

A Balancing Act: 3SST Revisited

There is a natural tension between showing the underlying *single-step* nature of the image and having the image become so complex that the *single-step* aspect of the image is lost. This complexity stems from the size of S , n , and J .

Adjusting S . If you have a single-step image you like, then you can create a more densely or less densely packed image that is similar by adjusting S for fixed n , J , and k . P adjusts according to *The 7-Line Generation Rule*. The rule for how S and hence P adjusts is simple and elegant.

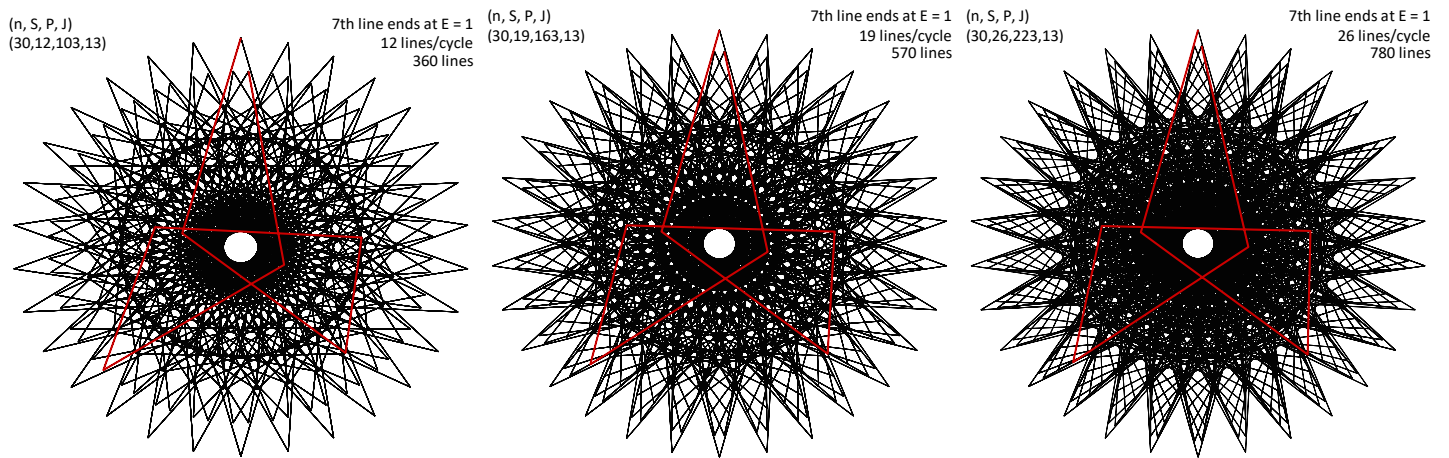
S and P adjustment rule. From a given S_0 and hence P_0 , adjust S in multiples of 7 and P in multiples of $k \cdot n$.

This rule is helpful to know if you are using the web version of PwP because it does not allow functional links between the parameters of the model.

An Example. The classic version of 3SST from [E8.4](#), shown in the middle, is $(n, S, P, J) = (30, 19, 163, 13)$. This image is based on $k = 2$: $P = 163 = \text{ROUND}(2 \cdot 30 \cdot 19 / 7, 0)$, which is single-step of length 7 because $7 \cdot 163 = 1141 = 2 \cdot 30 \cdot 19 + 1 = 1140 + 1$.

A less dense 3SST (at left). Reduce S by 7 and P by 60. The resulting image is $(n, S, P, J) = (30, 12, 103, 13)$.

A denser 3SST (at right). Increase S by 7 and P by 60. The resulting image is $(n, S, P, J) = (30, 26, 223, 13)$.



If you watch these get drawn 7 lines at a time, the first takes about 51 iterations, the second 83, and the last 111. The problem here is that watching the single steps is hard because each image fills in around the vertices in multiple times around. The first vertex touched after 0 in each of these images (viewed clockwise around the circle) is 8 for these three images. Since all vertices are used, the other 7 vertices must be filled in in later iterations before the image is complete. (This vertex fill-in process occurred in the following, seemingly haphazard (although it is not), order: 5, 2, 7, 4, 1, 6, 3.)

The search for 3SST process has led to images that are more parsimonious because they rely on a smaller number of “times around” to create the final image and the vertex fill-ins provide a very nice step process as well.

Adjusting n and J . As noted [elsewhere](#), there are a number of (n, J) pairs that produce 3SST style images. These four images fills in sequentially (the [first](#) and [third](#) counterclockwise, the [second](#) and [fourth](#) clockwise). Each in some ways, is superior to the original 3SST because the *single-step* nature of the image becomes clearer with fewer vertices involved. These images are not “one time around” as discussed in [E5.2](#) but they certainly appear that way.

