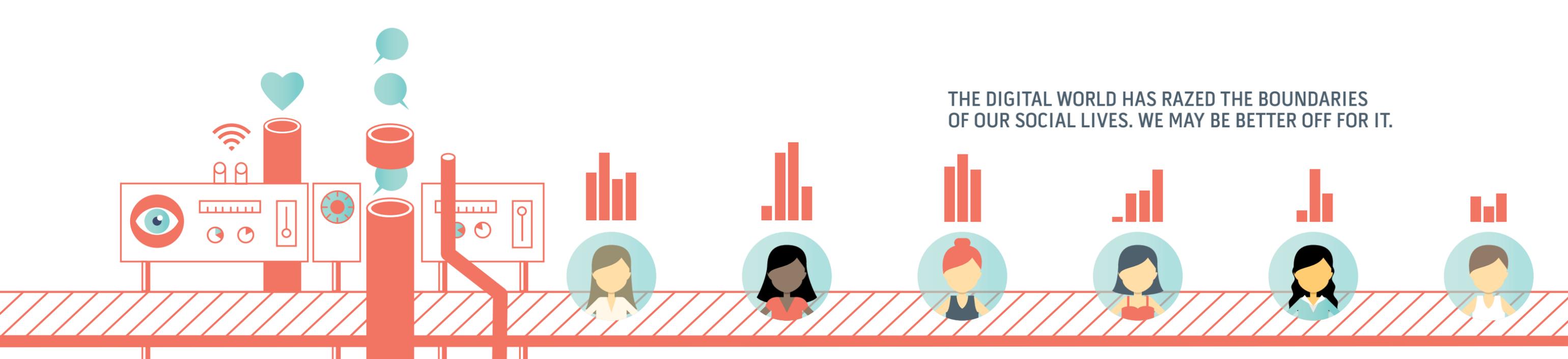


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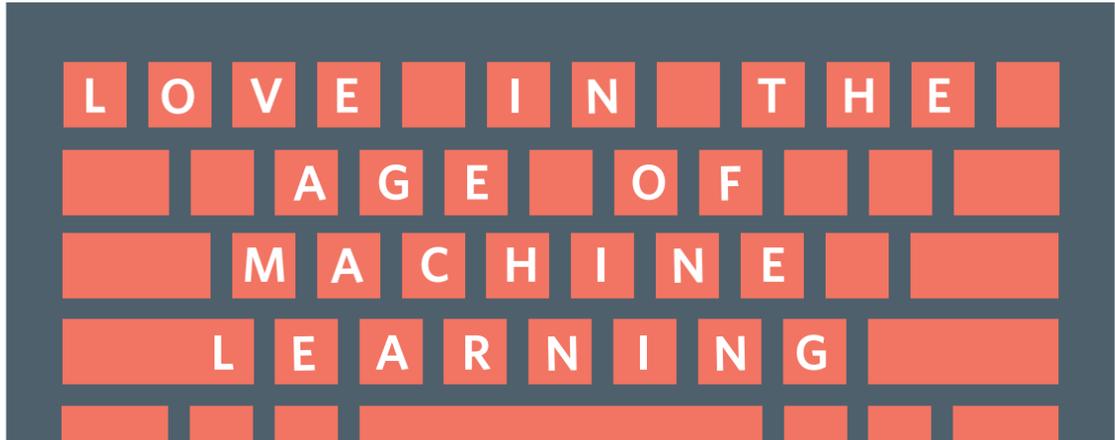
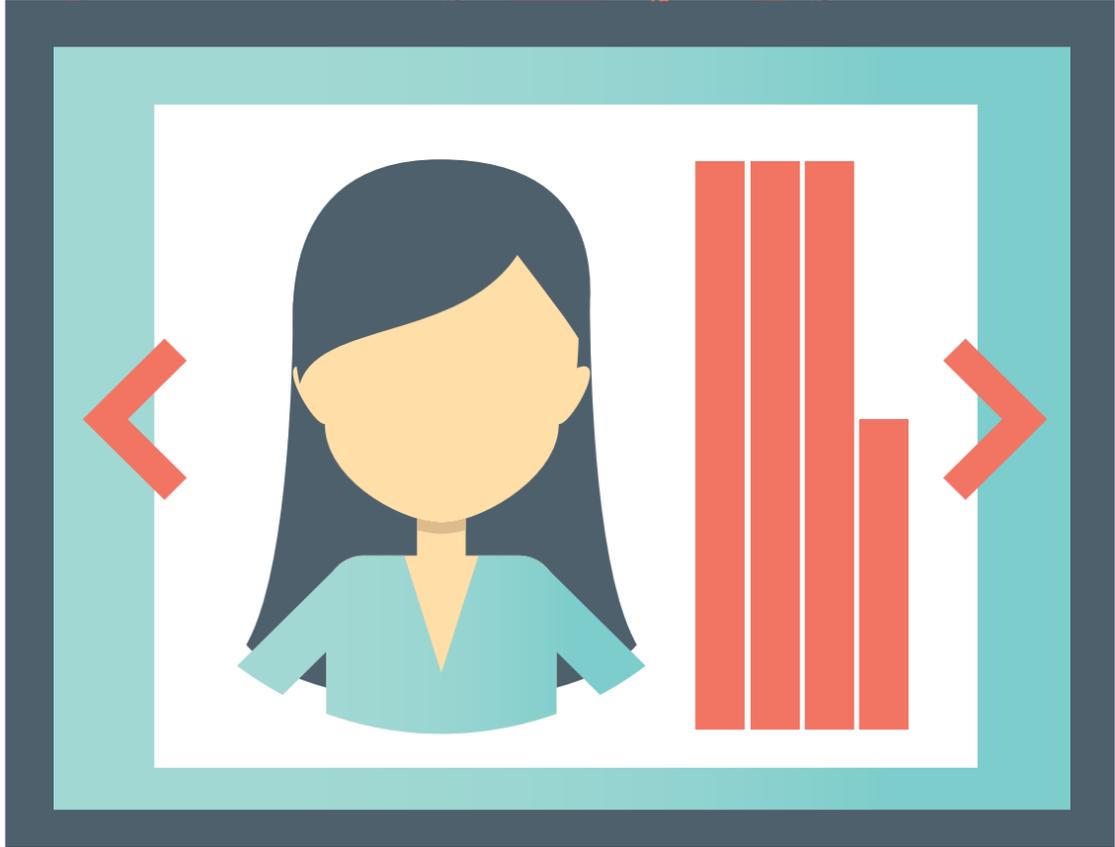
*romance*

