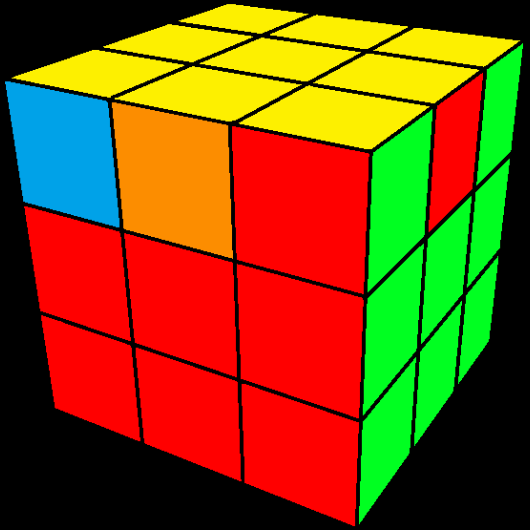
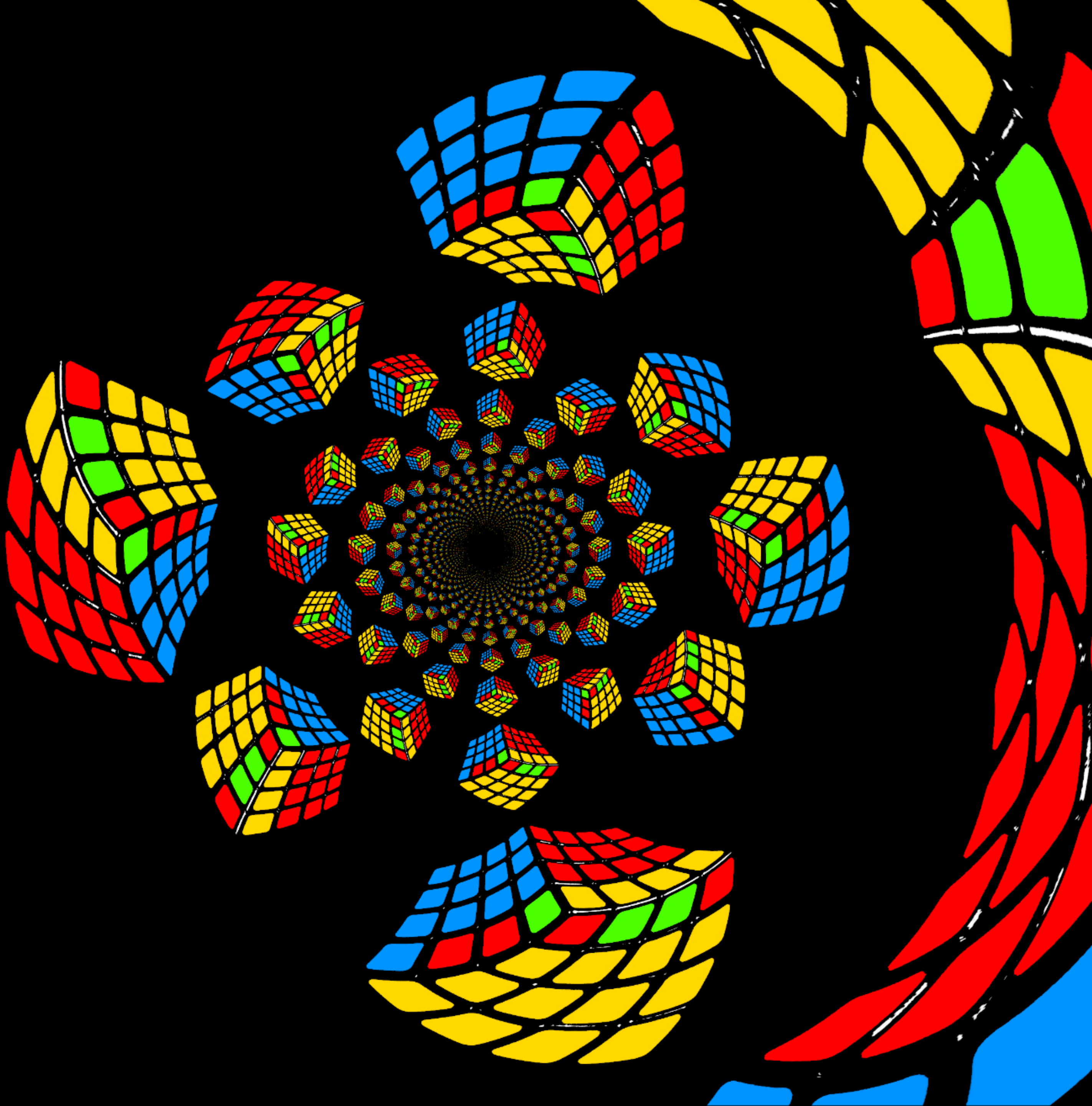
PLL 2SR:

A guide to recognising PLLs by looking at only two sides





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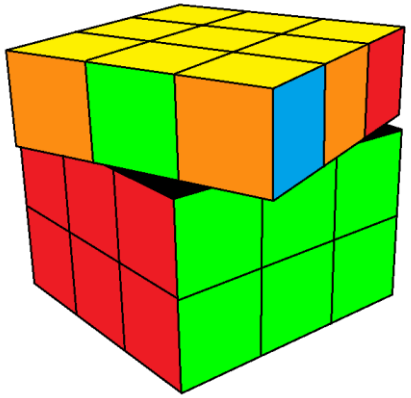
Parity Case Cubing

Contents (click bold text to jump)



Introduction 1: *2-Sided Recognition (2SR)*

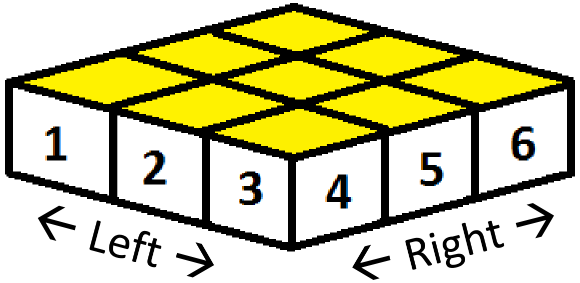
This guide deals only with *Permuting the Last Layer* (PLL). The aim is to make it easier to recognise each of the 21 PLLs by looking at only two sides (i.e., just one of the four possible angles). This can reduce your time when speed-solving as you will not have to look every side.

The guide requires that you can solve the first two layers of a 3x3 cube, can *Orient the Last Layer* (OLL) to make the top of your cube a solid color, and have PLL algorithms. There are excellent guides on the web and on YouTube. Please see the *Resources and Credits* page at the end of this document for suggestions.

The color scheme used in the examples is the standard cube scheme: yellow on top, with red, green, orange and blue faces on the sides (the bottom is not relevant here). Opposites are red:orange and green:blue.

Every PLL's page has a column for each angle. The PLLs are shown with two sides visible, from all four angles, progressing in 90° clockwise rotations. It is the *relationships* between the colored stickers that is of importance, not the colors themselves. If a diagram shows two red stickers followed by an orange sticker, it can be read as: "Two stickers of color X, followed by one sticker of the opposite color."

To facilitate description, the visible stickers of any particular angle are numbered 1 to 6. 1, 3, 4 and 6 are *corner* stickers; 2 and 5 are *edge* stickers. Note that left and right *do not* refer to the left and right sides of the cube, but to the two visible sides.



Additional tips are given in red. They may be useful for recognition or for determining how to position the top layer before solving the permutation with your preferred algorithm.

Introduction 2

At the top right of each page is the PLL's solution diagram, with corner movements shown in black and edge movements in purple. These are oriented such that the bottom right corner matches the 3,4 corner stickers of the first PLL angle on the page.

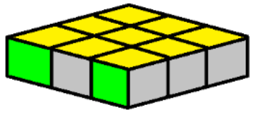
Some 2SR views will look similar for multiple PLLs. Tips on distinguishing between them and the PLL under consideration may be found under a thin black line in that view's column.

A list of *Common Patterns* and a *Quick Reference* guide follows this introduction.

"+", "<>" and "="

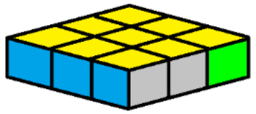
"+" indicates the stickers belong to a common pattern.

