

## Activity: Spiros by Ihor Charischak

*Spiros (Clime Microworld - Vol. I) continues to be one of my favorite activities in teacher workshops and with students. I've done such a session at least 25 times and amazingly I learn something new every time. The teachers start by looking at and collecting data. Initially there appears to be no correlation between the numbers and the design. But after some looking and thinking, patterns emerge. Here's how I organize the activity. IC.*

I have my workshop participants use the Spiros microworld to generate various Spiros designs (see figure 2 - next page). I ask the question, "Is there a relationship between the designs (Whimsy, Wumpus, and Gloop) and the numbers? Can you predict what the shape will be from the numbers?" Teachers come up with all sorts of conjectures some of which are fruitful and others less so.

For example one group of three teachers noticed that S 1 1 1, S 2 2 2, S 3 3 3, etc. formed squares and that they were always Wumpuses. So their initial conjecture was: if all the numbers are the same, then you get a Wumpus. This was correct, but it didn't seem to help them for situations when the numbers were not the same. So they decided to see what happens when they keep 2 numbers the same and vary the third number (figure 1). No light bulbs went off immediately. They were all surprised that S 2 2 5 was a Gloop. I walked away from the group and then returned a few minutes later noticing that one of them was exploring Gloops and eventually came up with a pattern that she generalized to all three categories. She noticed that S 2 2 5 produced a Gloop that had a 1 by 1 square in the middle. He then looked at the other Gloops (See figure 2) and recorded the information in a table. It wasn't long before she discovered a pattern for Gloops that she was able to extend to Whimsies and Wumpuses. See if you can discover how she did it. (Her Gloop conjecture is summarized in figure 3.)

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their own programming in any significant way. He then described his experience of using manipulatives in the teaching of algebra. (Creative Publications eventually marketed them under the title *Algebra*

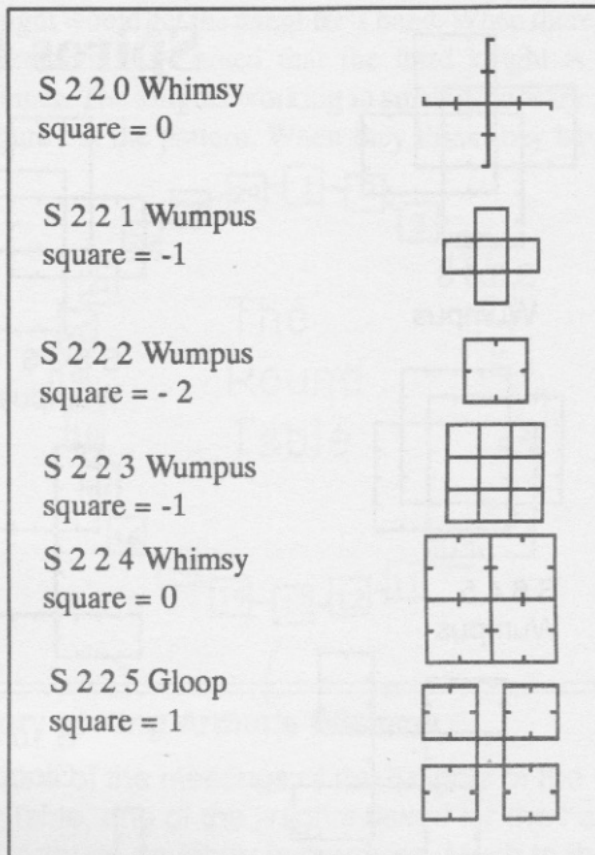


Figure 1

*Gear.)* What he liked about this experience is that he got his students to come up with their own rules rather than telling them exactly what they must do. This was a complete reversal of roles which Henri found very exciting. "In fact, the experience was very Logo-like because the essence of Logo is not the technology; it is the idea of the microworld, or the idea of the tool. But I got a lot more mileage out of these manipulatives, more than I did with the Logo tools. Why? I don't know, but here are a few guesses. Teachers lack access to the technology, manipulatives require less overhead of time, they're easier to explain, more affordable, less training of the teachers is needed and the relationship to math is less transparent," he said.

He completed his talk describing his experience with using Boxer (a more advanced Logo-like programming environment) which he was fortunate enough to be able to use in his classroom.

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