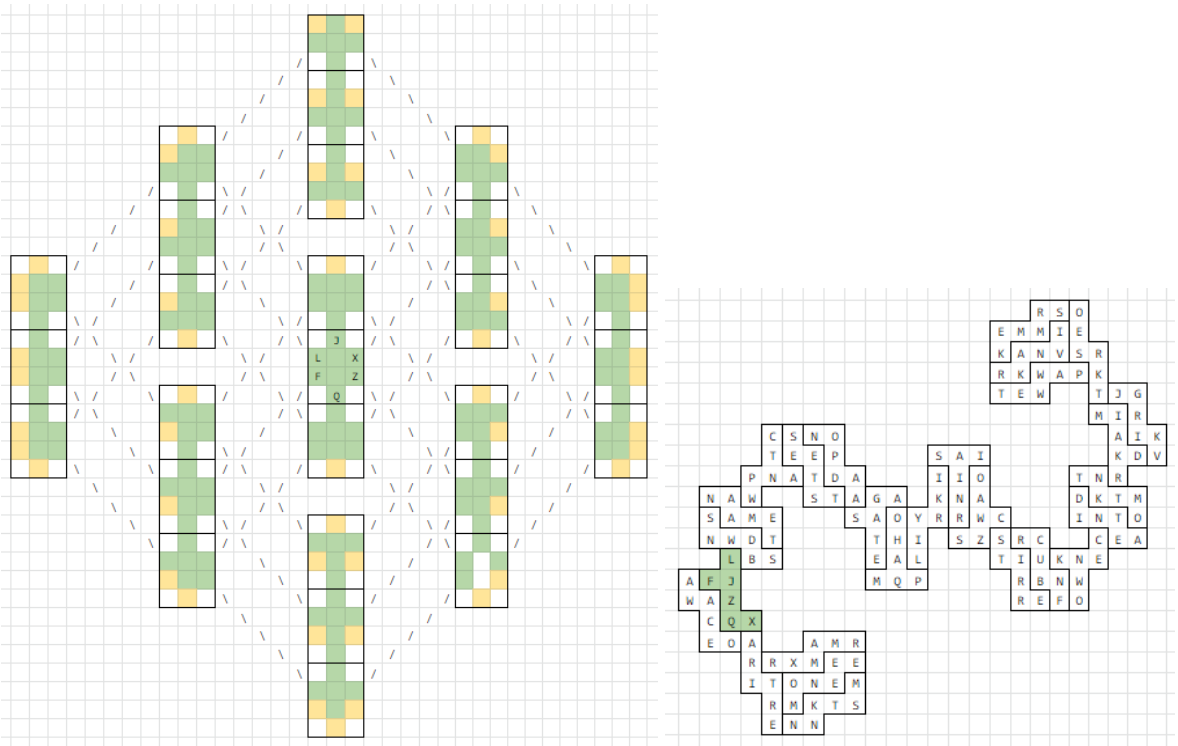
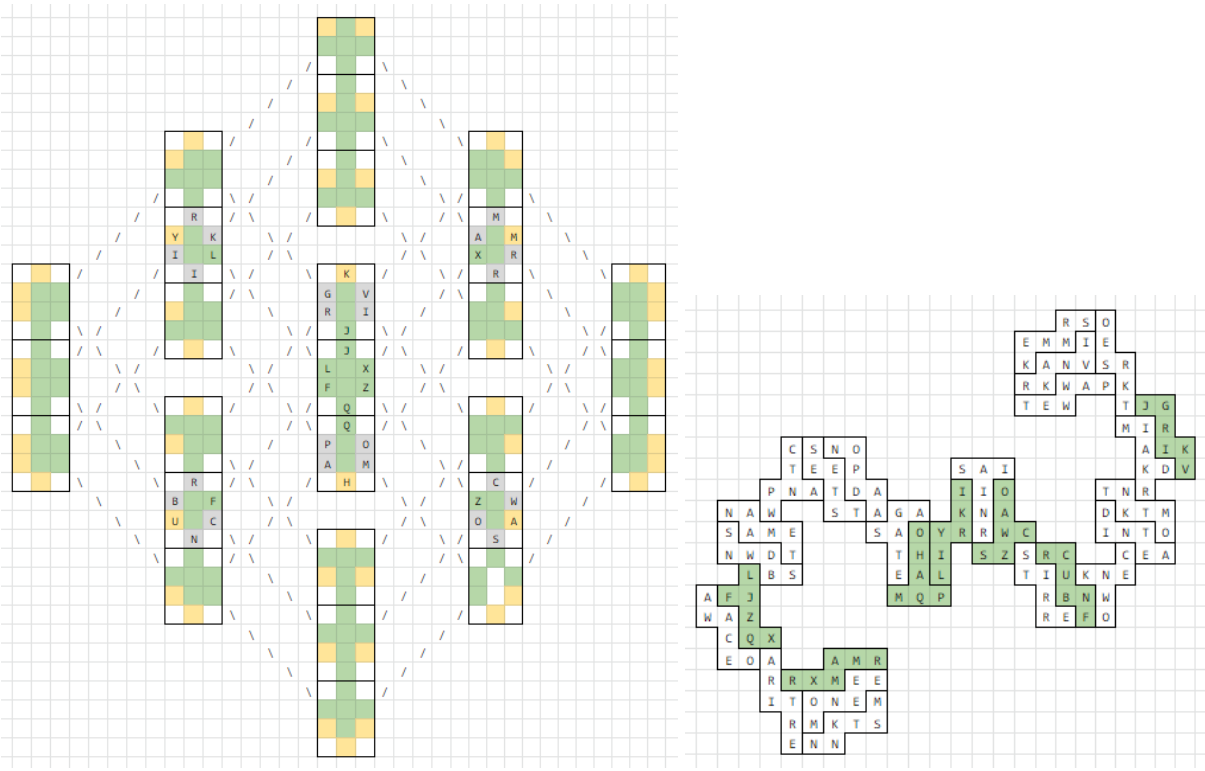
[Thanks to ghostbloods for this cube visualization method]

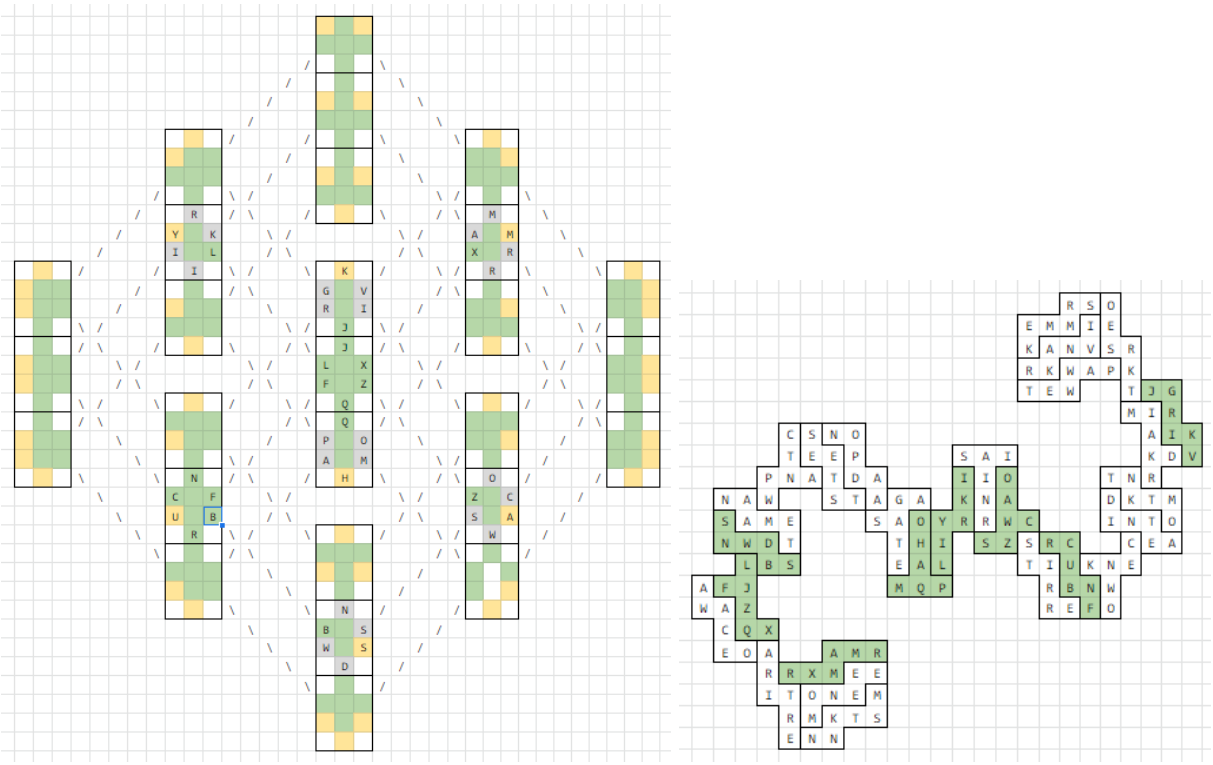
The letters K, Y, and U only appear once throughout all 27 cubes, and thus can not be matched up with any other face. Therefore, the K, Y, and U faces must all appear on the outside of the cube. For each face that appears on the outside of the large 3x3x3 cube, the opposite face on the corresponding small cube must appear on the inside of the cube, and must thus be matched with another face. Given this, we can say that J, L, and X (the letters opposite K, Y, and U) will be matched up with another face. These three letters all appear exactly twice, so they can be uniquely matched up. As it happens, the other occurrences of J, L, and X all appear on the same cube (the JXLZFQ cube), and comprise all three axes, so that small cube must be in the very center of the large cube. We can now place that cube in the center and decide on some random initial orientation for the cube (since the solution is symmetric in that respect).



