

self-similarity

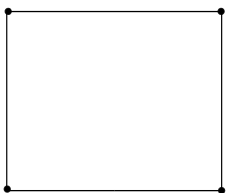
(continued)

recall: self-similarity

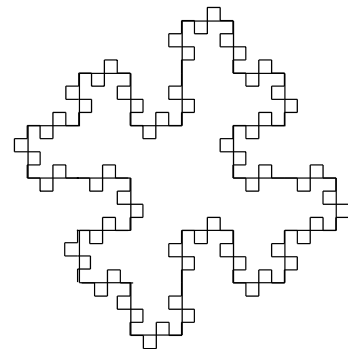
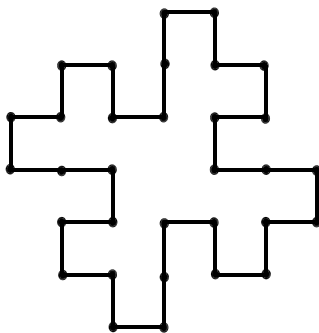
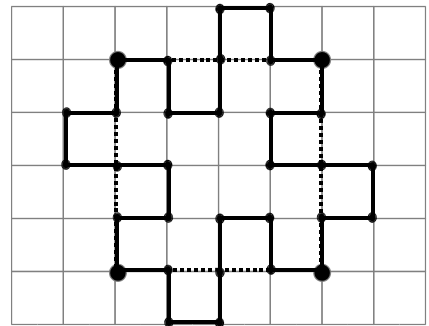
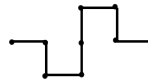
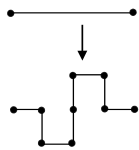
“when each piece of a shape is geometrically similar to the whole, both the shape and the cascade that generate it are called self similar”

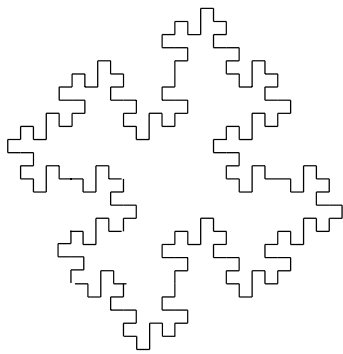
exercise: what do you get using the following initiator and generator?

initiator:



generator:



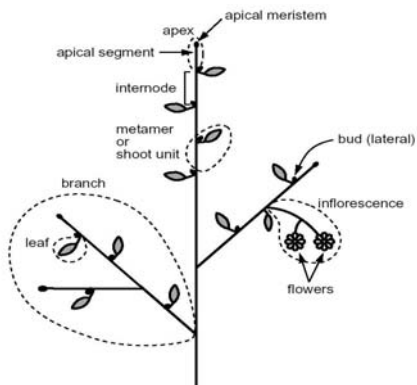


self-similarity in plants

- how to use generative systems to describe plants?
- why?
 - efficient way to generate plant images
 - can sheds insight on plant development



a generative system for tree structure: "sub-apical growth"



a generative system for tree structure: "sub-apical growth"

initiator: |

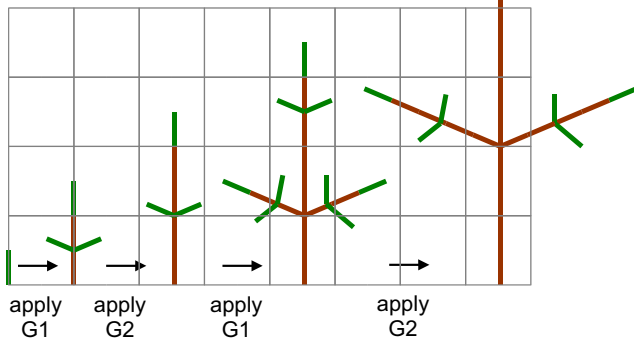
generators:

G1: | →

G2: | →

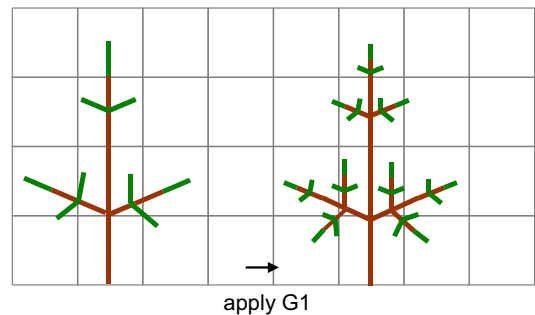
generators:

G1: | → G2: | →



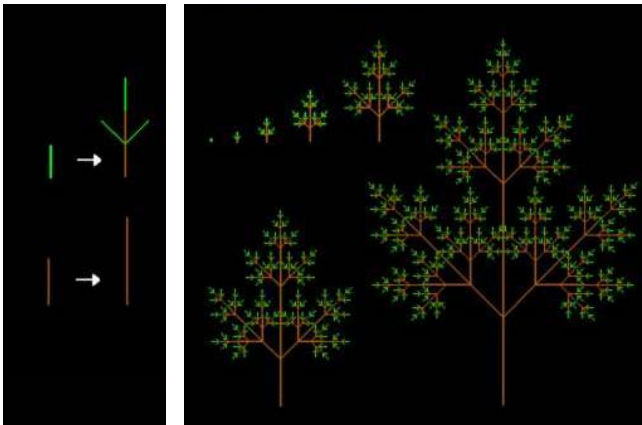
generators:

G1: | → G2: | →



generators

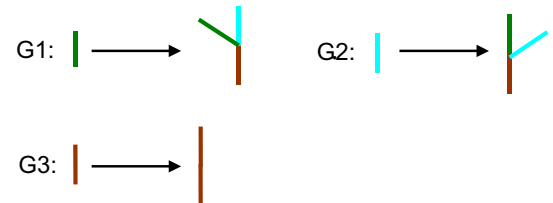
seven levels of application



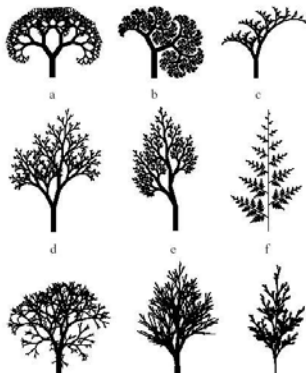
practice with another generative system

initiator: |

generators:



variations of previous systems



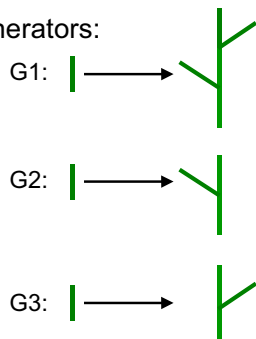
enhancing generative systems

- allow random choices among generators
- incorporate models of flowers, leaves, etc.
- add timing to model development to get animation
- ... and much more!

allow random choices among generators

initiator: |

generators:

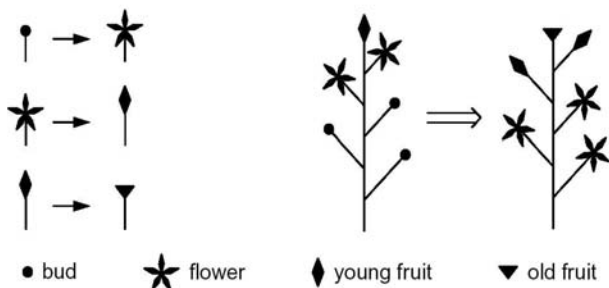


at each application of the generator, choose G1, G2, or G3 with equal probability

allow random choices among generators



add buds and flowers



add buds and flowers



add timing

see animations on Dr. P's website:

- **acropetal flowering sequence:**
 - <http://www.algorithmicbotany.org/vmm-deluxe/Animations.html#bluebellfield>
- **a field of creeping bellflowers:**
 - <http://www.algorithmicbotany.org/vmm-deluxe/Animations.html#bluebellfield>

other complex objects can also be described by generative systems!

- patterns on seashells
- shapes of mountains
- binary search algorithm: the process used to search in a big array is repeated on smaller and smaller arrays



resources

- see Dr. P.'s Algorithmic Botany Lab at U. of Calgary for beautiful illustrations: <http://algorithmicbotany.org/>
- for other simple self-similar objects, such as the Koch snowflake and the Highway dragon, see: <http://ecademy.agnesscott.edu/~liddle/ifs/ksnow/ksnow.htm>
- some self-similar objects are examples of *fractals*. A cool fractal art web site is J. Parke's Fractal Art: <http://www.infinite-art.com/>

wrap-up: computers and art

we've covered:

- historical perspective: evolution of technology, software tools, and computer art
- two ways to create images: GUI's vs programs
- generative systems for modeling plant development and generating images of plants