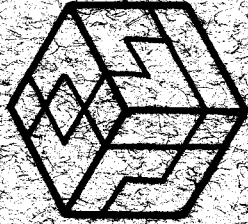


SOMA

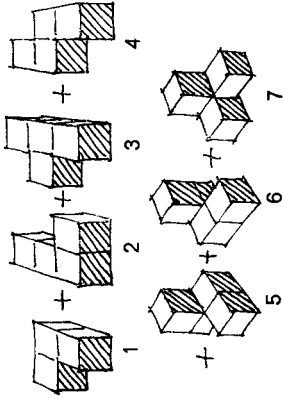


SKJØDE SKIERN DENMARK

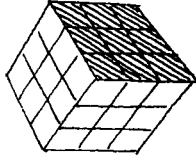
SOMA for Beginners

Never has anything so easy been so difficult. *Patrick D. Powerton*

The 7 SOMA pieces:



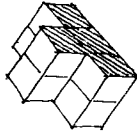
can be made
into the cube
in more than
one million
ways =



But try it
yourself
There are even
more ways
in which the cube
cannot be made.

SOMA looks so easy.

But even with a few SOMA pieces difficult shapes can be made.



This figure:

can be made from two of the seven SOMA pieces.

Which ones? And how?

(If you start with the above figure of two SOMA pieces it is particularly difficult to build the cube.)

.... And with all 7 SOMA pieces many hundred shapes can be built.

Advanced SOMA

Buy SOMA for your children - but don't let them get hold of it!

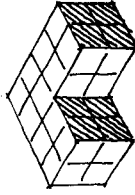
Humphrey H. Welder,

Inter-Planetary Steel Corp.

If the smallest of the SOMA pieces, No. 1, is removed

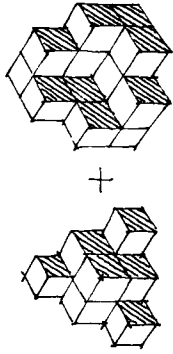


a similar shape can be made from the remaining six SOMA pieces (twice as large in all directions).



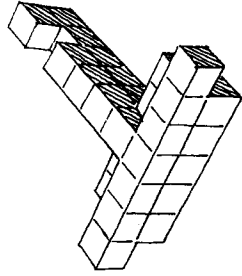
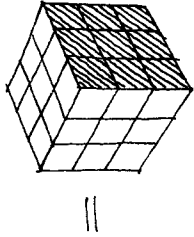
It looks easy!

There is a special way of building the cube.
First build these two regular figures:

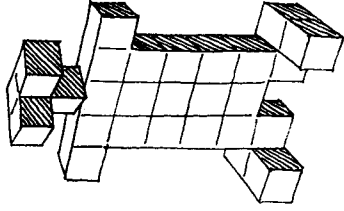


using respectively 3 and 4 of the 7 SOMA pieces.

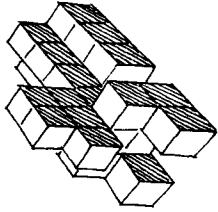
These two figures can then be put together in three different ways to form the cube.



The Aeroplane



The Robot

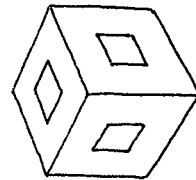
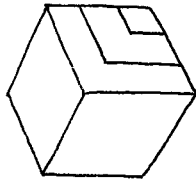
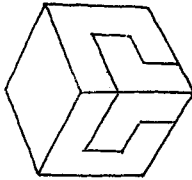
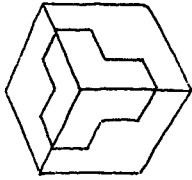


The Dog

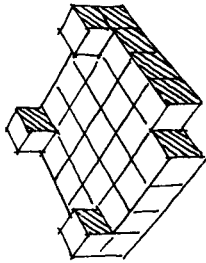
SOMA for Experts

SOMA is a sculpture which you yourself sculpt further.