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THE DIGITAL WORLD HAS RAZED THE BOUNDARIES OF OUR SOCIAL LIVES. WE MAY BE BETTER OFF FOR IT.



We connect to each other today through portals we never could have imagined a century ago. Our smart phones, tablets and computers place us within a fingertip's reach of billions of humans around the globe, any of whom could become future friends, business partners or spouses. Gone are the days when relationships were circumscribed by geography and circumstance—the walls around our villages have been torn down and we are discovering, even ourselves creating, a new boundless social universe.

The implications of these changes could be huge. Humans are uniquely social creatures, driven by the need for deep, intimate relationships. If everything about how we connect is transforming, what will it mean for our species? Will the Internet strengthen our bonds or weaken them, and how will these changes ultimately impact our evolution and survival? In a recent commentary, Arthur Aron, a psychologist and intimacy expert at the State University of New York at Stony Brook, put it this way: "The quality of our close relationships is the single biggest contributor to personal well-being and one of the largest contributors to health and longevity—so understanding a phenomenon that is changing the landscape for the formation of such relationships bears on fundamental issues in human life."

It might take decades to understand exactly how our new social landscape will affect us, but hints are emerging. Many of them, thankfully, are good. Overall, research suggests that Internet use boosts life satisfaction. Studies have found that people who spend time online are more satisfied with their lives than people who don't, accounting

for socioeconomic differences. And a recent study that followed more than 20,000 people from 13 countries reports that Internet use enhances people's social lives, increasing the overall amount of face-to-face contact—not just virtual contact—they have with friends and family.

Why might this be? Doesn't the Internet replace quality with quantity, inducing people to connect broadly but superficially? Perhaps not: many experts argue that the Internet can actually boost relationship quality for various reasons. "Social networks allow us to develop casual relationships into closer ones and help us maintain close relationships when geography or time commitments are getting in the way," explains Pamela Rutledge, director of the non-profit Media Psychology Research Center in Newport Beach, California. Often, what we do online bridges with and complements our "real" lives, too. We have "Tweet-up" parties to meet the people we follow on Twitter; we use Facebook to re-connect with old classmates.

