<u>Introduction to advanced cross</u>

Chapter 1: Adjacent theorem and Opposite theorem

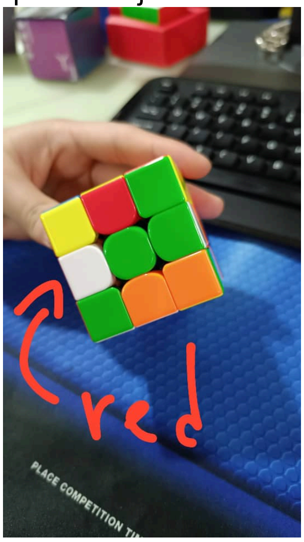
Are you still solving your cross pieces one by one? Is advanced cross too overwhelming of a concept to dive right into? I feel you, and this chapter is just for you.
Today, we'll be building a hypothetical bridge between absolute beginner cross solutions to advanced cross, to help you get faster.
Welcome, to INTERMEDIATE CROSS TUTORIAL.

Today, we'll be focusing on solving 2 pieces at a time instead of 1. We will address core concepts that will directly carry over into advanced cross, so although today's lesson won't significantly improve your time right away, it will definitely make the transition into advanced cross WAY less confusing and less overwhelming.
We'll split the chapter into a few parts, each part building on top of the other:

1. Basic adjacent theorem
2. Shifted adjacent theorem
3. Forced adjacent theorem
4. Basic opposite theorem
5. Shifted opposite theorem
6. Forced opposite theorem

Well, what the hell is the adjacent and opposite theorem, you may ask?
Essentially,I broke down advanced cross into its constituent components, and simplified them for the beginner to be able to understand and start implementing them immediately.
The result? Adjacent theorem and opposite theorem.
By understanding and applying these theorems, you would have already captured the essence of a full fledged advanced cross, just in a smaller, less intimidating package.

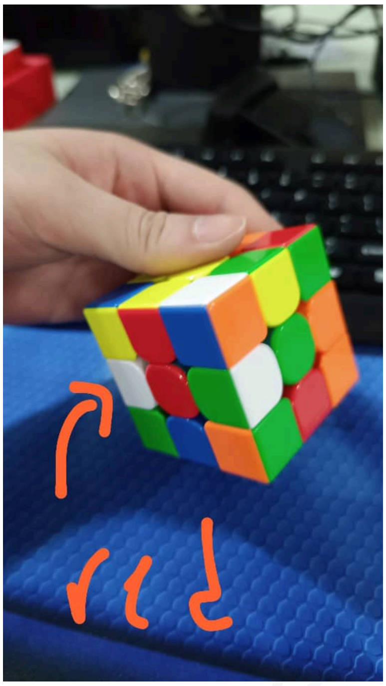
First and foremost, let's address the adjacent theorem. Adjacent theorem solves 2 cross pieces adjacent to each other.



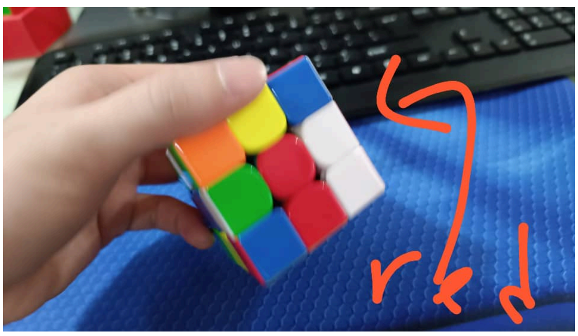
Now, as you can see, these 2 cross pieces can be solved adjacent to each other
Now, I know what you;re thinking right now.
“No shit.”

But give me some trust, I promise that we're building up to something very useful, and I'm not wasting your time.
Now, back to the case.
A beginner might see this, and just choose either red or green randomly to solve it.
However, it is worth noticing that if you solve green first, red gets thrown up to the U layer, which is kinda hard to solve isn't it?
On the other hand, if we were to solve RED first, you'll notice that green will not end up in a hard situation, and we can solve both in only 2 moves.
and that is the first principle of adjacent theorem: choose the correct order of solving pieces.