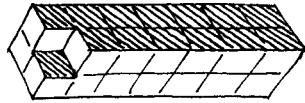
Maurice Ferrière



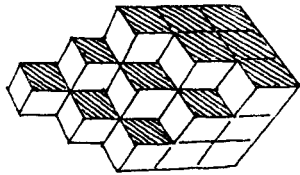
SOMA piece No. 7 can, theoretically, have 4 different positions in the cube. - Which of them are possible?



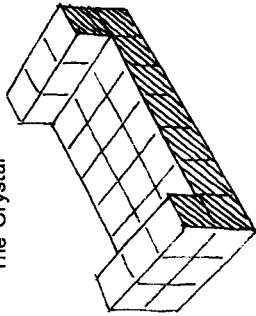
The Castle I



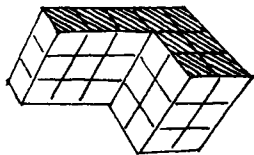
The Tower



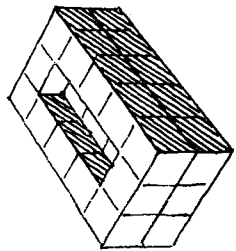
The Crystal



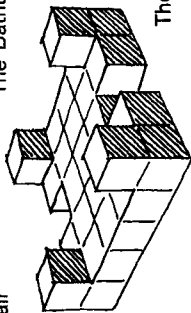
The Bed



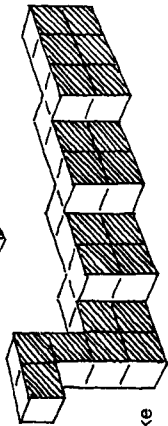
The Chair



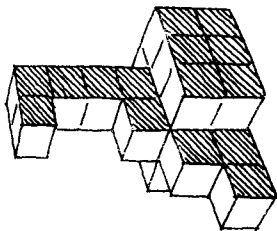
The Bathtub



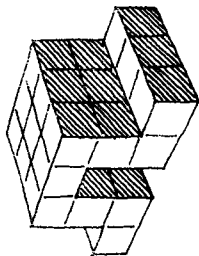
The Castle II



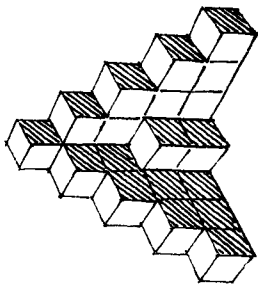
The Snake



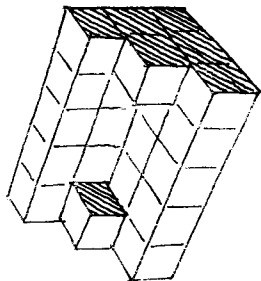
The Gallows



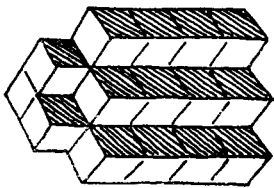
The Tunnel



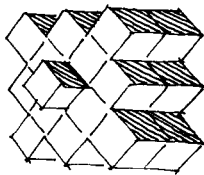
The Corner Stone



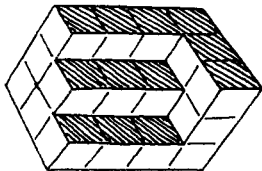
The Sofa



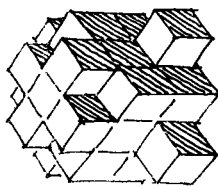
Corner House II



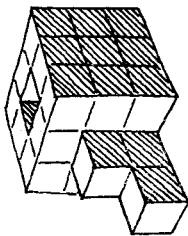
The Memorial
(proved impossible)



