

# The ‘DOVE-TAIL’ Puzzles of Moshé Zwarts

by Fred Horn



Moshé Zwarts

On page 35 in CFF 89 some DOVE-TAIL Puzzles of professor Moshé Zwarts are mentioned.

Editor note: CFF is the newsletter of NKC, the Dutch Cubists Club.

In 2002, I wrote an article about these puzzles and it was subsequently published in the monthly magazine *Natuurwetenschap & Techniek* No.72 in February of that year. The article focused on all of the known solutions at that time. As “a Question and a Puzzle” I reached out to the readers of the magazine to think about other possible solutions, but till this day, no other solution has been found.

The Dove-Tail Puzzles of Zwarts were part of an Exhibition (“Oratie in Beeld”) of Designs and Objects realized by Zwarts through the years, in “het Gebouw van BOUWKUNDE” of the former THD in Delft from April 25 to May 20, 1983. Some years later, my colleague Thijs Edelkoort from the Rijksgebouwendienst drew my attention to these puzzles he had seen at the Exhibition. After contacting Moshé in 1986 he did not know where the puzzles were stored, but he found a catalog and was kind enough to give it to me.



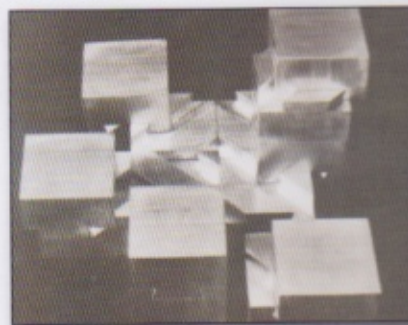
For the most part, my article was written on the basis of this catalog.

His basic assumptions were:

- 1) The outside look is the same as the original puzzle
- 2) There are no holes inside the puzzle
- 3) The puzzle consists of two parts which can be separated and put back together again

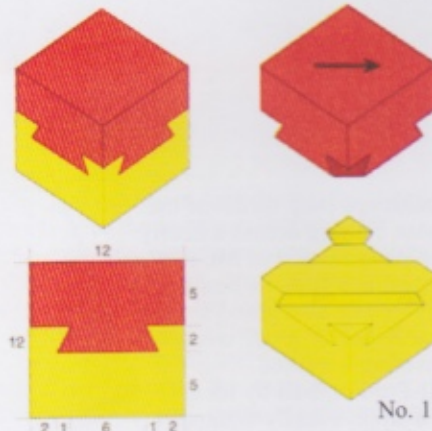
After he quickly found a second solution it became nearly an obsession to find more. And through the years one after another more variants were found.

But the original Dove-Tail Puzzle was also used in a construction of more Dove-Tail Puzzle pieces as part of the Exhibition:



Note: The original photographs printed in the catalog are of such bad quality the author elected to use the drawings from the article in “N-W & T.”

The original Dove-Tail Puzzle is pictured below and the drawing to its right shows the slide-action solution to take it apart.

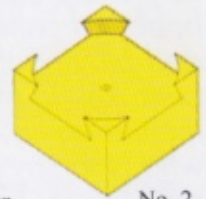


No. 1

But soon thereafter Moshé found his second solution, not by sliding the puzzle apart, but by turning its pieces. See figure No. 2 at right.

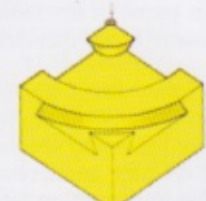


In a way, “sliding in a plane” and/or “rotating around a line” seems to suggest a way to construct Dove-Tail puzzles to allow the separation of its two halves. Growing older and wiser did not temper Moshé’s passion to find more possible solutions to the puzzle. Thinking along the same lines (of his second solution) he realized that rotating around the vertical line through an edge would do as well, thus discovering a third answer (No. 3):



No. 2

In fact, the vertical line around which the piece is rotated can be placed anywhere in the diagonal plane. This provides an endless amount of solutions, for which No. 1 (the original puzzle) makes use of the special case where the line is in infinity and No. 2, the other special case where the line goes through the middle of the puzzle.



No. 3

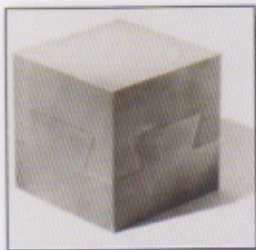
Not all of the possibilities—where the line goes through the body of the puzzle—can be counted as solutions because from some point on the two parts of the puzzle, its pieces are still able to be moved but they cannot be separated.

But the possibilities of “turning” were not yet exhausted. Turning around a horizontal diagonal would also provide solutions. No. 4 offers a whole series of solutions:



No. 4

## The Puzzles



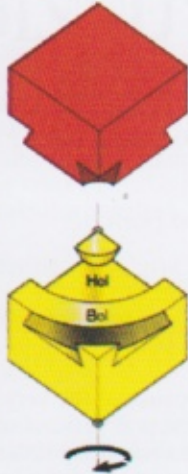
As a young man, Moshé saw this unusual object, which at first sight looked quite unsolvable.

But of course, as anyone knows, after some trial and error most people will be able to find the solution by sliding the two parts of the puzzle apart diagonally.

But this was not enough for the young Moshé. He was intrigued by the idea of these Dove-Tails and he asked himself: “Are there more?”

When the line goes straight through the middle of the puzzle no solution occurs because the two parts are unable to move. When directing the line up or down it will occur that from a certain point on, the two parts will not only move but they can also be separated from each other giving all solutions (No. 4).

At this time there is not a calculation of exactly where the two parts start to separate. Also there is no proof that turning pieces to the right will be equal to turning them to the left. Reaching infinity the original puzzle comes to light again!

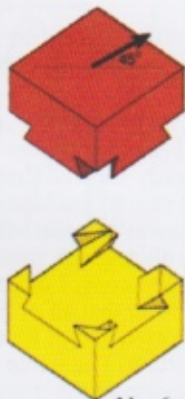


No. 5

But using a different line for rotating, this time going through the two opposite edges of only the lower part of the puzzle gives solution No. 5.

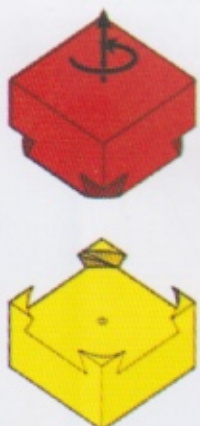
'Hol'=HOLLOW and 'Bol'=ROUND

And then it seemed (for a long time) as if the "puzzle within the puzzle" was solved, when Moshé's associate Rein Jansma did find one more solution, No. 6, by using only one movement—"sliding under a degree of 45°":



No. 6

Moshé himself found solution No. 7 using a composite movement, 'turning and sliding':



No. 7

And there the story ends...so far!

The *BIG* question for Zwarts in 1983 was of course: "Do I have ALL of the solutions?" Today that question still stands and we continue to ask ourselves:

"Are there more?"

The Hague  
12/28/2012



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