Online socializing and dating can also be a boon for people who are shy or socially marginalized. A 2012 poll conducted by digital marketing firm Performics found that 40% of Americans feel more comfortable interacting with others online than in person. Perhaps as a result, 38% of American adults who are "single and looking" for partners have used online dating sites or mobile dating apps, according to the Pew Research Center. Online dating sites "create a great way for people to take the first steps in a protected environment," explains Yair Amichai-Hamburger, director of the Research Center for Internet Psychology, part of the Sammy Ofer School of Communications at the Interdisciplinary Center (IDC) in Herzliya, Israel. "You can learn a lot about the other side before you more forward." People feel less inhibited online, too, and are more easily able to find others who have shared experiences or problems. "The Internet builds a sense of agency,

**When more social options are available, we can be pickier...**

competence and voice. It allows people to develop strengths, and normalize their feelings and experiences,” Rutledge says.

There’s yet another way the Internet may help bolster better relationships, too. When more social options are available, we can be pickier—we can find those one-in-a-million friends or partners more easily. According to the Pew Research Center, people use online dating sites for this exact reason—to find other people with common interests or beliefs. By combining the breadth of the Internet’s reach with algorithms that help to focus and filter its lens, we can find uniquely-suited partners and opportunities that would have remained hidden from us in decades past.

### Selecting the right person for marriage is the most underappreciated challenge in the human experience

This is the idea behind eHarmony, the popular online dating site that uses a sophisticated compatibility matching system to identify potential long-term romantic partners. The company’s continued success suggests that the Internet can be harnessed as a powerful tool to find well-matched needles in a huge and often overwhelming relationship haystack. By taking a close look at their approach, we gain a window into some of the ways the Internet could be used to brighten humanity’s social future.

### Building stronger bonds

It was 1997 when Neil Clark Warren realized that he could apply what he had learned about marriage to help people forge stronger ones. Warren was uniquely suited to attempt such a feat—he had spent the last 35 years as a clinical psychologist and marriage counselor. Over time, he

had discovered that couples who were compatible in certain ways tended to be more happily married, and that the couples who lacked these particular similarities often ended up divorced. And sadly, divorces seem to be the norm: statistics suggest that three out of every four marriages eventually turn sour. “Selecting the right person for marriage is the most underappreciated challenge in the human experience,” Warren says.

Warren spent three additional years, from 1997 to 2000, surveying hundreds of happily and unhappily married couples to find key elements predictive of marital satisfaction. He “wanted to discover what qualities made a marriage work well—not simply survive, but thrive,” he explains. Once he had isolated the key factors, he founded eHarmony. At its core, eHarmony is a web-based dating site that combines the scope of the Internet’s reach with the specificity of a unique matching algorithm to assist users in finding partners with whom they are truly compatible. It uses science, machine learning and the power of the Internet to help people form stronger personal connections—strengthening the very foundation of what makes us human.

eHarmony users are matched with others after completing long questionnaires that are designed to tease out their core attributes—their values, emotional skills and personalities, among other things. (These long and involved questionnaires also serve to “weed out” people who are not dedicated to finding compatible long-term partners.) Then, potential matches are refined by eHarmony through what is called affinity matching, a process that uses machine learning to identify the most appealing candidates. As eHarmony continues to learn from its users about which matches work and which don’t, it refines its algorithms to make them more successful. The numbers today suggest the algorithms work quite well: On average, 438 people get married each day who have been matched through the site.

## The Data Game

Love’s complicated. To make its initial matches, eHarmony pores through your questionnaire answers to figure out which users are most compatible with you. But what if a person who’s psychologically compatible isn’t someone you’re actually interested in? For more promising pair-ups, the service turns to machine learning, a sophisticated computing technique that runs through vast arrays of data, searching for patterns that humans might not see.