E.g., "(1+3)" means headlights at 1 and 3.



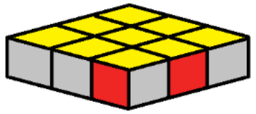
"<>" is short for "opposite color."

E.g., "(1+2+3)<>6" means sticker 6 is the opposite color of the stickers at 1, 2 and 3, *and* that (1+2+3) form a common pattern.



"=" means "same color"

E.g., "3=5" means stickers 3 and 5 are the same color.



Note: In many cases with a common pattern, the pattern itself is made of like-colored stickers. Preference is given to "+" over "=" in the descriptions.

E.g., Headlights always share a color, so are written (1+3) rather than (1=3).

Introduction 3

A note on my renaming of some PLLs

Some of the common PLL names are unhelpful for memorisation / recognition. I renamed those ones slightly when I was learning them. A few of these alternate names are already in use elsewhere too.

Both names are included at the top of each PLL page, but only my names are used when referring to other pages.

My Name	Common Name
A(cw)	A(a)
A(ccw)	A(b)
G1	G(c)
G2	G(b)
G3	G(d)
G4	G(a)

My Name	Common Name
J	J(b)
L	J(a)
Ns	N(b)
Nz	N(a)
U(cw)	U(a)
U(ccw)	U(b)

The “**cw**” and “**ccw**” indicate clockwise and counter-clockwise respectively.

The **G(a,b,c,d)** perms are numbered according to where the 2bar sits in relation to the headlights, moving clockwise around the cube, starting on the left of the headlights.

J(a) doesn’t look like a J – it looks like an L, so it is written as L.

J(b) actually looks like a J, so it is simply written as J.

N(a) is written as Nz, as it traces a Z-shape through the centre.

N(b) is written as Ns as it traces an S-shape through the centre.

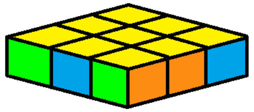
Navigating this Guide

As well as the in-document hyperlinks on the *Contents* page, you will find that clicking on the Parity Case Cubing logos will return you to the *Contents* page.

Common Patterns 1

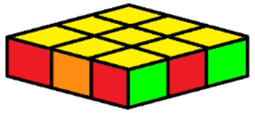
Headlights (“**HL**” & “**HLo**”)
Same sticker color on (1+3) or (4+6). If the headlights contain their opposite color, they are **HLo**, if not, then just **HL**.

HLo e.g., T:



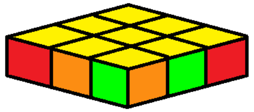
More than one set of HL and/or HLo can occur, and their colors will differ.

HLo + HL e.g., U(cw):

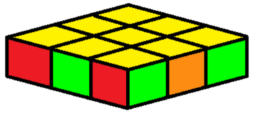


Checkerboard (“**CB**”)
This is when four or more stickers in a row alternate between two colors.

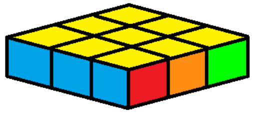
E.g., F:



E.g., U(ccw):



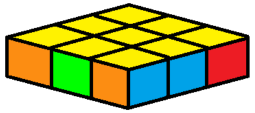
3bar
Same sticker color on (1+2+3), or (4+5+6). E.g., F:



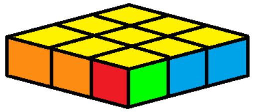
Cube is solved if 1-3 and *4-6 are 3bars.*

2bar
2 stickers of the same color on a side. I.e., (1+2), (2+3), (4+5), or (5+6). There may be a 2bar on more than one side.

E.g., R(b):



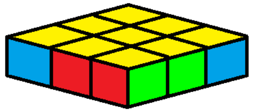
E.g., Y:



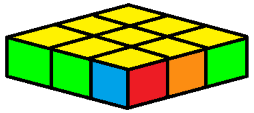
Note: Since we are only considering the visible sides, (1+2) or (5+6) may be part of a 2x2 block.

2x2 block (“**2x2**”)
A corner piece next to both its edge pieces, like two 2bars meeting at a single corner. Always (2+3+4+5).

E.g., A(cw):

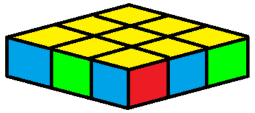


Note: part of a 2x2 block may not be fully visible from the two sides seen, and will appear as a 2bar. E.g., in the same A (cw) rotated 90°:



Alternators (“**ALT#**”)
Same-colored stickers at either (1+3+5) “**ALT1**”, or at (2+4+6) “**ALT2**.” One side must therefore include HL or HLo. **“ALT3”** = ALT1+ALT2

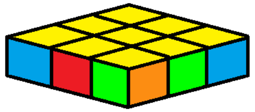
E.g., G3 is ALT1:



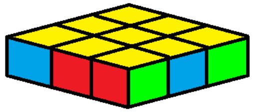
Common Patterns 2

Bookends (“**BEx**”)
This refers to single stickers (1+6). Bookends may be the same color (“**BEs**”), *opposite colors* (“**BEo**”), or else ***d**ifferent colors* (“**BEd**”).

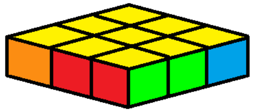
BEs - e.g., G4:



BEo - e.g., T:

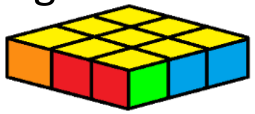


BEd - e.g., V:



17 of the 21 PLLs have BEx on at least one angle. **L**, **J**, **Ns**, and **Nz** do not have BEx on any angle.

No BE – e.g., Nz:

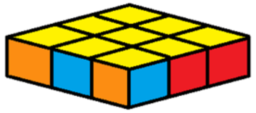


Bookends		
BEs	**BEo**	**BEd**
A(cw)	A(cw)	E
A(ccw)	A(ccw)	H
F	-	U(cw)
G1	G1	U(ccw)
G2	G2	V
G3	G3	Y
G4	G4	Z
R(a)	R(a)	-
R(b)	R(b)	-
-	T	-

Combinations

Many PLL angles exhibit more than one of these patterns at a time. As a general rule, descriptions only mention those necessary for distinguishing one case from another.

E.g., A(cw) from this angle shows HL at (1+3), CB from 1 to 4, and a 2bar at (5+6) (the 2bar is part of a hidden 2x2):



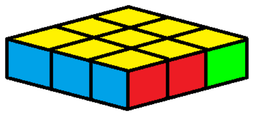
Common Patterns 3

Solo Stickers (“**Solo#**”)

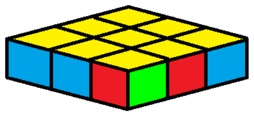
These are not really a pattern, but can aid PLL identification.

Eight cases have arrangements in which only three colors are visible *and* one of those colors appears on a single “Solo#” sticker. The number states the Solo sticker location. In these two examples, it is the green sticker:

E.g., L (Solo6):



E.g., R(a) (Solo4):



Solo1: J or R(a)

J has a 3bar on the right.
R(a) has CB from 2 to 6

Solo3: G2, L or R(b)

G2 has Solo3 at two angles: one has ALT2, the other has 2bar(5+6)<>4.

L has Solo3 at three angles: one has a 3bar on the right, the other two are sandwiched between two 2bars (1+2) and (4+5).

R(b) has Solo3 with 3<>2bar(5+6).

Solo4: G3, J or R(a)

G3 has two Solo4s: one has ALT1 (Solo4 with no visible 2bar is *always* a G3); the other has 2bar(1+2)<>3.

J has three Solo4s: one has a 3bar on the left, the other two are sandwiched between two 2bars (2+3) and (5+6).

R(a) has Solo4 with 4<>2bar(1+2).

Solo6: L or R(b)

L has a 3bar on the left.
R(b) has CB from 1 to 5.

Solo2 & **Solo5**: U(cw) & U(ccw) can both show Solo2 or Solo5 edges.

For both angles where two sets of headlights are visible, if you see Solo2, it is **U(cw)**; if you see Solo5, it is **U(ccw)**.

For the angles with a 3bar, if the 3bar is on the left, and 3bar<>Solo5, it is **U(ccw)**. If the 3 bar is on the right, and 3bar<>2, it is **U(cw)**.

