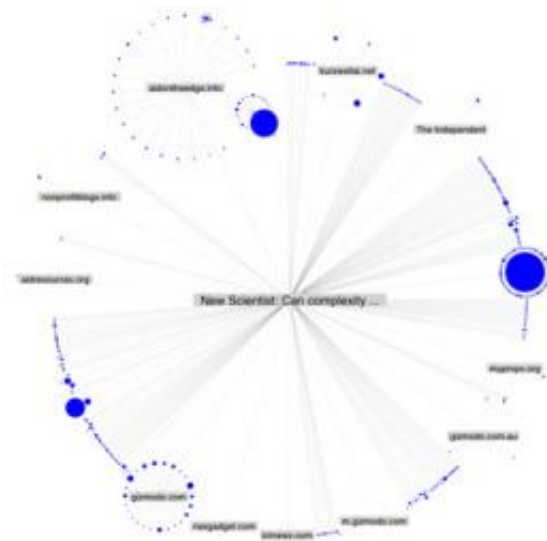# Twitter rising: Network scientists say social media are just what our society needs

March 29 2011, by Yaneer Bar-Yam

Tweet map showing tweets and retweets of New Scientist article "Can complexity theory explain Egypt's crisis?," followers are not shown, and image may not include all tweets. (Amaç Herdağdelen and Yaneer Bar-Yam)

The king of Web corporations has been Google with its dominance of search. Recently, Facebook has become the second-most popular website. How do the purposes of each of these successful sites differ, and where do they compete?

We will argue that Facebook, Twitter and other social websites are actually becoming a replacement of Google for a key function where they overlap—identifying the information that people pay attention to.

This is not a superficial change. It reflects an underlying fundamental truth about information and communication in complex networked systems.

We can better understand this by considering another system that has similar concerns: the human brain. A human brain is composed of perhaps 100 billion neurons with about 10 thousand connections each (though there is a wide range). Think of these connections, called synapses, as a way that each neuron receives and sends information. Neurons send each other pulses whose presence carries information in a code they understand. Each neuron has a certain set of neurons it listens to and a certain set of neurons it sends messages to.

As a neuron receives messages from its input synapses it combines them in some way, filtering or processing, and transmits the result to the neurons that are recipients of its output synapses.

What neurons don't have is the ability to search for information they might happen to want to see out of the information that is available to the brain as a whole. Instead the wired connections determine which information is available to each neuron. The connections do change over time, but not as rapidly as the information.

Social media sites serve a similar purpose. Each person has certain friends and subscribes to others who send information. Tweets, Shares, and Likes take information that one person considers important to his or her followers and friends and distributes it to them. This is not about personal information, but rather about information that one person considers important and wants to share. It is personalized to the recipient by the choices an individual makes about who to follow.

Two clickable "Tweet Maps" showing the network structure of tweets, retweets, and blogs of two recent science news articles are available [here](#)

and [here](#)*. The maps show network location and number of followers for hundreds of individual tweeters.*

This is completely different from the model Google provides. Google and other search engines serve as windows onto the web as a whole. There are indications that the growth of the web is so fast that the fraction of the web that [Google](#) can cover is shrinking.[1] More importantly, a person does not necessarily know what information is important to him or her, or how to look for it. Receiving a response to a question is not enough. Having many other people looking for what an individual should know about is even better than individuals looking only for themselves.

This doesn't mean that having a search capability is not useful; it surely is, since what we are doing and therefore the information we need is changing rapidly over time, even moment to moment. As long as this is the case, we need the ability to search for specific information because nobody knows what we will want tomorrow, not even ourselves. So general search is helpful when the types of information a person needs change rapidly over time.

Search is important when the information is changing slowly and the needs of an individual are changing rapidly.

Social links are important when the information is changing rapidly and there are diverse specific types of information that a person needs for what they are doing.

Today, the right balance is different for different people and different tasks they are doing. Some use search, others social networks. Professional and informal information are likely to be different. Over time, however the rapid growth of information will change that balance.

The most important controlling factors are the rate at which information is coming in to the system compared to the ability of an individual to process it (very high), the relevance of disparate pieces of information from many places in the system for a particular individual (high), and the rate at which the kind of information that an individual needs changes over time (slowing down).

Our society is facing increasing volumes of information.[2,3] Individually we can't cope, but collectively we can deal with the information. Together we need to ensure that the information that is needed—and not too much more than the information that is needed---gets to each individual. The solution is to have many people serving as filters for other people.

Over time, the way information is transferred among the individuals of the social network---the structure of the network---becomes itself a kind of map of the functions that are necessary for our society to survive and thrive.

More information: [1] B. Agapiev, What percentage of the web does Google index, and how has it changed over time?, www.quora.com/What-percentage- … it-changed-over-time

[2] Y. Bar-Yam, Complexity rising: From human beings to human civilization, a complexity profile, in Encyclopedia of Life Support Systems (EOLSS), (2002); also NECSI Report 1997-12-01 (1997). PDF file

[3] Y. Bar-Yam, Dynamics of Complex Systems, (Westview Press, 1997)

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