

Why everything that seems obvious isn't

Armchair sociologists who think that sociology is the study of the obvious: it could be time to climb down off your furry pedestal, as **Duncan Watts** debunks the attitude that social science is an oxymoron, and exposes the myth of “common sense”

When I was a boy, I dreamed of one day becoming a scientist. And of the many rewards I imagined, one of them was explaining to people how it was that scientists had managed to find answers to questions that at first blush seem deeply mysterious. Now that I am a scientist, however, I increasingly find myself in a position I never anticipated – of explaining to people how it is that the world is far more mysterious than they realize. Much of this turnabout has to do with a career shift I made several years ago, from the “hard” sciences of mathematics and physics to what is frequently considered the softest of them all – sociology.

What is sociology? It is funny how often I get asked this question. No-one ever used to ask me “What is mathematics?” or “What is physics?” but for some reason people find the very idea of sociology a bit puzzling. To be fair, even sociologists have trouble agreeing on what it is that they study, or how they go about studying it. Everyday events such as those that go on in families and in workplaces are of interest to sociologists, but so are events of historical importance like social movements and revolutions. Sociologists study large-scale institutions including countries, firms and markets, but they also study issues such as inequality, race and gender that affect individual people. And while some sociologists gather data by interviewing people or digging in the archives, others solve mathematical models or analyse networks. As a result, we have economic sociologists, cultural sociologists, political sociologists, historical sociologists and, yes, even mathematical sociologists (that’s me, sort of).

It is a big tent, but it has something of a shabby reputation these days, both among the other academic disciplines and also in the public mind. Some of this probably comes from those poorly taught, but easy to pass, introductory courses that everyone seems to have taken in college; and in part from the famously “non-rigorous” methods that some sociologists employ. Regardless of its origins, the perception of social science that is widely held among “real” scientists is one that was captured succinctly some years ago by the physicist and science writer John Gribbin. While reviewing a book on sociological research methods, Gribbin went on from excoriating the book itself to note that he had always thought social science was “something of an oxymoron” anyway, and that “any

physicist threatened by cuts in funding ought to consider a career in the social sciences, where it ought to be possible to solve the problems the social scientists are worked up about in a trice. Or, just maybe, to show that they are talking a lot of hot air.”

Not everyone is so openly contemptuous, but the impression that sociology is not rocket science, or even really science, is one that has plagued the discipline for generations. “Real” scientists, after all, have solved some pretty impressive problems, while sociologists, frankly, have not. Humanity has sent space probes out of the solar system and put men on the Moon; we have built atomic weapons and atomic clocks; we have understood the properties of semiconductors and superconductors; and we have theories that account for the expansion of the universe almost all the way back to the Big Bang.

By contrast, we have great difficulty designing effective economic-development programmes. We do not know how to balance social inequality with economic growth, foster desirable social behaviour (like avoiding risky sexual behaviour or electing to drive a fuel-efficient vehicle) or avert mutually destructive cycles of ethnic and religious violence. We do not even have the ability to measure relatively straightforward-seeming outcomes, such as the effectiveness of an advertising campaign or the propagation of social influence.

Why the lack of progress? Could it be, as Gribbin seems to believe, that physicists have simply been too busy trying to ascertain the age of the universe, or figure out string theory, to pay attention to socioeconomic problems? Having now spent more than 10 years of my life trying to do more or less what Gribbin suggested – namely switch from physical science to social science – I can venture that the answer is “no”. The efforts of physicists, along with other mathematically inclined scientists who have in recent years piled into areas of research that were once the exclusive domain of sociologists, have generated some exciting progress. But it has also driven home another message: sociology is hard. I do not want to say that it is harder than physics, or biology, or anything else for that matter – everything is hard once you really try to understand it. But it is probably about as hard as any other discipline, and certainly hard enough that even the best physicists have trouble solving any but the most trivial problems.

Duncan Watts

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Why is social science hard?

