triad spellings
{0.25, 5.75, 7.75}

A= 0.25 B#↑ B##↓ C↑ C#↓ Dbb↑ Ddb↓
B= 5.75 E##↑ E×↓ F#↑ F#↓ Gdb↑ Gb↓
C= 7.75 G#↑ G#↓ Ab↑ Ab↓

example procedure

1. choose ordering

A=0.25
B=5.75
C=7.75

G=∅

2. possible spellings for A

B#↑, B##↓, C↑, C#↓, Dbb↑, Ddb↓

3. assess possibilities

sp.	rules	cost
B#↑	enharmonic (R_{n2})	=1
B##↓	R_{n3}, R_{n4} (3q-steps)	=2
C↑	quintets	=0
C#↓	R_{n3}	=1
Dbb↑	R_{n1}	=1
Ddb↓	R_{n3}, R_{n4}	=2

4. order by increasing cost

(C↑, B#↑, C#↓, Dbb↑, B##↓, Ddb↓)
0 1 1 1 2 2

5. add lowest-cost sp. to graph

G=(C↑)
C(G)=cost(G)=0

6. poss. spellings for B

E##↑ E×↓ F#↑ F#↓
Gdb↑ Gb↓

7. assess possibilities (AB, B)

	sp.	rules(B)	rules(AB)	cost local	cost global
C↑	E##↑	R_{n3}, R_{n4}	aug(R_{e3})×1	3	0
	E×↓	R_{n1} (R_{n2})	R_{e3}×2, R_{g2} (et conflict)	3	1
	F#↑	R_{n3}		1	0
	F##↓		R_{e3}×1, R_{g2}	2	1
	Gdb↑	R_{n3}, R_{n4}	R_{e3}×1	3	0
	Gb↓		R_{g2}, R_{e3}×1	1	1

8. order p

(F#↑, Gb↓, Gdb↑, F##↓, E##↑, E×↓)
1 1 3 2 3 3
0 1 0 1 0 1
1 2 3 3 3 4

[* error! cost should be 2 because (F#↑, G↑) is aug.

9. add first to graph

G=(C↑, F#↑)

C(G)=1

10. poss. spellings for C

G#↑ G##↓ Adb↑ Ab↓

11. assess (AC, BC, C, ABC)

	sp.	C	AC	BC	ABC	cost
C, F#↑	G#↑	R_{n3}				1/0
	G##↓		R_{e3}×1		R_{g2}	1/1
	Adb↑	R_{n3}, R_{n4}		R_{e3}×1	R_{g1}	3/1
	Ab↓			R_{e3}×1	R_{g1}, R_{g2}	1/2

12. order

(G#↑, G##↓, Ab↑, Adb↑)
1/0 1/1 1/2 3/1

13. add first to graph

G=(C↑, F#↑, G#↑)

C(G)=2

14. update parameters, since this is the first graph

1. thresh = C_{max} = 2
min cost = C_{min} = 2
min-cost graphs = G_{best} = [(C↑, F#↑, G#↑)]

15. pop back up and consider other spellings for C=7.75

(G♯↑, G♯↓, Ab↓, Ab↑↓)

total cost: (2) 3 4 5

> Cmax, don't explore

16. pop back up and consider other spellings for B=5.75

(E♯↑, Gb↓, Gb↑, F♯↓, E♯♯↑, E×↓)

total: (1) 2 3 3 3 4

≤ Cmax, can be explored

> Cmax, won't be explored

17. push the next lowest-cost spelling

G=(C↑, Gb↓)

C(G)=2

18. assess possibilities for C

	sp	C	AC	BC	ABC	cost
C↑,Gb↓	G♯↑	R_{n3}		R_{e1}	R_{g1} R_{g2}	2/2
	G♯↓		$R_{e3\times 1}$	R_{g1}	R_{g1}, R'_{g2}	2/2
	Ab↑	R_{n3}, R_{n4}			R_{g2}	2/1
	Ab↓				R_{g2}	0/1

19. order

(Ab↓, Ab↑, G♯↑, G♯↓)

0/1 2/1 2/2 2/2

total: 2 4 5 5

→ Cmax

R_{g2} only applies once, so the total cost is 2

20. add first to graph

G=(C↑, Gb↓, Ab↓)

C(G)=2

21. update parameters

G_{best} = [(G♯, F♯↑, G♯↑), (C↑, Gb↓, Ab↓)]

22. pop up.

(no more spellings for C to consider)

G=(C↑, Gb↓)

23. pop up.

No more sp(B) to consider

G=(C↑)

24. pop up. consider spellings for A

(C↑, B♯↑, C♯↓, Dbb↑, B♯♯↓, Ddb↓)

G 1 1 1 2 2

≤ Cmax

(G=∅)

25. add next to graph

G=(B♯↑)

C(G)=1

26. assess (B, AB)

		B	AB	(AB)	cost
B♯↑	E♯♯↑	R_{n3} R_{n4}	$R_{e3\times 1}$		3/1
	E×↓	R_{n1}	$R_{e3\times 1}$	R_{g2}	2/1
	F♯↑	R_{n3}	$R_{e3\times 1}$		2/0
	F♯↓		$R_{e3\times 1}$	R_{g2}	1/1
	Gdb↑	R_{n3} R_{n4}	$R_{e3\times 2}$	R_{g1}	2/2
	Gb↓		$R_{e3\times 2}$	R_{g2} R_{g1}	2/2

27. order

(F♯↑, F♯↓, E×↓, E♯♯↑, Gdb↑, Gb↓)

total: 3 3 4 5 5 5

> Cmax

28. pop up. consider (A)

(C♯↓, Dbb↑, B♯♯↓, Ddb↓)

1 1 2 2

≤ Cmax

(G=∅)

29. add next

G=(C♯↓)

