

television and 120 print (magazine) advertisements. These involved 29 product categories, and a variety of characteristics were controlled, including advertising strategy and familiarity. Analytic responses (elicited from questions asking: did the ad make you think of fact, arguments, differences, etc.) were higher for advertisements in print media, while syncretic responses (elicited from questions asking: did the ad make you happy, feel good, excited, etc.) were higher for television advertisements (see Figure 1).

Adding emotion to the Bentley et al. analysis could arguably contribute to its usefulness. It is not incompatible with the cognitive explanation that this involves the relative presence or absence of rational consideration of payoffs and risks. Bentley et al. have noted that modern Western society is characterized by saturated markets in which there are thousands of extremely similar information sources and consumer products. Moreover, adding emotion to the model allows a way to consider the complex emotions – far beyond simple considerations of positive or negative valence – that can have nuanced effects on decision-making in a wide range of actual and consequential risky situations.

As an example, Buck et al. (2004) queried college students in America and India about emotions experienced in risky sexual situations (e.g., using or not using condoms with strangers or long-term partners; discussing condom use with a potential partner). Results indicated a wide range of significant results: for example, condom use was associated with more *caring* but less *intimacy* in both female and male respondents, using condoms made men report more feelings of *anger* and less *power* while the opposite was found for women, and patterns of response in India and America were quite similar. These results informed the design of an intervention stressing *emotional education* involving a filmed conversation between two persons discussing having sex, whether to use condoms, and the emotions involved. This brief intervention was found to significantly increase reported condom use six months later (Ferrer et al. 2011).

I suggest that learning about the emotions likely experienced in a risky situation ahead of time can, in effect, inoculate the individual against being “carried away” by those emotions when the risky situation presents itself. In the Bentley et al. analysis, this could constitute a way in which payoffs and risks can be made more transparent, but it goes further in suggesting specific ways in which such transparency may be achieved.

Mapping collective behavior – beware of looping

doi:10.1017/S0140525X13001696

Markus Christen^{a,b} and Peter Brugger^b

^aInstitute of Biomedical Ethics, University of Zurich, CH-8032 Zurich, Switzerland; ^bDepartment of Neurology, Neuropsychology Unit, University Hospital Zurich, CH-8091 Zurich, Switzerland.

christen@ethik.uzh.ch peter.brugger@usz.ch

<http://www.ethik.uzh.ch/ibme/team/mitarbeitende/markuschristen.html>

http://www.neuroscience.ethz.ch/research/neural_basis/brugger_p

Abstract: We discuss ambiguities of the two main dimensions of the map proposed by Bentley and colleagues that relate to the degree of self-reflection the observed agents have upon their behavior. This self-reflection is a variant of the “looping effect” which denotes that, in social research, the product of investigation influences the object of investigation. We outline how this can be understood as a dimension of “height” in the map of Bentley et al.

Maps facilitate the orientation in complex worlds, and the target article by Bentley et al. provides an excellent map to the world

of human decision behavior. But maps are more than descriptive tools; they coin entities and influence the way the map makers think about the world – the information maps provide feedback to those who have been mapped. Ian Hacking established the term “looping effect” to convey the notion that when humans (as opposed to, say, molecules) are the object of investigation, they consciously react to both the process and the product of investigation.

Famously, Hacking (1992) illustrated the principle of looping by pointing out the influence of medical-psychological classification systems on the prevalence of certain health-related conditions. For instance, in North America the condition labeled “multiple personality disorder” appeared to explode in frequency after the medical community accepted it as a disease, devoted scientific conferences to the topic, and had findings and opinions regarding it disseminated among the general public. In the United Kingdom, where the same condition was regarded as an iatrogenic madness of the crowd, multiple personalities remained rare. Hacking’s point was that illnesses can be transient and regional just like the classification manuals of mental diseases are bound to certain times and places. Mapping diseases is not principally different from mapping healthy human behavior, from sexual orientation to attitudes toward poverty, immigration, and violence (Hacking 1995), but also to first-name or Facebook popularity.

