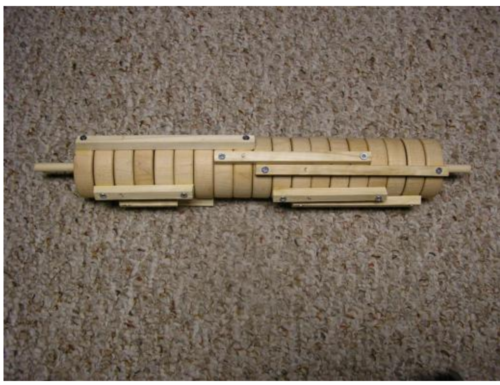
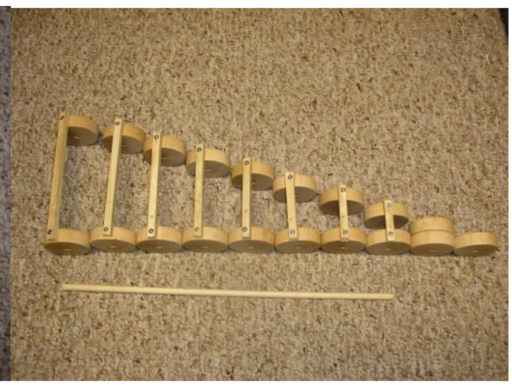
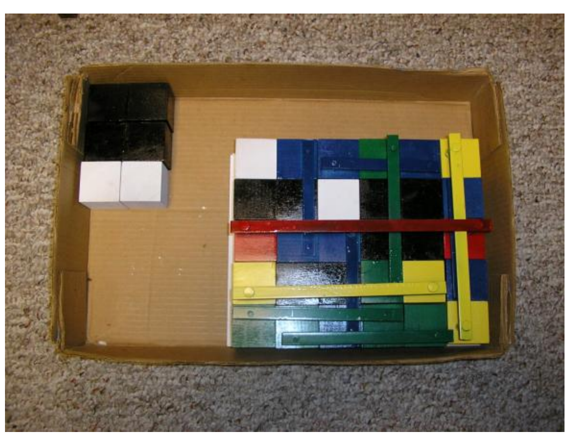
Devil's Lock & Gate Puzzles

These puzzles are based on the Langford Problem of number spacing arranged as an interlocking sequence. See bibliography. The simplest using 1,2,3 is: 312132 and the mirror image. These are limited using 1,2,3,…N, where N = a multiple of 4 or one less. N = 3,4,7,8,11,12… etc. D. Hardisky in 2009 added two zeros 00 (spaced 0) and -1 (no space) to produce sequences such as: 3 1 -1 1 3 2 0 0 2. This modification using -1,0,1,2,3,…N seems to have solutions for all N: -1,0,1,2,3,… No proof exists but examples are many.

In 2009 Hardisky also created a wooden puzzle (*Devil's Lock*) of 2" discs arranged on a wood dowel that can interlock to produce the above modified sequence and/or all Langford sequences. This is shown below:

In 2010 Hardisky adapted the above modification to 2 dimensions to produce Devil's Gate. This was previously created by Ferdinand Lammertink and marketed by George Miller of the Puzzlepalace in plastic (5,6). It is no longer available. The version by Lammertink uses 0,1,2,3… in 2D. Hardisky added the -1 to produce more solutions (2,3),(3,4),(4,5),(5,6)…and higher. Using wooden cubes 1 ¾" on a side resulted in another wood puzzle. A 5x6 is shown below:



There are additional complexities to this wood version. The metal straps that connect the cubes in the Langford sequences must "jump over" other numbers. This is accomplished by adding risers on each number to raise the strap high enough to do this. Additionally, numbers must interlock horizontally or vertically with each other in some solutions. This is accomplished by offsetting each strap to allow interlocking. The bottom horizontal green 2's interlock in the picture. Finally to produce all solutions -1 is added as two single white cubes. They must not appear adjacent to be unique. The above picture numerically is:

	1	2	3	4	5	6
1	-1	1	1	2	1	3
2	0	0	-1	0	0	1
3	4	1	1	0	0	4
4	3	0	0	2	3	1
5	2	2	1	2	2	3

Solutions that use two -1's are called "alternate" solutions as opposed to the original one by Lammertink. In the original form solutions are only possible for: (3,4),(4,5),(5,6). Miller marketed a (5,6) solution in plastic. Using two -1's solutions are possible for N,(N+1) at least up to 7x8 to date. The user is invited to create higher versions numerically, although one must be careful to follow the spacing rules. Paper grids can be supplied with a standard puzzle.

A standard Devil's Gate puzzle utilizes 36 blocks to maximize the size and number of simultaneous puzzles that can be assembled. The blocks are made: **1 – 4**, **2-3's**, **3-2's**, **4-1's**, 6 – 0's and 2 – (-1)'s. Each pair of blocks is similar and (n+2) blocks long. One (1) is shown:

The smallest is (2,3) with two of these assembled simultaneously or two (3,4)'s or two (2,3)'s and one (3,4). One (4,5) and one (5,6) can be assembled.

This can be marketed as a combination of ***Sudoku*** and ***Rubik's Cube*** since it has elements of both popular puzzles. No US Patent exists of this date for either the Lock or Gate.

Wooden discs and cubes can be obtained from Casey's Wood on the Web. Dowels and metal straps are easily found in any hardware store.

POST HOC: The ***Devil's Lock*** shown here is not to be confused with the Ipod App:

http://itunes.apple.com/us/app/devils-lock/id327226029?mt=8 a totally different puzzle.

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Bibliography

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