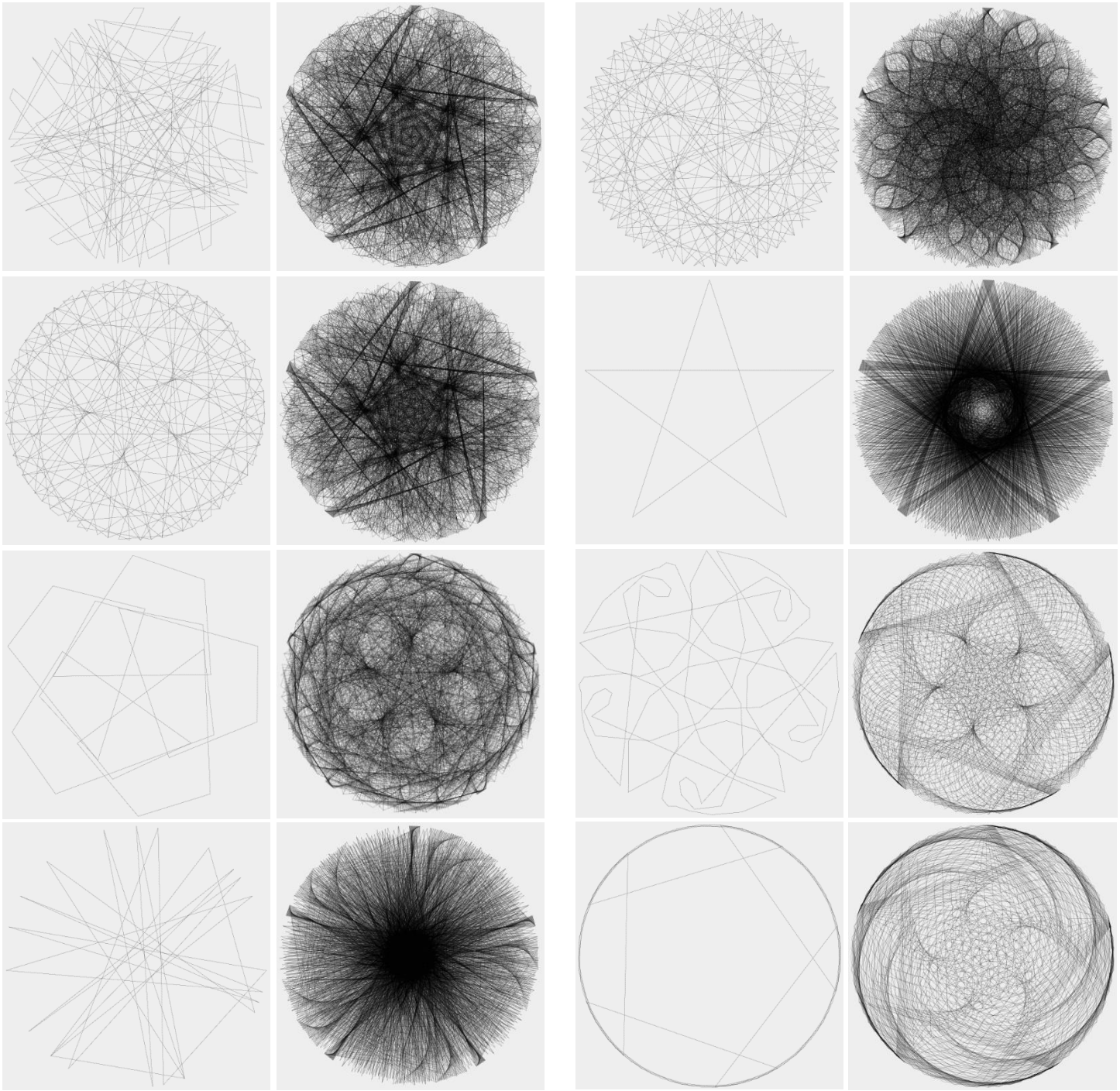
Comparing SCF > 1 Images to nearby SCF = 1 Images

Sequence Player images all have SCF = 1 by design to avoid the flickering that occurs when SCF > 1. You can often understand why a specific image looks like it does by looking at nearby ***P*** values with SCF > 1. This was initially discussed with porcupine images where a single vertical line at ***P*** = ***n***/2 turns into a porcupine for nearby ***P***, but it is discussed more generally in E10.2.2. These discussions are predicated on single jump models, but this can be generalized to jump set models. Oftentimes the relation is not as obvious in these situations.

