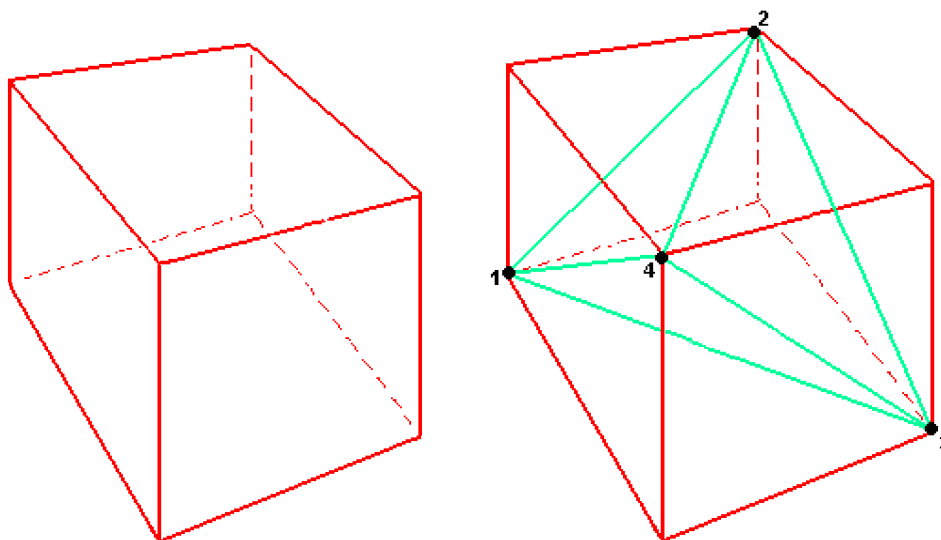


Geometrical Models in the Sepher Yetzirah and Bahir

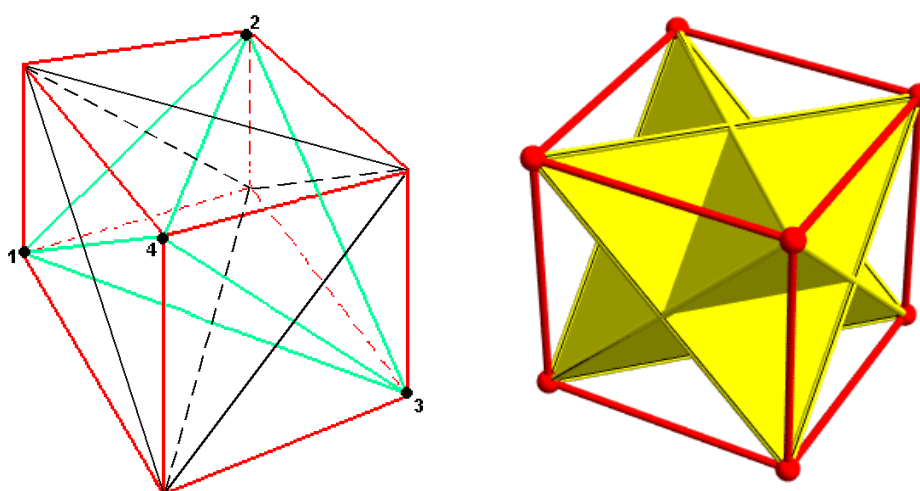
In the introduction to their translations of the *Sepher Yetzirah* and *Sepher ha-Bahir*¹, W.G. Davies and G. Zur suggest that the structure of the Sephirot described is consistent with that of a cube containing a double tetrahedron and octahedron. The aim of this note is to try and clarify this geometry.

Making the model

We start with a cube, shown in red. By joining alternate corners of the cube, we make a tetrahedron (a triangular pyramid), coloured green and labelled 1,2,3,4:



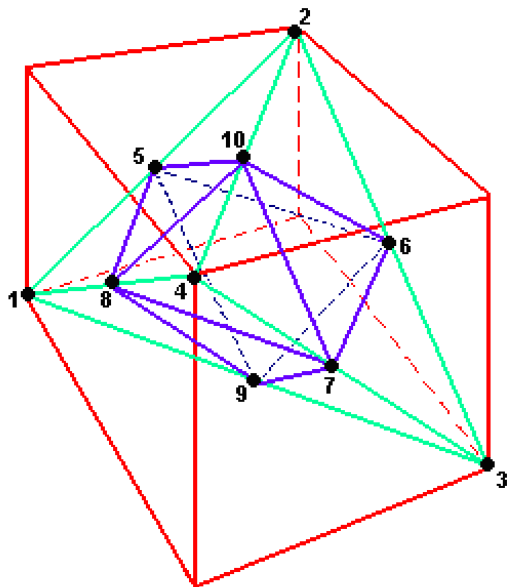
We make a second tetrahedron, joining the other four corners of the cube (shown below in black). This makes two intersecting tetrahedra as illustrated below. (See footnote for an animated version²).