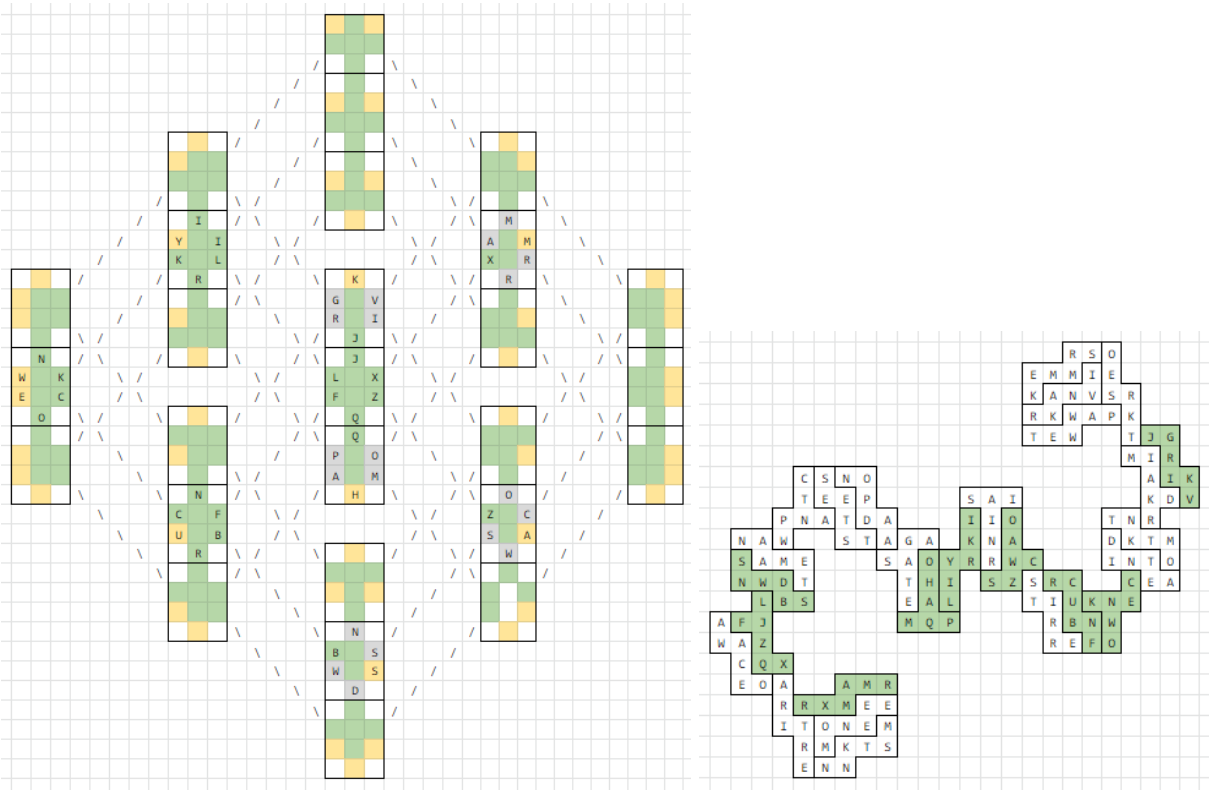
All six of the letters J, X, L, Z, F, and Q only appear twice in the entire puzzle, and none of the faces are on the outside of the cube, so we can place all six of those cubes onto the puzzle, with ambiguous rotation (the three aforementioned cubes and three more).



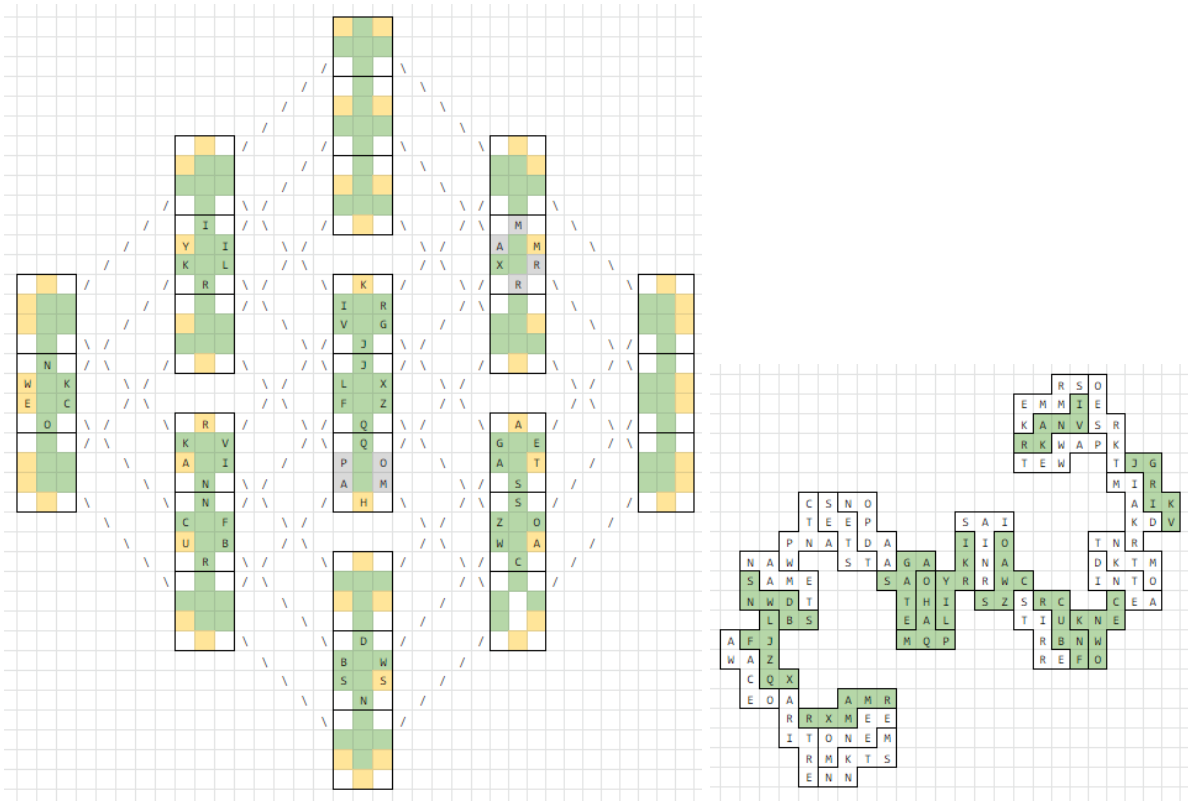
We can now consider the rotation of NFCBUR. There are 16 possible letters that the letter B can be adjacent to, based on the rotation of NFCBUR and the rotation of the four cubes the B cube would be next to. The four letters adjacent to the single occurrence of B on a free cube are DWNS, and the relevant letters of the rotatable cubes are VGRI, KIIR, MOPA, and WSOC. The only cube that has any letters from DWNS is SOZAWC (the one with WSOC), so we can place DWBSSN with ambiguation rotation and affix the rotation of NFCBUR.



