Research Note

Making Data Speak: Lessons for Using Numbers for Solving Public Policy Puzzles

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There is a vast increase in the production of policy analysis in government, but behind the rising volume is a deep paradox: We are generating information faster than we are devising strategies for hearing what it tells us and helping policymakers act on it. There are 10 big issues in using numbers for solving policy problems, and they lead to important lessons: Analysts need to speak in a language that policymakers can understand, capture the inevitable ambiguity of analysis without muddying their message, use analysis to help policymakers discover the opportunities for collaboration across interrelated policies, and speak to the questions that policymakers most want to have answered, instead of the questions they most want to study. These are the keys to defining what an information-age government truly means.

For generations, policy analysts have argued that government needs more and better numbers to inform policy decisions and their implementation. To be sure, there now are a lot more data, but with the rising supply comes a sharp question: Why do we collect more numbers, and perform ever-more sophisticated analysis on them, yet struggle to ensure these analyses have real impact on the policy process? Can we make data speak, more clearly and more effectively?

The puzzle has deep roots. After all, a set of reinforcing ideas drove the growth of schools of public policy and the evolution of policy analysis in the 1960s: the notion that traditional public administration was weakly rooted in systematic evidence, the argument that economic analysis could produce vastly better decisions, and that better data would produce better policy (Allison 2006; Dahl 1947; Rivlin 1971). The movement accelerated in the 2010s. In a play on the numbers revolution that baseball's Oakland A's brought to the game—a 2002 revolution christened "moneyball"—a bipartisan team of seasoned political hands produced a book, *Moneyball for Government*, led by Jim Nussle and Peter Orszag, both former directors of the U.S. Office of Management and Budget. They lamented that "less than one dollar out of every hundred dollars the federal government spends is backed by even the most basic evidence" and urged government to do better (2014, 4). The Pew Charitable Trusts and the MacArthur Foundation teamed up to improve the use of evidence policymaking, especially in state governments, while the Bloomberg Philanthropies launched a major initiative to help 100 mid-sized American cities bring more data to their operations. It was a revolution in data not seen since the rise of benefit–cost analysis and planning-programming-budgeting systems in the 1960s.

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The revolution built on interlocking trends. Policy analysis for public decision making evolved into a strong push for randomized controlled trials, to bring the "gold standard" of scientific testing into the policy world. Performance management brought stronger analysis into policy implementation (Behn 2014). The big data movement, coupled with an explosion of data-based applications for smartphones, vastly increased the volume of available information and the sophistication of analyzing it. The revolution was remarkably broad, from the highest levels of government (in the U.S. Office of Management and Budget, for example) to the grassroots (through CitiStat processes in many local governments). It stretched around the world, especially in the United Kingdom, New Zealand, Japan, Singapore, Brazil, and a host of other countries in a global government reform movement.

Despite the breadth of the movement, however, there is a nagging worry: The revolution has produced more and better data, but demand for better data, along with techniques to use them to improve both policy decisions and their implementation, has not kept pace with supply. Government's data geeks often echo Nussle and Orszag's worry: Even though there is a vast quantity of data, many decisions are being made without looking at what the data tell us.

Ten reasons explain why data do not speak, more clearly and more often.

1. *It is easy to act without data—and elected officials often do*. The basic argument of policy analysts is that the world would be better if policymakers listened to them more often (it would) and that policymakers should do so (but very often they do not). In a very useful 1979 book, Charles E. Lindblom and David K. Cohen explain why. Policy analysts, they argue, "greatly overestimate the amount and distinctiveness of the information and analysis they offer for social problem solving." Even more important, they point out, society can—and often does—rely on "ordinary knowledge" to make decisions—information that flows from experience and common sense. For most problems, "people will always depend heavily on ordinary knowledge." It is always available, it always provides at least some answer to every question, and it is not always clear to policymakers what value sophisticated policy analysis adds (Lindblom and Cohen 1979, 12).

The instincts of policymakers only deepen that challenge. After all, they have achieved their positions by winning elections. That understandably convinces them that they not only have a good finger on the pulse of voters, but that they have a better sense of voters' minds than their opponent. There is no better reinforcement of their own ordinary knowledge than that—or their assumption they need nothing more. Policymakers will not use policy analysis unless it answers questions for which they want answers—and unless it provides the answers when they need them, in language clear enough to overcome ordinary common sense.

