

Why SET is (almost) like (wraparound)

4-D Tic-Tac-Toe

by Galen Wilkerson

SET cards have 4 attributes: shape, number, color, shading.

- Let's start with 2 card attributes: shape & number. (ignore the other attributes - color and shading)

shape

oval pnut diamond

- Put an X in the box representing a card's shape and number attributes.

For example, if we have a card with one diamond,

put an X here.

A second card has 2 peanut symbols.

Another card has 3 ovals

- Look! We have a SET (for 2 attributes), since for each of the two attributes, all of the cards are either the same or different.

(In this case, they are all different.)

number	1			X
	2		X	
	3	X		

Is this a SET?

	shape	oval	pnut	diamond
number	1			X
2				X
3				X

How about this one?

	shape	oval	pnut	diamond
number	1	X		
2				X
3			X	

Imagine a board that

"wraps around", repeating

beyond the edges... now the Xs form

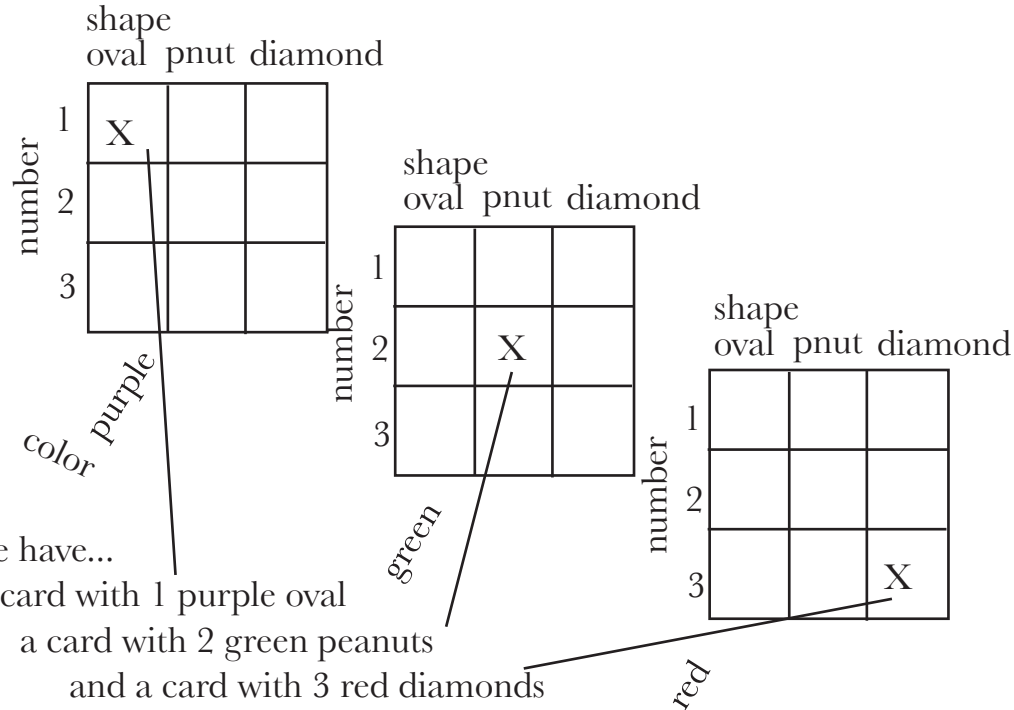
a diagonal line, just like the first example.

number	1	X			X		
	2			X			X
	3		X			X	

Now let's add another attribute: color.

But wait, there's nowhere to show it on our 2-dimensional tic-tac-toe board.

If we add a 3rd dimension, we have a way to show which color a card has.