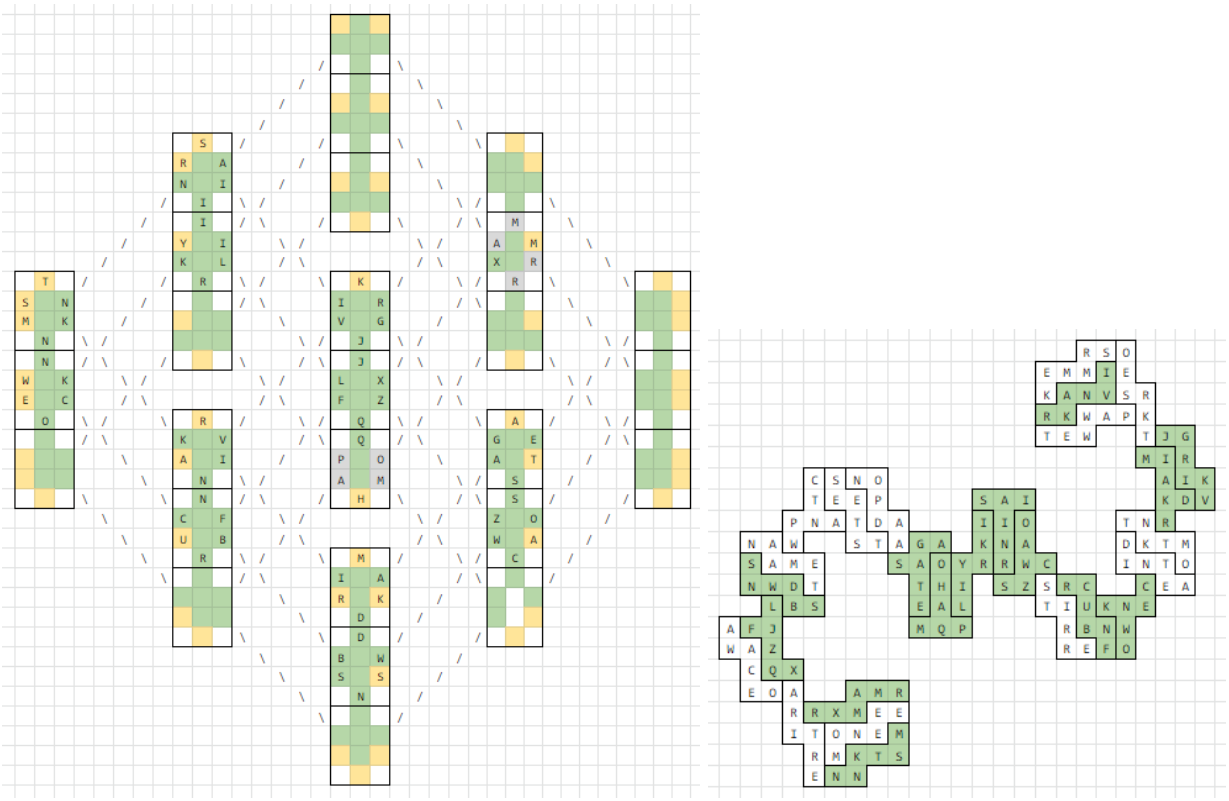
We must now find the letter C adjacent to any of RKIL. This only occurs once, with a CK pair on NKWCEO, so we can place and affix that cube, as well as affixing IIYLKR.