Now, let's step it up a notch, and go to shifted adjacent theorem.
basically, what I'm trying to say is, adjacent theorem can be used in less obvious situations, such as this:

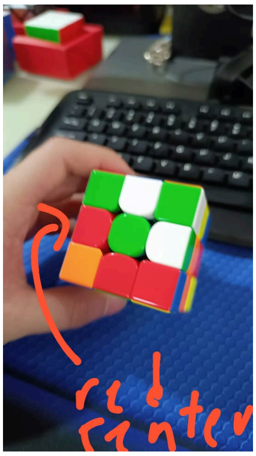


This is quite obvious for the experienced cuber, But let me explain it for the up-and-coming cubers.
If we were to solve these 2 pieces adjacent to each other, we can shift the bottom layer by a D move to the right, to solve both pieces simultaneously!
and how do we identify that we can do this?
it's simple.
while thinking of your cross solution, refer to the color of your center pieces.
If the red center is at the left of your green center, then you know you can solve your red cross piece at the left of your green cross piece, before shifting the bottom layer using D moves to solve both simultaneously!
And THAT, is the essence of the adjacent theorem.

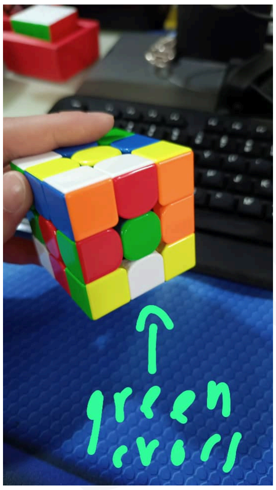


And obviously, You couldn't solve your red cross piece at the right of your green cross piece, if not it will be wrong even if you shift the bottom layer.

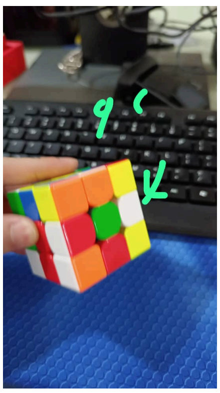
Now, take a moment to process what I just said, cos shit's about to get real.
Now, let's learn the final variant of adjacent theorem, the forced adjacent theorem
We can't always just hope for the cube to be in a perfect state for us to use adjacent theorems, so most of the time we have to use a move or two to force a case where the adjacent theorem can be used conveniently.
for example, we have learnt that these 2 pieces can be solved adjacently using just a few moves.



But what if you get a case like this?

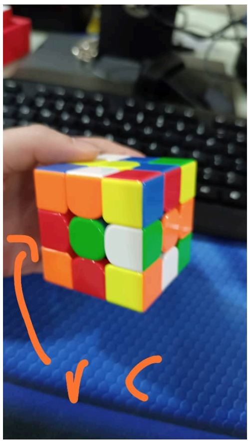


Many beginners will just brush this off as a shitty case, but in truth, we can manipulate it in just a move to set up adjacent theorem to be used.
All you need to do is an F' turn, and you'll get this:

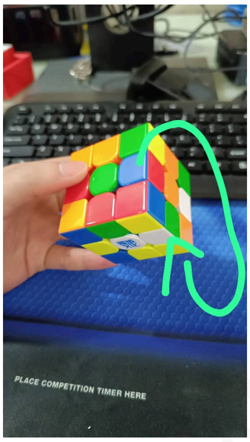


And as you can see, we forced a situation exactly like the previous one.
And now, just like we learnt, we can use shifted adjacent theorem to solve it.
We solve them to the bottom, then shift the bottom layer using D moves to solve the pieces.

Last but not least, I would like to address that I have been using the exact same case to demonstrate regular, shifted, and forced adjacent theorem.
There are slightly varied situations where the exact same theorems can be applied in the same, way, I'll address the most intuitive ones first.

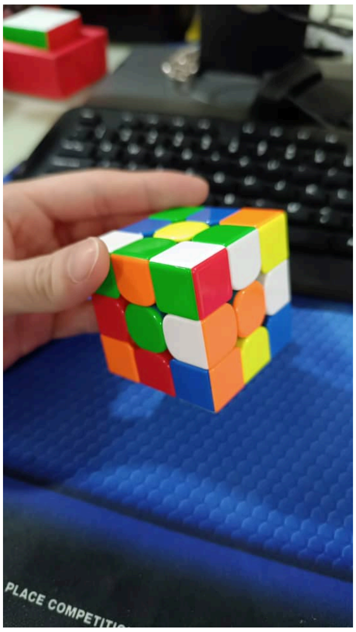


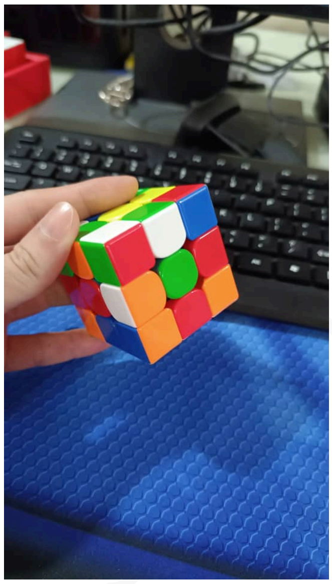
This is the exact situation I've been using to teach the adjacent theorem
obviously, it will work just the same if my green piece was here:



Now I can actually solve the 2 adjacent pieces in fewer moves, that is F’ and D’.
and of course, adjacent theorem works exactly the same if my green cross piece was facing up.
Or even if it faces in the opposite direction of the first case shown.
Now, we will stop right here for the adjacent theorem. In this chapter, I will only teach cases where the 2 cross pieces in question are solved completely separately without affecting each other.
There are more complex uses of the adjacent theorem where the 2 pieces solved affect one another, I will show them just to give an idea of it. I would not recommend looking into it before you understand and have tried applying the basic theorem.

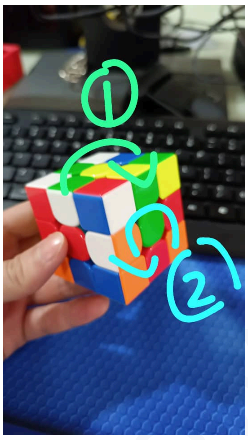
First and foremost we have this very simple chain reaction case, where solving orange sets up green to be solved:





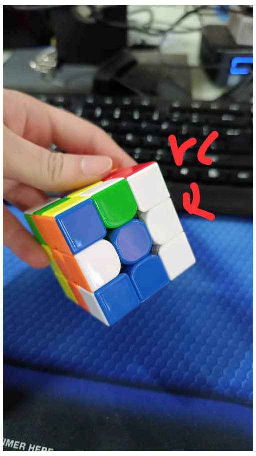
Of course, it also works shifted: —---

..and forced:



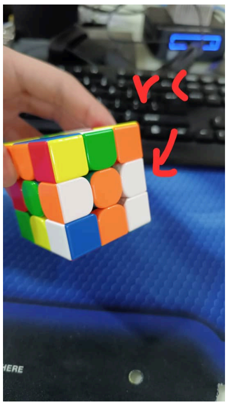
But don't let that confuse you, learn to walk before you try to run.
Make sure you can consistently apply the adjacent cross piece cases for basic situations before you look into these.

Well, we have addressed adjacent theorem, now lets address opposite theorem.
We'll use the red and orange cross pieces to demonstrate these, starting with the very very basics:



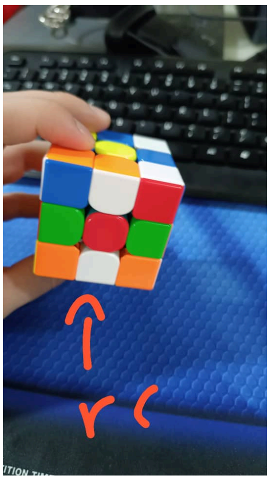
I'm sure even a non-cuber can figure out that both cross pieces can be solved in 2 simple moves, which are L and R’.

Now, let's step it up just a little bit and show a shifted application of opposite pieces:



as you can tell, since my red and orange center pieces are opposite to each other, I can solve my red and orange cross pieces opposite to each other before shifting the bottom layer to fix both pieces.
And that, is essentially the entirety of opposite theorem.

So, now let's address forced opposite theorem.
Essentially, there is only one rather interesting case where we force pieces into a situation where opposite theorem can be used, which is this right here:



This specific situation might seem like a shitty case, but upon further inspection, it is actually one move away from being solved using the opposite theorem. That move being an F or F' turn.

The usage of opposite theorem is much more intuitive than adjacent theorem, so I believe it would be rather counterproductive for me to show more cases, as it might cause confusion while you could easily figure it out yourself just by playing around with the cube.

Now, we have addressed both adjacent theorem and opposite theorem.

From now on, when solving the cross, try your best to apply the theorems learnt to solve 2, or maybe even 3, pieces at a time at the start of your cross, then solve the remaining cross pieces as you would usually solve it, one at a time.

Over time, you will get more comfortable with solving shifted pieces and also develop a strong intuition on which pieces are adjacent or opposite to each other.

when you're familiar and consistent at said skills, I firmly believe you will be able to pick up advanced cross in no time.

The journey to mastering advanced cross is a long one, full of experimentation and experience. I hope I have given you sufficient information to bridge the gap between your current skill level and that of a full fledged advanced cross. Transitioning from a beginner method to CFOP can indeed be very intimidating, so I hope this chapter has been helpful to you.

Image notation:
rc means red cross piece, gc means green cross piece

Author contact: so.xiong24@gmail.com

(This guide is meant to complement a YouTube video, and was never meant to stand alone. It is an adapted version of my video script that I adapted into a book chapter for fun)