¹ Electronic copies available at <http://www.bizworld.co.uk/saros/pubs.html>

² For an animated version (thanks to Greg Egan and John Baez) click on http://math.ucr.edu/home/baez/mathematical/egan_compound_polyhedra/cube_with_2_tetrahedra.gif

The edges of the two tetrahedra cross at the middle of each face of the cube, giving six points. Joining these points together makes an octahedron, shown in blue and labelled 5,6,7,8,9,10:



(For the sake of clarity, only one of the tetrahedra is shown).

Another visualisation of the octahedron and cube without the tetrahedron.

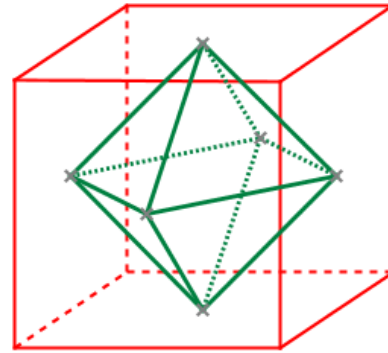
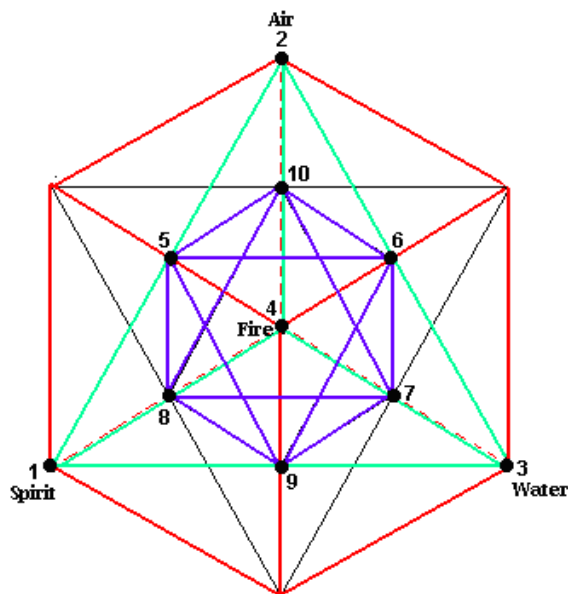


Image credit:
Birgit Lachner via Wikimedia Commons

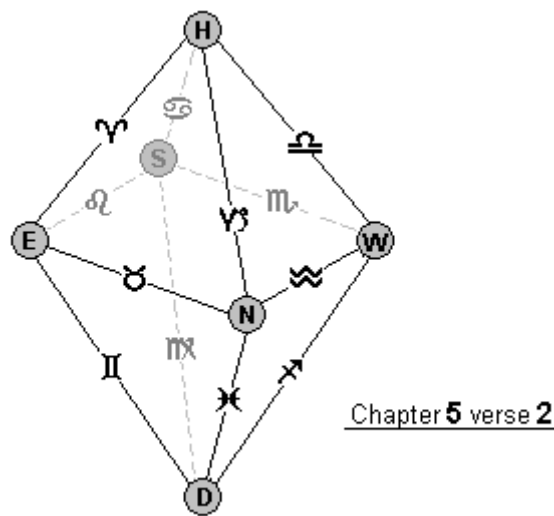
The figure below shows the same structure, viewed from a different direction lining up with point 4. Considering Verse 8 of Chapter 1 in *Sepher Yetzirah*, we interpret the four corners of the green tetrahedron as representing: 1-Spirit, 2-Spirit (or Air) from Spirit, 3-Water from Spirit, and 4-Fire from Water. The corners of the octahedron are interpreted as aligning with the six directions (Height, Depth, East, West, South, North).³ Thus these points are the 10 Sephirot.



³ Note that the numbering of the points in the diagram of the octahedron do not correspond to the numbering of the directions in verse 8.