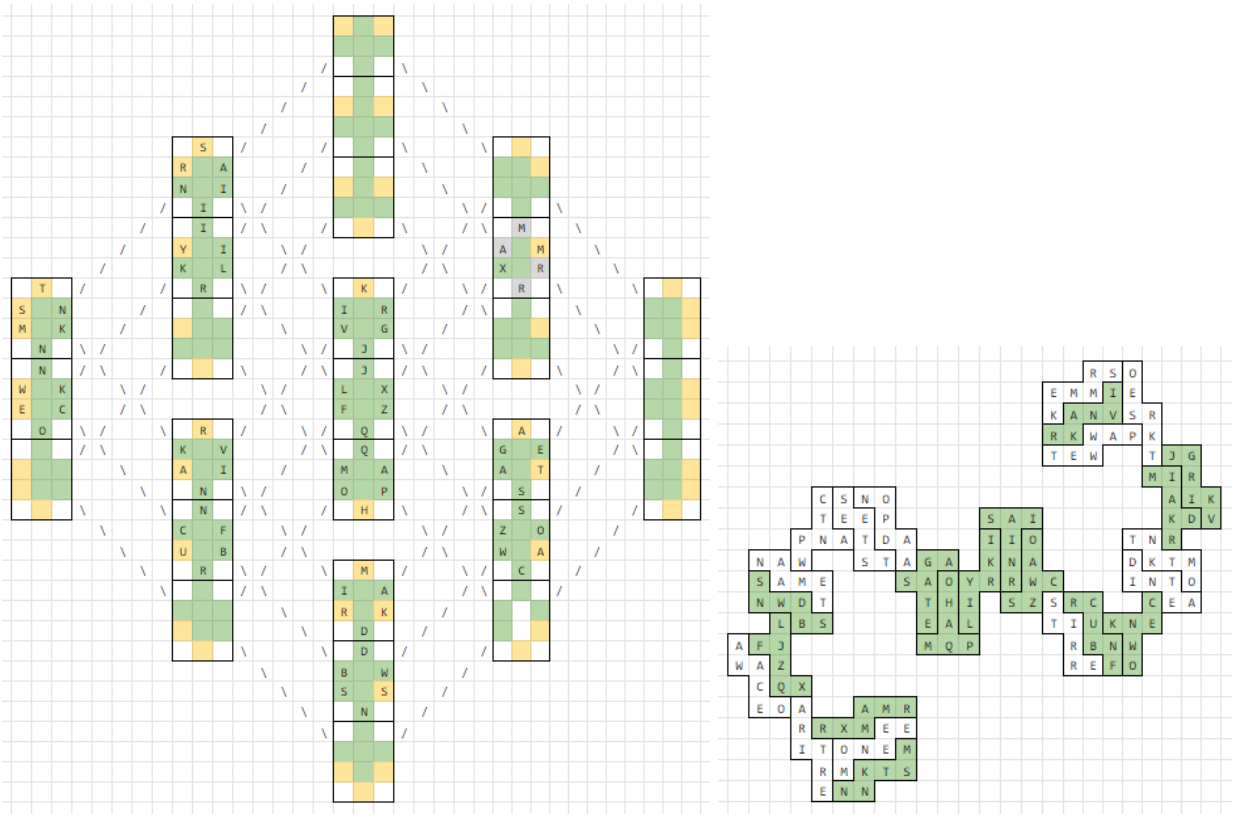
We must now consider the rotation of KRIGVJ. NFCBUR and IIYLKR have fixed rotations, with N and I, respectively, facing up. RMRAXM and SOZAWC have ambiguous rotations, and have the possibility of RAMR and SOCW, respectively, facing up. V only appears on one free cube, adjacent to RINK, which eliminates two rotation possibilities, and G only appears on one free cube, adjacent to AESA, which eliminates the last possibility. With this, we can affix the rotation of KRIGVJ, place and affix RVKIAN, and place and affix AEGTAS.



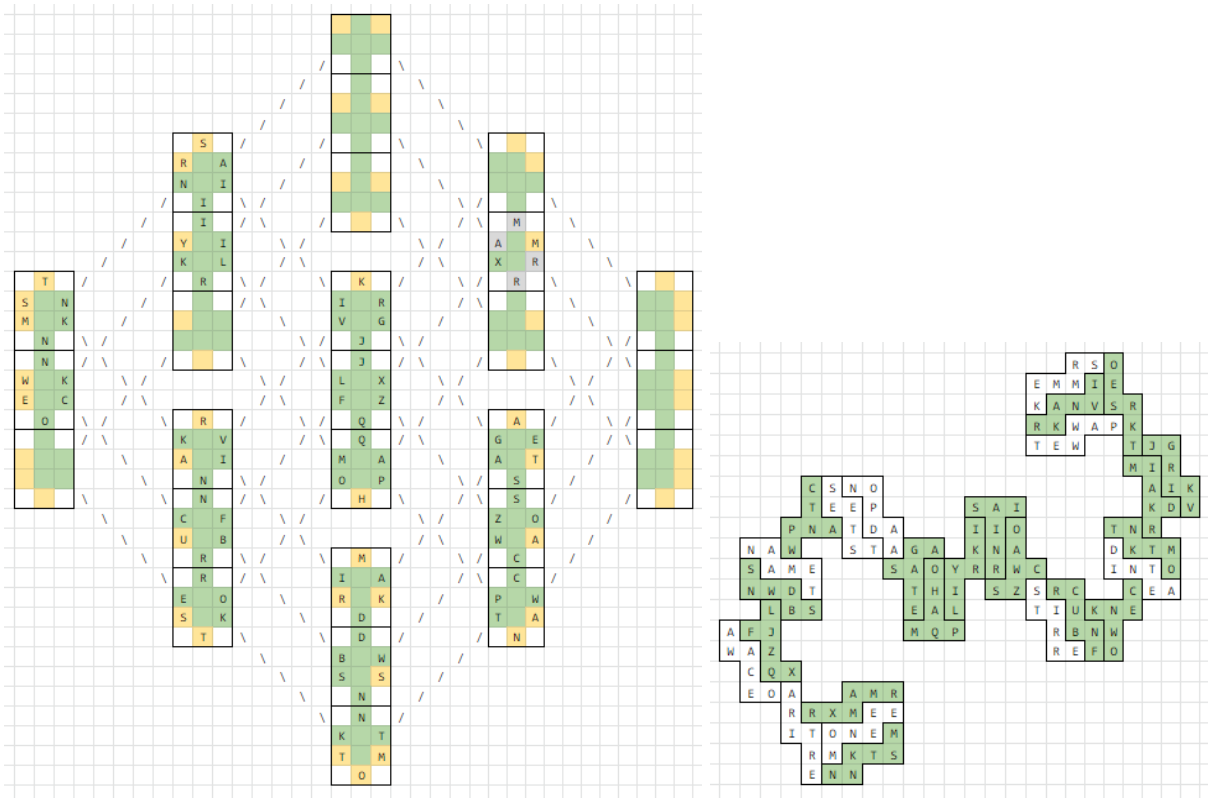
We can now trivially place and/or affix a few cubes. Affixing AEGTAS places an S pointing downwards, and helps us affix SOZAWC. This in turn allows us to affix DWBSSN. There is only one free cube, SARINI, that has II adjacent, and only one free cube, TNSKMN, that has NK adjacent, so these can both be placed in their respective positions in the top layer, with rotation ambiguity. SARINI can only border TNSKMN with an A or an N, and A does not appear in TNSKMN, so we can affix SARINI. The new N also allows us to affix TNSKMN. Finally, two free cubes has AID mutually adjacent, but only one can actually be rotated, and not reflected, to be placed in that corner in the top layer, so we can place and affix MAIKRD in said corner.