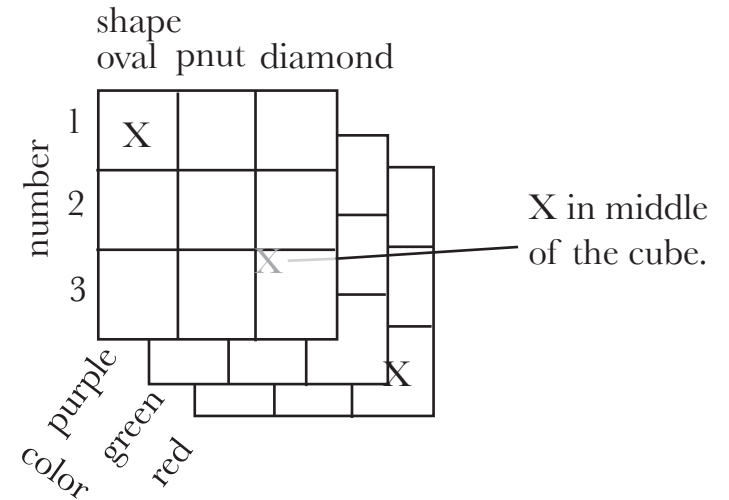
So, if we have...

a card with 1 purple oval

a card with 2 green peanuts

and a card with 3 red diamonds

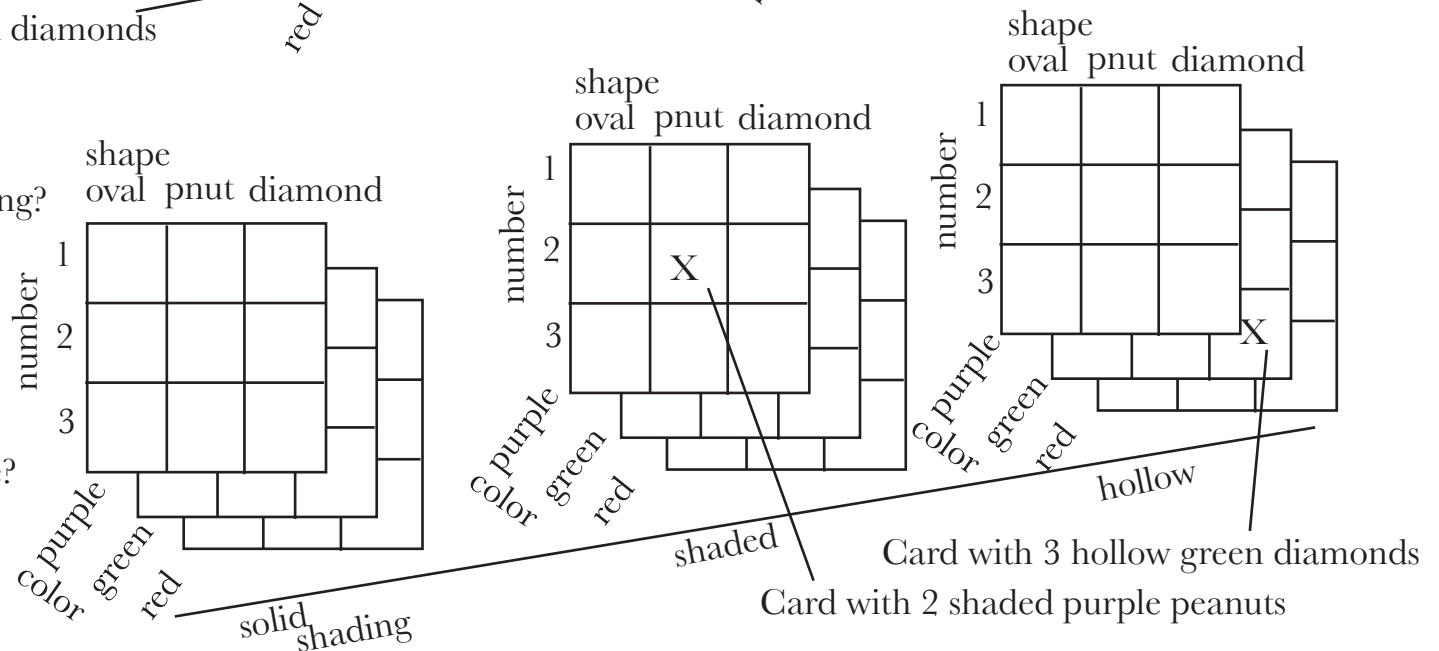
If we put all 3 boards together,
we get a cube!



Guess what happens when
we add the 4th attribute - shading?

We have to put 3 cubes
next to each other to make a
4-dimensional "hypercube".

What does a SET look like here?
Does it still wrap-around?



Card with 3 hollow green diamonds

Card with 2 shaded purple peanuts