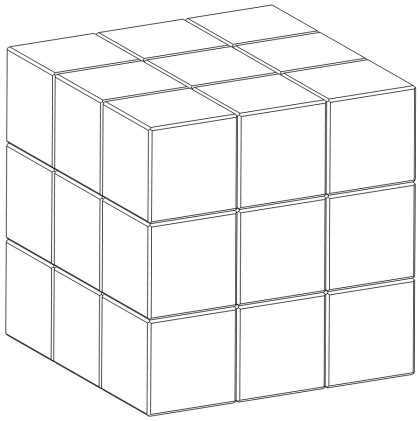
Piet Hein

SOMA

SPILLEREGLER / RULES OF THE GAME

DANSK

Piet Hein



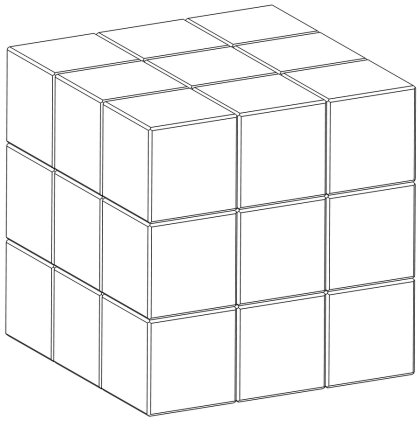
SPILLEREGLER

Nu og da har man prøvet på at konstruere et tre-dimensionalt puslespil. Bedst er det efter min opfattelse lykkedes med Somakuben, opfundet af den danske designer og forfatter Piet Hein (i 1933, red.)
Piet Hein fik ideen til Soma-kuben under en forelæsning i kvante-fysik af Werner Heisenberg. Mens den berømte tyske fysiker talte om et rum opdelt i kuber, undfangede Piet Heins letbevægelige fantasi i et lynsnart glimt denne usædvanlige geometriske teori: Hvis man tager alle de uregelmæssige former, som kan dannes af højst fire kuber - alle af samme størrelse og sammenhængende langs en sideflade - vil disse former kunne sammenlægges til en større kube.

Lad os gøre det tydeligere. Den simpleste uregelmæssige form - »uregelmæssig« i den forstand, at den et eller andet sted har en konkavitet eller et hak indad - fremkommer ved sammenlægning af tre kuber, som vist i fig. 1,1.
Det er den eneste sådanne »uregelmæssige« form, som lader sig sammenstille af tre kuber. (Det siger sig selv, at der hverken af en eller af to kuber kan dannes uregelmæssige former). Hvis vi går over til fire kuber, opdager vi, at der er seks forskellige måder, hvorpå vi kan danne uregelmæssige former ved at forene kuberne side mod side, nemlig de der er vist i fig. 1, 2-7. For at kunne identificere disse syv former har Piet Hein forsynet dem med numre. Ikke to af dem er ens, men 5 og 6 er spejlbilleder af hinanden. Piet Hein påpeger, at to kuber kun kan forenes langs en enkelt koordinat. Tre kuber kan føje en anden dimension vinkelret på den første, medens fire kuber kræves for at opnå den tredje dimension vinkelret på de andre to.
Da vi ikke kan gå ind i den fjerde dimension for at sammenstille kuber langs en fjerde koordinat, tilvejebragt af femkubeformationer, er det rimeligt, at Somastykkernes antal er begrænset til syv. Det er et overraskende faktum, at disse elementære kombinationer af ens kuber kan samles til en større kube.