C(G)=1

30. assess (B, AB)

		B	AB	(AB)	cost
C♯↓	E♯↑	3,4	$R_{e3} \times 2$	R_{g2}	4
	E♮↓	1	$R_{e3} \times 2$		2
	F♯↑	3	$R_{e3} \times 1$	R_{g2}	3
	F♯↓		$R_{e3} \times 1$		1
	G𝄫↑	3,4	$R_{e3} \times 1$	$R_{g2} R_{g1}$	5
	G♭↓		$R_{e3} \times 1$	R_{g1}	2

31. order

(F♯↓, G♭↓, ...)

cost: 2 >Cmax

32. add

G=(C♯↓, F♯↓)

C(G)=2

33. assess (C, AC, BC, ABC)

(any broken rule disqualifies)

~~C♯ F♯↓~~ ~~G♯↑~~ (R_{g2})

G♯↓ 0

~~A𝄫↑~~ (R_{e3})

~~A♭↓~~ (R_{e3})

34. order

(G♯↓, ...)

2 >Cmax

35. add

G=(C♯↓, F♯↓, G♯↓)

C(G)=2

36. update params

G_{best}:

[(C↑, F♯↑, G♯↑);

(C♯↓, F♯↓, G♯↓)]

37. pop up. no more C sp.

38. pop up. nor more B sp.

((

39. pop-up. consider A

(D𝄫↑, B♯↓, D♭↓)

1 2 2

≤Cmax

G=∅

40. add

G=(D𝄫↑)

C(G)=1

41. assess (B, AB) (2 broken = out)

		B	AB	cost
D𝄫↑	~~E♯↑~~	$R_{n3} R_{n4}$		
	~~E♮↓~~	R_{n1}	R_{e3}	
	E♯↑	R_{n3}	R_{e3}	
	~~F♯↓~~		R_{e3}, R_{g2}	
	~~G𝄫↑~~	$R_{n3} R_{n4}$		
	~~G♭↓~~		R_{g2}, R_{e3}	

42. order

(...)

>Cmax

43. pop up. consider A

(B♯↓, D♭↓)

2 2

2

≤Cmax

44. add

G=(B♯↓)

C(G)=2

45. assess (B, AB) (1 broken = out)

		B	AB
B♯↓	~~E♯↑~~	R_{n3}, R_{n4}	
	~~E♮↓~~	R_{n1}	
	~~E♯↑~~	R_{n3}	
	~~F♯↓~~		R_{e1}
	~~G𝄫↑~~	R_{n3}, A	
	~~G♭↓~~		R_{g1}

46. order

(...)

>Cmax

47. pop up. consider A

(D♭↓)

2

≤Cmax

48. add

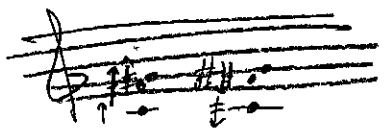
G=(D♭↓)

C(G)=2

49. assess (B, AB) (1 broken = out)

D♭↓ ~~E♯↓~~ R_{g1}

~~G♭↓~~ R_{e3}



50. order

(...)

>Cmax

51. pop up. consider A

()

G=~~∅~~

52. pop up: done with recursive search!

53. return spellings with minimal cost

^ G_{best} = [(C↑, F♯↑, G♯↑),

(C♯↓, F♯↓, G♯↓)]

triad spellings

{0, 1, 2}

			uni R_{e1}	cross R_{e2}	aug/dim R_{e3}	conflict R_{g1} R_{g2}
A=0	B=1	C=2				
B#	B×	C×	AB			
		D	AB		Ac, Bc	
		Ebb	AB		Ac, Bc	
	C#	C×	Bc			
		D			Ac	
		Ebb			Ac, Bc	
	Db	C×		Bc	AB	
		D	Bc		AB, Ac	
		Ebb			AB, Ae	
C	B×	C×	Ac	AB		
		D		AB	Bc	
		Ebb		AB	Ac Bc	
	C#	C×	Ac Bc AB			
		D	AB			
		Ebb	AB		Ac Bc	
	Db	C×	Ac	Bc		
		D	Bc			
		Ebb			Ac	
Dbb	B×	C×		AB Ac		
		D	Ac	AB	Bc	
		Ebb		AB	Bc	
	C#	C×	Bc	AB Ac		
		D	Ac	AB		
		Ebb		AB	Bc	
	Db	C×	AB	Bc Ac		
		D	AB Ac Bc			
		Ebb	AB			

0 C B# Dbb
1 C# B× Db
2 C× D Ebb

B# C# D

C C# D

C Db D

dyad

2.25 D↑ D#↓ C×↑ Ebb↑ Edb↓
5.25 G× A Bbb

dyad

2.25 C×↑ D↑ D#↓ Ebb↑ Edb↓
5.25 E#↑ E##↓ F↑ F#↓ Gbb↑ Gdb↓

	C×↑	D↑	D#↓	Ebb↑	Edb↓
E#↑		a/d	et,a/d	f/s,u,et	f/s,u,et,cr
E##↓	et	et,ad	a/d	f/s,u,et,cr	f/s,u,cr
F↑	a/d		et	a/d	et,a/d
F#↓	et,a/d	et		et,ad	a/d
Gbb↑	f/s,d/a	a/d	f/s,d/a,et		et
Gdb↓	f/s,d/a,et	et,a/d	f/s,d/a	et	

G×	C×↑	
	D#↓	a/d
	D↑	a/d
	Edb↓	a/d f/s
	Ebb↑	a/d f/s
A	C×↑	a/d
	D#↓	
	D↑	
	Edb↓	a/d
	Ebb↑	a/d
Bbb	C×↑	a/d f/s
	D#↓	a/d
	D↑	a/d
	Edb↓	
	Ebb↑	