Pattern Distribution: *Quick Reference*

PATTERNS	PLLs												
Headlights x1	A(cw)	A(ccw)	G1	G2	G3	G4	R(a)	R(b)	T	U(cw)	U(ccw)		
Headlights x2	H	U(cw)	U(ccw)	Z									
CB (1-4)	A(cw)	G1	U(ccw)										
CB (1-5)	R(b)												
CB (2-5)	F	V											
CB (2-6)	R(a)												
CB (3-6)	A(ccw)	G4	U(cw)										
CB (1-6) [=ALT3]	Z												
3bar	F	J	L	U(cw)	U(ccw)								
2bar x1	A(cw)	A(ccw)	G1	G2	G3	G4	J	L	R(a)	R(b)	T	V	Y
2bar x2	J	L	Ns	Nz	Y								
2x2 Block	A(cw)	A(ccw)	V										
ALT1	A(ccw)	G3	R(b)	U(cw)									
ALT2	A(cw)	G2	R(a)	U(ccw)									
ALT3 [=CB (1-6)]	Z												

TIPS

- Only **F** can show a 3bar *and* three other colors; only **J** & **L** can show a 3bar *and* a 2bar.
- **Ns**, **Nz** & **Y** have two separate 2bars next to an opposite color; only **Y**'s 2bars sandwich a corner between them.
- 1x HL/HLo: **A(cw)**, **A(ccw)**, **G1**, **G4**, **R(a)**, **R(b)** & **Z**'s HL *never* contain their opposite color. **G2**, **G3**, **H** & **T** are *always* HLo. **U(cw)** & **U(ccw)**'s headlights may or may not contain their opposite color.
- 2x HL/HLo: **U(cw)** & **U(ccw)**'s angles with 2x headlights only show 3 colors; **H**'s show 4 colors and **Z**'s show either 2 or 4 colors.

*** **E** lacks any of the patterns on this page ***

2bar x1

2bar x2

- A *single* 2bar adjacent to its opposite colored sticker exists only in **A(cw)**, **A(ccw)**, **G2**, **G3**, **V** & **Y**. The 2bar is *always* to the left of the single sticker in **A(cw)** & **G3**; always to the *right* of it in **A(ccw)** & **G2**; *but* may be to the left or right of it in **V** & **Y**.

Headlights Cases: *Quick Reference*

1x HLo: G2, G3, T, U(cw) or U(ccw)		
2bar (on left or right)		**T**
3bar → U(cw) or U(ccw)	...with HL<>5 *or* 3bar<>2	**U(cw)**
	...with HL<>2 *or* 3bar<>5	**U(ccw)**
3 colors on the left → G2 or G3	...with ALT2/Solo3	**G2**
	...with 2<>3	**G3**
3 colors on the right → G2 or G3	...with ALT1/Solo4	**G3**
	...with 4<>5	**G2**

2x HL:	
2x HLo	**H**
Solo2 ***with*** **(HLo + HL)** ***or with*** **(HL + HL)**	**U(cw)**
Solo5 ***with*** **(HL + HLo)** ***or with*** **(HL + HL)**	**U(ccw)**
ALT3 (=2x HL)	**Z**

1x HL: A(cw), A(ccw), G1, G4, R(a), R(b), U(cw), or U(ccw)			
3 colors on the left: → A(cw), G4 or R(a)	...with CB(2-6)/Solo1		**R(a)**
	...with CB(3-6)		**G4**
	...none of the above		**A(cw)**
3 colors on the right: → A(ccw), G1 or R(b)	...without ALT1 or Solo6		**G1**
	...with ALT1 → A(ccw) or R(b)	...and 2<>4	**A(ccw)**
		...and 2=4/Solo6	**R(b)**
2bar touching HL	...with 2bar on right side		**R(a)**
	...with 2bar on left side		**R(b)**
2bar not touching HL	...with 2bar on right side → A(cw) or G4	...and 2=4	**A(cw)**
		...and 2<>4	**G4**
	...with 2bar on left side → A(ccw) or G1	...and 3=5	**A(ccw)**
		...and 3<>5	**G1**
3bar	...on right side (+Solo2)		**U(cw)**
	...on left side (+Solo5)		**U(ccw)**

2bar Cases: *Quick Reference*

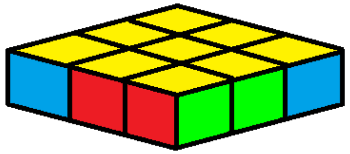
Single **2bar with its opposite color on same side:**		
2bar(1+2)<>3 with...	Solo4	**G3**
	4<>5	**A(cw)**
	4<>6	**V**
2bar(2+3)<>1 with...	BEs	**G2**
	BEd	**Y**
2bar(4+5)<>6 with...	BEs	**G3**
	BEd	**Y**
2bar(5+6)<>4 with...	1=2bar	**G2**
	1<>3	**V**
	2<>3	**A(ccw)**

Single **2bar (on left side) with its NON-opposite color on same side:**		
2bar(1+2) with...	Solo4	**R(a)**
	3bar on right	**L**
	CB(3 to 6), 3=5	**A(ccw)**
	3<>5, HL	**G1**
	3<>5, no HL/HLo	**T**
2bar(2+3) with...	BEs	**G4**
	3bar on right	**J**
	HLo	**T**
	HL	**R(b)**

Single **2bar (on right side) with its NON-opposite color on same side:**		
2bar at (4+5) with...	BEs	**G1**
	3bar on left	**L**
	HLo on left, 2<>HL	**T**
	HL on left, 2<>2bar	**R(a)**
2bar at (5+6) with...	CB(1 to 4)	**A(cw)**
	HL, no CB	**G4**
	3bar on left	**J**
	Solo3	**R(b)**
	1<>3, 2<>4	**T**

Two **2bars, joined or separate:**			
(1+2), (4+5) with...	Solo3	**L**
	(1+2)<>3 & (4+5)<>6	**Ns**
(2+3), (5+6) with...	Solo4	**J**
	1<>(2+3) & 4<>(5+6)	**Nz**
(2+3), (4+5) [=2x2 block] with...	BEs, (4+5)<>6	**A(cw)**
	BEs, 1<>(2+3)	**A(ccw)**
	BEd	**V**
(1+2), (5+6)		**Y**

A(cw) – aka A(a)



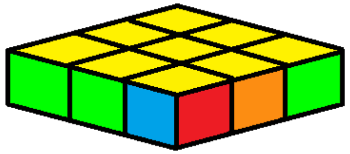
2x2 with BEs

(4+5)<>6. HL are opposite this side.

If you can tell it’s an A, the opposite colors on the right indicate cw movement.

A(ccw) has 1<>(2+3) instead of the (4+5)<>6.

V also has a 2x2 with (4+5)<>6, but V *also* has 1<>(2+3), so V has BEd.



2bar(1+2)<>3. HL are opposite this side.

2bar=6

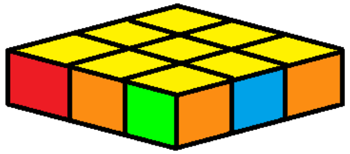
4<>5. The opposite colors on the *right* indicate cw.

3 and 5 are not the same color.

G3 is the same except for 5. In G3 (3=5), so stickers 4 and 5 are not opposite colors.

R(a) & **T** do not have 2bar<>3.

V has (3=5), and 4<>6.



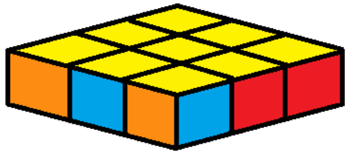
ALT2

HL(4+6)

Left side has three different colors.

2x2 is in the back corner.

R(a) shares ALT2, but has (3=5).



HL(1+3)<>2bar(5+6)

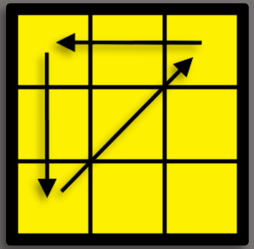
2bar is part of a hidden 2x2.

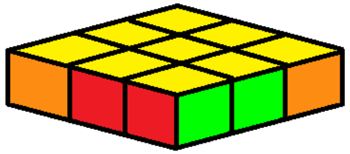
CB from 1 to 4

G4 is similar, but lacks the CB, because G4 has (2<>4).

