UC SANTA BARBARA

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Sonia Fernandez

Computer Love

In your quest for true love and that elusive happily ever after, are you waiting for the "right" person to come along, or do you find yourself going for the cutest guy or girl in the room, hoping things will work out? Do you leave your options open, hoping to "trade-up" at the next opportunity, or do you invest in your relationship with an eye on the cost-benefits analysis?

For something so fundamental to our existence, mate selection remains one of humanity's most enduring mysteries. It's been the topic of intense psychological research for decades, spawning myriad hypotheses of why we choose whom we choose.

"Mate choice is really complicated, especially in humans," said Dan Conroy-Beam, an assistant professor in the Department of Psychological & Brain Sciences at UC Santa Barbara, and author of a paper in the journal Personality and Social Psychology Review. "And there have been a lot of people who have proposed abstract ideas about how it might happen."

One line of thinking, for instance, posits that we assess potential mates against an internal threshold of preferred qualities and attributes — a "minimum bar," that they have to meet to be considered a potential partner.

"And we learn where that minimum bar is based on how other people treat us," he said. Another model describes the dating market somewhat like the European social dances of the 18th century.

“One side approaches the other side and they get these kinds of temporary relationships going,” Conroy-Beam said. “And basically you stay in a relationship until you get a better offer and everybody kind of recurrently ditches their partners for better ones.”

But these mate selection models, and others like them, don’t capture a lot of the nuance that goes into real-life mate selection, Conroy-Beam noted.

“When you have a system that is particularly complicated like human mating markets are, verbal models are sometimes not such a great way to understand what’s going on,” he said. Competing desires and social dynamics play heavily into mate selection, he explained, adding layers of complexity and moving parts that can’t be captured or quantified.

So what *can* hold human-like multiple levels of detail and complexity? The next best thing: a computer simulation. In an effort to move understanding of mate choice forward, Conroy-Beam has developed a new approach — called “couple simulation” — that essentially test-drives models of mate selection against the attributes and priorities of a sample of real-life couples.

“The real advantage that we have here is that we’re going away from just these verbal models and into explicit computational models,” he said. “We’re directly simulating people’s real choices; we’re removing the limits of doing this in our own heads because we have computers that can keep track of all the very complicated interactions that are going on.”

Sim Dating

The process begins by measuring the traits and preferences of a population of a few hundred couples — real people who have made real-life mate choices. That data is crunched into simulated copies of each person — “avatar agents” that have the same attributes and desires as their human counterparts, except in the simulated world they’re single.

“We break them up and throw all these little agents into the market,” said Conroy-Beam, who received support for his research from the National Science Foundation’s Early CAREER program. “Then we run various algorithms and see which ones do the best job at putting them back together with the agent representing their real-world partner.”

The algorithms represent different models of mate selection, which dictate the rules by which the agents can interact, based on the predictions of the model. In addition to the Aspiration Threshold Model (minimum bar) and the Gale-Shapley Algorithm (optimizing stable pairs), the team also used the Kalick-Hamilton Model (KHM), which assumes people choose mates according to their attractiveness, and a new model Conroy-Beam proposed called the Resource Allocation Model (RAM).

“It’s thinking about mate choice in terms of investment of limited resources,” he said. “So you’ve only got so much time and so much money and so much energy that you can dedicate to potential partners. And so your question as the person who’s looking for a partner is ‘who deserves most of these limited resources?’”

Conroy-Beam’s model, it turns out, proved to be the most accurate, correctly matching approximately 45% of the couples in the simulated market in the very first runs of couple simulation. What makes the Resource Allocation Model work so well?

“There are a number of differences between RAM and the other models,” he said. “The other models treat attraction like an on/off switch, but RAM allows for gradients of attraction. It also incorporates reciprocity: the more a potential mate pursues you, the more you pursue them in return,” he said. The Gale-Shapley algorithm came in second, followed by the aspirational threshold model and then the KHM (attractiveness). Random pairings came in last.

It’s still early days for couple simulation; after all, Conroy-Beam said, 45% right is still 55% wrong. For a first pass, however, 45% accuracy is impressive, and according to the study, the people in this cohort also report having higher-quality relationships (more satisfied, more committed, more love, less jealous) than the people in the inaccurately paired couples.

Conroy-Beam and his team at the Computational Mate Choice Lab at UCSB will continue to refine their models, which he calls “really rough sketches,” to increase accuracy. They’re hoping to soon conduct a longer term longitudinal study to see if couples that are accurately predicted differ in longevity.

“We hope to do this across cultures as well as to incorporate same-sex couples in the near future,” he said. “We also have plans in the next couple of years to try to apply this to single people to prospectively predict their future relationships.”

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