Our digital behavior says a lot about who we are. eHarmony looks at factors

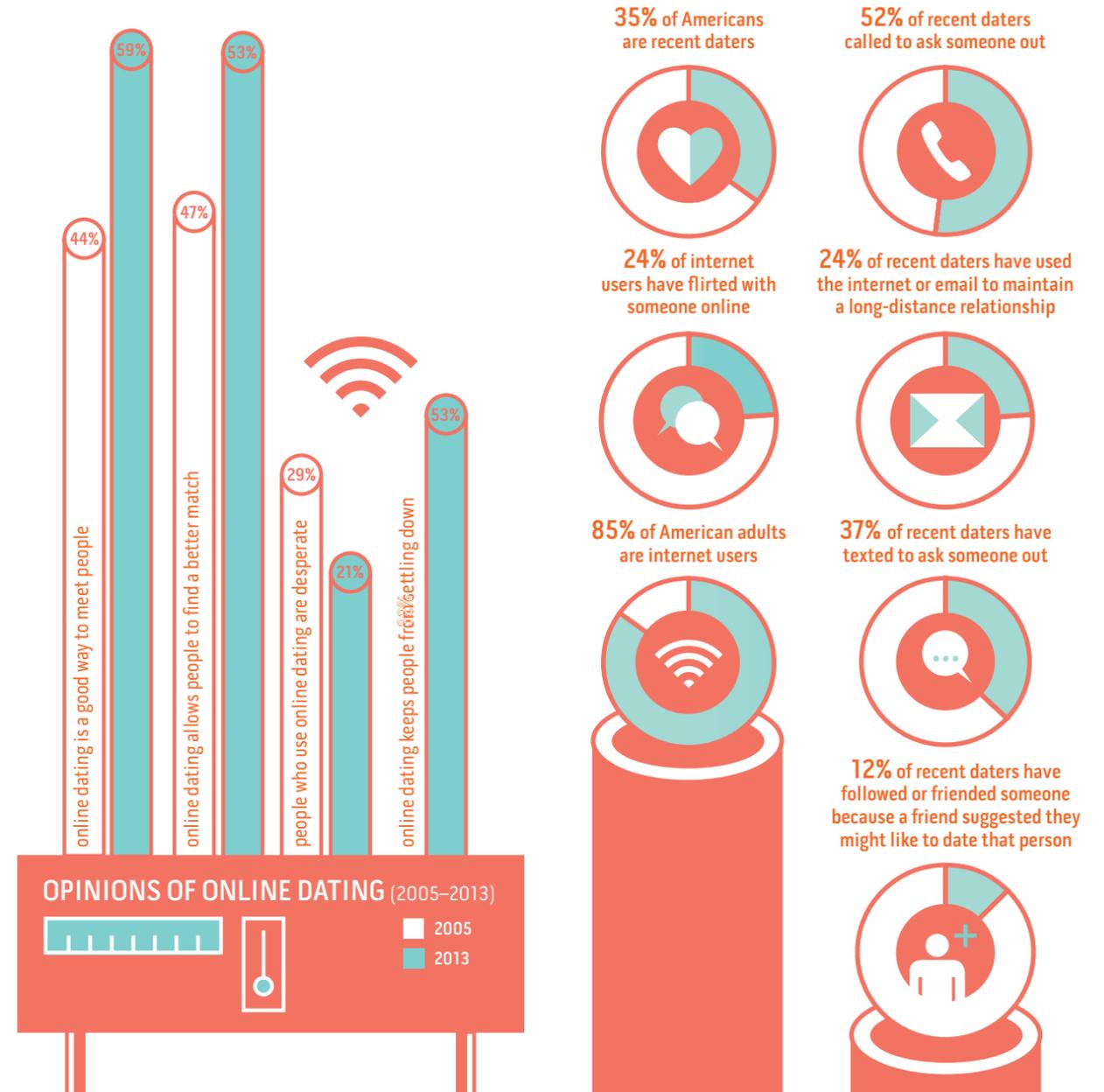
such as how often users log on, at what time of day, and from what sort of device. It considers how you communicate in your answers or in emails to other users—not only the type of language you use, but the length of the response. Other details it extracts from photos: are you blonde or brunette, do you wear glasses or a beard, are you rail thin or pleasantly plump? These are among the thousands of different features it culls from all sorts of users.

Then comes the matchmaking. eHarmony searches for successful pairs, which it defines by the number of two-way communications between users over a

seven-day period. Presumably, if you email someone, and that person replies, there’s a mutual attraction. It compares thousands of features among millions of users and builds a statistical model of which combination of features predicts success. This allows it to then look at another user and say, “given your particular mix of these features, these are the other people you’ll probably have affinity with.”



« Jonathan Morra



To refine the matches even further, the site analyzes individual users to determine their preferences. If you’re a heterosexual man, for instance, it will run the

The computer gathers a lot of information that users might not even be aware they’re giving.

profile it’s developed for you against all the straight women to find the best matches. “It’s not like, ‘the population of men prefers blondes,’” says Jonathan Morra, director

of data science at eHarmony. “It’s ‘this particular person prefers redheads’ or ‘this particular person prefers high-education people,’ or whatever the case may be.”