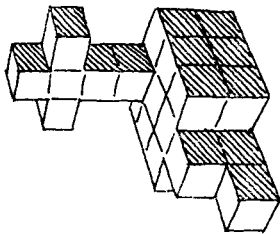
Corner House I



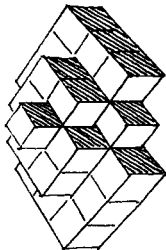
The Gordian Knot



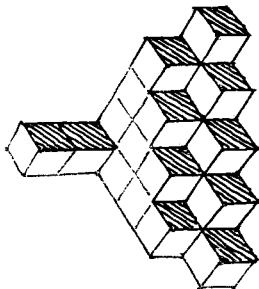
The Well



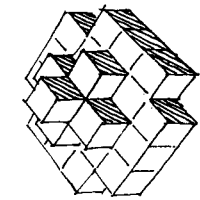
The Monument



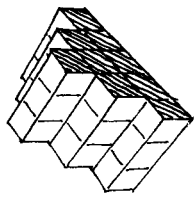
The Steamer



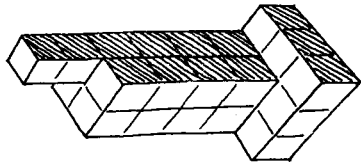
The Tomb



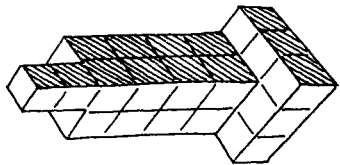
The Pyramid



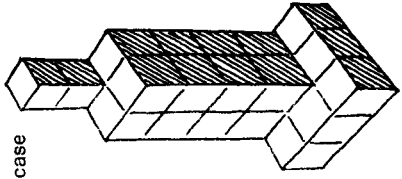
The Staircase



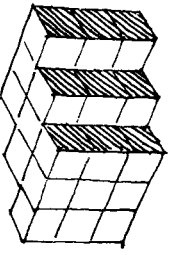
Skyscraper I



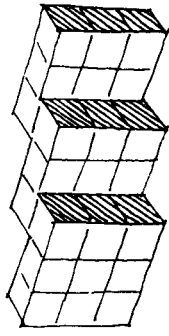
II



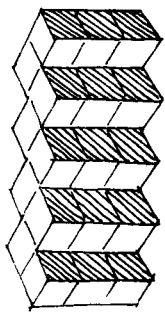
III (Is it possible?)



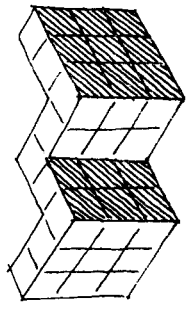
Apartment Block I



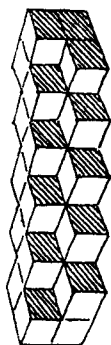
Apartment Block II



The Zig-Zag-Wall



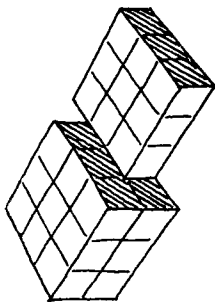
The W-Wall (Is it possible?)



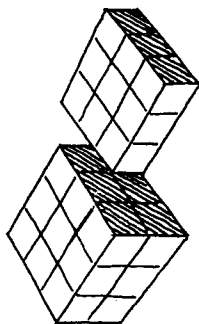
The Five Seats Bench

There are hundreds of regular SOMA figures, and yet it is still possible to find new ones.

SOMA can also be used by two players, who compete to build a given figure in the shortest time. If the two players exchange a piece (not No. 1), they can still build the cube.

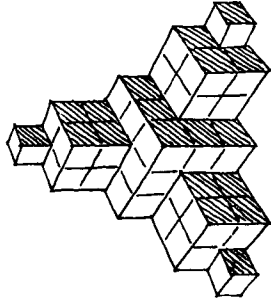


High and Low I



High and Low II

With two sets of SOMA pieces many more figures can be built, for example, the following:



The Triple Cube

Condensed from

SCIENTIFIC AMERICAN

and from "Mathematical Games and Puzzles, II" by Martin Gardner:

THE SOMA CUBE

"...no time, no leisure...not a moment to sit down and think - or if ever by some unlucky chance such a crevice of time should yawn in the solid substance of their distractions, there is always SOMA, delicious SOMA..."