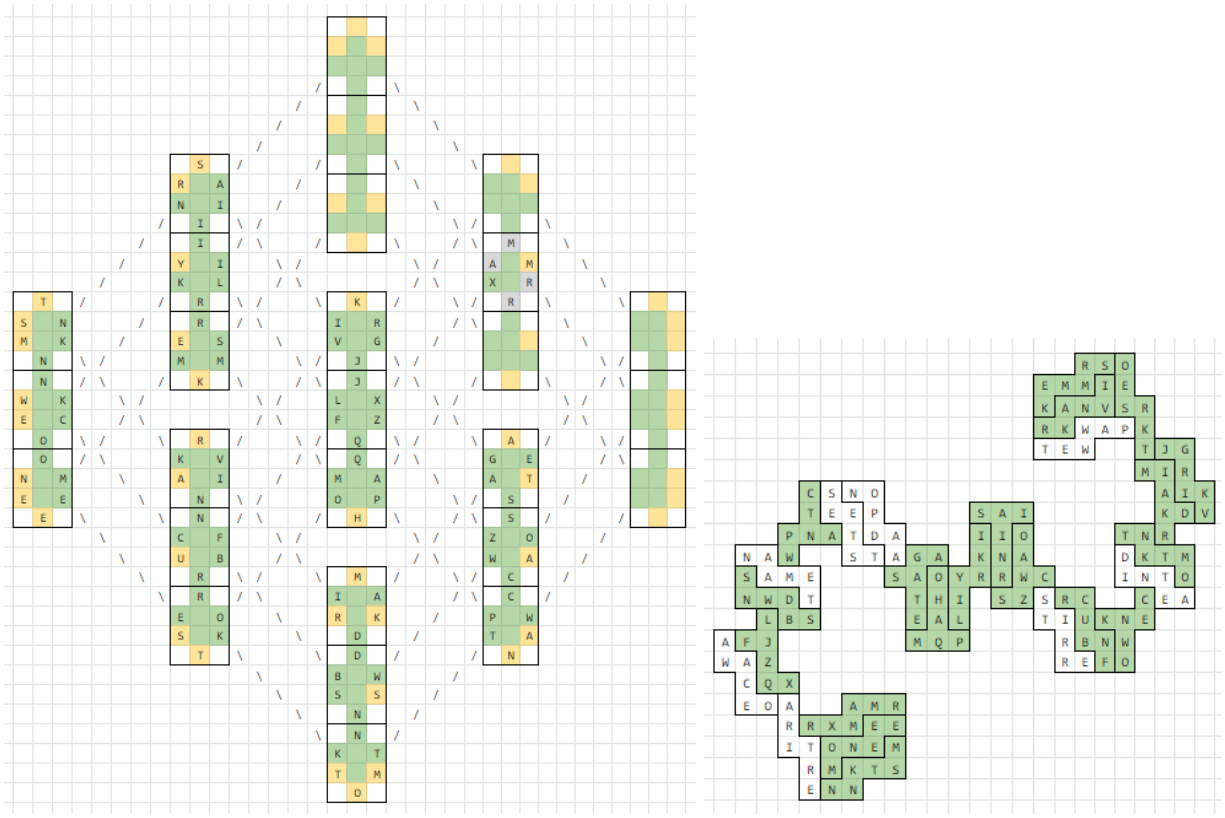
Our next task is to disambiguate the rotation of QAMPOH. We can first consider the Rs coming down from both NFCBUR and IIYLKR. PR can not be seen adjacent in any free cubes, so we can eliminate the two rotations where the P is adjacent to either of the two Rs. Eliminating the third rotation requires a minor lookahead. We can temporarily assume that we rotate QAMPOH such that the O from QAMPOH is adjacent to the C from SOZAWC. There is only one possible cube fitting between these, AOACWE, and it has a unique rotation which points an A into the bottom front corner (below DWBSSN). Furthermore, this rotation also results in the M from QAMPOH being adjacent to the R from NFCBUR. There is only one free cube, RSEMMK, that has MR adjacent, and it has two possible rotations, so it points either an M or an E into the bottom front corner. That corner now requires MNA or ENA all mutually adjacent on a free cube. MNA does not appear, and ENA appears on MTEAAN, but in the wrong orientation and would require reflection, so this QAMPOH rotation is disproven. Therefore, we can definitively affix QAMPOH.