The four unlabelled points on the intersecting tetrahedron (black line) perhaps correspond to the four measurements in Chapter 1, Verse 4: boundless good, boundless evil, boundless beginning and boundless end⁴. The directions again correspond to the octahedron corners.

In Chapter 5, Verse 2 of the *Sepher Yetzirah*, the twelve simple letters are linked to the 12 diagonal directions: East-Depth, South-Height, South-East and so on. These correspond to the edges of the octahedron. Each corner of the octahedron corresponds to one of six directions, and so the lines joining them correspond to the 12 diagonal directions (as illustrated below, showing the signs of the zodiac corresponding to each of the 12 simple letters).



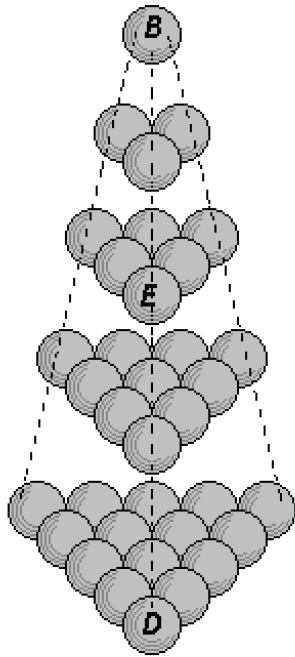
Visualisation

As a result of this understanding, it might be possible to imagine oneself standing in the centre of the octahedron. Each corner of the octahedron is one of the six directions, sealed with the different combinations of the letters *yod*, *vav* and *heh*. The twelve edges of the octahedron represent the twelve simple letters, or the signs of the zodiac. Through each triangular face of the octahedron, one looks out to a corner of one of the two tetrahedra, or (equivalently) a corner of the cube. Spirit, air, water, fire, beginning, end, good and evil.

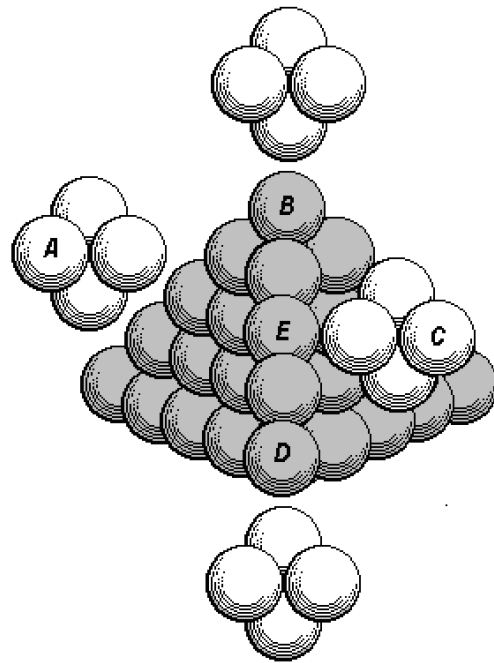
⁴ In the introduction to *Sepher Ha-Bahir*, where this diagram originates, the three visible corners are labelled Good, Height and Depth. I suspect that Height and Depth were labelled in error and should have been Beginning and End.

Second Model

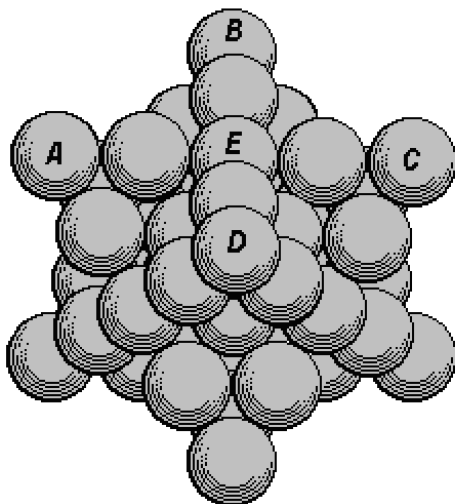
An alternative way of representing the same geometry is to use a model constructed from spheres (eg. table-tennis balls) instead of lines and corners. To do this we start by making a 5-layer tetrahedron, and then add a group of four balls to each face, thus making two intersecting tetrahedra – a ‘star’ shape.



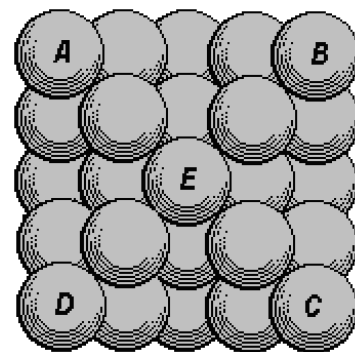
5-layer tetrahedron



Adding to each face to make the star shape.