Almost by definition, “social” phenomena are less about the behaviour of individuals than of collections of individuals such as groups, crowds, organizations, markets, classes and even entire societies, all of which interact with each other via networks of information and influence, which in turn change over time. As a result, social systems – like other complex systems in physics and biology – exhibit “emergent” behaviour, meaning that the behaviour of entities at one “scale” of reality is not easily traced to the properties of the entities at the scale below. Firms, for example, can exhibit highly stable identities and cultures even as the particular employees who work in them change completely over time – just as you remain “you” even as the cells in your body get replaced during the course of your lifetime. Conversely, the stock market, the economy or a political regime can collapse suddenly and unexpectedly even as the various players and background conditions

remain the same.

In the past few decades, physicists have also been increasingly concerned with complexity and emergence. But physics, it is worth noting, has made tremendous progress precisely by studying physical phenomena that take place at different scales in relative isolation, and by solving approximations of problems that are more complicated in reality. Outside of black holes, for example, one does not need to worry about gravity to solve problems in quantum mechanics; and although planetary motion is technically a multibody problem, the Sun is so big that the two-body approximation works extremely well. But these tricks do not work in social science, where the decisions of corporations or even governments, for example, may be affected disproportionately by the personal interests – or egos – of a handful of executives; or where, conversely, the behaviour of individuals is powerfully constrained by the corporate or political culture to

Tangled web

Understanding the collective behaviour of individuals is not as simple as you might think.

Talent or choice?

Experiments show that success – be it Madonna in music or the *Mona Lisa* in art – is as much a matter of chance as intrinsic quality.

Ronald Wittek/epa/Corbis



which they belong. Unlike in physics, therefore, essentially every problem of interest to social scientists requires them to consider events, agents and forces across multiple scales simultaneously.

Familiarity breeds contempt

Given the unavoidably multiscale, complex and emergent nature of social phenomena, it is not surprising that theories of social behaviour and change have been difficult to work out in any realistic detail. But if that is true, then the real puzzle is our tendency to assert that social problems are *not* so hard to figure out; that they are “not rocket science”, as it were. Where does this attitude come from?

A big part of the answer is that sociology necessarily deals with objects, processes and phenomena with which most people are familiar, and that familiarity breeds a certain amount of contempt. We all have friends, so we all are part of a social network; most of us work, so we belong to at least one organization; and we generally buy things, vote and watch TV, so we are constantly immersed in markets, politics and culture. In contrast, most of us do not have much personal experience with superconductivity, molecular biology or geophysics; and as a result, while we might have opinions about whether these subjects are interesting or important, we do not tend to question the claims they make. If a physicist explains something to you about superconductivity, you may or may not find it interesting but you are not going to dismiss the conclusions as obvious – or as obviously wrong. When the topic is human or social behaviour, however, the feeling that we already understand what is being explained often elicits precisely these reactions.

To illustrate, a few years ago one of my graduate students and I published a paper in which we analysed the evolution of a network of e-mail interactions in a population of roughly 40 000 university students, faculty and staff over a one-year period. Getting this kind of data used to be impossible and it is still difficult today.



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Analysing it is also not trivial, yet when I explained to a reporter that most new ties in the network form either between individuals who share at least one mutual acquaintance or one activity, her response was that she felt sorry for us that we had spent so long working out something so obvious. Of course, it is also obvious that light travels “really, really fast”, but few people would suggest that measuring the speed of light is either trivial or pointless. In real science, measuring things is considered a legitimate activity, whether or not the result is surprising. Yet because most results in social science accord with something we have either heard about, or even experienced ourselves, it is hard not to write them off as something we already knew.

Interestingly, when the result *does not* accord with our experience, our reaction is not to be surprised but instead to assume that it is wrong. Why, for example, is the *Mona Lisa* the most famous painting in the world? Why have J K Rowling’s *Harry Potter* books sold more than 300 million copies? And why is Madonna the most successful female musical artist of all time? Common sense suggests that superstars – whether performers, books or paintings – are successful because they are the best, or at least the best at appealing to the lowest common denominator. Whatever you personally happen to think of Madonna, in other words, common sense insists that Madonna is successful because she gives people what they want. And we know that Madonna is what they want because that is what they bought.

