Tops, Tops, & More Tops

Spinning tops have been a popular children's toy in many different cultures throughout history. The Chinese spin tsa lin (tops). Japanese spin koma asobi (top spinning). The dreidel (top) is used for a traditional Jewish Hanukkah game. The spinning top was one of the earliest toy patents granted by the United States Patent Office. Scientists and sailors attempted to use the spinning top to assist in navigation, which led to the development of gyroscopes. In 1898, Ludwig Obry used the gyroscope in the steering mechanism he developed. Elmer Sperry used the gyroscope as a component of the automatic pilot he invented in the early 20th century. Today, gyroscopes are commonly used in navigation systems in ships, missiles, airplanes, satellites, and space shuttles... and children throughout the world continue to enjoy spinning tops, as they have throughout history.

The "best top" is one made from very consistent material and machined very carefully. It would also probably be a thin disc, with a thicker rim to move the weight away from the axis, and the disc would be very close to the surface on which it will spin. Since we are making our tops of wood which is a totally inconsistent material, I have found that laminating different layers and alternating the grain tends to help. A large top turned from one block of wood is almost always a disaster.

Another suggestion regards the point on which the top will spin. Ironically a very sharp point may cause problems. A very sharp point may dig into the surface a bit, making any slight vibration due to material and machining variations much more pronounced. A slightly rounded tip allows the top to vibrate a bit with the point moving around slightly on the surface, while the top itself spins quite smoothly.

Basic Design Rules

1. The greater diameter of the whorl (circular mass that rotates the spindle) the longer the top will spin.
2. The greater the diameter, then the more stable the top will be.
3. The more weight on the perimeter, the more difficult it will be to finger spin
4. The more weight you have on the perimeter, the more thought you have to put into the design of the finger spin shaft, i.e. the more weight the larger the diameter of the finger spin area of the shaft and also the great need for "grip" being built into the design (Of course you can make it a longer "palm spin" shaft if you like!)
5. The position of the whorl on the shaft has an effect on the stability. The lower the whorl, the more stable. Higher than one third of the shaft length begins to make the top much less stable. Though palm spin (faster spinning) tops will work OK at above this height. Sure it will still spin ok but better if the proportional position is lower than one third.
6. Whorl and weight principles can be stated more scientifically by talking about center of gravity, instead of where the main weight is positioned.
7. Design your top shape for streamline effect. Air friction does have an effect, though only really noticeable on a very "whiskery" top.
8. Reduce friction at the contact point also. A sharp, but not penetratingly sharp point will be better than an blunt point. Metal is better than most woods as a spinning point. Glass is a great surface to spin them on. (a concave shaving mirror... the sort that makes your face look bigger!! It has a nice retaining rim too)