Researchers use physics to analyze dynamics of bestsellers

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A glowing report in The New York Times or a public relations blitz might send a book's sales soaring temporarily, but such heady buzz doesn't hold up like good old-fashioned word-of-mouth, says a group of researchers that includes a University of California, Berkeley, graduate student.
The researchers, who recently published a report in the journal Physical Review Letters, used a statistical physics model for complex systems to analyze the dynamics of commercial success for 138 books on Amazon.com's Top 50 list between 2002 and 2004 and to quantify consumer behavior.

They found that these books were characterized by two types of sales peaks: Some books reached their peak abruptly, then experienced decreasing sales, while others reached the top rankings after a longer time on the market, then saw gradually falling sales. Their model symmetrically and exactly matched the rates of sales growth and decline for 84 percent of the bestsellers examined.

Thomas Gilbert, a Ph.D. student in finance at UC Berkeley's Haas School of Business, analyzed the Amazon.com bestseller database, which included thousands of books with popularity rankings updated hourly with the infusion of sales data. He used a generic network model that predicts the two kinds of peaks and he tested it against Amazon.com's database.

"It's quite amazing that in those 138 cases, this matching works so well,"

said Gilbert, who has a master's degree in physics. "The model doesn't just indicate that book sales are going to decay faster or slower, it gives us an exact slope. This is quite phenomenal because we're talking about a human system: It is human beings talking and buying books and talking some more."

This "econophysics" model has been applied to forecast earthquake aftershocks, stock market crashes and epidemics, Gilbert said, but this use is a first for consumer behavior with respect to such a simple and ordinary product -- books. The model focuses on two types of "shocks" that cause a significant outcome: exogenous shocks that strike like a hammer blow and quickly subside, and endogenous shocks that build slowly and retain more of their strength longer.

Gilbert described how this applies to book buying.

"With the exogenous shock, it's like you're driving along the road, and you see this advertisement on a billboard, or in the newspaper as you're flipping through it. You think, 'Oh, sounds exciting, I'll buy it,'" he said. "Maybe you like the book, maybe you don't, but you won't necessarily talk about it with somebody else, so the word may not spread. Yes, it was propelled to the bestsellers' list, but it's not penetrating the network, and it's not really influencing everyone. It's not personal, and it doesn't travel well."

In a specific case that spurred the research, Gilbert's adviser, Professor Didier Sornette at UCLA, found that his book on why stock markets crash zoomed from a ranking around 4,000 to No. 5 within a day of the posting of his interview with MSN on its "Moneycentral" Web site in January 2003. His book's success wasn't far behind that of a new Harry Potter book, which had snared the No. 1 slot.

Then, Sornette found his book's high standing erode rapidly, in typical

exogenous fashion.

Books on the other side of the equation, those that experience endogenous shocks, Gilbert said, include novels such as "The Divine Secrets of the Ya-Ya Sisterhood," a longtime bestseller that started out with a printing of just 20,000 copies and no major marketing plan.

"But women started creating their own 'little sisterhoods,' and the word spread like fire," Gilbert said.

This research offers valuable tools for book publishers and marketers, he said.

"The endogenous shock," said Gilbert, "clearly says that if you manage to convince a small handful of people or small book clubs here or there, the likelihood of really penetrating the network of buyers and selling a lot is higher."

For a book characterized by exogenous shock, Gilbert said, publishers could opt to re-launch the book when sales start to decay, spending more money on an ad and "pushing the network" again. "This gives them a way of quantifying this very precisely, timing the market and timing it very well," he said.

Gilbert noted that 16 percent of the bestsellers the researchers examined defied the model. An example, he said, is the re-release of a classic such as "The Lord of the Rings," in coordination with the sale of the video and DVD version.

Another example, Gilbert said, is a new book published by popular author who produces a novel every few years, sees it quickly reach the top of the charts, watches it fall just as fast -- and moves on to the next one.

Gilbert admitted that he himself is easily subject to the exogenous shock, buying books that pop up on ads, but said he always tries to spread the word after reading a book he really likes, such as "The Da Vinci Code."

Gilbert worked with Sornette, Fabrice Deschâtres of the École Normale Supérieure in France and Yann Ageon of the University of Nice, France, on the bestseller project.

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