It is a very reassuring picture of the world, but is it right? A few years ago, my students and I addressed this question in an experiment in which roughly 15 000 participants were asked to listen to, rate and download songs by unknown bands via a website that we created. Some of the participants had to make their decisions independently, while others had information about which of the songs other people liked. In the “social influence” condition, two things happened. First, popular songs were more popular (and unpopular songs less popular) than in the independent case. But second,

which particular songs turned out to be the most popular became increasingly difficult to predict. What these results suggest is that in the real world, where social influence is much stronger than in our artificial experiment, enormous differences in success may indeed be caused by small, random fluctuations early on in an artist's career, say, that then get amplified by a process of cumulative advantage – a “rich get richer” phenomenon that is thought to arise in many social systems.

An important – and not at all obvious – consequence of these findings is that common-sense explanations for why Madonna, say, or J K Rowling, or even Shakespeare are successful simply do not account for all the other singers, novelists and playwrights who once upon a time might have seemed just as promising but did not succeed. In truth, the difference could just be the result of an early, random fluctuation that has grown exponentially over time, analogous to the famous “butterfly effect” from chaos theory. But try explaining this result to a Madonna fan, or to a *Harry Potter* fan, or to a Shakespeare fan for that matter. Common sense insists that what has succeeded in our world is different in some important and obvious way from what did not succeed, and any theory that says otherwise is probably wrong.

What is common sense anyway?

Up to a point, of course, it is reasonable to check theories of the social world against our experience – just as in physics we want to test our theories against empirical reality. But in relying so heavily on experience, common-sense explanations of the world can mislead us. For example, a critical feature of the music experiment was our ability to create multiple “worlds” in which randomly assigned groups of people could create different versions of history in parallel with each other. By observing how popular the same song became in different worlds, we could measure directly how much of its success could be attributed to some intrinsic “quality” that transcended the effects of cumulative advantage, and how much resulted from random chance. We found that although, on average, “good” songs did better than “bad” songs, the random fluctuations arising from social influence were larger than those arising from differences in quality. But because in real life we only ever experience one such world, we never get to make this kind of comparison. As a result, common sense reaches conclusions that it simply does not have the evidence to support.

Another problem with common sense is that what we learn from experience does not lead to a well-defined, self-consistent system for understanding the world in the first place. Unlike our knowledge of the physical world, which is characterized by a relatively small number of very general laws from which special cases can be derived in a logically self-consistent manner, common sense is a scattered and often contradictory hodgepodge of accumulated advice, experiences, aphorisms, cultural norms, received wisdom, inherited beliefs and introspection. Birds of a feather flock together – yes, but opposites attract. Does absence make the heart grow fonder, or is out of sight out of mind? Well, both of course. Should you look before you leap when you also know that he who hesitates is lost? And at what point



Common sense in conflict
Is it “Look before you leap” or “He who hesitates is lost”?

does try, try and try again turn into flogging a dead horse? Hard to say. Everyone knows it is bad to sweat the small stuff, but everyone also knows that it is good to be detail-oriented. How do we know when we are doing one and not the other? Likewise, we all value teamwork and collaboration while despising committees and groupthink, but nobody seems to know how to consistently attain the former while avoiding the latter.

The problem with common sense is not that it does not give sensible advice, but that what is sensible turns out to depend on a surprisingly large number of factors, most of which are not specified by the advice itself. Psychologists and, more recently, behavioural economists have built a cottage industry conducting experiments in which subjects respond quite differently to the same situation depending on changes to how questions are worded, the order in which decisions are presented, whether or not particular options are presented as defaults, what information (including irrelevant information) participants are given prior to making a decision and even what kind of music is playing in the background. Likewise, sociologists have long argued that much of what we take for granted – whether it be the supposed superiority of US-style capitalism, the brilliance of particular artists or the values underpinning a healthy society – is arrived at not through some process of rational examination and improvement but as a consequence of various historical accidents that get locked in via a process of collective rationalization.