U(ccw) has CB from 1 to 4, but has HL on the right.

A(ccw) – aka A(b)





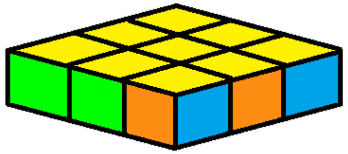
2x2 with BEs

1<>(2+3). HL are opposite this side.

If you can tell it’s an A, the opposite colors on the *left* indicate ccw movement.

A(cw) has opposite colors with (4+5)<>6 instead of 1<>(2+3).

V has a 2x2 with 1<>(2+3), but *also* has (4+5)<>6, so V has BEd.



2bar(1+2), with CB from 3 to 6 and HL(4+6)

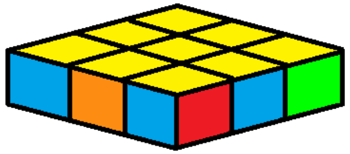
2bar<>HL

3=5

2bar is part of a hidden 2x2

U(cw) has CB from 3 to 6, but has HLo on the left.

G1 is the same except for 5, and it has (3<>5).



ALT1<>6, BEo

2<>4

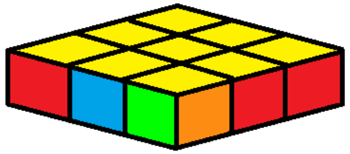
HL(1+3)

G1 shares (1,3,4,6), but has no ALT and G1 has a CB from 1-4.

G3 shares ALT1<>6, but has HLo

R(b) shares ALT1<>6, but has (2=4).

U(cw) has ALT1, but not BEo.



2bar(5+6) (part of a hidden 2x2)

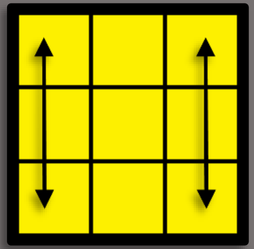
1=2bar and 4<>2bar

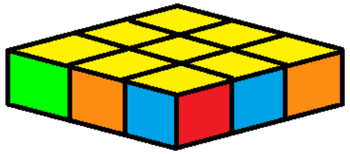
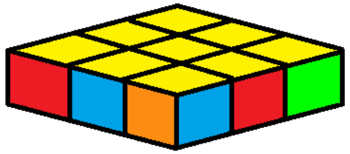
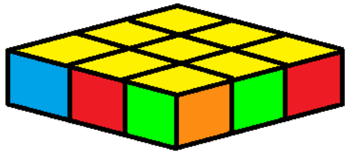
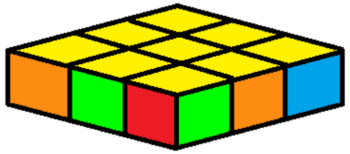
2<>3. If you can tell it’s an A, the opposite colors on the *left* indicate ccw movement. HL are on the opposite side.

G2 shares 1,3, 4, (5+6), but G2’s 2 and 3 are not opposites.

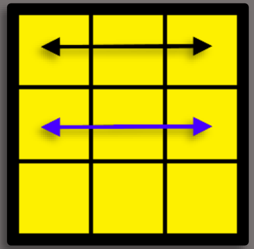
R(b) & **T** are similar, but their 2bars at (5+6) are not the opposite color of 4.

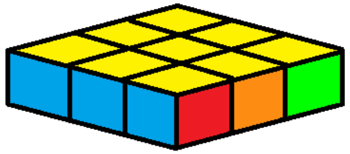
E



 BEd. Lacks common patterns. Colors (1,2) are not reversed at (6,5). 3=5, so corners need swapping along the side 5 is on, and along its opposite side.	 BEd. Lacks common patterns. Colors (1,2) are not reversed at (6,5). 2=4, so corners need swapping along the side 2 is on, and along its opposite side.	 Same as column 1	 Same as column 2
F, **G1**, **G4**, **R(a)** & **R(b)** all look similar, but have BEs. **V** looks similar, and shares BEd, but has CB from 2 to 5. (Continued in column 3…)	Same as columns 1 and 3	(…Continued from column 1) **Y** looks similar, but Y's colors from (1,2) appear twice (reversed at 5,6). Neither of Y's middle corner colors (3,4) are repeated, but in E one of them will be visible at 2 or 5.	Same as columns 1 and 3

F





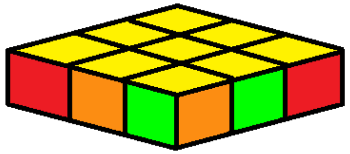
3bar on left.

Right side shows three other colors. No other permutations have a 3bar with 3 more colors.

J & L both have a 2bar on the right.

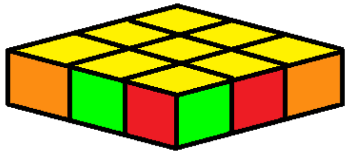
U(cw) has HLo on the right.

U(ccw) has HL on the right.



CB 2 to 5, BEs

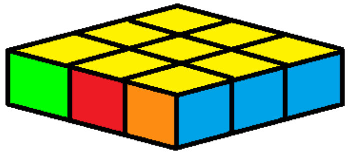
3 & 5 are not the opposite color of any other stickers (so the 3bar is on the opposite side of edge 5).



CB 2 to 5, BEs

2 & 4 are not the opposite color of any other stickers (so the 3 bar is on the opposite side of edge 2).

V also has a CB from 2 to 5, but has BEd, not BEs.



3bar on right

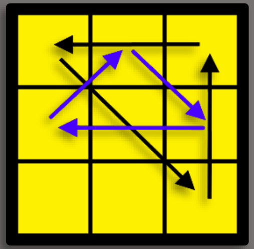
Left side shows three colors. No other permutations have 3 colors followed by a 3bar.

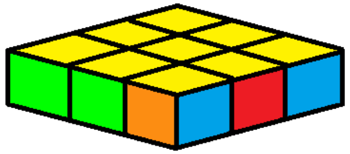
J & **L** both have a 2bar on the left.

U(cw) has HL on the left.

U(ccw) has HLo on the left.

G1 – aka G(c)



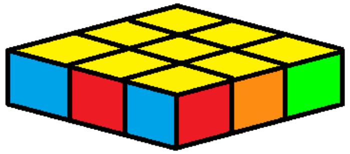


2bar(1+2), with HL (5+6)

3<>5

A(ccw) has the same 2bar and HL, but has 3=5.

R(b) is the same except for sticker 2. Its 2bar is at (2+3), not (1+2).



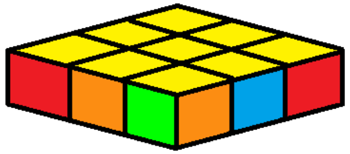
CB from 1 to 4

3 single colors on the right side

BEo

A(cw) has a 2bar at (5+6) after its CB from 1 to 4 ends.

U(ccw) has CB from 1 to 4, but has ALT2.



3 single colors on both sides

BEs

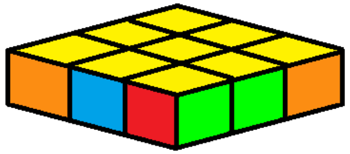
3<>5 and 2=4

E, **V** & **Y** have 3 single colors on both sides, but have BEd.

F has CB from 2 to 5 between its BEs.

G4 has 3 single colors on both sides and BEs, but in G4, 3=5 and 2<>4.

R(a) & **R(b)** have 3 single colors on each side and BEs, but both have 2<>5.



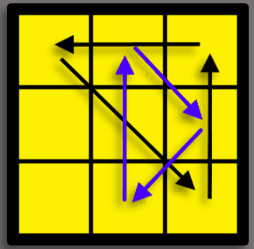
BEs with 2bar(4+5)

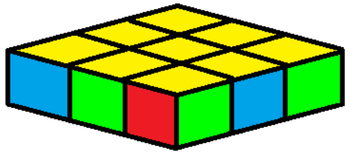
3 different colors on the left side

G3 has BEs and a 2bar in the same position, but in G3, 2bar<>BEs.

R(a) is the same except for sticker 1; R(a) has BEo not BEs.

G2 – aka G(b)





ALT2

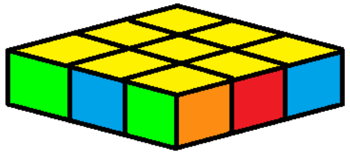
HLo (4+6)

Solo3

A(cw) & **R(a)** both have ALT2, but they have HL, not HLo.

