

# The Arête of Line Designs

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## Abstract

This workshop will explore the historical, philosophical, and pedagogical nature of line designs, with a focus on good designs and what constitutes the proper context and good environment ensuring "joy in work" is realized, now and in the future.

Math curriculum frequently includes line design lesson plans, a careful structure on how to achieve a desired result, and a method to grade results. To ensure relevance to a topic, many line designs are crafted to mimic some picture, such as a face or a valentine. Further "enhancements" include many java-enabled web sites affording ease of creation of these designs. As this integration of line designs increases in math curriculum, it's instructive to consider what it is about these designs we consider "good".

Mary Everest Boole, wife of famed mathematician George Boole and known by many as the origin of this type of activity, said the following regarding this process:

*"The beauty of some of the designs is unquestionable; and there can be no second opinion about the value of the method, as training, from the point of view of geometry as well as from that of art. What is not quite so obvious at first sight is its bearing on the training of the unconscious mind for science. Without the slightest intellectual strain it puts the children through that normal sequence of orderly attention to classification and detail, interspersed with nodal points of synthesis, which may be called the very breathing-rhythm of the scientific discoverer.*

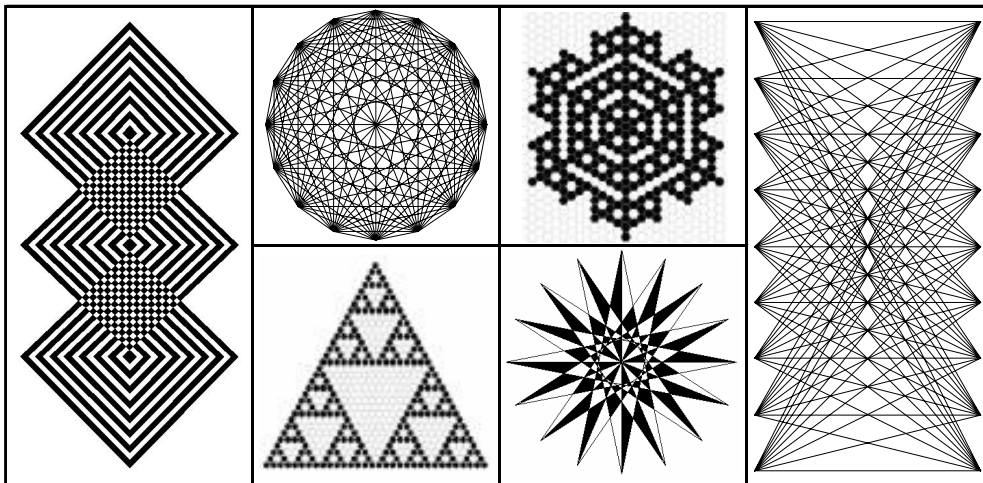
*But to make this exercise of any use there must be no copying from diagrams; the value of it depends on the child evoking a curve, watching it growing, under his fingers, from mere obedience to a law ... and beauty has resulted, not from understanding but from obedience ... the act of evoking a curve 'out of the everywhere into here', by simple obedience to a rhythmic law, lodges an impression on the unconscious mind which will be ready to surge up in ten years' time." [1]*

Clearly, what we as adults consider "good" qualities are necessary conditions for a good activity, but are they sufficient? Ms. Boole addresses 'orderly attention' and 'classification of detail', leading to 'beauty' as the result, with a particular benefit the training of the mind for future excellence. How is this *process* captured in a rubric concentrating on *product*? To emphasize this point, Edith Somervell said the following about the "process versus product" dilemma:

*"Beautiful curves are produced by a process so simple and automatic that the most inert child can succeed in generating beauty by mere conscientious accuracy; and the habit of doing this tends to produce a keen feeling for line. It has also been noticed in*

*some cases, where clean, pure, and strong colour has been used, that a remarkable sensitiveness to colour relation has grown.” “The results obtained by a child, of exquisite curved and flower forms on the ‘back’ of his card, by faithful obedience to a dull little rule in making straight stitches on the ‘front’, is of the nature a miracle. It should, therefore, be hardly necessary to insist that the less said the better, when the little worker produces anything especially beautiful or unexpected.” [2]*

What as adults can we do regarding the working environment to ensure a good process *with* beautiful results? What types of designs *are* appropriate for children? How do we translate “dull little rule” into practice? And finally, if the method is so powerful we can see the impression years down the road, how can we ensure the children continue creating such designs *outside* the classroom?



**Figure 1:** Results of the Prepared Environment

To ensure the integrity of the environment for quality work, certain conditions must be met. For example, “mental perfection” in the design-layout process requires exact calculations. A circle consisting of 16 equally spaced points requires angle measures differing by 22.5 degrees. Not seeing that *exact* measure on the protractor, the child knows the design to be mentally flawed. A necessary condition for the good environment, then, is the creation of “mentally perfect” designs. What are other necessary conditions?

This teacher workshop addresses many of these issues as the result of a number of after-school clubs I’ve conducted over the past couple of years, integrating the “prepared environment” philosophy of Maria Montessori [3] with the idea of flow [4]. Current experiments in the working environment, including the introduction of background percussion music to highlight the rhythmic nature of the activities, and various materials demonstrating the dynamic quality of these patterns, will be explored as well.

[1] Mary Everest Boole, *Preparation of the Child for Sciences*. University of Oxford. 1904

[2] Edith L. Somervell, *A Rhythmic Approach to Mathematics*. George Philip & Son, Ltd, London. 1906

[3] E.M. Standing, *Maria Montessori: Her Life and Work*. Penguin Books USA. 1984

[4] Mihaly Csikszentmihalyi, *Flow: The Psychology of Optimal Experience*. Harper & Row Publishers, New York. 1990

[5] Robert M. Pirsig, *Zen and the Art of Motorcycle Maintenance*. William Morrow and Company, Inc. 1974

[6] W. Edwards Deming, *The New Economics*. MIT. 1993