

Department of Theoretical Physics

Theoretical Physics Colloquium

<i>Speaker</i>	:	Deepak Dhar
<i>Topic</i>	:	Modelling Proportionate growth
<i>Day, Date & Time</i>	:	Tuesday, March 4, 2014 at 4:00 p.m.
<i>Place</i>	:	AG 69

Abstract :

It is fascinating to see baby animals grow into adults. Understanding the development of different organs from a single egg cell has been the central problem in developmental biology for over a hundred years. However, there is a considerably simpler problem of understanding how a small baby animal grows to a much larger size. In the case of humans, the body weight increases by a factor of 30 or so. In the case of elephants, this factor is about 100. As the baby grows, different parts of the body grow at same rate. This is called proportionate growth.

One can view the animal as a network of cells that change their state depending on input signals, and can send signals to neighboring cells. I will discuss a simple model in which such proportionate growth is achieved quite naturally from local rules, without fine tuning any parameter. The patterns produced are composed of large distinguishable structures with sharp boundaries, all of which grow at the same rate, keeping their overall shapes unchanged, and can have a striking resemblance to natural ones.

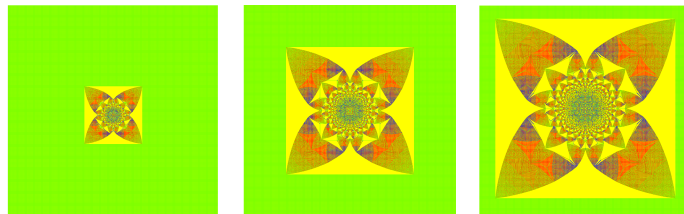


Figure 1: Patterns produced by adding (a) 4×10^4 (b) 2×10^5 (c) 4×10^5 particles on a square lattice with initial background of all heights 2. Color code : heights 0,1,2,3 = R,B,G,Y

(Saumen Datta)