U(ccw) has ALT2 but has 2x HL or HL + HLo.

L & **R(b)** have Solo3, but a 2bar will be visible on the left or right side.

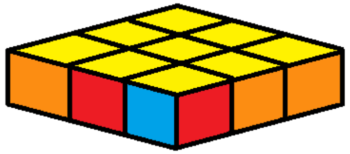


HLo (1+3). HLo is followed by three single colored stickers.

4<>5

A(ccw), **G1** & **R(b)** all have HL (not HLo) followed by three single colored stickers.

G3 looks similar, as only 5 is different. However, G3 has ALT1, so its 4 is not the opposite color of 5.



Solo3

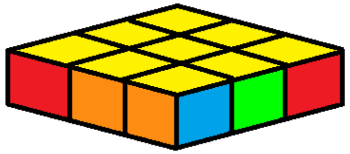
2bar(5+6)<>4

1=2bar

2=4

A(ccw) has the same single 2bar<>4, but its 2 is not the same as 4, and its 3 is not solo.

V also has the same single 2bar<>4, but its 1 is not the same color as the 2bar. V's 3 is also not solo.



1<>2bar(2+3)

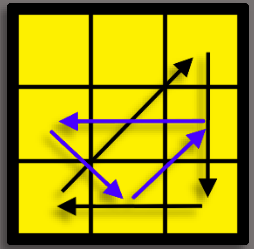
BEs

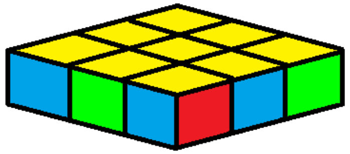
4<>5

Three different colors on right side

Y has the same single 2bar<>1, and has three colors on its right side, but Y has BEd, and its 4 is not the opposite color of its 5.

G3 – aka G(d)





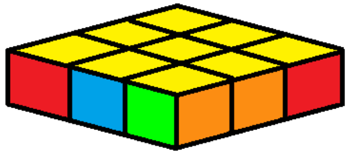
ALT1 with Solo4. Solo4 with no visible 2bar: must be G3.

HLo(1+3), followed by three single stickers on right.

A(ccw) & **R(b)** are ALT1, but have HL, not HLo.

U(cw) is ALT1 and can have HLo on left, but it will also have HL on the right side.

J & **R(a)** have Solo4, but a 2bar will be visible.



2bar(4+5)<>6

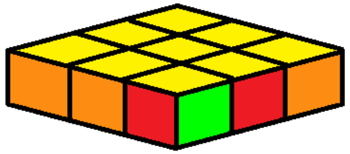
BEs

2<>3

A(cw) has the same right side, but has a 2x2, so lacks 2<>3.

L & **Ns** have another 2bar.

V & **Y** also have the same right side, but both are BEd and lack 2<>3. V has a 2x2.



2bar(1+2)<>3

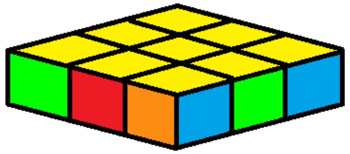
Solo4

3=5

A(cw) has 2bar(1+2)<>3, but it lacks Solo4 and has 3<>5.

J has Solo4, but will have a 2bar the right side.

R(a) has Solo4, but has 2bar(1+2)<>Solo4, instead of G3's 2bar(1+2)<>3.



HLo(4+6)

Three colors on the left side, with 2<>3

G2, **H**, **T**, **U(cw)** & **U(ccw)** all share HLo(4+6). However:

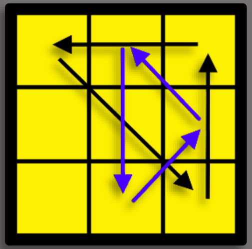
G2 also has three colors on its left, but its 2 is not the opposite color of its 3. G2 has Solo3 and ALT2.

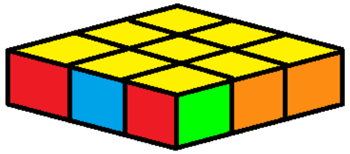
H has HLo & **U(ccw)** has HL on the left.

T has a 2bar at (2+3).

U(cw) has a 3bar on its right.

G4 – aka G(a)



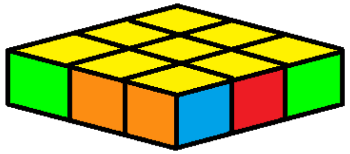


HL(1+3)

2bar(5+6)

2<>4

A(cw) looks the same except for 2. A(cw) has 2=4, not 2<>4.



BEs<>4

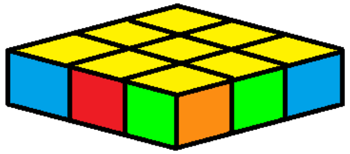
2bar(2+3) is not the opposite color of its adjacent sticker at 1.

Right side has three colors.

F has BEs<>4, but has no 2bar.

G1 & **R(b)** have BEs<>4 and three colors on the right side, but have no 2bar.

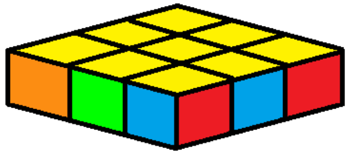
G3 has BEs<>4 but its 2bar is on its right side.



BEs with three colors on both sides

2<>4

F, **G1**, **R(a)** & **R(b)** all have BEs with three colors on both sides, but do not have 2<>4. F, G1 & R(a) have 2=4. R(b) has 2<>5.



Three colors on the left

CB from 3 to 6

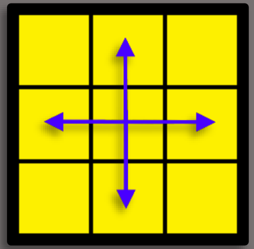
HL(4+6)

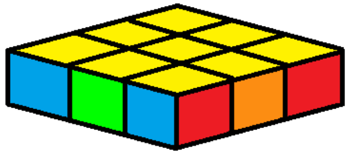
A(ccw) has CB from 3 to 6, but has a 2bar at (1+2).

U(cw) also has CB from 3 to 6, but has two sets of HL.

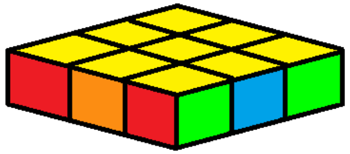
A(cw) and **R(a)** both have HL and have three colors on the left side. However, they are both ALT2.

H

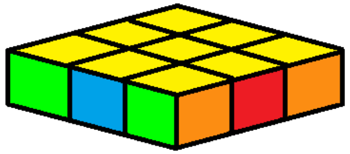




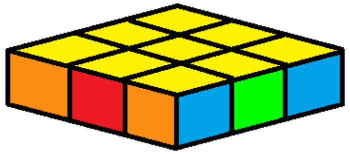
2x HLo. No other permutations have this feature. H's solution is the same for all four angles.



Same



Same

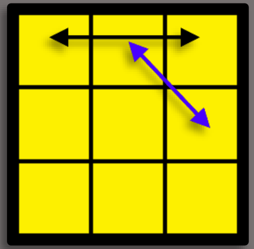


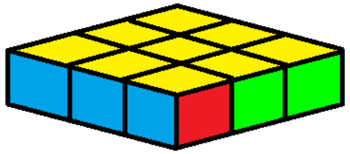
Same

U(cw) & **U(ccw)** may show 2x headlights, but one or both sets will not be HLo. They also both have an ALT.

Z shows 2x HL, not HLo.

J – aka J(b)



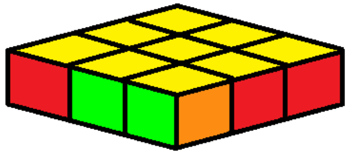


3bar on left<>2bar(5+6)

Solo4

F, **L**, **U(cw)** & **U(ccw)** share a left 3bar. F has three colors on its right side. L's 3bar joins to its 2bar(4+5). U(cw) has HLo and U(ccw) has HL on their right.

G3 & **R(a)** have Solo4. G3 either has ALT1, or has a 2bar on its left side. R(a) has a 2bar on its left.



