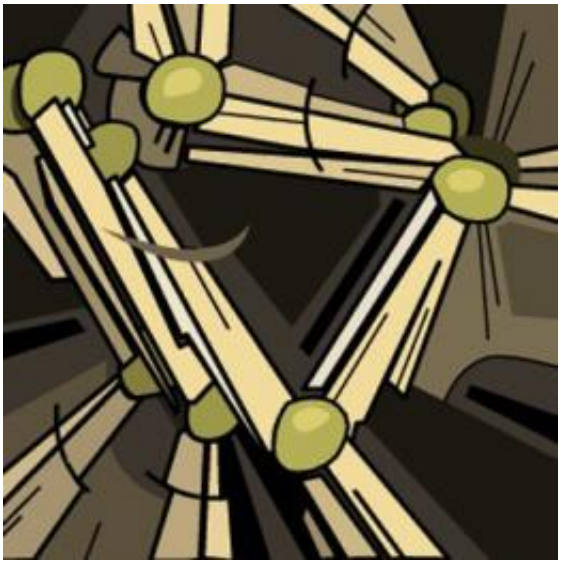
MedicalXpress

Tags for studying the spread of epidemics

July 22 2011



Abstract representation of dynamic networks inspired by a work by Marcel Duchamp. Credit: Wouter Van den Broeck

Participants in a congress were asked to wear a tag for two days in order to study their movements and interactions within a population. The data, collected by a French-Italian team including researchers from CNRS, Inserm, the Universite Claude Bernard Lyon and the CHU de Lyon, makes it possible to envisage the simulation of the spread of infection risks within a population, or even the optimization of the response to the expansion of an epidemic. The results of this work are published on 11 July in *BMC Medicine*.

Until now, data concerning the dynamic of contacts was vague: it was

often assumed that within a group, each individual could be confronted with another according to an average estimation of the frequency and duration of contacts. In the case of an infectious risk, the determined probability of infection was consequently not representative: in fact, in epidemiology, a single contact lasting one minute does not have the same impact as a repeated or longer contact.

As part of the SocioPatterns project, a team gathering physicists and epidemiologists from CNRS laboratories and other organizations took the opportunity of a two-day congress to measure the contacts between the 500 participants, each of whom agreed to wear a RFID (radiofrequency identification device). These tags made it possible to detect when two individuals were close together and faced each other. The devices were able to intercommunicate through the emission of very low intensity waves (1,000 times weaker than a mobile telephone) at a distance comprised between 1 and 2 meters. After collecting and processing the data by computer, the researchers succeeded in modeling the dynamic of contacts.

This has enabled the team to precisely define the relations between individuals in terms of temporal data, namely duration and frequency. Modeling the dynamic of actual interactions in a population makes it possible to simulate the spread of infection and, in the long term, envisage a better response in the event of an epidemic. To refine the model, the team intends to gather complementary information, which is why contacts between pupils at a school are currently being analyzed and the measurement infrastructure has already been deployed for a study in a hospital in Rome. In the future, it will be possible to envisage integrating this new inter-tag communication within businesses or in new technologies, since smartphones are already very well equipped with sensors.

More information: Simulation of an SEIR infectious disease model

on the dynamic contact network of conference attendees. J.Stehlé, et al. *BMC Medicine*, 11 July 2011