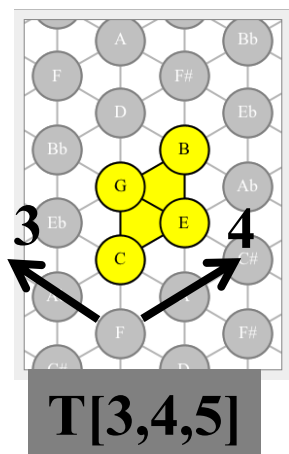
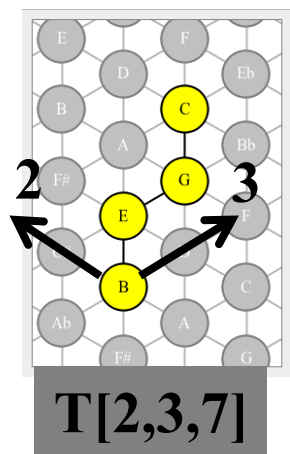
t=10
e=11



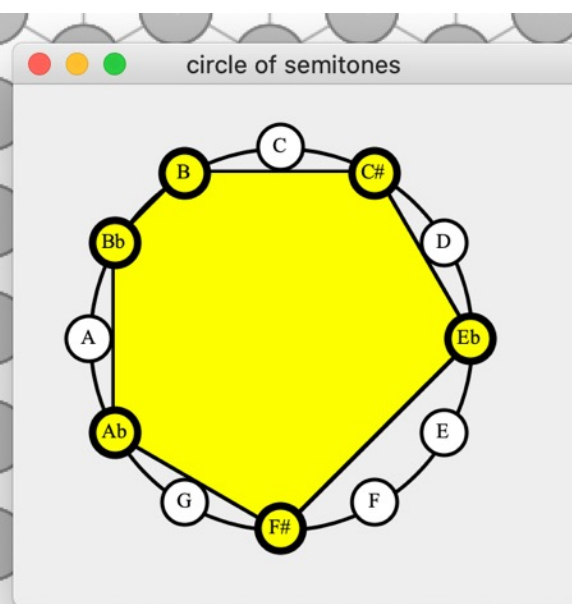
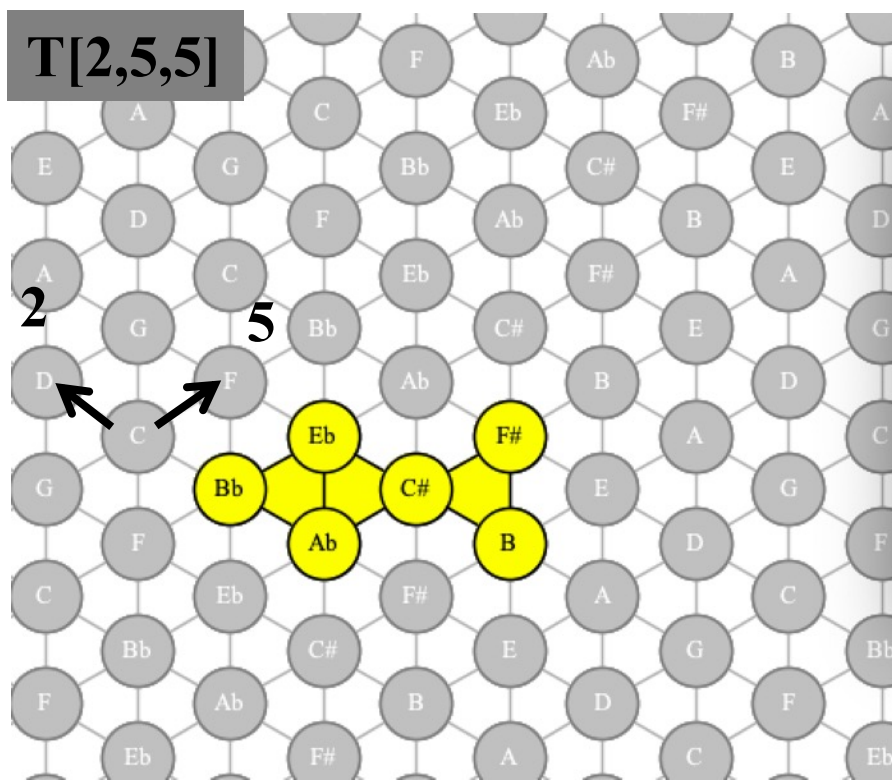
Application au jazz : « Giant Steps » (John Coltrane)



Application au jazz : « Giant Steps » (John Coltrane)

