The Creation of a Chimera

by Joseph DeVincentis

I wrote the puzzle shown in Figure 1 for the 2008 MIT Mystery Hunt. It appeared with the title Chimera with a single line of flavor text accompanying it: “Yee-haw! Time to round up those islands!”

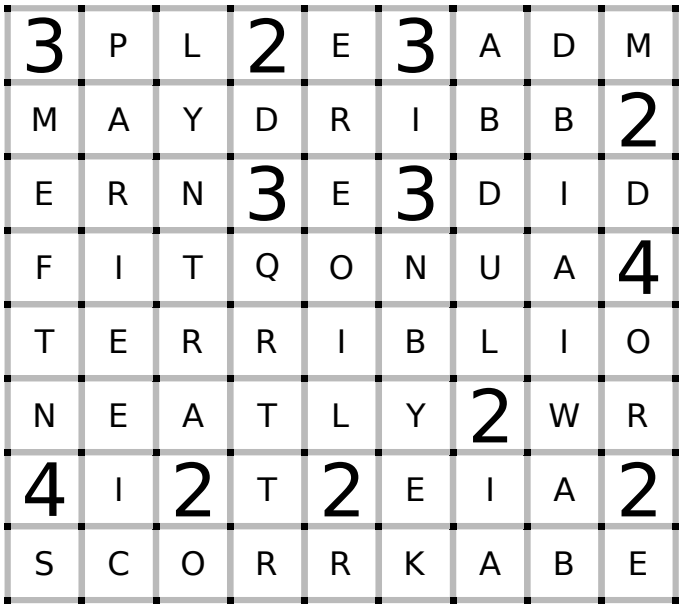

Figure 1. Chimera puzzle from the 2008 MIT Mystery Hunt

The letters are primarily there to provide a final answer at the end, though there is also a hint within them as well. The final answer, as is customary for Mystery Hunt puzzles, is a word or short phrase. If you wish to make copies on graph paper to solve, you need copy only the 12 large digits into a 9x8 grid.

The solvers at MIT had no more indication of what puzzle type this is than what you have received here, though it was expected that competitive teams would have members with experience in popular types of logic puzzles such as ones published by Nikoli, ones that appear in the United States Puzzle Championship and the World Puzzle Championship, etc.

If you would like to solve this puzzle, you should do it now. On the next page, spoilers about the puzzle type are revealed, as they are the main subject of this article.

The MIT Mystery Hunt

The Mystery Hunt is an annual puzzle-hunt at MIT, started in 1981 by student Brad Schaefer. It has changed with the times; as both team size and the capabilities of finding information quickly on the Internet grew, the Hunt adapted. The number of individual puzzles grew, and those puzzles changed from being simple trivia questions into complex, multi-part puzzles. Sometimes those puzzles take the form of standard puzzle types solvers may have seen before, but, just as the trivia in the early Hunts was laden with tricks and traps, these puzzles rarely work entirely in the manner of the standard puzzle types they resemble.

The Essence of the Chimera

The trick in this particular puzzle is that the same clue numbers work as clues to two different well-known puzzle types, each leading to a unique solution.

One of these types is Nurikabe, the popular “island” puzzle. Each number is part of an island of unshaded squares, and each island needs to contain exactly one number which indicates the number of squares in that island (including the one with the number). No two islands can share an edge, though they may touch at a corner. All non-island squares are shaded. The shaded squares must form a single connected group (a polyomino), and there must not be any 2x2 region of squares which are all shaded.

The other type is Corral. In this type, there is a single closed loop of “fence” drawn along the boundaries between squares. The fence does not cross or touch other parts of itself. All the numbers must lie inside this fence, and each number tells the total number of squares visible in each of the four orthogonal directions from the square containing the number, including the square with the number, treating the fence as blocking vision. Hence, a square with a 2 has fence along three of its sides, and just one more square between it and the fence on the fourth side.

Some solvers found the concept of the clue numbers working for two different puzzle types mind-blowing. Others found it surprising, but not *too* terribly surprising; they've grown to expect impossible-seeming puzzles to show up in the Hunt.

The Conception of the Chimera

While practicing for the US and World Puzzle Championship, I sometimes resorted to solving puzzles from foreign-language publications whose instructions are written in a language I cannot read, including Japanese puzzles from Nikoli and Dutch puzzles from the magazine *Brein Brekers*. In these cases, I relied on my puzzle experience as well as the style of the grid, the clues, and the characteristics of the clues to determine what type of puzzle I was looking at.