If we always had to make predictions about outcomes before we knew them, the difficulty of identifying which of many potentially relevant factors were the most important would eventually become apparent to us. But because we typically only try to explain cause and effect after we know the outcome, we are never forced to learn this lesson. Instead, we are almost always in the much easier position of picking and choosing from our wide selection of common-sense statements about the world to come up with something that sounds like what we now know to be true. And because we only ever have to

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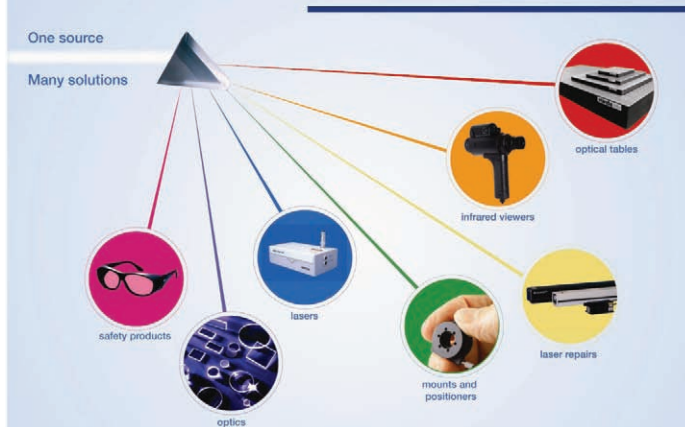
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We are all guilty to some extent of considering our own beliefs to be common sense

account for one outcome at a time – because we can ignore the “counterfactuals”, the set of plausible alternatives that somehow did not happen – it is always possible to construct an account of what did happen that not only makes sense, but sounds like a causal explanation.

Common sense, in other words, is extremely good at making the world seem sensible, quickly absorbing even the greatest surprises into a coherent-seeming world view, and as such it is a very effective design for getting through life. But a system that relies so much on simplification and self-deception is arguably not one that is well suited to the task of resolving complex social problems. In the US, for example, Republicans and Democrats disagree vehemently about the performance of President George W Bush, the basis for going to war in Iraq and the state of the US economy. Yet both sides are living in the same country, following the same events and looking at the same basic set of facts; and both sides, moreover, claim that their opinions are based on “facts” so obvious and overwhelming as to be almost self-evident. Arguably, in fact, it is precisely because everything seems so obvious that neither side is capable of persuading the other. Nor are Democrats and Republicans unique in their predicament – we are all guilty to some extent of considering our own beliefs to be common sense, and professing mystification at the obtuseness of others, without seriously questioning why it is that they feel the same way about us.

Some exciting progress

Both our perceptions of social science and our ability to conduct it could be changing with the explosive growth of the Internet, and the attendant migration of hundreds of millions – soon-to-be billions – of people online. The resulting avalanche of data – not to mention an influx of physicists and computer scientists – has the potential to revolutionize social science, just as the invention of the telescope revolutionized physics.

But no matter how many data we acquire, it is still a daunting task to address the big problems of society – questions about systemic risk in financial systems, solutions to urban poverty, the design of healthcare or public-education systems – or even the more mundane questions of, say, market research. At the very least, it will require the kind of “industrial science” model of large teams, well-equipped labs and dedicated research institutes that has proven dramatically successful in physical, biomedical and engineering science over the past century. In this sense also, the arrival of physicists and computer scientists has helped, and we are already seeing a range of multidisciplinary projects, centres and institutes springing up in both academia and the private sector. Industrial-scale science, however, is time-consuming and expensive, and support for such an enterprise is inconceivable as long as Gribbin’s attitude – that social science is, in essence, an oxymoron – prevails. ■