The method is powerful, says Morra, and not limited to love interests. eHarmony has launched a job-matching service, Elevated Careers, to apply the same techniques to the hunt for the perfect position. “We think it’s a problem in the marketplace that’s not actually solved by the job-match sites,” Morra says. The initial match—whether your résumé includes the skills required of the

job—might be likened to eHarmony’s compatibility score. But then Elevated Careers applies its algorithms to what it knows about a company’s employees to try to predict whether you’ll fit in, or if there’s a personality match between you and your potential boss.

Eventually, Morra hopes to use the same techniques in other areas—such as finding a financial advisor who sees eye-to-eye with you. The approach should work anywhere the company can gather data about which people get along with each other. “We think of ourselves not as a dating site, but as a relationship company,” he says.

These marriages seem to last, too. In a 2013 study published in the *Proceedings of the National Academy of Sciences* that was supported by eHarmony, researchers at the University of Chicago and other institutions surveyed 19,131 Americans who had gotten hitched between 2005 and 2012. They found that one-third of these partnerships had begun online, and that spouses who met online had higher marital satisfaction and were less likely to get divorced or separated. “These data suggest,” the authors wrote, “that the Internet may be altering the dynamics and outcomes of marriage itself.”

### The double-edged digital sword

eHarmony is but one of a large universe of digital instruments that have been created to placate the deep human desire to connect. But they are not all created equal, in part because they use vastly different criteria to forge connections. Some smartphone apps focus on geolocation—they use geocoding and geotagging to make it easier for people at the same bar to “hook up” with one another. Others introduce people to each other based on whether or not they have common Facebook friends. And of course some of the most widely used online dating sites are “open” sites in that they allow users to select potential partners themselves, by browsing and searching a vast database of online profiles.

But the matches facilitated by these tools are often short-lived, because they connect people based on information that has little to do with long-term compatibility.

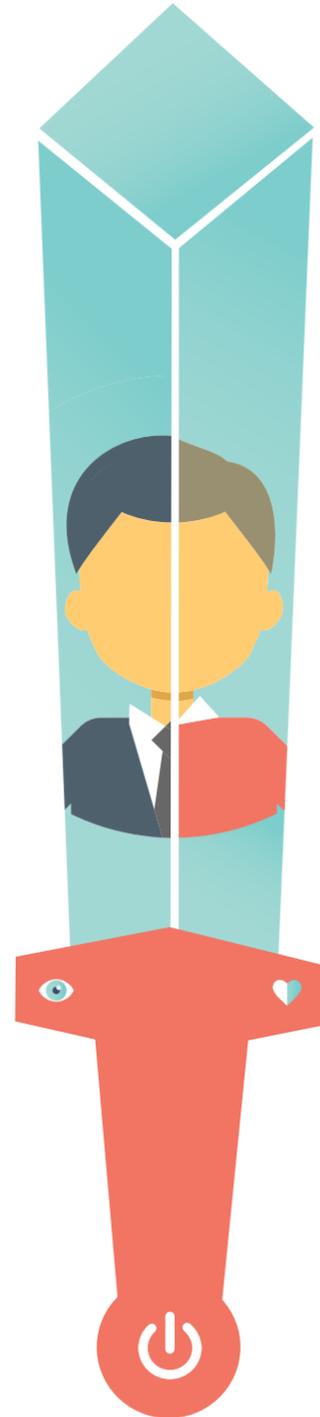
One major problem with “open” sites is that when people are allowed to choose their own matches, they make bad decisions. A woman might like a potential match she sees because of how he looks or where he lives—factors that may be important for the creation of a relationship, but don’t have much to do with its endurance.

By matching people based on attributes that actually predict long-term happiness, eHarmony is “going to do a better job of saying who you should meet than you are,” explains Steve Carter, eHarmony’s Vice President of Matching, who has a Ph.D. in psychology. eHarmony is one of the only tools that combines the science of psychology and relationship satisfaction with the power of machine learning and artificial intelligence in order to match two people who will actually be happy in a long-term relationship together. Indeed, people who are looking for a serious relationship have learned to trust eHarmony: Almost 1 in 20 couples married in the United States since 2005 met on eHarmony, and research shows that fewer eHarmony marriages end in divorce or separation compared to those begun on other sites or offline.