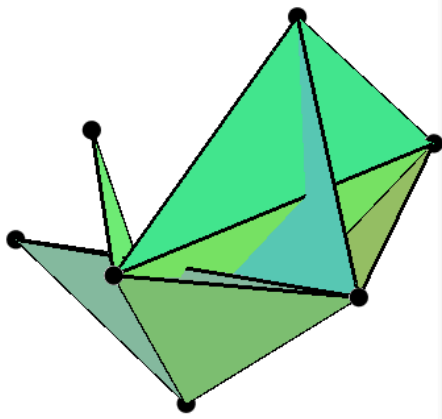


T[2,5,5]

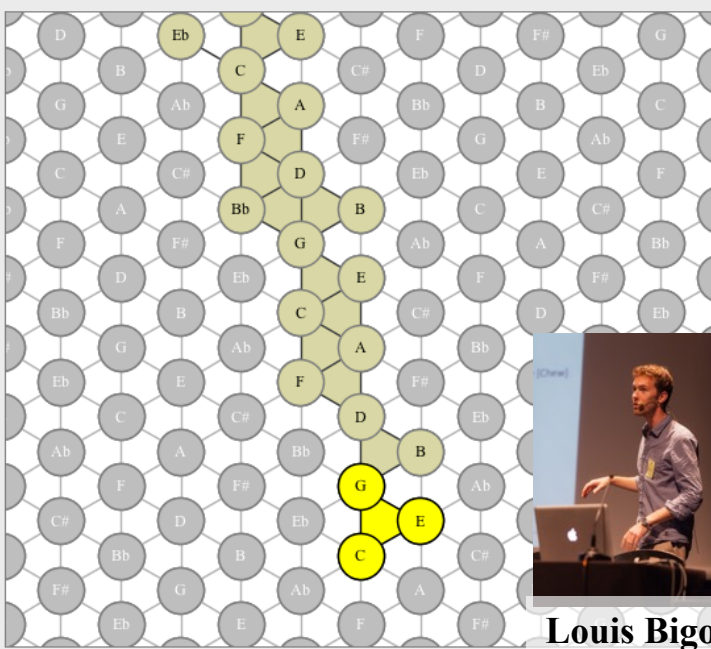


« Embeddings » musicaux dans *Hexachord*

Plex Viewer



Tonnetz : K[3,4,5]



InfoBox

Tempo: **bwv0281.mid**

0 10 20

Play Stop

Select midi file

Chromatic complexes: K[2,3,7] Heptatonic complexes: CM

Trace off Harmonization ON

Display graph

Vertical compactness

compactness dimension: 2-complexity complexes dimension: 2

compute compactness

absolute compactness

Path Transformation

Origin complex: K[3,4,5] Destination complex: K[3,4,5]

Rotation: 0 North translation: 0 North-east translation: 0

Path Transformation

Tonnetzs network



Computer Music Journal

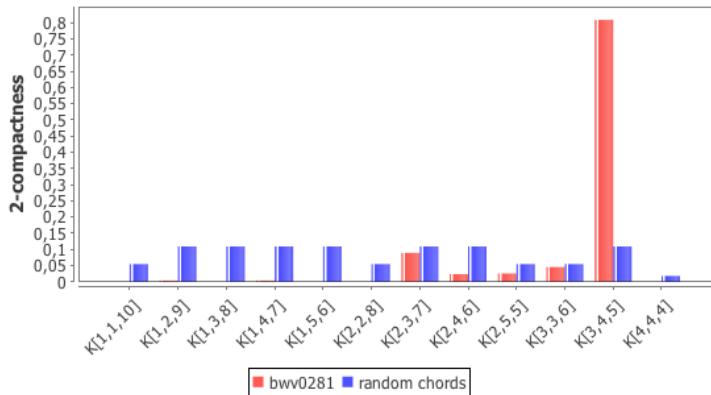
Volume 39, Number 3 ISSN 0148-9267 \$18.00 Fall 2015

Dynamical Systems and Stipistical Chord Spaces

Published by The MIT Press <http://mitpressjournals.org/cmj>

Chart

bwv0281



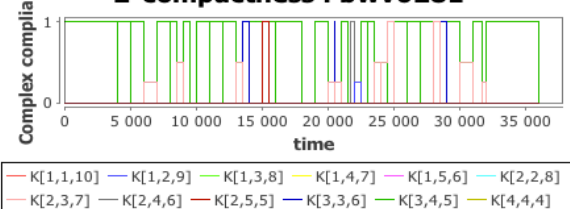
2-compactness

K[1,1,10] K[1,2,9] K[1,3,8] K[1,4,7] K[1,5,6] K[2,2,8] K[2,3,7] K[2,4,6] K[2,5,5] K[3,3,6] K[3,4,5] K[4,4,4]