2. *Some of what we know is wrong*. Of course, what we know from ordinary knowledge is not always correct, although that does not prevent policymakers from acting on it. Repeating wrong information often enough can make it seem true, at least to some people. One poll (Schroeder 2015), for example, found that 29% of Americans (and 43% of Republicans) believed that Barack Obama is a Muslim (he is a Christian) and that 20% believed he was born outside of the United States (he was born in Hawaii, after it became a state). Fact-checking organizations like PolitiFact have more work than they can handle. An ABC News/*Washington Post* poll found that 63% of Americans found climate change a serious threat, a drop of 6 points in 18 months. The poll revealed that 43% of those surveyed believed that scientists disagreed on whether global warming was happening (ABC News/*Washington Post* 2015). In fact, NASA (2016) concluded, 97% of scientists believed that global warming was real.

Policymakers believe what they think they know. Sometimes what they believe to be true syncs with careful policy analysis. Sometimes it does not. But regardless of whether their ordinary knowledge syncs with the conclusions of policy analysts, they are prepared to act on what they believe to be true, unless policy analysis provides a straightforward and convincing counter.

3. *Data do not speak for themselves*. Policy analysts sometimes come to the policy process assuming that once they have produced their conclusions, supported by their equations, policymakers will follow them. In fact, data rarely speak clearly on their own. Good policy analysis is rarely definitive. Better policy analysis expresses its conclusions within confidence intervals, conveying findings with a sense of how certain the basic conclusion is and how likely extremes on either side might be. Basic conclusions, expressed as means, medians, correlations, coefficients of determination (or r-squared), or other statistical measures, are often opaque to those outside the analytical community. Measures of uncertainty sometimes are buried, which lends false precision to the conclusions. Sometimes analysts lay them out clearly, which can trap the uninitiated in uncertainty about what to do. Harry S. Truman, exasperated with economic advisers who told him, "on the one hand" and "on the other hand," said simply, "give me a one-handed economist!"

That speaks both to the impatience of policymakers with the inevitable uncertainty of policy analysis and the difficulty of communicating that uncertainty in ways that speak clearly to policymakers. Chopping a hand off each economist will never produce clear language. Policy analysts need to speak in a language policymakers will hear, and much of policy analysis does not. Charts and figures often work far better than equations and statistics.

4. *Anecdotes often speak louder*. A close corollary of the first three points is that both citizens and policymakers alike tend to communicate through anecdotes. Policy analysts frequently complain that they often produce detailed reports only to find that their superiors—especially elected officials—latch onto stories that they retell endlessly, which might or might not match the findings of the analysis. Anecdotes often are more memorable. In fact, many politicians have audience-tested their favorite anecdotes over the years and rely on the ones that get the best reaction. On HBO's *Last Week Tonight*, host John Oliver (2015) featured a clip of Sen. John McCain's endlessly repeated favorite joke. Asked about how he had been doing since losing the 2008 presidential election, he said, "I've been sleeping like a baby—slept two hours, wake up and cry." Politicians instinctively reach for the lines that connect them best, fastest, and easiest with voters, and anecdotes often work better than complex policy analysis.

There is nothing new here, of course. Many of the founders were great story tellers, perhaps none more than Benjamin Franklin, who had a whole "almanack" of his best metaphors and stories. But there is a profound paradox here. The loudest voices in anecdotal data are often the ones to which audiences react strongest, and rarely are they statistically valid.

5. *We often do not focus on helping anecdotes speak better*. On the other hand, because many policy analysts inherently distrust anecdotes, they rarely work to make anecdotes speak more clearly and powerfully. Anecdotes, however, can draw on real data and pack real meaning. In a graduate seminar at Stanford University, a graduate student challenged a statement made in class as a mere anecdote. The professor, Raymond Wolfinger (2009), brilliantly replied, "the plural of anecdote is data." Data researchers, however, rarely spend much time determining how to make the connection between the singular and plural and, therefore, often miss an important opportunity to connect with policymakers and to help policymakers connect with citizens.