Another problem with open sites is that people lie when they create online social profiles. Research has shown that men commonly lie about their age and height, while women most often lie about their weight, physical build, and age. Indeed, online daters on open sites actually

spend more time crafting their personal profiles than they do getting to know potential matches.

And when social sites allow people to see so many options, “it looks like an endless market,” Amichai-Hamburger says. One study found that online daters on open sites spend an average of 5.2 hours a week browsing profiles but less than two hours a week actually meeting potential matches face-to-face. Indeed, access to too many



### How is eHarmony using Big Data & Machine Learning to help you find love?

Despite what some might think, computers have not yet reached the state where they can easily learn things on their own. In most ways, they are grossly inferior to humans when it comes to learning and solving problems. However, one area where they truly excel is the ability to store and use very large amounts of information with near perfect accuracy. Machine Learning is a field that evolved from statistics and computer science to develop algorithms to tease out patterns in this “big

data” that can solve problems in a way that a person might not be able to understand.

eHarmony makes use of Machine Learning to create matches that its users will find attractive (or more specifically, want to communicate with). eHarmony has years of data relating to users receiving, reviewing, and either communicating or not communicating with other users. Although the key mission of eHarmony is to create and deliver matches most likely to result in successful long-term relationships, there’s

much to be learned from those pairings that don’t stand a chance. In addition to its data on people in lasting relationships, the site also harnesses the insights gained from the vast majority of instances in which two people have no interest in dating. Drawing on the sizeable data compiled over its 15+ year history, eHarmony employs Machine Learning to generate algorithms that provide users with the most promising matches—ones that will inspire them to take that first step toward a new relationship.

potential partners may reduce online dating to a form of shopping—“relationshopping,” as some researchers call it—which may make them less willing to settle on any one potential partner or work to get past initial relationship obstacles. “When things go a bit wrong, you might say, ‘why should I work hard? There are so many great options online,’” Amichai-Hamburger explains.

These problems also plague many online job-search sites. Nearly half of all Americans have applied for jobs online, according to the Pew Research Center—yet individuals often use the wrong criteria to choose employers or jobs, and employers make similar mistakes picking their staff. These errors are partially to blame for the fact that more than 70% of employees do not feel fully engaged in their jobs, according to the Gallup-Healthways Well-Being Index.

To overcome these barriers to job satisfaction, eHarmony has launched an online job site, Elevated Careers, that uses its proven algorithmic approach for long-term compatibility to connect job seekers with employers. It makes sense: a person’s psychological profile predicts not only who—he will be romantically happy with, but also who—he will be happiest working with and in what kind of environment. The idea behind Elevated Careers is to connect people to the job opportunities for which they are perfectly matched, so that they can have fulfilling and productive professional lives.

### It’s all in how you use it

Inevitably, while the Internet can be an immensely powerful way to connect individuals, it can also pose risks and backfire. It has potential, but we have to know what we’re doing.

Consider this historical example: Since computers were first introduced into workplaces in the 1970s, scholars have pondered their potential social impacts. Some

theorized that computers would foster online friendships and interactions that would be unfulfilling compared to those that happen in “real life,” because of their lack of important social cues and context. In an oft-cited 1998 study known as HomeNet, researchers at Carnegie-Mellon

### heavy Internet use was associated with greater psychological well-being

University in Pittsburgh found what appeared to be clear evidence in support of this notion. When they provided people with computers and free Internet access, the subjects said they

became more lonely; the more frequently the participants went online, the lonelier they felt. Online relationships were believed to be “weak ties,” much less meaningful and fulfilling than those formed in person.

Yet the HomeNet study had limitations—among other things, it only included novice Internet users and followed them for just a short period of time. When the researchers followed up with a subset of the same participants three years later who had continued to use the Internet, they found that the negative effects disappeared—that Internet use was associated with greater psychological well-being, and that heavy Internet users were also more likely to be involved in their communities and to see their friends and family.

These discoveries suggest that while the Internet’s immense scope can be socially isolating and counterproductive, it can also be harnessed to connect us more deeply. As more companies like eHarmony dig into Big Data and use machine learning and psychology to introduce us to the opportunities and relationships to which we are uniquely suited—those we never would have found on our own in the past—we may end up happier, more harmonious, and ultimately, more powerful ourselves.



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