bwv0281 random chords

Chart

2-compactness : bwv0281



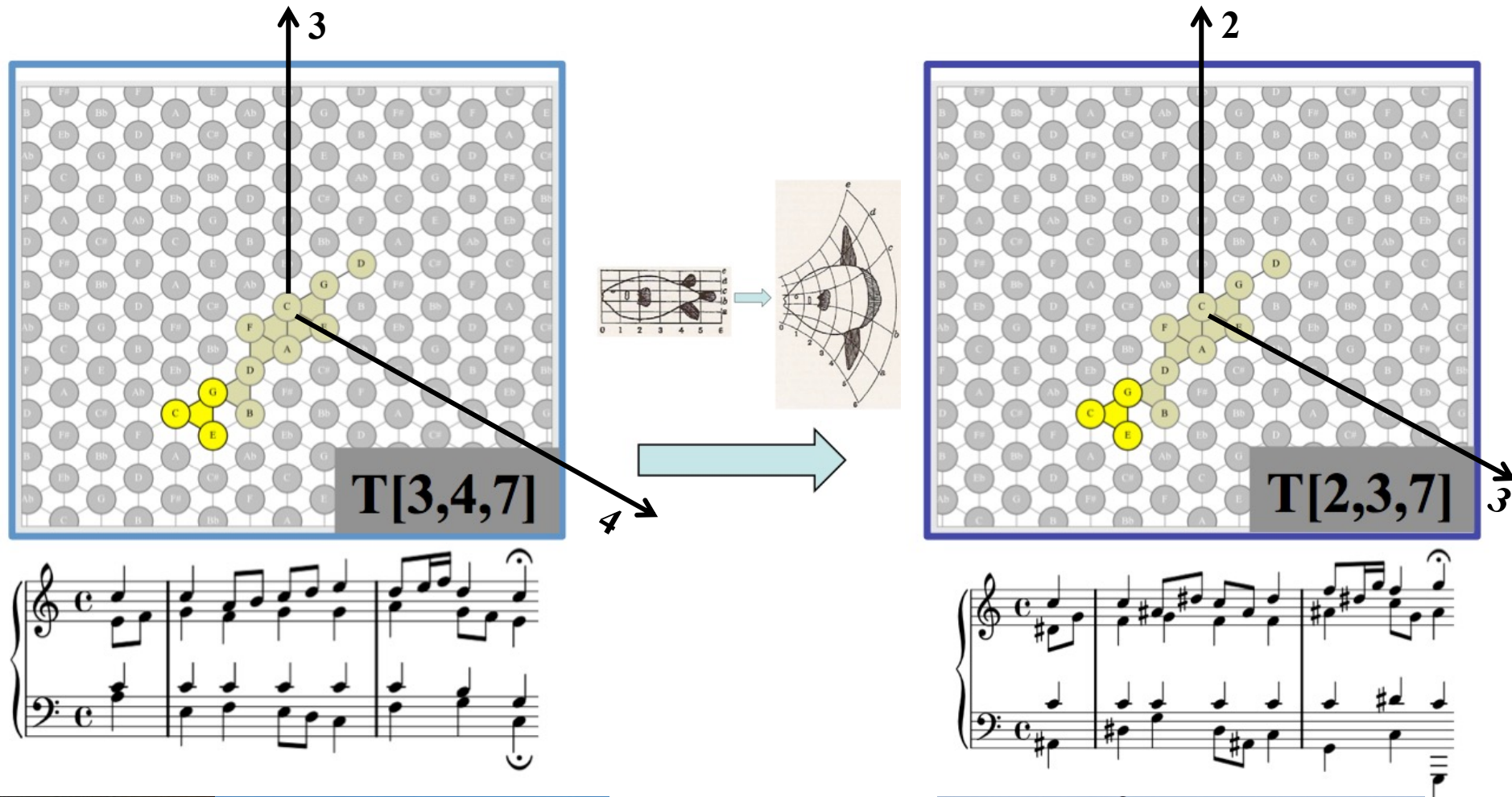
Complex compliance

time

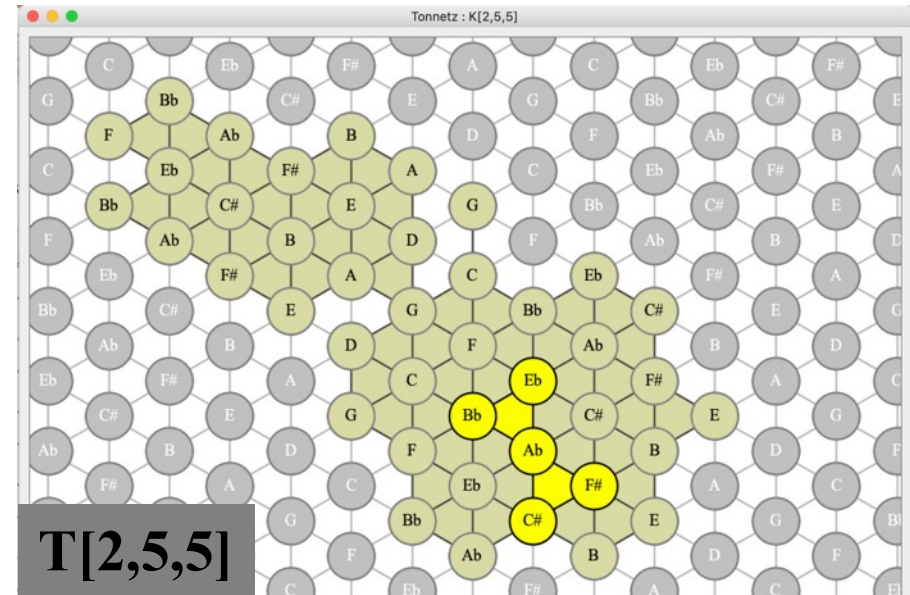
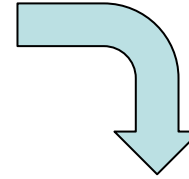
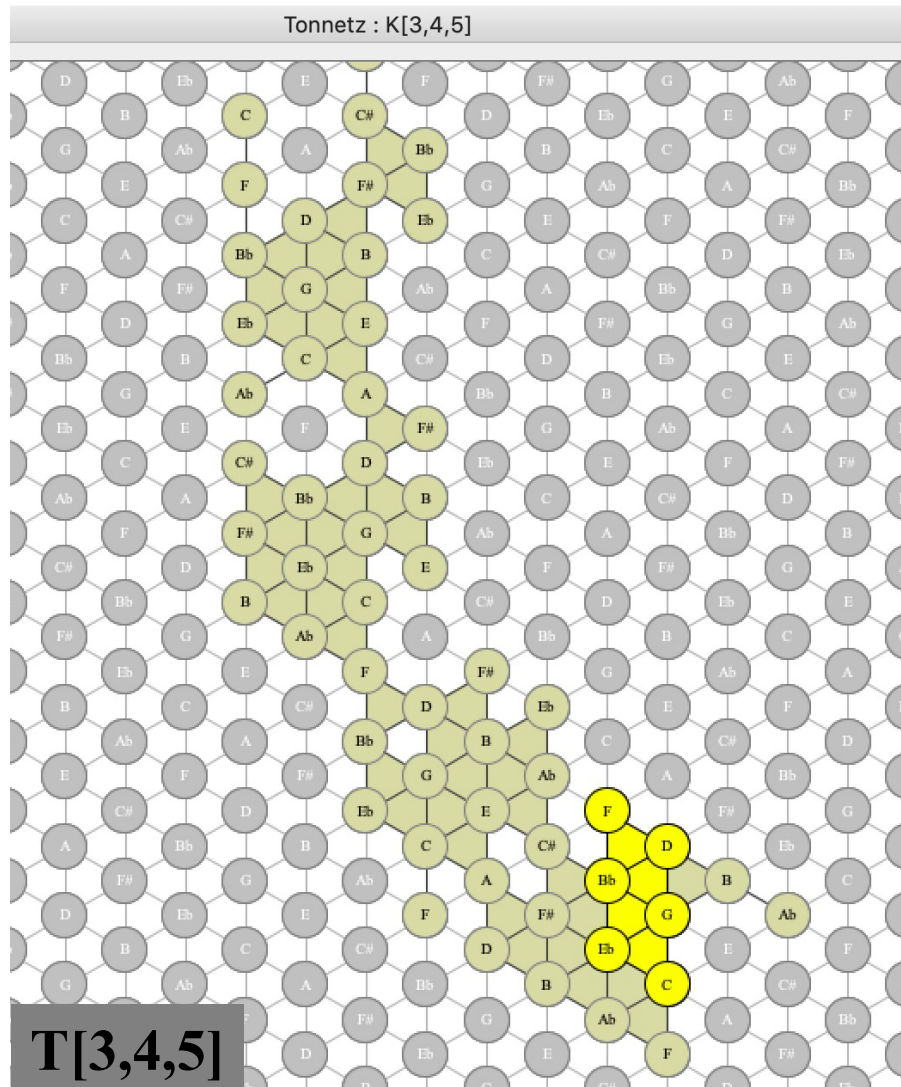
— K[1,1,10] — K[1,2,9] — K[1,3,8] — K[1,4,7] — K[1,5,6] — K[2,2,8] — K[2,3,7] — K[2,4,6] — K[2,5,5] — K[3,3,6] — K[3,4,5] — K[4,4,4]

➔ <http://www.lacl.fr/~lbigo/hexachord>

Un exemple de « morphing » stylistique



(Mega)Giants Steps : du morphing « quartal »



Essayez vous-mêmes avec le
software HexaChord !

➔ <http://www.lacl.fr/~lbig0/hexachord>