Some puzzles have distinctive styles. Sudoku, for instance, has equal-sized regions with heavy boundaries. Kakuro (a.k.a. Cross Sums) has diagonally-divided black squares with the sums to the adjacent row and/or column of numbers printed in each one. But several puzzle types have nothing but numbers, and these are harder to distinguish. Slitherlink (a.k.a Fences) has only 0, 1, 2, and 3 as clue numbers. Corral can have larger numbers but a minimum of 2. Nurikabe's clues have a minimum of 1 and cannot be in orthogonally adjacent squares. There are at least half a dozen more. The experience of trying to differentiate some of these puzzle types inspired me to write Chimera.

In addition to this, I had seen a puzzle where you had to distinguish which of two different grids was each of two different puzzle types. This concept was explored further in 2009 (well after Chimera was published) in the Matchmaker puzzle in the OAPC contests leading up to that year's World Puzzle Championship. In Matchmaker, five different sets of instructions for puzzles were presented (including standard types Nurikabe, Minesweeper, and Tapa), all based on grids with numbers in some of the squares and no other clues. You had to use clues from the values and positioning of the numbers to figure out which grid went with each puzzle type. But my idea for Chimera was somewhat different; instead of challenging solvers to match different grids to rule sets, here the same grid was to be used for two different rule sets.

Choosing Puzzle Types

My first and most important step was to determine which two puzzle types I was going to use. I started with Nurikabe because I like this type, and it is quite popular and well known. My first thought was to

pair it with Slitherlink, which would have limited me to use only 1, 2, and 3 as clue numbers. It is perfectly possible to make a Nurikabe with all the islands of size 3 or smaller, but there is a certain “density” of clues required in each type. With Nurikabe the sum of all the clue numbers is the total number of island squares in the solution, so this sum is limited to a certain fraction of the total area of the grid, less than half that area when the islands are all small. Slitherlink, however, tends to require a greater density of clue numbers than Nurikabe, and I didn't think the Nurikabe clue numbers would be sufficient to make the Slitherlink solution unique. Fillomino is much the same as Slitherlink in this regard, but requires an even greater clue density. With this type of process I evaluated and discarded several choices of pairs of puzzle types.

The combination of Nurikabe and Corral gave better results. The clue densities were compatible, and furthermore, the same configuration could lead to starting points for both puzzles: two numbers in the same row or column with one space between them had to have a shaded square between them in the Nurikabe, and imposed limits on the positions of fences in that row in the Corral puzzle. If one of the numbers was a 2, the space between them must be outside the fence, since having it inside would allow the 2 to see 3 spaces.

Building up the Puzzle

I worked on graph paper, with two copies of my grid side by side. I would fill in some clue numbers I was testing into both grids, and try to solve both puzzles as far as I could, initially ignoring any logical steps in the Nurikabe based on there not being any islands capable of reaching a particular square, since I planned to add more numbers as I went along. When I couldn't deduce anything more in the Corral, I added a number in such a way as to not make the Nurikabe solution impossible. When I reached a part in the Nurikabe solution that would have left too large a region with no islands, I added a number there. Effectively, constructing the puzzle meant solving a whole bunch of similar, broken Nurikabe and Corral puzzles until I found a pair that both had unique solutions.

Fairly early on, I arrived at the configuration seen in the upper-middle portion of Chimera, a 3x3 square region with numbers at all four corners, though I had not decided which numbers would appear. This forced a cross-shaped bit of shaded cells in the Nurikabe. Any 2s among these clues had to be separated from their near neighbors in the Corral solution by a square outside the fence, and even a single 2 among the four numbers meant that the center square in this 3x3 also had to be outside the fence since to have it inside would make the fence cross or touch itself.

My initial attempts were on an 8x8 grid, size chosen arbitrarily as big enough to be interesting, but small enough to maybe let the puzzle work. After a few attempts I came up with the case seen in Figure 2.

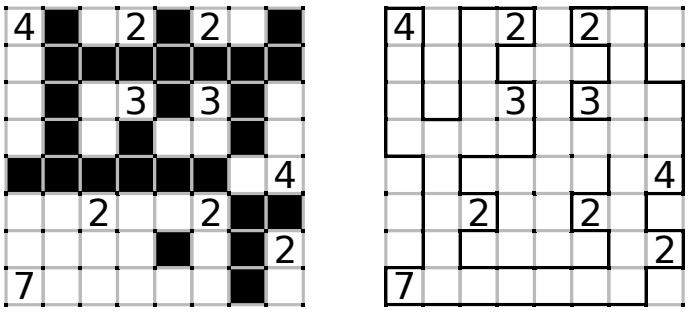

Figure 2. Broken Nurikabe and Corral Puzzles on 8x8 Grid

The Nurikabe here has two solutions. One of the two spaces between the 2s in row 6 must be land to avoid the 2x2 pool there. Each choice leads to a solution. I figured that a different arrangement of clues might fix this.