L/R Row	***P***	SCF	Lines
Left 1	23	23	125
Left 2	**25**	**25**	**115**
Left 3	460	115	25
Left 4	1000	125	23
Right 1	1075	25	115
Right 2	1150	575	5
Right 3	1196	23	125
Right 4	1200	25	115

Below are eight of 1100 distinct 2875-line images from the ultimate zig-zag image sequence with two adjustments, ***n*** = 75 and ***S*** = 25, because multiples of 25 are readily recognizable. The prime factors of 2875 are 5 and 23 = ***k***. The full density images are ***P***+1 from SCF > 1 values in the table. These images were chosen to show a variety of SCF, and hence line values. The **Left 2** (***P*** = ***S*** = 25) image is bolded in the table because it is the VF.



SCF > 1 Factors. SCF is a multiple of 23 for four images: Left 1 and 3, and Right 2 and 3. SCF is a multiple of 25 for five images: Left 2 and 4, and Right 1, 2 and 4. Note that Right 2 is a multiple of both 23 and 25.

Left 1 and 2. The first four images, Left 1 and 2, are ***P*** = 23, 24, 25, 26 which is why the two full density images are so close to one another. The ***P*** = 25 VF has a notable swirl and 24 and 26 both have a faint version of this swirl. The five dramatic sharp V-shaped parts of the image are created from the first and last jump of the jump set because each involves a 1 vertex jump (from 0-1, 15-16, 30-31, 45-46, and 60-61) and hence a tight curve using those vertices.

Inscribed Pentagram. Perhaps the most obvious similarity is between SCF > 1 and SCF = 1 images in Right 2. The SCF > 1 version is a 5 line pentagram. ***P*** = 1150 uses only vertices 0, 15, 30, 45, and 60 since ***n*** = 75. Given ***S*** = 25, 1150 is the 46th vertex jump or the end of the second jump set of 23. The first jump set ends at vertex 15 = MOD(540,75) so the second ends at 30.

Think about where the first few lines of the ***P*** = 1151 image end. The first line ends 1/25 (1 subdivision) along the VF line from vertex 30 to 31. The second ends 2/25 along the VF line from vertex 60 to 61. And so on. The dark slightly tilted pentagram in the SCF = 1 version exists because of these 1/25 movements along these five one vertex jump portions of the VF. The rest of the image is less dense because other portions of the VF involve jumps of more than a single vertex and hence the distance between subdivision endpoints is larger as noted in E16.4.

Although it is not included in the above images, ***P*** = 575 and ***P*** = 576 are similarly closely related. ***P*** = 575 is an inscribed pentagon for the reasons just discussed and ***P*** = 576 is a slightly tilted pentagon just like the slightly tilted pentagram when ***P*** is twice as large. If you look at that image, there is a nicely petalled flower visible inside the pentagon.

Full Density Swirls. Consider Left 3 and Right 1. Both full density images exhibit the swirl. But only the Right 1 SCF > 1 image has this swirl. Indeed, the relation between Left 3 and its ***P***+1 counterpart is perhaps the most difficult to see of all eight pairs.

Large Internal Pentagons. The SCF > 1 versions of Left 3, Right 3 and Right 4 all have a large internal pentagon. The same can be said for the SCF = 1 versions for Right 3 and 4 but not for Left 3. If you look carefully at how the Left 3 pentagram is constructed, you will note that each side is in fact made up of two crossed lines instead of a single line spanning the side like in Right 3 and 4.

A Quick Changeover. The SCF = 1 versions of Right 3 and 4 only differ by 4, ***P*** = 1197 versus ***P*** = 1201 and there are only two intervening full density images not shown, P = 1198 and 1199. Certainly, there are some similarities between the two images, but notice how much the outer 5-curve swirl becomes visible and the 5-point flower turns into a reverse direction 5-curve inner swirl.

Rotational Symmetry of the SCF > 1 Images. Seven of eight SCF > 1 images have 360/5 = 72° rotational symmetry. Left 4 with ***P*** = 1000 has 23 lines and does not have rotational symmetry at all. Each of the 23 endpoints in that image are vertices of the 75-gon because each represents choosing an endpoint 40 VF endpoints farther along the VF since ***P*** = 40***S***. Forty jumps is a total of 933 vertex jumps so that first line of the 23 line image ends at vertex 33 = MOD(933,75). One could map out the rest of the lines in the same way.

Only Three SCF > 1 Images use Interior Subdivision Endpoints. Note that Left 1, Left 3 and Right 3 have ***P*** that are not multiples of 25. If ***P*** is a multiple of 25 each used subdivision endpoint is also a vertex of the 75-gon. Put another way, if P is a multiple of 25, there are no interior points used to create the SCF > 1 image.