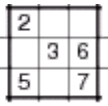
Single's Chains

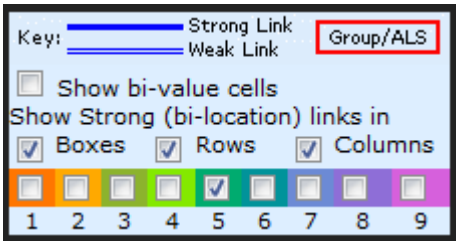
From sudokuwiki.org, the puzzle solver's site



Single's Chains, also known as **Simple Colouring** is a chaining strategy and part of a large family of such strategies. 'Simple' refers to the idea that one candidate number is considered - in contrast to 'multi-colouring' which is the basis of 3D Medusa. Single's Chains also related to X-Cycles.

A 'chain' is a series of links hopping from one candidate to another following very simple rules. A candidate can either be ON or OFF. That is, we either think it is a possible solution to that cell, or we do not. There are consequences to the rest of the board when we 'link' these two states. When we are starting out we don't know which will be ON or OFF so any two colours will do.

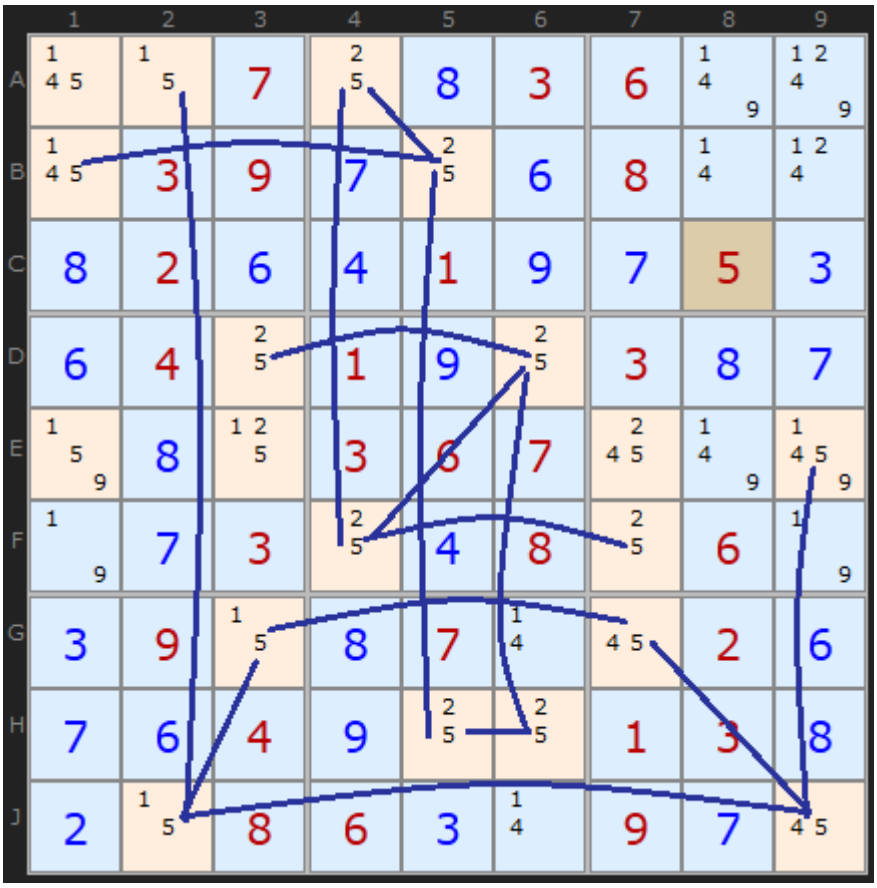
On this board I have clicked on 5 in **C8** to highlight all the 5s in the puzzle. You can also use the little tool under the list of strategies to focus on a specific number and view all the chains. Tick the "rows", "columns" and "boxes" and un-tick the other numbers. This gives us all the possible chains where there are only two remaining 5s left in any row, column or box.



How to show Chains

The technical term for these are 'bi-location' links. Where there are three or more 5s - for example in box 1 and box 6, no links are possible within those boxes. But there are plenty about.

Now, the Colouring aspect which sometimes gives this strategy its name, is illustrated in the rules below. Each end of each link can be assigned one of two colours. You can start in any position, taking any 5 on the board and give it one colour. Then follow each chain link **alternating the colour**. The strategy is all about recognising that one of those colours will be the solution and the other not. The rules that follow identify the contradictions that allow us to eliminate candidates or decide which colour (which end of every link) is the solution.



