

Group-Based Trajectory Modeling of Citations in Scholarly Literature: Dynamic Qualities of “Transient” and “Sticky Knowledge Claims”

Loet Leydesdorff and Susanne Baumgartner

University of Amsterdam, Netherlands

Email: loet@leydesdorff.net

Abstract

Group-based Trajectory Modeling (GBTM) is applied to the citation curves of articles in six journals and to citable items—articles, reviews, and letters—in a single field of science (“virology”, 24 journals), in order to distinguish statistically among the developmental trajectories in subpopulations. Can highly-cited citation patterns be distinguished in an early phase as “fast-breaking” papers? Can “late bloomers” or “sleeping beauties” be considered as statistically significant groups or are these uncommon exceptions? GBTM has proved a useful method for investigating specific citation trajectories. Most interestingly, the findings raise questions about typical indicators of “excellence” that use aggregated citation rates after two or three years (e.g., impact factors). In contrast, we find significant differences between “sticky knowledge claims” that continue to be cited more than ten years after publication, and “transient knowledge claims” that show a decay pattern after reaching a peak within a few years. Although both patterns exhibit a rapid increase in the first years after publication, only papers following the trajectory of a “sticky knowledge claim” can be expected to have a sustained influence. Because findings indicate that aggregated citation curves can also be composites of the two patterns, 5th-order polynomials (with four bending points) are needed to capture citation curves precisely. For the journals under study, the most frequently cited groups were much smaller than ten percent. However, GBTM did not enable us to define a percentage of highly-cited papers inductively across different fields and journals.