Given the undeniable fact that, in social research, the product of investigation thus influences the object of investigation, in what ways could looping shape the map proposed by Bentley and colleagues to describe human collective behavior? When people know that their behavior is in the southeast (using Bentley et al.’s terminology), what effect would this knowledge have? We suggest that this kind of information adds a third dimension to the map that may be captured by the analogy of height (or contour lines on geographical maps) indicating the degree of self-reflection the observed agents have upon their behavior. Even if you are in the same quadrant of the map – it is quite a different situation to be deep in a valley lacking “looping-related” insights compared to being on top of a hill indicating a high degree of self-reflection the agent (or system of agents) has with respect to their knowledge of what they know about themselves or others know about them.

We suggest that such looping-related insights indicating the degree of self-reflection refer to two types of knowledge that are related to two ambiguities inherent to the dimensions of the map proposed by Bentley et al. Their first dimension concerns the degree of social influence on the decision of the agent, with complete independence attainable at the far western side of their map and a pronounced susceptibility to mirror social expectancies at the far eastern side of their map. Going from west to east thus denotes an increase in social influence, which is associated with the ability to discern social behaviors and options associated with others’ behaviors and to adopt the own behavior through mechanisms such as, for instance, imitation. The perspective of looping, however, adds an additional knowledge component to this picture, because people make models (simple theories) based on themselves as well as on other people with respect to mechanisms driving their behaviors. People may copy the behavior of others without knowing anything about why they display a particular behavior, or by having an accurate model of the mechanisms that drive their own and others’ decisions. Although this modeling does not directly change observed behavior patterns, it will have an impact, as outlined below.

The second dimension in Bentley et al.’s map captures the transparency in the payoffs and risks associated with the decisions agents make. In the far north, people have full transparency on what options are available and what their associated payoffs are. In the deep south, options and their consequences are opaque. But again, we need to consider an orthogonal dimension associated with this *north–south* axis, one that takes looping into account. That is, it critically matters whether an agent is aware

of whether his or her knowledge of option payoffs is accessible to third parties, too. People may have no transparency with respect to payoffs *and* know that others also lack this transparency—or they may *not* know to what extent the others know the payoffs. Again, the opacity of the payoff for each person is the same, but the two situations drastically differ.

If we quantify effects of looping as the degree of self-reflection along the two dimensions just outlined, we do not expect that the major characteristics of the behavioral pattern in terms of output distributions change (e.g., Gaussian in the northwest versus long-tailed in the southeast). However, we suggest that this additional dimension helps one to understand the *dynamics* on this map. In a nutshell, we believe that a higher degree of self-reflection will allow for quicker movements on the map, that is, make behavioral patterns more unstable.

Having accurate knowledge (and models) of what drives others' decisions will allow for strategic decisions which—just as the “invention” of new diseases has shown—may then change the behavioral mechanisms of others, by providing novel “identities” for persons: that is, a mechanism of de-stabilization. In contrast, not knowing that others also don't know enhances the opacity of payoffs and may contribute to pluralistic ignorance. This would stabilize social dynamics, if often only in a suboptimal state. Elaborating the map analogy a bit further: A higher degree of self-reflection means standing on a mountain with a view, but risking falling down (and consequently to be relocated on the map). Finally, this analogy points to an additional aspect when taking looping into account: Increased self-reflection—also by reading sociologists' behavioral maps—may not be a positive exercise in all cases. While many situations may require an increase in self-reflection, in other situations (supported, e.g., by privacy arguments) too much self-reflection may lend a disservice to the agent (Christen et al. 2013).

Modesty can be constructive: Linking theory and evidence in social science

doi:10.1017/S0140525X13001702

Steven N. Durlauf

Department of Economics, University of Wisconsin at Madison, Madison, WI 53706.

sdurlauf@ssc.wisc.edu

<http://www.ssc.wisc.edu/econ/Durlauf/>

Abstract: This commentary argues that Bentley et al.'s mapping of shifts in collective human behavior provides a novel vision of how social science theory can inform large data set analysis.