All links on candidate 5

Just a note on rule numbers: The solver uses the same search algorithm for both Singles Chains and 3D Medusa so I have synchronised the rule numbers that are returned. Rules 1 and 3 apply only to 3D Medusa (Multi-colouring) since they extend chains to different numbers. However, the solver needs to look for Singles Chains first because I deem it to be a simpler strategy that's easier to search for.

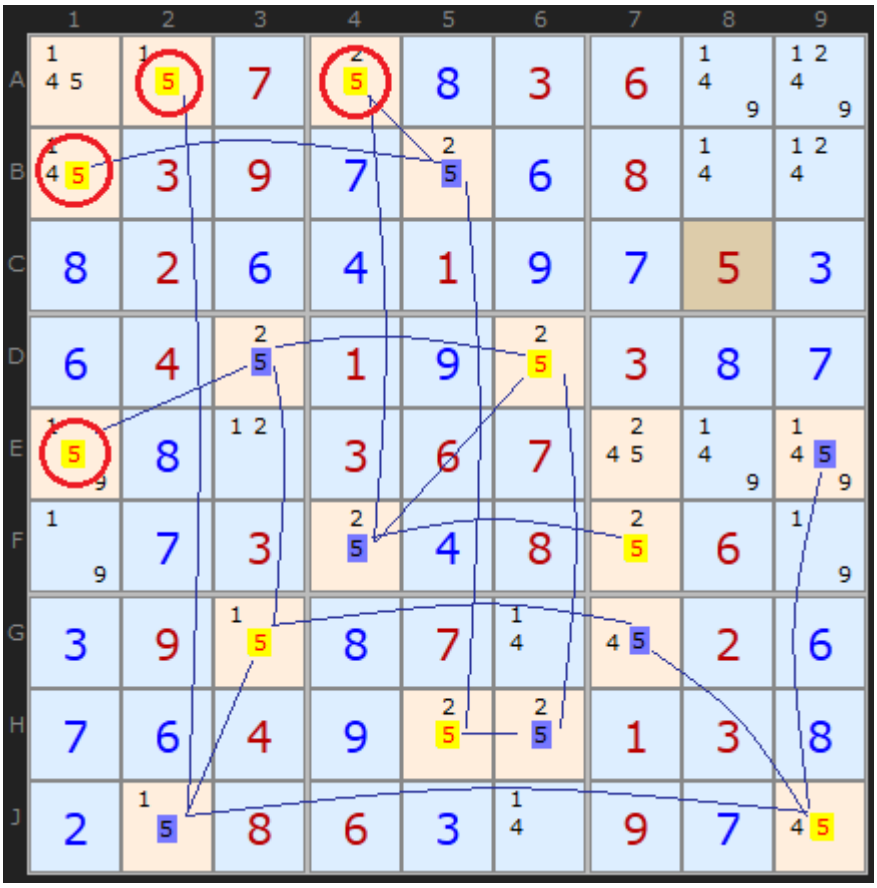
Rule 2 - Twice in a Unit

This rule is shared with 3D Medusa.

Taking the example we started with, the 5 in **E3** is removed by Rule 4, but the next step uses Rule 2, shown here. Mapping all the chain links we find that in three units there are 5s highlighted in the same colour. The top row has two yellow 5s in **A2** and **A4**. Box 1 has yellow 5s in **A2** and **B1** and finally, column 1 has yellow fives in **B1** and **E1**. This Rules says that if any unit has the same colour twice ALL those candidates which share that colour must be OFF. The alternative colour will be ON and the solution for that cell.

(Actually yellow is the colour I use to show eliminated candidates. The solver will return Green and Blue for the colouring but then switch one or other to yellow if the candidates are to be eliminated).

Rule 4 - Two colours 'elsewhere'



Simple Colouring Rule 2 : Load Example or : From the Start

If we can eliminate "off chain" in a cell we can certainly do so off-chain. This is a great example puzzle for Rule 4 - there are three in succession and I'm showing the first and third. This first cannot be simpler. Either **B9** is 3 or - follow the chain - **F5** is 3. One or the other. Since the 3 at **B5** can see both ends of the chain it can be removed. You've heard that story before in earlier strategies. With Simple Coloring the 3 in **B5** can 'see' two different colors elsewhere.