The Corral is also broken, though I liked the solution technique as far as it went. One key step: if the 3 at row 3, column 6 sees one space to the right and one space below, this limits the 4 in row 5 to a maximum of 3 spaces seen. But the square at row 4, column 7 can be inside or outside the fence. I kept running into a non-uniqueness problem in this area for every configuration I tried. Eventually I decided to add another column to the grid on this side, figuring that something different was needed, and I worked on finding a right side of the puzzle that forced a unique solution.

I found one, but it no longer worked with the clues along the bottom, so they also had to be replaced. There was a lot of trial and error in here, leading to near-misses such as the one seen in Figure 3.

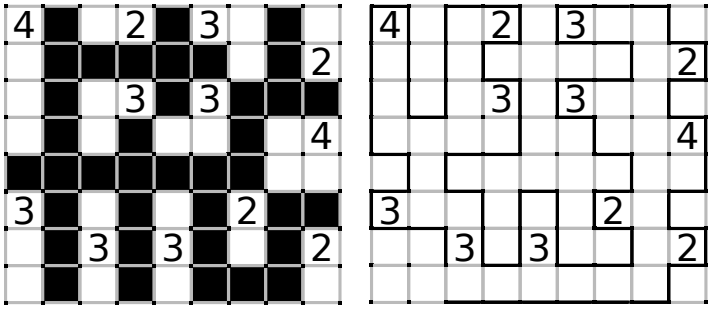

Figure 3. Another Close Nurikabe-Corral Effort

This case gives a completely unique solution for the Nurikabe, but in the Corral, it is possible for none, one, or both of the two squares at the left end of the bottom row to be inside the fence.

Solution

Eventually I found a solution that worked, which was the one used in the puzzle. The complete solution is shown in Figure 4.

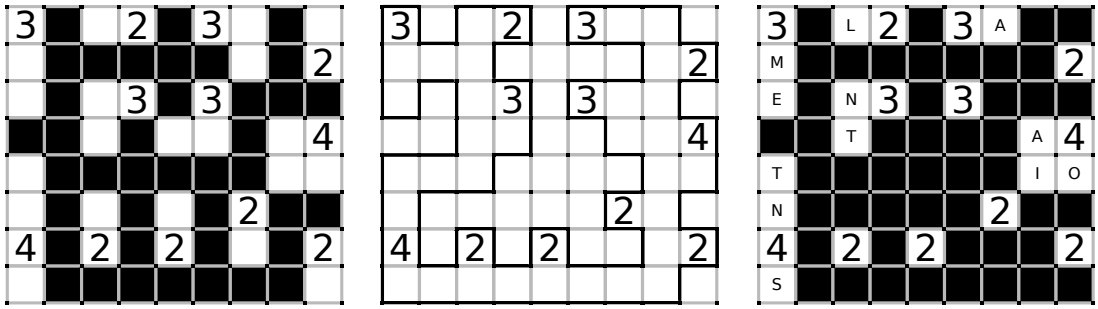

Figure 4. Solution for Chimera

The third diagram in Figure 4 shows the intersection between the unshaded island cells of the Nurikabe solution and the equivalent inside-the-fence cells of the Corral solution by shading all other spaces. This was how I chose to hide the final answer. Besides the numbered cells, there were 12 of these, so I simply checked our answer list for 12-letter answers, found that there were very few, and selected one, LAMENTATIONS. I wrote these letters into the given squares, then filled the squares which were unshaded or inside the fence but not both to try to make the solution not obvious to people who had solved only one of the two forms of the puzzle. Finally, I filled in the remaining spaces to make various words and partial words written across the rows.

In order to make it possible for solvers to figure out the crazy thing I had done here, I dropped some hints. The flavor text hinted very briefly at both puzzle types, and the last 8 letters in the grid spelled out CORR-KABE, a portmanteau of the names of the two puzzle types used. And the puzzle title is also a hint; a chimera is a blend or mixture of two or more different things, and this is what I had created.