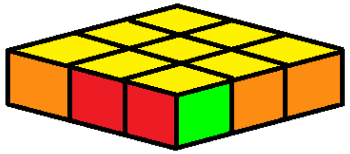
Two 2bars, on the right of each side, with Solo4. Only J has Solo4 between two 2bars.

Solo4<>2bar(5+6). The 3bar is opposite this side.

G3 & **R(a)** have Solo4, but have no 2bar on the right side.

L & **Ns** have their 2bars to the left of each side.

Nz has two 2bars in the same positions, but both touch their opposite color.



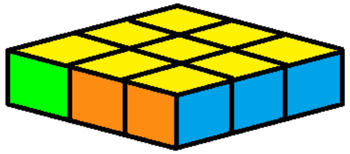
Two 2bars, on the right of each side, with Solo4. Only J has Solo4 between two 2bars.

1<>(2+3). The 3bar is opposite this side.

G3 & **R(a)** have Solo4, but have no 2bar on the right side.

L & **Ns** have their 2bars to the left of each side.

Nz has two 2bars in the same positions, but both touch their opposite color.



Solo1

2bar(2+3) connects to the 3bar on the right side in a "J" shape.

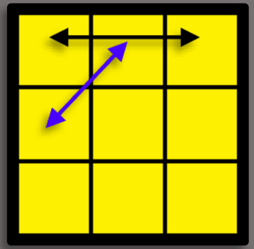
R(a) is the only other Solo1. It has CB from 2 to 6.

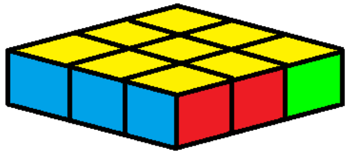
F has 3 colors on the left.

L's 2bar is not connected to its 3bar, as it is at (1+2).

U(cw) & **U(ccw)** have HL or HLo on their left.

L – aka J(a)





3bar on left forms an “L” shape with the 2bar(4+5) on the right side. This is the only permutation that forms an “L”.

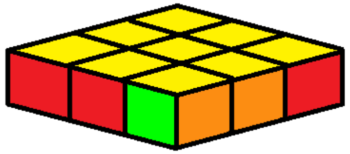
Solo6

F has a 3bar with three colors on the adjacent side.

J’s 2bar is not connected to its 3bar, as it is at (5+6).

R(b) has Solo6, but has CB from 1 to 5.

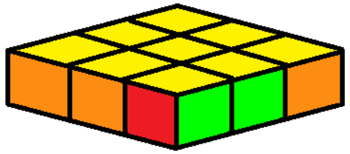
U(cw) & **U(ccw)** have a left 3bar, but also have HL or HLo.



Two 2bars on the left of their sides. Only one 2bar touches its opposite color.

Solo3. Only L has Solo3 between two 2bars.

2bar(4+5)<>6. The 3bar is opposite this side.



Two 2bars, on the left of their sides. Only one 2bar touches its opposite color.

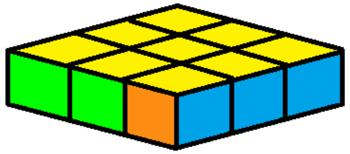
Solo3. Only L has Solo3 between two 2bars.

2bar(1+2)<>3. The 3bar is opposite this side.

J & **Nz** have their 2bars to the right of their sides.

Ns has its 2bars in the same positions, but both touch their opposite color.

G2 and **R(b)** have Solo3, but G2 will have ALT2 or a 2bar at(5+6), not (4+5). R(b) will also have a 2bar at (5+6).



2bar(1+2) with a 3bar on right side.

Solo3

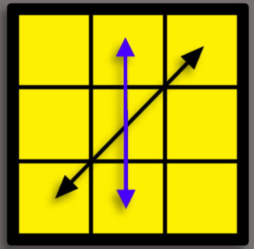
F has a 3bar with three colors adjacent, and no Solo3.

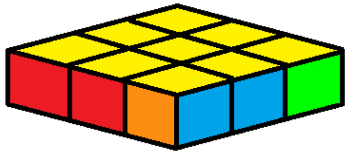
J’s 2bar is connected to its 3bar, as it is at (3+4). No Solo3.

U(cw) & **U(ccw)** have a 3bar, but also have HL.

G2 and **R(b)** have Solo3, but neither has a 3bar.

Ns – aka N(b)

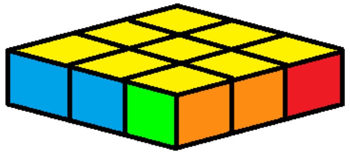




Two 2bars, on the left of their sides.

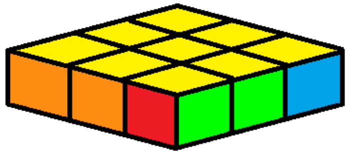
2bar(1+2)<>3

2bar(4+5)<>6

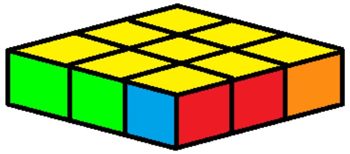


Same

Ns has the same solution from all four angles.



Same

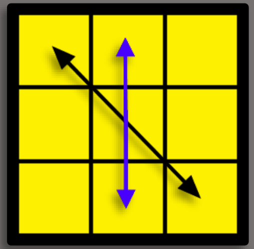


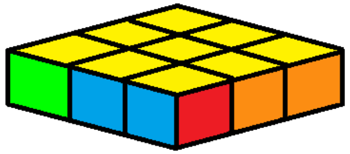
Same

J & **L** both show two 2bars, but only one of them is adjacent to its opposite color.

Nz also has two 2bars that are the opposite color of their adjacent sticker, but the sequence is reversed, so they are on the right of each side, with 1<>(2+3) and 4<>(5+6).

Nz – aka N(a)

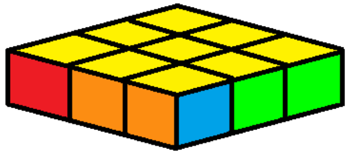




Two 2bars, on the left of their sides.

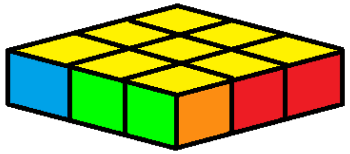
1<>2bar(2+3)

4<>2bar(5+6)

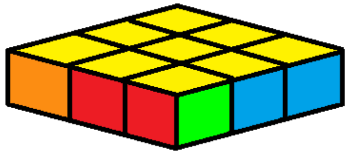


Same

Nz has the same solution from all four angles.



Same

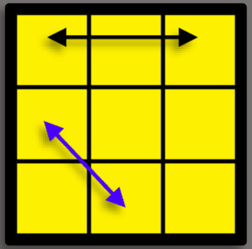


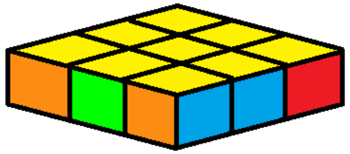
Same

J & **L** both show two 2bars, but only one of them is adjacent to its opposite color.

Ns also has two 2bars that are the opposite color of their adjacent sticker, but the sequence is reversed, so they are on the left of each side, with (1+2)<>3 and (4+5)<>6.

R(a)

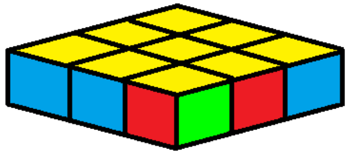




HL(1+3), joined to a 2bar(4+5) on the right.

2 and 6 are different colors.

T is the only other case with headlights on the left joined to a 2bar at (4+5), but T’s is HLo. T has 2=6.



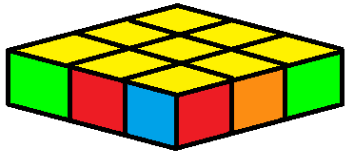
Solo4<>2bar(1+2)

3=5

A(ccw) looks a bit similar, but it has HL on the right and no Solo4.

G3 & **J** have Solo4. G3 has ALT1 or has (1+2)<>3. J shows a 3bar or another 2bar.

T looks similar, but has 3<>5 and no Solo4.



BEs

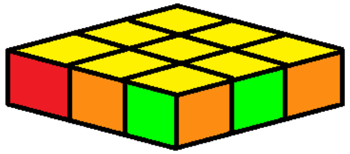
2<>5

2=4

Three more cases have BEs with no other common patterns:

G1 & **G4** do not have 2<>5.