Some researchers have invested more energy in exploring how to use "evocative writing, short films, infographics, and maps, to convey global issues," as a conference at Washington's Wilson Center put it. Indeed, "stories are very powerful," argued Dingaan Mithi (2013), a journalist for JournAIDS in Malawi, because "they change how politicians think." Some federal agencies have invested resources in storytelling, while agencies like NASA have focused energy on developing new strategies for communicating complex information to busy policymakers. The approach builds on two important notions: that policy analysts have to speak in the language that policymakers will hear, and that policymakers can give voice even to complex analyses through anecdotes, because well-chosen anecdotes can capture the central tendency of data just as well as statistical measures like means and medians—and get more laughs.

6. *Data for policy decisions often do not connect with data for policy implementation—and vice versa*. Policy analysts sometimes are their own worst enemy in seeking to persuade policymakers because too often they neglect their most important allies: other policy analysts. Data on policy decisions and program evaluation rarely connect with data from policy implementation, for a host of reasons. There are big differences in disciplinary approaches, problems studied, and time horizons. Economists often focus on policy decisions and multiyear analyses, through evidence-based approaches (think randomized-controlled trials of which policy decisions produce better results). Public management analysts often focus on performance management approaches focused on accumulating long-term trends from short-term snapshots (think the "stat" strategy of week-by-week tracking of a program's outputs). The differences in the questions asked, the time horizons studied, the disciplines invoked, and the professional guilds involved often means that the dots between policy decisions and their implementation remain unconnected [Correction added on 8 September 2016, after first online publication: the phrase "professional guilds in involved" was changed to "professional guilds involved" in the preceding sentence]. That, in turn, weakens the collective voice of the analysts.

As public management professor Don Moynihan points out, program evaluation and performance management are "a tale of two children who were brought up in the same house but were raised by different tribes and aren't so friendly with one another." The split, moreover, has become "institutionalized in government," Moynihan (2016) observes. Mashing the two streams together into a single government office never works. Focusing instead on how to help top executives deliver better services for citizens offers more promise, as the prime minister's delivery unit strategy showed in the United Kingdom (Barber 2008).

7. *Sometimes policy analysis takes policymakers down the wrong road*. Analyses that lead policymakers down the wrong road can diminish their taste for data. In 2014, analysts suggested that cash-starved Flint, Michigan, could save $1 to $2 million per year by drawing its water from the Flint River instead of relying on the Detroit Water and Sewerage Department, Governor Rick Snyder explained later. Almost immediately after the switch, citizens began complaining that their water smelled and tasted funny. The water from the Flint River, it turned out, had high levels of corrosive chemicals, which corroded the lead pipes in the system and lead levels in city residents, especially children, increased dramatically. Snyder later admitted that the disaster turned into his own Hurricane Katrina disaster story. He had lost citizens' trust, admitting, "Trust is something that once you lose it, it's much harder to earn it back. So that's the point we're at" (Fournier 2016). Policymakers never forget advice that compels them to admit such abject failure. Risk analysis and strategies of anticipatory governance can help analysts speak clearly—but also see and communicate the downside of the proposals they recommend (Guston 2014; Webster and Stanton 2015).

8. *Pictures often speak better than numbers*. Many a piece of policy analysis concludes with a table of numbers, full of significance tests and asterisks. For most policymakers, however, these artifacts do not speak clearly out of the background noise. They require translation to be meaningful. NASA discovered that amazing photographs from the Hubble space telescope conveyed the broader wonder of its work. Policy analysts are just beginning to realize the same thing.

Political scientist Edward R. Tufte helped launch this movement with his path-breaking book, *The Visual Display of Quantitative Data* (1983), a modern classic privately published and first sold out of his garage. He helped launch the data visualization movement, which has been supercharged by the rise of geographic information systems and big data. Tufte's illustrations show how images often convey more information, more powerfully than statistics. When coupled with sophisticated mapping techniques, which overlay data from multiple sources and studies, they can also make data real for people. After all, citizens live in neighborhoods, not government programs, and place-based mapping can illustrate how different programs come together to affect where they live. Although Tufte launched this movement, policy analysis still has miles to go before developing regular, sophisticated strategies to convey complex findings in simple, easy-to-follow illustrations that speak clearly to those without sophisticated statistical training.

