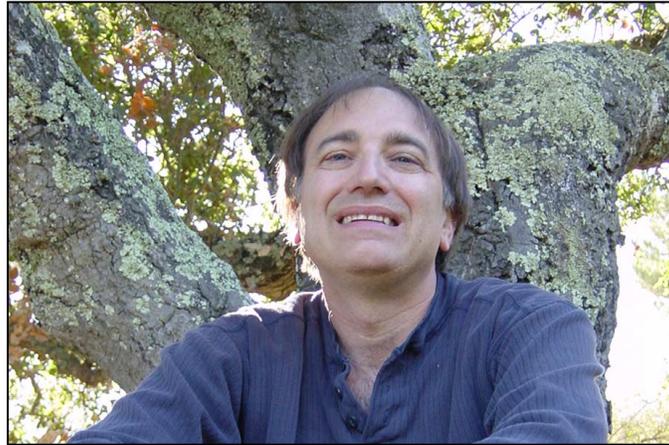


# To Draw a Tree

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## Abstract

The quintessential goal of information visualization is depicting abstractions and relations for non-spatial data. A hierarchy is a particularly expressive abstraction that can be applied to a broad range of domains: the genealogical lineages of human descent, the functional decomposition of complex mechanical objects, the classification of knowledge, the evolutionary relationships between species. All of these hierarchical relationships are representable through the abstraction of a recursively defined tree. For this reason, trees occupy a place along with arrays, lists and graphs as one of the most important data structures in computer science.

Considering the simple problem of how to effectively draw a tree uncovers many issues fundamental to information visualization. Different drawing styles emphasize different properties of trees, often in subtle ways. I will discuss how people think about trees, and thus what kinds of relationships a tree drawing can usefully convey. My discussion will include a review of many methods for drawing trees, including both historical examples from the sciences and techniques recently developed by researchers in information visualization.

**Pat Hanrahan** is the CANON USA Professor of Computer Science and Electrical Engineering at Stanford University where he teaches computer graphics. His current research involves visualization, image synthesis, and graphics systems and architectures. Before joining Stanford he was a faculty member at Princeton. He has also worked at Pixar where he developed volume rendering software and was the chief architect of the RenderMan(TM) Interface - a protocol that allows modeling programs to describe scenes to high quality rendering programs. Previous to Pixar he directed the 3D computer graphics group in the Computer Graphics Laboratory at New York Institute of Technology. Professor Hanrahan has received three university teaching awards. He has also received an Academy Award for Science and Technology, the Spirit of America Creativity Award, the SIGGRAPH Computer Graphics Achievement Award, and was recently elected to the National Academy of Engineering.