Aldous Huxley,
"Brave New World"

From time to time efforts have been made to devise a three-dimensional puzzle game.

None, in my opinion, has been as successful as the Soma cube, invented by Piet Hein, the Danish writer. He conceived of the Soma cube during a lecture on quantum physics. When the lecture touched on a

space sliced into cubes, Piet Hein's supple imagination caught a fleeting glimpse of the following curious geometrical theorem:

If you take all the irregular shapes that can be formed by combining no more than four cubes, all the same size and joined at their faces, these shapes can be put together to form a larger cube.

While the lecture continued Piet Hein swiftly convinced himself that the seven pieces, containing 27 small cubes, would form a $3 \times 3 \times 3$ cube. After the lecture he glued 27 cubes into the shape of the seven components and quickly confirmed his insight.

Piet Hein named the set of pieces SOMA.

After working with the pieces for several days many people find that the shapes become so familiar that they can solve Soma problems in their heads. Tests made by European psychologists have shown that abi-

lity to solve Soma problems is roughly correlated with general intelligence, but with peculiar discrepancies at both ends of the I. Q. curve. Some geniuses are very poor at Soma and some morons seem specially gifted with the kind of spatial imagination that Soma exercises. Everyone who takes such a test wants to keep playing with the pieces after the test is over.

The number of pleasing structures that can be built with the seven Soma pieces seems to be unlimited. When I wrote the column about Soma in Scientific American, I supposed that few readers would go to the trouble of actually making a set. I was wrong. Thousands of readers sent sketches of new Soma figures and many complained that their leisure time had been obliterated since they were bitten by the Soma bug. Teachers made Soma sets for their classes. Psychologists added Soma to their psychological tests. Soma addicts made sets for friends in hospitals and for Christmas gifts. A dozen firms inquired about manufacturing rights.

The charm of Soma derives in part, I think, from the fact that only seven pieces are used; one is not overwhelmed by complexity.

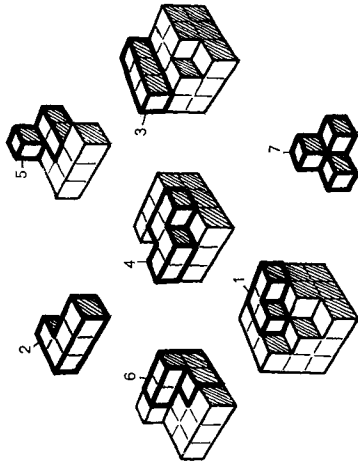
Martin Gardner

*It is a beautiful freak of nature
that the 7 simplest irregular combinations
of cubes can form the cube again.*

*Variety growing out of unity returns to unity.
It is the world's smallest philosophical system.
That is an advantage.*

Piet Hein

One way of building the cube:



Number of combinations

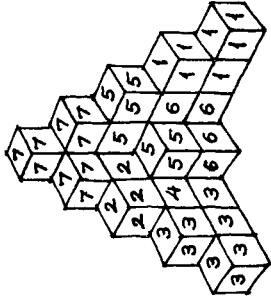
The seven Soma pieces can be made into the cube in exactly **1.105.920**

- one million, one hundred and five thousand, nine hundred and twenty - different ways (counting as different all solutions which are reflections of each other or that can arise from each other by rotations of the whole cube or of single pieces).

This figure is based on the result of an analysis by Dr. John H. Conway and Dr. M. J. T. Guy, both of Caius College, Cambridge, England, carried out by means of an electronic computer.

The same result was arrived at by N. S. Newhall of the trajectory department at the Jet Propulsion Laboratory of the California Institute of Technology, Pasadena, California, using an IBM 7094 electronic computer which printed out the solutions in 82 seconds. The result has later been verified by several other scientists.

When you have solved a SOMA problem you can write up the solution by filling in the number of pieces on the drawing:



The Corner Stone
Solution

SOMA (Sanskrit): Euphoriant plant extract used in ancient India as a narcotic. - Addicts were oblivious of time and space.