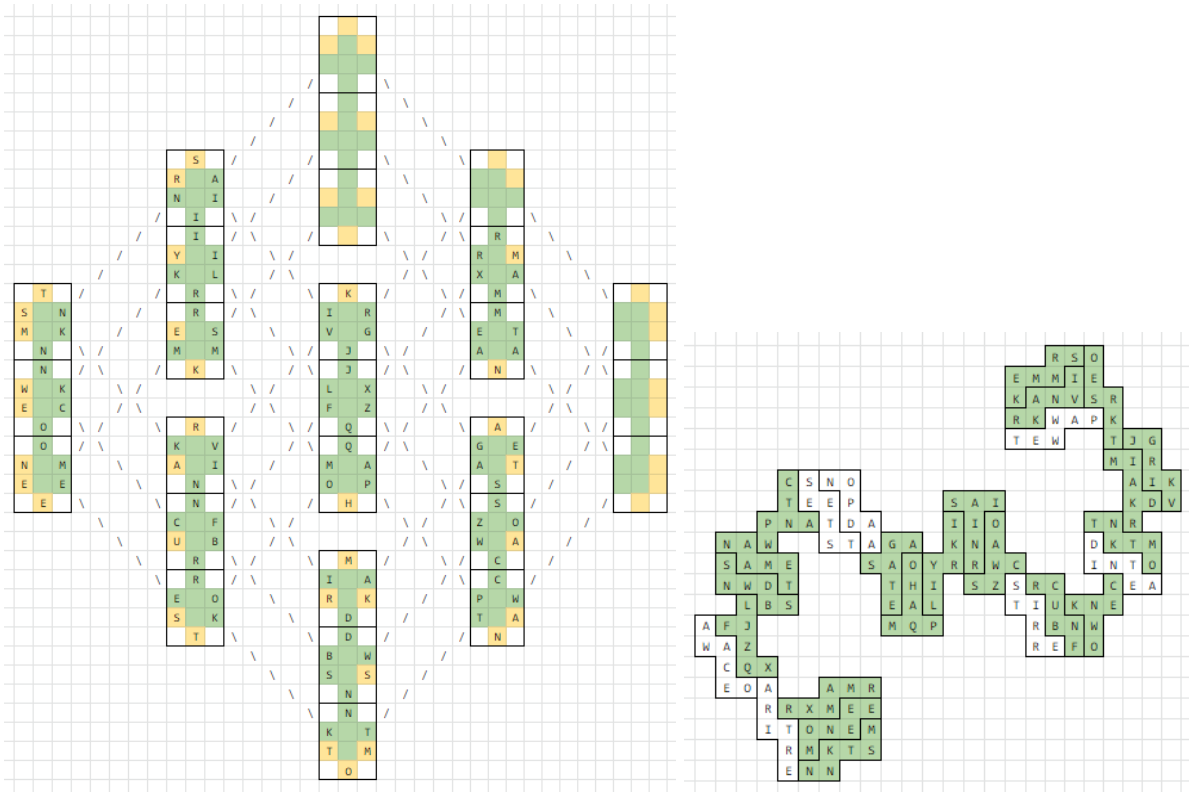
PC only appears adjacent on one free cube, CWPATN, so we can place and affix it next to the P from QAMPOH. OR also only appears adjacent on one cube, ROEKST, so we can place and affix it next to the O from QAMPOH. Finally, KNT only appears adjacent on one cube, NTKMTO, so we can place and affix it in the corner next to the two previously placed cubes.