R(b) has 3=5 instead of 2=4.



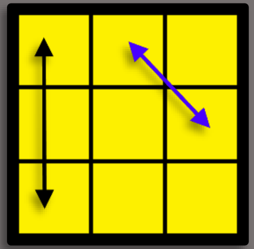
CB from 2 to 6. Must be R(a), as no other cases have a CB from 2 to 6 (**Z** is ALT3).

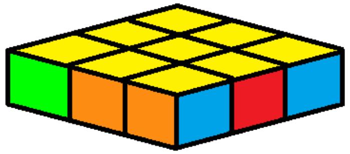
ALT2

Solo1

J is the only other Solo1, but it has a 3bar on the right.

R(b)

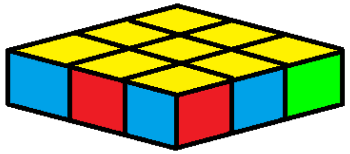




2bar(2+3), with HL on right

1 is not the same color as 5.

T is the only other case with a 2bar at (2+3) joined to headlights on the right, but T's are HLo. T has 1=5.

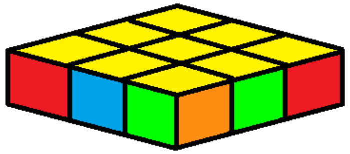


CB from 1 to 5. Must be R(b), as no other cases have a CB from 1 to 5 (**Z** is ALT3).

Solo6

ALT1

L also has Solo6, but has a 3bar on the left side.



BEs

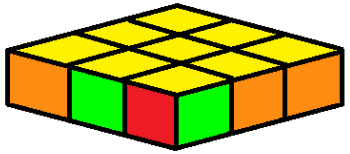
2<>5

3=5

Three other cases have BEs with no other common patterns:

G1 & **G4** do not have 2<>5.

R(a) has 2=4 instead of 3=5.



2bar(5+6)<>Solo3

2=4 and 4 is not the opposite color of the 2bar.

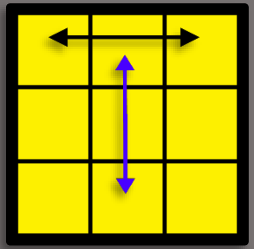
A(cw) & **G4** are similar, but have HL on the left.

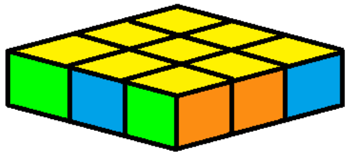
J shares the right side but has a 2bar on the left side.

G2 & **L** also have Solo3. G2 has either ALT2 or 4<>2bar(5+6). L has either a 3bar or two 2bars visible.

T is the same except for 2. T has 2<>4.

T



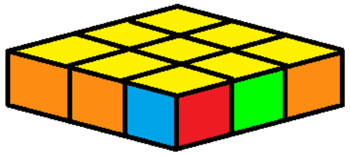


HLo(1+3) joined to 2bar(4+5). This is the only permutation with these features together.

2=6

G2, **G3** & **H** also have HLo; **U(cw)** & **U(ccw)**'s headlights may be HLo. None of these cases have a 2bar visible at the same time.

R(a) has HL joined to a 2bar, but 2 and 6 are not the opposite color of the HL.



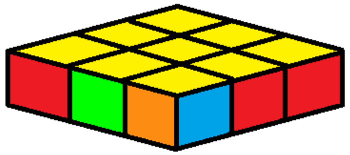
2bar(1+2)=6. 2bar on left is not adjacent to its opposite color.

3<>5

A(ccw) & **G1** have the same left side, but have HL on the right, and 2bar<>6. A(ccw) has 3=5.

L has a 2bar on its right side too.

R(a) looks similar, but only has 3 colors after the 2bar.



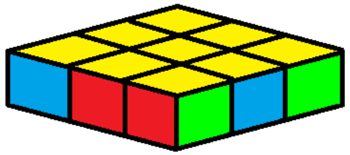
1=2bar(5+6). 2bar is not adjacent to its opposite color.

2<>4

A(cw) & **G4** have the same right side, but both have HL on left, and 1<>2bar. A(cw) has 2=4.

J has a 2bar on its left side.

R(b) only has the same left side and 1=2bar, but has 2=4.



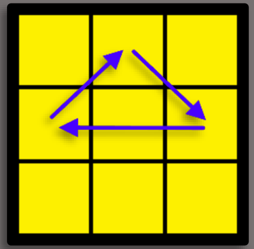
2bar(2+3) joined to HLo(4+6). This is the only permutation with these features together.

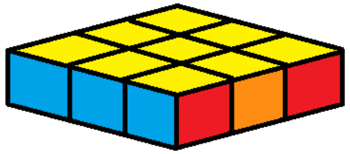
1=5

G2, **G3** & **H** also have HLo; **U(cw)** & **U(ccw)**'s headlights may be HLo. None of these cases have a 2bar visible at the same time.

R(b) has a 2bar joined to HL, but 1 and 5 are not the opposite color of the HL.

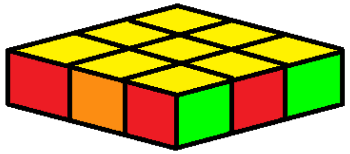
U(cw) – aka U(a)





3bar on left, with HLo
(so it must be a cw U).

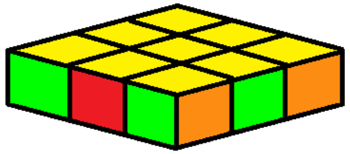
Solo5. 3bar on left is not the opposite color of Solo5
(so it must be a cw U).



HLo + HL, with Solo2
(so it must be a cw U).

The 3rd set of headlights is on the opposite side of HLo.

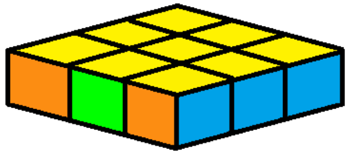
ALT1 with CB from 3 to 6
(so it must be a cw U).



ALT1 with CB from 3 to 6
(so it must be a cw U).

2x HL with Solo2 (so it must be a cw U).

The 3rd set of headlights is HLo, and is on the side opposite the CB).



HL(1+3), Solo2, with 3bar on the right.

Solo2<>3bar on right (so it must be a cw U).

F, **J** & **L** share the 3bar, but lack headlights on the left.

U(ccw) has its left 3bar<>Solo5, so has HL(4+6), not HLo.

A(ccw) has CB from 3 to 6, but it has a 2bar on the left.

H has 2x HLo. H has no ALTs and no CB.

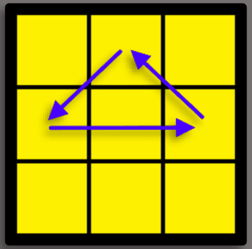
U(ccw) has two sets of headlights at two of the viewing angles, but both are ALT2, not ALT1.

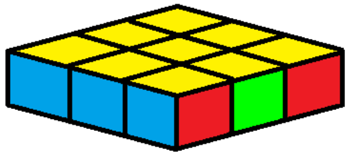
Z has 2x HL at all viewing angles, but shows either ALT3 or no ALTs.

F, **J** & **L** share the 3bar, but lack HL on the left.

U(ccw) has HLo(1+3), so U(ccw)'s Solo2 is not the opposite color of its 3bar.

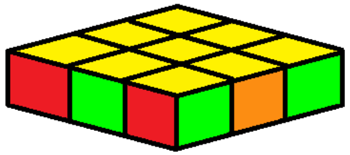
U(ccw) – aka U(b)





3bar, with HL(4+6) (so it must be a ccw U).

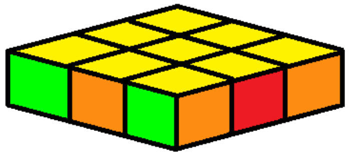
Solo 5<>3bar on left (so it must be a ccw U).



ALT2 with CB from 1 to 4 (so it must be a ccw U).

2x HL with Solo5 (so it must be a ccw U).

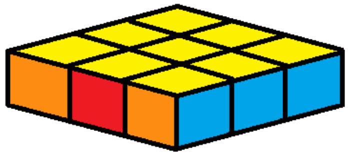
The 3rd set of headlights is on the side opposite the CB).