ENGLISH

Piet Hein

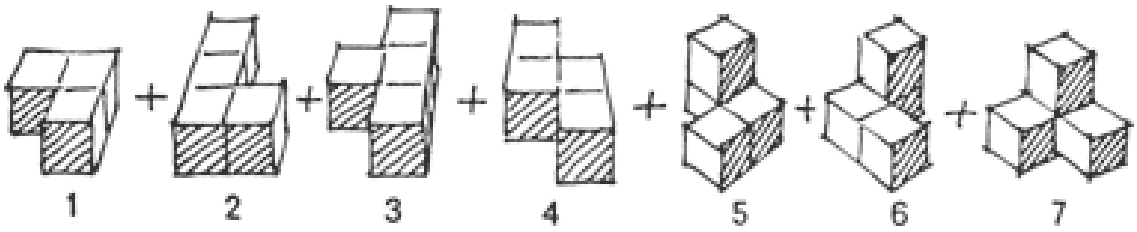


RULES OF THE GAME

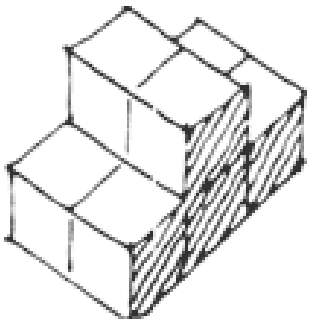
From time to time efforts have been made to devise a puzzle in three dimensions. None, in my opinion, has been as successful as the Soma cube, invented by Piet Hein, the Danish writer whose mathematical games, Hex and Tac Tix, are discussed in the first Scientific American Book of Mathematical Puzzles. In Denmark, Piet Hein is best known for his books of epigrammatic poems written under the pseudonym Kumbel.)

Piet Hein conceived of the Soma cube during a lecture an quantum physics by Werner Heisenberg. While the noted German physicist was speaking of 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.
Let us make this clearer. The simplest irregular shape - "irregular" in the Sense that it has a concavity or corner nook in it somewhere - is produced by joining three cubes as shown at 1 in Figure I. It is the only such shape possible with three cubes. (Of course no irregular shape is possible with one or two cubes.) Turning to four cubes, we find that there are six different ways to form irregular shapes by joining the cubes face to face. These are pieces 2 to 7 in the illustration. To identify the seven pieces Piet Hein labels them with numerals. No two shapes are alike, although 5 and 6 are mirror images of each other. Piet Hein points out that two cubes can be joined only along a single coordinate, three cubes can add a second coordinate perpendicular to the first, and four cubes' are necessary to supply the third coordinate perpendicular to the other two. Since we cannot enter the fourth dimension to join cubes along a fourth coordinate supplied by five-cube shapes, it is reasonable to limit our set of Soma pieces:to seven. It is an unexpected fast that these elementary combinations of identical cubes can be joined to form a cube again.

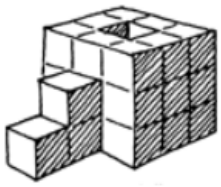
Piet Hein



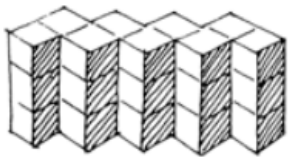
FIGUR I



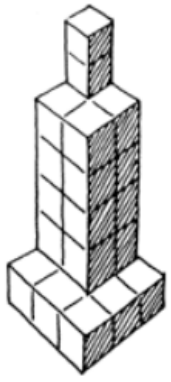
FIGUR II



WELL

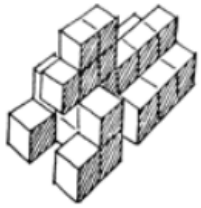


WALL



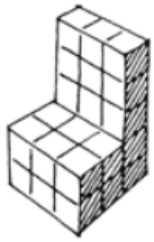
SKYSCRABER

PYRAMID

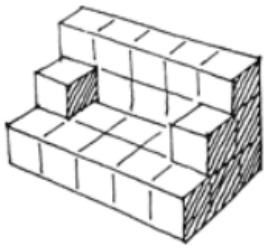


DOG

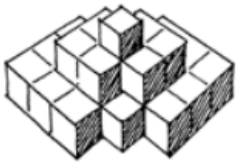
STAIRS



CHAIR



SOFA



STEAMER

FIGUR III