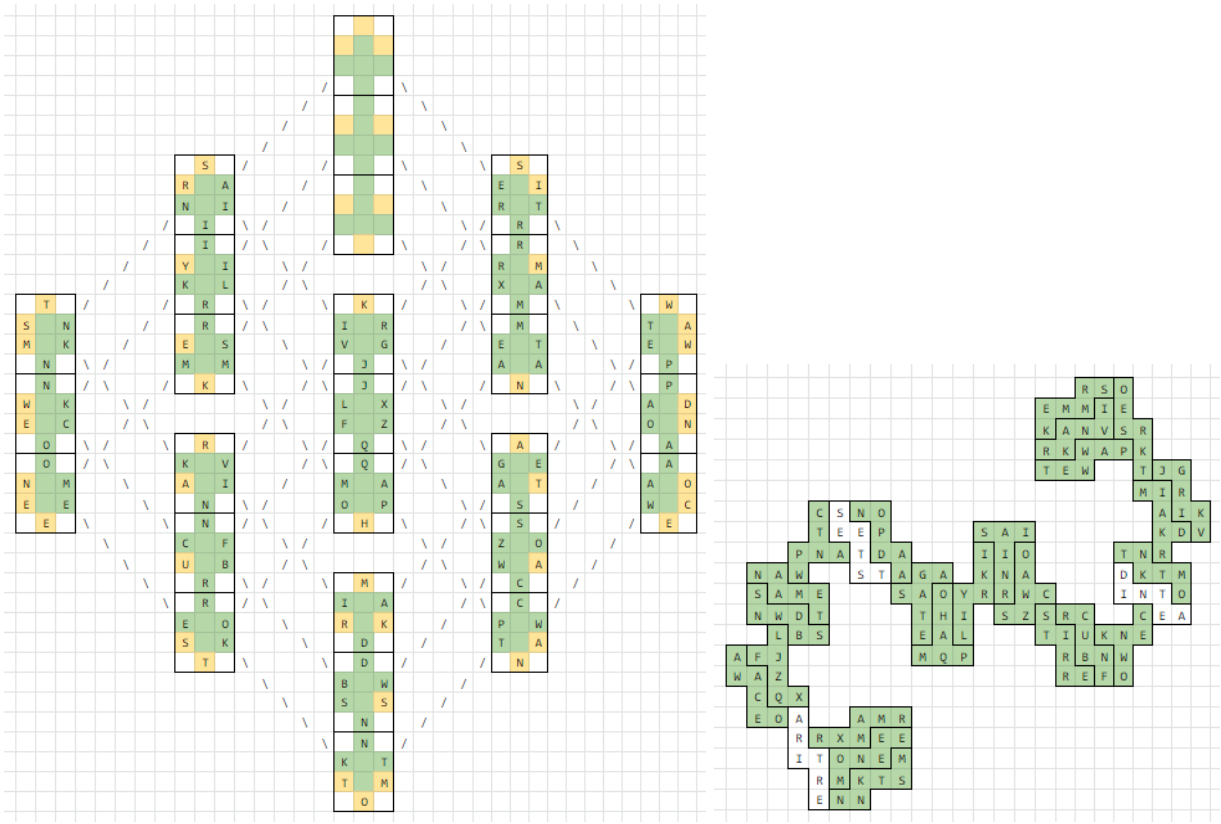
There is only one free cube, RSEMMK, that has MR adjacent, so we can place it with two possible rotations. This places either an M or an E adjacent to the O and E in the adjacent corner. There is only one cube, OMNEEE, that has MOE or EOE adjacent, so we can place it. OMNEEE actually happens to have both MOE and EOE adjacent, so we still cannot disambiguate the rotations of either one that way. However, we can consider what happens to RSEMMK with one rotation. If E ends up facing OMNEEE, then M ends up facing some unknown cube. This is a problem, because we also already know that the M from RMRAXM is also facing some different unknown cube, but there is only one free cube containing an M. Thus, this rotation cannot occur, and both RSEMMK and OMNEEE are affixed.



At this point, we can disambiguate the rotation of RMRAXM. Based on the rotation, the M from RMRAXM will be adjacent to one of IROA. The one free cube with an M, MTEAAN, has its M adjacent to TAAE. Therefore, the M must be adjacent to an A. This affixes RMRAXM and places MTEAAN with ambiguous rotation. However, in one of the two rotations of MTEAAN, the A ends up adjacent to the S from RSEMMK, and no free cube has AS adjacent, so we can affix MTEAAN.



There are two free cubes with AW adjacent to place next to the W from CWPATN, namely AOACWE and WATWEP. However, placing WATWEP there results in either a W or a P being pointed up and placed adjacent to the above A and O. No free cube has WAO mutually adjacent, and one cube has PAO mutually adjacent, but in the wrong orientation, so WATWEP cannot be placed in that corner. Thus, we can place AOACWE with ambiguous rotations. Those two rotations result in A or C being pointed up and placed adjacent to A and O. CAO does not exist mutually adjacently in any free cubes, so AAO must be used and we can affix AOACWE. From here, we can trivially work our way through all but three of the remaining cubes . Only one free cube, PDANOA, has AAO adjacent, so we can place and affix it. Then, only one free cube, WATWEP, has PE adjacent, so we can place and affix it as well. Now only one free cube, SIETRR, has TRR mutually adjacent, so we can again place and affix it.



There are two free cubes that have AE adjacent, namely INDEAT and TARRIE. However, if we use TARRIE, we end up with an R pointing down adjacent to R and I. No free cube has RRI mutually adjacent, so we can place and affix INDEAT. Only TARRIE out of the remaining two has TRI mutually adjacent, so we place and affix it, and finally place and affix the final cube, ETTESS.