If you have looked at X-Cycles you'll spot how these two strategies overlap - if your colouring happens to form a loop, as it does here. Also, if you've read as far as AICs you may recognize the pattern of 3s as a classic double alternating Nice Loop with a discontinuity in **B5**. But that's another story.

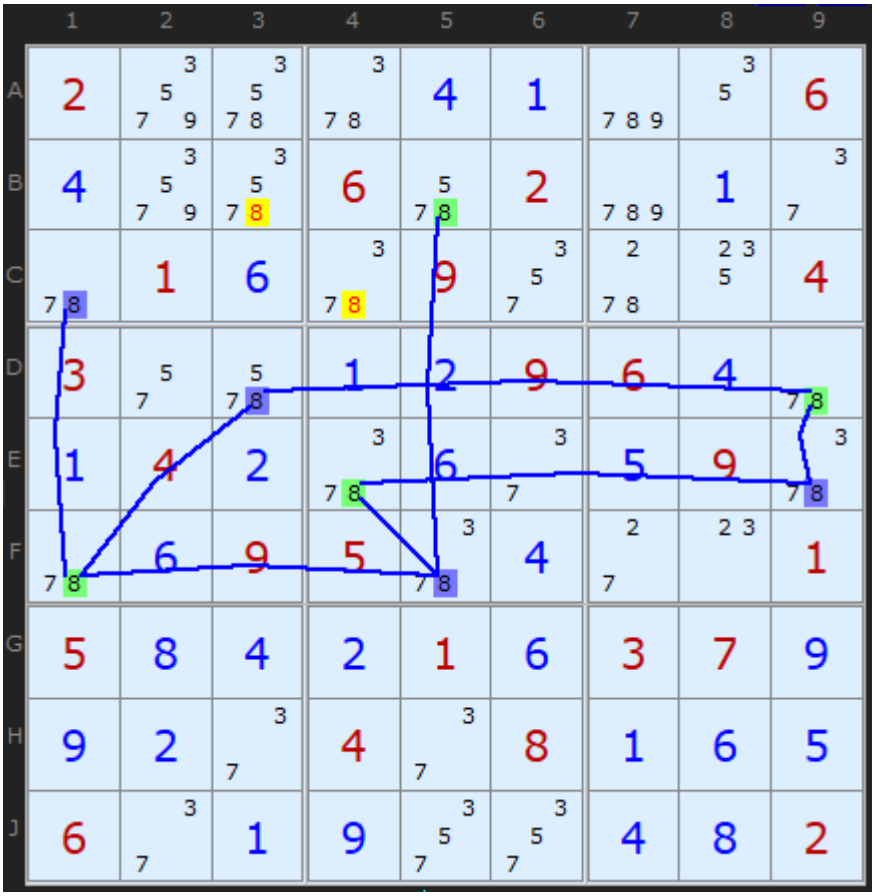
Single Chains Rule 4 : Load Example or : From the Start

Michael Wallis is an early pioneer of

Simple Coloring and this rule family.
This rule is shared with 3D Medusa.

Rule 4 is simply put: if you can spot a candidate X that can see an X of both colours - then it must be removed. The third instance of this strategy concerns 8s and I show it reveal a more complicated network of 8s that the 3s above. However, it is easy to pick out the blue and green 8s that point to the eliminations.

The documentation on this page has changed in February 2015 when a reader called **FallsOffRocks** wrote to me to point out the algorithm for the old Rule 5 could always get all Rule 4 eliminations. So have rolled Rule 5 into Rule 4. Both rules are examples of off-chain eliminations looking at candidates in different cells. The simplification also affects 3D Medusa



Single Chains Rule 4 : Load Example or : From the Start

The strategy which naturally follows on from Singles Chains is 3D Medusa, but you should also read up on the article Introducing Chains and Links.

Singles Chains Exemplars

These puzzles require Singles Chains strategy at some point but are otherwise trivial.
All contain only one Naked Pair in addition to Single Chains They make good practice puzzles.

- Exemplar 1, x1 (score 74)
- Exemplar 2, x2 (score 81)
- Exemplar 3, x2 (score 100)
- Exemplar 4, x2 (score 100)
- Exemplar 5, x3 (score 148)
- Exemplar 6, x3 (score 150)

Go back to X-Wings Continue to Y-Wings