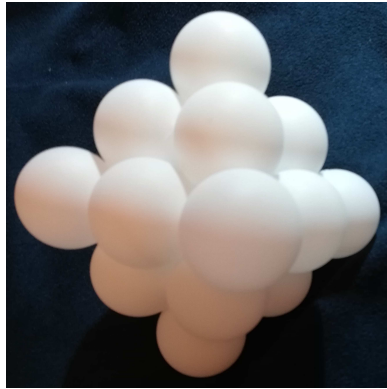
Looking at the star shape from a corner shows the intersecting tetrahedra – one ‘pointing up’ towards the viewer and the other ‘pointing down’.



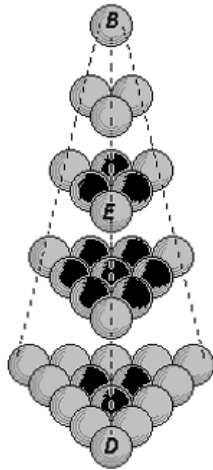
Looking at the star shape from the side shows the cube outline.

Although less obvious, the octahedron is still embedded within the star shape, with the six directions at the intersections of the edges of the tetrahedra (the centers of the

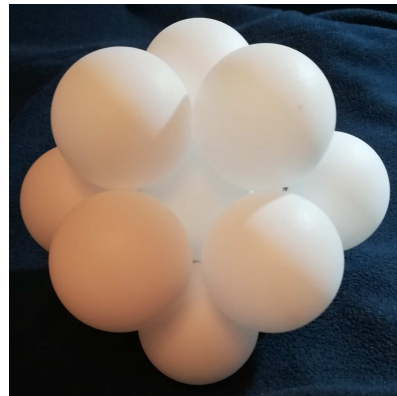
cubic faces). For example, the ball marked 'E' in the diagram above represents one of the six directions. By cutting off the 8 corners of the tetrahedra, the octahedral shape is exposed:



Also concealed within the star shape (and indeed within the octahedron) is the *dymaxion* or cuboctahedron shape. This shape, where one central ball is surrounded by 12 others, is an aspect not seen in the 'line-and-corner' model.



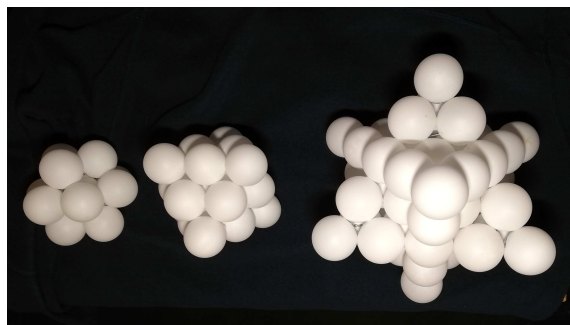
The dark coloured balls make the dymaxion.



The dymaxion

One way of thinking about the star shape is that there is:

- One ball at the very centre
- Twelve balls that surround it and make the dymaxion (13 balls)
- Add a ball for each of the six directions to make the octahedron (19 balls)
- Add four groups of 4 balls to make a 5-layer tetrahedron (35 balls)
- Add four groups of 4 balls to make the star shape (51 balls).



The introductions to the Yetzirah and Bahir include other numerical interests in the star shape:

- The star shape has seven levels.
- The surface contains 50 balls (all but the central ball is on the surface). The letter *Nun* equals 50 in numerical value.
- Each tetrahedron contains six edges (*Vav*) and the number of spheres along these edges adds up to 22.
- When it is on its base, the number of visible spheres in a tetrahedron is thirty-one (all except the one in the middle and the three on the inner part of the bottom face). The total of all spheres in the tetrahedron is 35. when it is remembered that it was customary to include in the numbering the whole that is formed, we have the combination of the 32 and the 36 upon which much of the Bahir's explanation is built

One of the comments in the introduction to the Yetzirah is a little unclear: "Also each of the subsidiary tetrahedra contain 10 spheres which answer to the four worlds of logos, creation, fashioning and making." A three-level tetrahedron contains 10 spheres, and there are several ways that three-level tetrahedra can be seen in the star shape. Precisely which four of these are meant to correspond to the four worlds is not clear.

R.T.
Oct 2019