Diffusion in networks affect how you dress at work

The way we dress, and the choices we take are based on a lot of different factors. In the same way that the weather can provoke certain parts of our wardrobe, how our friends and family around us dress can also have a say. In this short blogpost we will be looking at diffusion in networks. How trends can spread through a social network, and what can cause a full cascade and the impact of the cluster density in your social circle.

Before we discuss fashion, there is a couple of basic ideas we need to define. Your social network can be drawn as a network graph, with bridges between the people that know each other. The model we will be looking at is called direct benefit effects model (*Easley, 566*). This model looks at your family, friends and acquaintances, the more of these people who adopt a new behavior increase the chance of you also adopting this new behavior. Its all about the direct benefits you get from adopting.

So, if we have two behaviors at work, where *a* is using fancy clothes and *b* is using a more casual way of dressing. If you are the type of person who is more laidback, what will make you dig deep in your wardrobe to find more fancy clothes and adopt behavior a? We can model this by giving each behavior a payoff. We give behavior a=3 and b=2. With some simple algebra we get the formula shown in *figure 1(Easley, p567)*.

$$p \geq \frac{b}{a+b}.$$

Figure 1: Simple Algebra

In this formula the p stands for the fraction of friends who adopts behavior a. And the threshold to change is b / (a + b). If we go back to the question of what will make you change to behavior at least 2/5 (40%) of your friends will need to adopt behavior a before you will. In this example because of the payoffs we chose, the threshold to change were small, other times it will be a very high threshold and you then need more people around you to adopt the behavior before you would. We call it a full cascade if every person in the networks switches to the same behavior.

In an office there is only two equilibrium. Everyone using behavior a or everyone using b. To look at what can cause a full cascade, we need to look at the density of the network. We use the definition from David Easley: "*We say that a cluster of density p is a set of nodes such that each node in the set has at least a p fraction of its network neighbors in the set"* (Easley, p574*)*. In other words, the person with the least fraction of friends in the network cluster becomes the easiest entrance for the diffusion. If the density is greater (1-q) the diffusion stops.

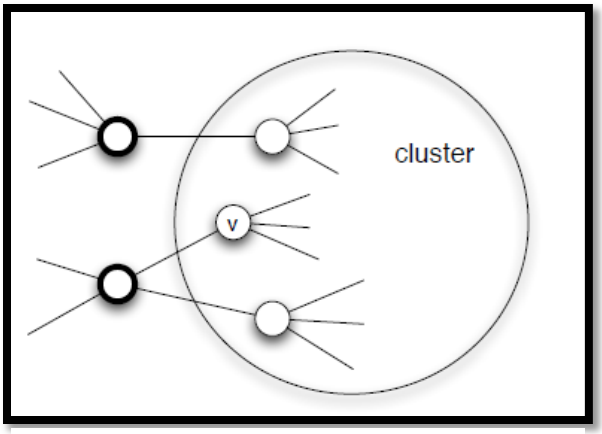

Figure 2: Cluster entrance

Knowing all this, you should now be more aware of the factors leading up to the choice of going with loafers or sandals to work. The payoffs for different behaviors together with the network you are in could define a lot of the patterns of your behavior. And not only when it comes to fashion, the way we speak and the technology we use are also affected in the same way. And maybe all this will help you be more aware of your actions. How will you dress tomorrow?

Recourses:

Easley, David. *Networks, crowds, and markets: reasoning about a highly connected world*. USA, Cambridge University Press, 2010