[P5] Layer-switching cost and optimality in information spreading on multiplex networks

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We study a model of information spreading on multiplex networks, in which agents interact through multiple interaction channels (layers), say online vs. offline communication layers, subject to layer-switching cost for transmissions across different interaction layers. The model is characterized by the layer-wise path-dependent transmissibility over a contact, that is dynamically determined dependently on both incoming and outgoing transmission layers. We formulate an analytical framework to deal with such path-dependent transmissibility and demonstrate the nontrivial interplay between the multiplexity and spreading dynamics, including optimality. It is shown that the epidemic threshold and prevalence respond to the layer-switching cost non-monotonically and that the optimal conditions can change in abrupt nonanalytic ways, depending also on the densities of network layers and the type of seed infections. Our results elucidate the essential role of multiplexity that its explicit consideration should be crucial for realistic modeling and prediction of spreading phenomena on multiplex social networks in an era of ever-diversifying social interaction layers †.

† B. Min, S.-H. Gwak, N. Lee, and K.-I. Goh, Sci. Rep. **6**, 21392 (2016).