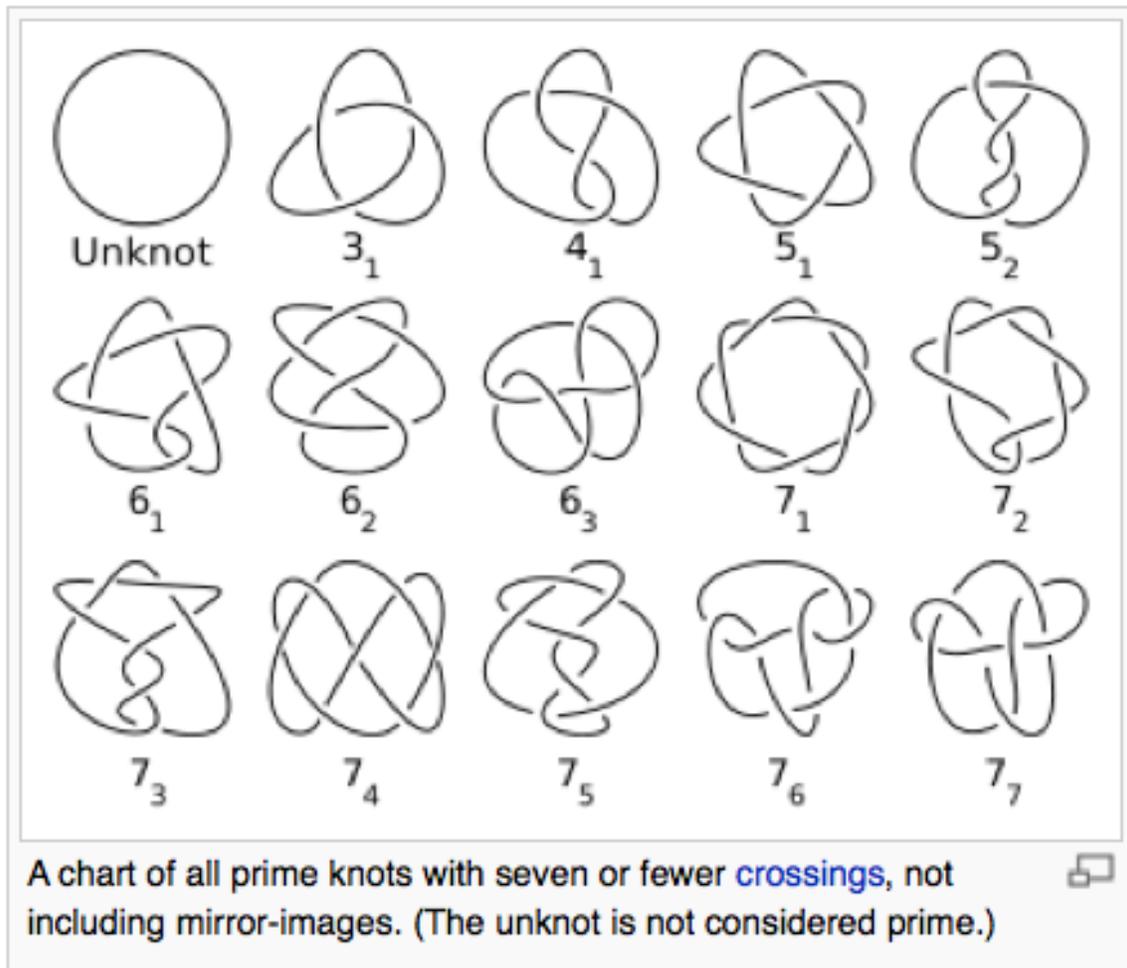# Braid List Of Prime Knots *

A prime knot is a knot that cannot be written as the knot sum of smaller knots. For example, the Square Knot and the Granny Knot are not prime since each is a sum of two Trefoil Knots. There are 249 prime knots with at most 10 minimal number of crossings. In 3DXM we use the braid representation of knots. Vaughn Jones gave this list to one of us in the 80s. The usual hand drawn versions are prettier than the braids:

A chart of all prime knots with seven or fewer crossings, not including mirror-images. (The unknot is not considered prime.)

Copied from the article 'Prime Knot' in Wikipedia.

The above first 14 prime knots are all so called alternating knots: if one follows the thread of the knot then one passes – alternatingly(!) – overcrossings and undercrossings. A knot that is represented as an alternating knot cannot be drawn with fewer crossings, in particular: an alternating knot is always non-trivial.

The notion of prime knot is important because Horst Schubert proved that the decomposition of a knot as knot sum (= connected sum) of prime knots is unique.

All torus knots are prime knots. The genus 2 knots in 3DXM are sums of two torus knots.

The space curve "Morph Prime Knots 5 4 3" has a default morph that runs through the prime knots 3.1, 4.1, 5.2, 6.1, 7.2. If one changes dd from 3 to 5 then the ff-morph runs through 5.1, 6.2, 7.5. The prime knot 7.4 is shown as a Lissajous knot.

H.K.