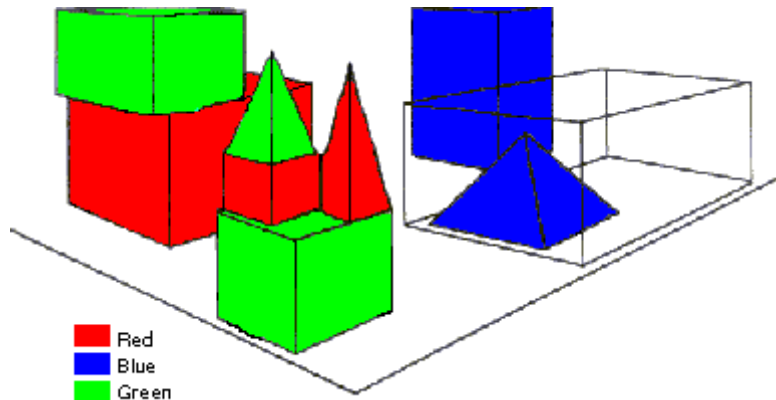


SHRDLU the Robot

SHRDLU is a computer program constructed at MIT by Terry Winograd. SHRDLU controls a robot arm that operates above a table top strewn with colored play blocks of various shapes and sizes. Both the arm and its environment are simulated by a computer which also synthesizes a TV display of the arm's activities. Communication between human and robot is via a keyboard, with the computer's replies appearing as 'subtitles' on the TV screen. Below is a representative dialog between SHRDLU and Winograd, which demonstrates SHRDLU's ability to handle natural English instructions and discuss the "motives"; of its own actions.

[The dialog is taken from "Artificial Intelligence: a philosophical introduction" by John Copeland, Blackwell Publishers, Cambridge, MA 1993; pages 16-18.]

Winograd's questions are shown in boldface. SHRDLU's responses are shown in capital letters indicated by a green dot (●). Copeland's comments are italicized in parentheses.



Pick up a big red block.

● OK.

(On the screen, the robot arm swings into action. Two red blocks are visible, one small, one large, as on figure above. The large one has a green cube stacked on top of it. The robot first transfers the green cube to the table top, and then picks up the red block.)

Find a block which is taller than the one you are holding and put it into the box.

● BY 'IT', I ASSUME YOU MEAN THE BLOCK WHICH IS TALLER THAN THE ONE I AM HOLDING.

(SHRDLU puts down the red block, picks up a taller blue one, and places it in the box.)

What does the box contain?

● THE BLUE PYRAMID AND THE BLUE BLOCK.

What is the pyramid supported by?

● THE BOX.

(There are in fact two other pyramids on the table, a red one and a green one. SHRDLU rightly assumes that the question concerns the pyramid he

just mentioned.)

How many blocks are not in the box?

🟢 FOUR OF THEM.

Is at least one of them narrower than the one which I told you to pick up?

🟢 YES, THE RED CUBE.

Is it supported?

🟢 YES, BY THE GREEN BLOCK.

Can the table pick up blocks?

🟢 NO.

Can a pyramid be supported by a block?

🟢 YES.

Can a pyramid support a pyramid?

🟢 I DON'T KNOW.

Stack up two pyramids.

(The robot tries and fails.)

🟢 I CAN'T.

The blue pyramid is mine.

🟢 I UNDERSTAND.

I own blocks which are not red, but I don't own anything which supports a pyramid.

🟢 I UNDERSTAND.

(The next four questions give SHRDLU an opportunity to display his powers of deduction and logic.)

Do I own the box?

🟢 NO.

Do I own anything in the box?

🟢 YES, TWO THINGS: THE BLUE BLOCK AND THE BLUE PYRAMID.

Is there anything which is bigger than every pyramid but is not as wide as the thing that supports it?

🟢 YES, THE BLUE BLOCK.

Does the shortest thing the tallest pyramid's support supports support anything green?

(SHRDLU took less than twenty seconds to make sense of this; I needed rather longer.)

🟢 YES, THE GREEN PYRAMID.

What colour is it?

(SHRDLU sensibly assumes that the question is not about the green pyramid.)

🟢 BY 'IT', I ASSUME YOU MEAN THE SHORTEST
THING THE TALLEST PYRAMID'S SUPPORT SUPPORTS. RED.

Does a steeple

🟢 SORRY, I DON'T UNDERSTAND THE WORD 'STEEPLE'.

(SHRDLU interrupts as soon as he encounters a word that he doesn't know.)

A 'steeple' is a stack which contains two green cubes and a pyramid.

🟢 I UNDERSTAND.

Are there any steeples now?

🟢 NO.

**Will you please stack up both of the red blocks and either a green cube
or a pyramid.**

🟢 OK.

*(SHRDLU opts to stack the red blocks with a green cube. In the course of
building his stack, he has to move the green pyramid off one of the red
blocks. Remember this.)*

Which green block is sitting on the table?

🟢 THE ONE WHICH SUPPORTS THE RED PYRAMID.

Put the littlest pyramid on top of it.

🟢 OK.

(SHRDLU duly picks up the tiny green pyramid.)

Had you touched any pyramid before you put one on the green block?

🟢 YES, THE GREEN ONE.

When did you pick it up?

🟢 WHEN I WAS STACKING UP A RED CUBE, A LARGE
GREEN CUBE AND A LARGE RED BLOCK.

Why?

🟢 TO GET RID OF IT.

Why did you do that?

🟢 TO CLEAR OFF THE RED CUBE.

Why did you clear off that cube?

🟢 TO PUT IT ON A LARGE GREEN CUBE.

Why did you do that?

🟢 TO STACK UP A RED CUBE, A LARGE GREEN CUBE
AND A LARGE RED BLOCK.

Why did you do that?

🟢 BECAUSE YOU ASKED ME TO.