

Small size, high connectance networks – the case of the artistic social network Aerowaves

Stryidon Bekiaris¹, Dimitrios Xenikos²

¹*School of Electrical and Computer Engineering, National Technical University of Athens, 15773 Zographou, Greece,* ²*School of Appl. Mathem. & Physical Sciences, National Technical University of Athens, 15772 Zographou, Greece*

The aim of our research is to examine the structure and the evolution of specific artistic social networks, in order to identify normative patterns seen in other social or biological networks. For this purpose, we chose to study the European social network of artistic activity called Aerowaves, which aims to support new choreographers and dance companies, by promoting their artistic work across Europe. Specifically, we have analyzed the mesh of artistic connections among European countries that depicts the international mobility of dance artists who are supported by the Aerowaves network. A short description of the Aerowaves structure and operation reveals the following: The network has currently 44 partners from 33 countries who select 20 out of 600 candidate works every year. These works are performed in the annual Spring Forward Festival organized by a partner's state. Moreover, every network partner invites at least 3 works to be performed in the partner's premises. That way, the work of a choreographer from a certain country is performed in another, connecting the two countries with a (directed) network link. There are 540 directed links between pairs of European countries during the studied period October 2014 - September 2021.

There are several possible representations of the above network mesh, which illuminate different aspects of the partner associations:

- In the representation where we keep the direction of the links, we observe linear rank plots for the out- and the in-degree. However, the slope of the out-degree plot is larger. This is consistent with fewer European countries producing most cultural content, compared to the countries that invite Aerowaves dance performances.
- If we consider all links in the network representation as undirected weighted edges, we find exponential degree distribution $P(k) = 10^{-k/70}$. This means that relatively few European countries dominate the cultural exchanges in Aerowaves.
- Most importantly though, we may compare Aerowaves with other studied networks if we consider all links as single-weighted and undirected. In that representation, the Aerowaves has $L=225$ edges and $S=33$ nodes, so it is of relatively small size and of high connectance $C= L/S^2 \approx 0.2$ (a much larger value than in other real networks as coauthors, word associations, power grid etc.). It has been reported that such complex networks have a tendency towards linear degree distributions and low clustering, as is observed in food-webs of aquatic and terrestrial ecosystems, where trophic species feed on each other in food chains [1]. We find that this is consistent with the Aerowaves degree distribution and clustering coefficient, despite the fact that the Aerowaves is a social network, where the concept of food chain is not explicitly relevant.

The similarity of social with ecological networks suggests that general structure characteristics do exist in small, high connectance networks. Social initiatives like Aerowaves may evolve and take action to preserve and expand their activity by emulating self-preservation processes and network structures observed in nature.

References

- [1] J.A. Dunne, et al. Proceedings of the National Academy of Sciences, 99(20), 12917-12922 (2002).