

PART II

ELECTRONIC STRING ART EXTENSIONS

This part of **PwP** provides another look at material initially examined in the book, **Electronic String Art: Rhythmic Mathematics**, hereafter denoted as **ESA**. There are a couple of reasons we reexamine that content here.

Before discussing the new string art material that merits additional treatment in **PwP**, we provide a quick summary of some of the main attributes of the electronic string art model in Chapter 10. This is done in a broad brush-stroke fashion, with references to individual sections and chapters of **ESA** using the short-hand Ea.b.c where a is the Chapter, b is the Section, and c is the Subsection of **ESA**. For example, [E2.2.1](#) refers to **ESA** Chapter 2, Section 2, Subsection 1 (titled *Stars that Work and Stars that Don't*) which is where **n,J**-stars are discussed in **ESA**. The other two parameters used to describe **ESA** images are the number of subdivisions between vertices, **S**, and the counting rule for drawing lines, **P**, are discussed in [E3.1](#) (A Primer on **S**), [E3.2](#) (A Primer on **P**), and [E3.3](#) (How Lines are Created from **S** and **P**). Collectively, **ESA** images are described using **(n,S,P,J)**; all four parameters are initially mentioned in [E1.1.1](#).

Chapter 11 focuses attention on one of the simplest image types available: central needles. Indeed, central needles on odd **n** formed the basis for the second **ESA** video, *Searching for Similarity*, which asks the question: *How can I find other images that are similar to this one, but not the same?* Answering this question leads to mathematical discovery, even though that is not the explicit rationale for undertaking the search. This chapter examines an open question originally posed in [E11.7](#): *Can you find examples of even pointed needle stars? If so, can you determine similar rules that produce even point stars to those posed in E11.7 for odd needle stars?*

Chapter 12 introduces a dynamic mode of viewing for users called *Sequence Player* mode. For a given set of **n**, **S**, and **J** values, by clicking **Play Sequence** in *Sequence Player* mode, you are provided with a constantly changing set of images that morph from one to another by sequencing through all **P** values with SCF = 1. This avoids the flickering that occurs when scrolling through **P** values manually (discussed in the fifth **ESA** video, *Flickering Videos and Waves of Images* and in [E18.5](#)) because **P** values with SCF > 1 are removed from the image sequence. Mesmerizing waves of images result, especially when jump sets are employed.

Chapter 13 is an in-depth exploration into the underpinnings of one of the more consequential images from **ESA**, [\(30,19,163,13\)](#): *Three Shape-Shifting Triangles*, 3SST, [E8.4](#). This exploration process led to the systematic categorization of 7-line single-step images of which 3SST is simply one example.

Chapter 14 turns the **ESA** analysis on its head. Instead of following our standard approach of thinking about how the image is created from a single piece of electronic string where endpoints are connected one line at a time (with each endpoint separated by **P** subdivisions), we consider pieces of images to learn more about the whole image. For example, by considering whether adjacent lines intersect, we can learn how the final image is impacted.