9. *Better data can help policymakers cross boundaries—but boundary-crossing data often are not available*. It is a truism that the information age has replaced industrial society and that cross-boundary problems have become the central public policy challenge for the 21st century. Information can cross boundaries that traditional approaches, based on organizational structure, cannot. But devising systems for doing so are just in their infancy.

The potential of information in bridging boundaries, however, came from the Recovery.gov Web site, which the federal government created to track the $840 billion stimulus program launched in 2009, at the height of the great recession. The Obama Administration wanted to ensure that the program provided quick feedback to citizens, was as free of waste as possible, and encouraged cross-agency and intergovernmental collaboration. Citizens could type in any address in the country and identify which programs, from which agencies, were operating in their neighborhood. At one demonstration of the Web site, a college freshmen who had never heard of the program was asked to provide an address. She replied with a zip code for Seattle. A map of the Recovery.gov programs in the area popped up in a couple of seconds. She stared at the screen for seconds and zeroed in on precisely the right question: "I wonder if they are talking to each other?" That is a sign of how mapping-based data can help analysts speak even more forcefully on the puzzles of collaboration.

10. *Research findings and policy decisions are often out of sync*. Randomized controlled trials, in particular, often take years to produce solid results, especially since an important part of the approach is to determine whether programs produce outcomes sustained over time, since results tend to fade over time. Policymakers have few incentives to commission long-term studies whose results will not be available until after their terms are over. If data are to speak clearly, the data need to be in sync with those who need to act on them. Policy analysis, however, often gets stuck in a dilemma: The best research by policy analysts can produce results that are the least useful for policymakers.

Some practitioners have developed strategies to break this dilemma. The state of Kentucky, for example, has sought to identify "emerging practices" in the very short term, based on positive findings from past research; "promising practices" in the medium term, grounded in quantitative evidence of positive impact; and "best practices" over the long term, founded on strong empirical evidence, findings that are

controlled for extraneous influences, and strategies that are replicable. Careful research, carefully structured, can bring evidence and policymaking more closely into sync.

Lessons for Policy Puzzles

Even though policy analysis has vastly expanded in the last two generations, there has been a growing tension between its ever-growing supply and policymakers' demands. Smart policymakers have asked for more usable data; analysts have sometimes struggled to wrestle with the enormous volume of information and present it in a way that fits the needs and time horizons of elected officials who need to use it. That has been the large—and growing—challenge of making data speak.

These lessons, however, point to ways that data can speak more clearly and more effectively, in four ways. First, analysts need to speak in a language that policymakers can hear. That means increasing use of graphics and anecdotes to capture complex ideas, clearly and persuasively. Second, analysts need to convey the inevitable ambiguity of their analyses without muddying their messages. That means communicating the central tendency of data while signaling the uncertainties, including the range of outcomes that are both likely and possible. Third, analysts need to help policymakers see the opportunities for collaboration across interrelated policies. That means using information for the biggest problems an information-age government confronts—creating strong links among related programs—and doing what information does best—building bridges across bureaucratic boundaries. Fourth, analysts need to speak to the questions that policymakers most need to have answered, in a time frame that matches policymakers' own timetables. That means focusing more on the demand side of the equation—what policymakers want—than on the supply side—what researchers most want to study.

These steps could not only produce more of what Lindblom and Cohen (1979) call "usable knowledge." It could also improve the odds that careful analysis, rather than the noisy background of ordinary knowledge that might or might not be true, shapes policy. These are the fundamental keystones of an information-age government.

How would we know that this is working? We have developed good indicators, like Google Scholar, for measuring whether scholars read other scholars' work. Measuring the impact of policy analysis on practice, however, is far more difficult. In the fierce marketplace of ideas, it is often hard to distill the contributions of individual pieces of analysis, because policymakers do not footnote their speeches and rarely want to share political credit for good ideas. Assessing the impact of analysis is largely anecdotal, with examples that a particular government adopted the recommendations of an individual analysis. Pew's Results First Initiative, for example, has systematically collected examples of governments' use of systematic research, and the Johns Hopkins Center for Government Excellence has produced detailed analytics on cases where governments have adopted data-based approaches. But if the evidence of the use of analysis is anecdotal, evidence that policymakers need and want it abounds, if it answers the questions for which they need answers when they need them, in a language that is clear. Making data speak has enormous potential if the supply and demand forces can be brought together.

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