The target article by Bentley et al., “Mapping collective behavior in the big-data era,” is a fascinating paper and the authors deserve congratulations for a pioneering piece of research.

The article's important contribution is the development of a synthesis between behavioral models of the type that are standard in economics and statistical models of the type that are normally used in the analysis of large data sets. From the economic perspective, the goal of an empirical exercise is the development of an interpretive framework for observed behaviors, one in which choices and outcomes derive from well-posed decision problems. The standard “big data” analysis exploits the availability of massive data in order to develop statistical models that well characterize the data. The size of these data sets allows for a constructive form of data mining, in which the analyst allows the data to select a best-fitting model. From the perspective of an economist, the data mining exercise often appears to be a black box. Although the statistical model may have high predictive power, it does not reveal the mechanisms that determine individual choices and so is not amenable to counterfactual analysis. In contrast, from the

statistician's perspective, economic models may be predicated on functional form and other assumptions that are required to operationalize a given theory, but do not have any justification outside of tractability.

Bentley et al. transcend the limitations of these approaches by showing how behavioral models may be used to understand patterns found in a range of large data sets. They achieve this by using behavioral models as an interpretive device, rather than as a literal representation of reality. In this respect, they take a more modest stance than is found in so-called structural approaches to econometrics. The authors compellingly demonstrate that this modest stance can still provide substantive social science insights. The authors consider two aspects of the determinants of decisions. The first dimension involves the respective role of individual-specific versus social factors in affecting choices; the second dimension involves the quality of information available to agents on the payoffs from actions. By partitioning environments determined by individual versus social factors and information rich versus information poor environments, one can then consider four categories of choice types. The target article shows that this “quadrant” approach allows for interpretation of differences in the properties of large data sets that are collected in disparate contexts. Bentley et al. demonstrate that these differences can be understood in terms of underlying differences in the preferences and information sets of the individuals that comprise the data.

Unlike the standard economics paper, Bentley et al.'s study does not contain any formal statistical calculations, hypothesis tests, and the like. This absence is *not* a reason to question the empirical contributions of the target article. Social science evidence comes in many forms. The approach taken by the authors, which uses economic theory to interpret data patterns, rather than fully explain them, is underappreciated as an integration of empirics and theory. The modesty of the theory/empirics link respects the limits of any social science theory or set of theories as an interpretive framework for data sets of the type under study. Thus, the authors have articulated a constructive vision of “big” social science for “big” data. I look forward to their subsequent work.

The crowd is self-aware

doi:10.1017/S0140525X13001714

Judith E. Fan^a and Jordan W. Suchow^b

^aDepartment of Psychology, Princeton University, Princeton, NJ 08544;

^bDepartment of Psychology, Harvard University, Cambridge, MA 02138.

jefan@princeton.edu suchow@fas.harvard.edu

<https://sites.google.com/site/judithfan/>

<http://jordansuchow.com>

Abstract: Bentley et al.'s framework assigns phenomena of personal and collective decision-making to regions of a dual-axis map. Here, we propose that understanding the collective dynamics of decision-making requires consideration of factors that guide movement *across* the map. One such factor is *self-awareness*, which can lead a group to seek out new knowledge and re-position itself on the map.

In the target article Bentley et al. propose a framework for describing personal and collective decision-making in which decisions vary along two principal dimensions: the extent to which they are made independently versus socially, and the extent to which values attached to each choice are transparent versus opaque. They argue that in at least some domains—such as the generation and transmission of knowledge—the dynamics of how ideas are selected and propagated are approaching hive mind.

Bentley et al. use their dual-axis approach to chart an impressive range of social phenomena. Beyond assigning each phenomenon to a position on the map, however, it is important to