The maths behind memes—why numbers could help us predict an internet sensation

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Planking.

In today's social media driven society an internet meme or online trend can explode in popularity overnight, remember the Ice Bucket challenge? But why do some online trends take the world by storm before disappearing just as quickly as they arrive?

Researchers at The University of Manchester's School of Mathematics and [data analysis](#) company Spectra Analytics, are investigating internet trends and memes from the recent past to find out.

From 'planking' and 'cat beards' to and 'the lying down game', the team have been looking at 26 different internet memes and trends dating back to 2011, measuring their impact and longevity then collating the data for analysis.

All the numbers have now been crunched and the team have identified and tested a mathematical model that accurately demonstrates why some fads will take off and even predicts how long it will last.

'Complex contagion' is the model that best describes the spread of behaviours driven by online sharing according to Dr Thomas House, the study's senior author. Complex contagion isn't a new concept but here, and for the first time ever, Dr House and the study's first author Dr Dan Sprague have used mathematics and data analysis to describe the complex contagion theory and provide empirical evidence for its action across society.

Dr House explains: 'Social influence can lead to behavioural "fads" that are briefly popular but then quickly die out. Various theories and models have been proposed to explain such behaviours, but [empirical evidence](#) of their accuracy as real-world predictive tools has been absent so far.'

What makes this discovery even more important is that not only does it provide evidence to explain why such trends take off, but could also be used predict the next online fad. That makes it extremely useful for people working in professions such as advertising and marketing, and it could also change the way public health and safety campaigns are disseminated to the general public, for example.

Dr House added: 'Complex contagion has predictive power. The fast spread and longer duration of fads driven by complex contagion has important implications for activities such as publicity campaigns and charity drives. If we can predict and control what messages go viral, that is a very power tool.

'The significance of the study isn't simply to understand why we follow fads online, but to fully understand social influence and the effect others' behaviour has on our own. Improved understanding of this phenomenon should help to predict various phenomena of interest, from how well public-health interventions will work to the use of "nudges" in public policy.'

To test the model's predictive capabilities Drs House and Sprague applied it to one of 2014's biggest global social media trends, the Ice bucket Challenge. The model predicted the impact and duration of the Challenge with 95% accuracy.

Dr House said: 'Here we have shown that the observed spread of real-world behaviours linked to online trends can be explained using a complex contagion model, and demonstrate that this model provides a predictive modelling framework for real-world behaviours spread online. Simply put, we potentially have a way to predict human behaviours and trends using maths, this is exciting stuff.'

  More information: Daniel A. Sprague et al. Evidence for complex contagion models of social contagion from observational data, *PLOS ONE* (2017). DOI: 10.1371/journal.pone.0180802

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