HL + HLo, with Solo5 (so it must be a ccw U).

The 3rd set of headlights is on the opposite side.

ALT2 with CB from 1 to 4 (so it must be a ccw U).



HLo with a 3bar on the right (so it must be a ccw U).

Solo2 is not the opposite color of the 3bar (so it must be a ccw U).

F, **J** & **L** share the 3bar, but lack HL on the right.

U(cw) has HLo when on the right of the 3bar.

A(cw) has CB from 1 to 4, but they are followed by a 2bar.

H has 2x HLo. H has no ALTs and no CB.

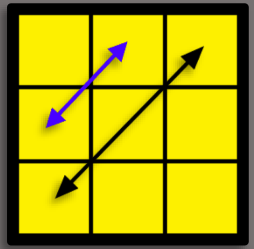
U(cw) has two sets of headlights from two angles, but both show ALT1, not ALT2.

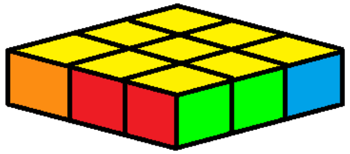
Z has 2x HL at all viewing angles, but shows either ALT3 or no ALTs.

F, **J** & **L** share the 3bar, but lack headlights on the left.

U(cw) has 2<>3bar when the 3bar is on its right side.

V

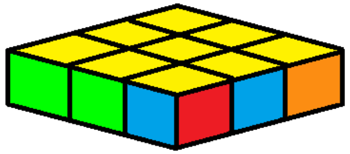




2x2

BEd

A(cw) & **A(ccw)** both have a 2x2, but in both cases, BEs.



2 bar(1+2)<>3

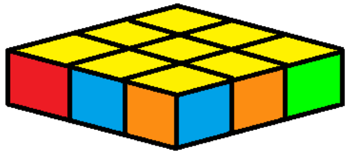
3=5

2bar is not the same as 6.

4<>6

A(cw), **G3**, **L**, **Ns**, & **Y** all share the 2bar<>3.

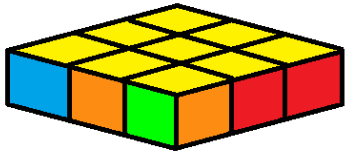
However, only **G3** shares 3=5. In G3, 2bar=6.



CB from 2 to 5

BEd

F shares the CB from 2 to 5, but has BEs.



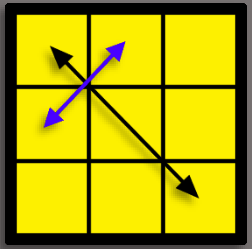
4<>2bar(5+6)

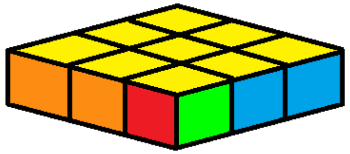
2=4

1<>3

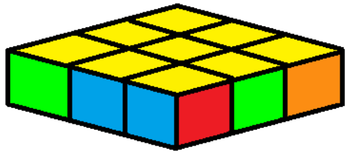
A(ccw), **G2**, **J**, **Nz**, & **Y** all share the 4<>2bar(5+6). Only **G2** shares 2=4. In G2, 2bar=1 and 1 is not the opposite color of 3.

Y





Y is the only PLL with a corner sandwiched between two 2bars.



1<>2bar(2+3)

BEd

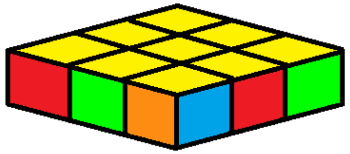
1=5

4<>6

A(ccw) shares 1<>2bar and 4, but has a 2x2 and BEs.

G2 shares 1<>2bar and 4, but in G2 has BEs.

Nz shares 1<>2bar and 4, but has a 2bar at (5+6).



BEd, but no other patterns

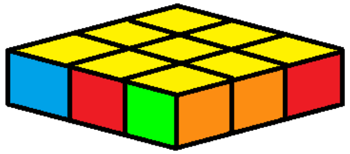
Only the colors from (1,2) show twice (reversed at 6,5). The middle corner colors (3,4) are unique. The lone corner (see column 1) is diagonally opposite this corner.

E is similar, but a color from middle corner (3,4) is repeated at either 2 or 5.

F has BEs and CB from 2 to 5.

G1, G4, **R(a)** & **R(b)** all have BEs.

V has CB from 2 to 5.



2bar(4+5)<>6

BEd

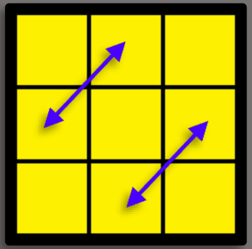
1<>3

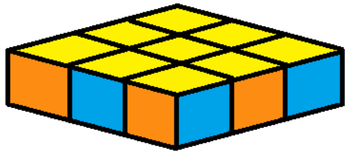
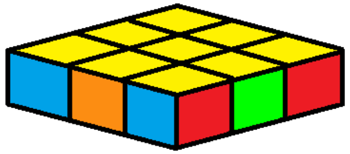
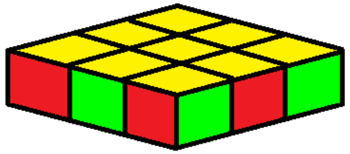
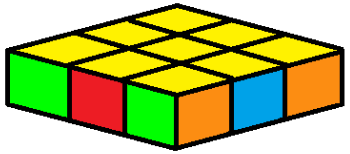
A(cw) & **G3** share 2bar<>6, but have BEs. **A(cw)** also has a 2x2.

L and **Ns** share 2bar<>6, but have a 2bar at (1+2).

V shares 2bar<>6 and BEd, but has a 2x2.

Z



 ALT3, so CB from 1 to 6 The middle edge of each HL is the color of the other visible HL.	 2x HL All four colors are visible. HL(1+3)<>5 *and* HL(4+6)<>2.	 Same as column 1	 Same as column 2
H has 2x HLo. **R(a)** & **R(b)** have CB from 2 to 6 and 1 to 5 respectively, but not ALT3. **U(cw)** and **U(ccw)** both have two sets of headlights, but include a third color on one of the middle edge stickers.	**H** has 2x HLo. **U(cw)** & **U(ccw)** both have two sets of headlights, but only three colors will be visible, so one of the middle edges will be the same color as a set of headlights.	Same as column 1	Same as column 2

Credits and Resources

Other cube aficionados have created very helpful guides to recognising PLLs from just two sides. I put this guide together to help me learn, to approach and present the material in a way that suits my learning style, and to contribute something to the cubing community. You may have a different learning style and find the other guides easier to use, or may simply find seeing how others conceptualise the same problem useful for improving your recognition. You can't have too much good information.

I am most grateful to the following three people for their guides, all of which I have read or watched in the past: Sarah Strong, Crazybadcuber and Joseph Skyler. I took the somewhat odd approach of learning PLL algorithms before FL2 or OLL, and found the information overwhelming as the cube was still so new to me. My solving times were also so slow that an extra few seconds to look at sides three and four before executing a PLL barely affected my time. Having learned a lot more about cubing since then, I decided it was time to make an effort to learn 2SR. I intentionally avoided peeking at their guides again before making mine so that I would be forced to figure out the sticker relationships myself. That said, some of their wisdom will have undoubtedly seeped into my brain and may have surfaced in my guide too. Hopefully my material is presented in a sufficiently different manner so as to constitute an addition rather than a replication.

Sarah Strong: 2-Side PLL Recognition Guide

Crazybadcuber: Ultimate PLL Recognition *Guide*

Joseph Skyler: My 2-Side PLL Recognition Method Part 1 (Part 2 is here)

Having difficulty with the earlier stages, or need F2L/OLL/PLL algorithms? Try these…

Parity Case Cubing (my blog)

→ PLLs for every angle in this guide (coming May/June 2014)
→ OLLs from multiple angles (coming July/Aug. 2014)
→ F2L guide (coming Sept. 2014)

Also:
Speedsolving.com's wiki and forum
Badmephisto's site

YouTube Channels:

Adventures in Cubing
Badmephisto
Crazy Bad Cuber
Cubing World
Joseph Skyler
The Westonian

…and, once I have time to make some videos:

Parity Case Cubing

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