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Management fads, pedagogies, and other soft technologies

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ABSTRACT

We present a model for the diffusion of management fads and other technologies which lack clear objective evidence about their merits. The choices made by non-Bayesian adopters reflect both their own evaluations and the social influence of their peers. We show, both analytically and computationally, that the dynamics lead to outcomes that appear to be deterministic in spite of being governed by a stochastic process. In other words, when the objective evidence about a technology is weak, the evolution of this process quickly settles down to a fraction of adopters that is not predetermined. When the objective evidence is strong, the proportion of adopters is determined by the quality of the evidence and the adopters' competence.

1. Introduction

In domains such as management and education, organizational practices often seem to come and go in puzzling ways. They are introduced with fanfare, but then they diffuse with little evidence that they work well. While they are sometimes discarded at later times, this is often done with little conclusive evidence about their performance. Consider, for example, Quality Circles. Possibly as many as 90 percent of the Fortune 500 companies had adopted QCs by 1985, but "more than 80% of the *Fortune* 500 companies that adopted QCs in the 1980s had abandoned them by 1987" (Abrahamson, 1996, p. 256). Yet one is hard pressed to find hard evidence of their impact, even after the fact.

Fads are so common in American education that one observer reports that school leaders in a whimsical mood sometimes play a parlor game called "Spot That Jargon", in which the goal is to name as many past educational fads as possible. The list is usually impressive (Lashway, 1998; Maddux and Cummings, 2004).

The economic implications of such diffusions can be substantial. For example, the discarding of Quality Circles may have indicated that this procedure did not discernibly improve firms' production processes. Hence, since the cost of implementing this new procedure might have been appreciable in some firms, the initial rush to adopt it might have been a Type 1 error of some significance. Alternatively, discarding it could have been a Type II error.

Similarly, process re-engineering diffused without evidence of its effects on profits, stock price, or indeed any measure of performance. Hence, this diffusion might have wasted managerial time and effort that could have been allocated to more productive activities (Davenport and Short, 1990; Hammer, 1990; Malhotra, 1998).

We cannot now know whether the adoption of Quality Circles or process re-engineering was a Type I error or whether discontinuing them was a Type II error. They came and they went, unencumbered by little hard evidence.[1]

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[1] The popular press on Quality Circles suffers from a positivity bias (Barrack and Alexander, 1987, p. 588), and even the scholarly papers often fail to address many well-known threats to causal inference (Barrack and Alexander, 1987, p. 589).

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This paper examines the diffusion of such innovations or ideas. We call them *soft technologies*, not because of their physical properties but because evidence for or against them is equivocal, inconclusive, or even non-existent. We contend that the choices made by adopters are quasi-rational: they reflect both an attempt to assess the imperfect data surrounding such innovations as well as a reliance on social cues, i.e., what peers have done. We argue that these two elements are linked by what could be called Festinger's Hypothesis: the more equivocal the evidence, the more people rely on social cues (Festinger, 1954, p. 118).[2]

In this paper we present a model that considers soft technologies as those for which (1) the objective evidence is weak and (2) people rely heavily on the prior choices of people in similar roles. We then show that the dynamics of the model leads to outcomes that appear to be deterministic in spite of being governed by a stochastic process. In other words, when the objective evidence for the adoption of a soft-technology is weak, any sample path of this process quickly settles down to a fraction of adopters that is not predetermined by the initial conditions: ex ante, every outcome is just as (un)likely as every other. In the case when the objective evidence is strong, the process settles down to a value that is determined by the quality of the evidence. In both cases the proportion of adopters of the technology never settles into either zero or one.

In the most highly developed mathematical models of fads – economic theories of "herding" – decision makers also use social cues but do so in perfectly rational ways, via Bayesian updating.[3] We agree that social cues matter. Indeed, the evidence that humans imitate one another is overwhelming (e.g., Meltzoff, 1999).[4] But we think that the premise of Bayesianism exaggerates the rationality of agents facing the difficult decision of whether or not to adopt a soft technology. The above experimental evidence has clearly established that even very young babies follow social cues, which strongly indicates the presence of non-Bayesian mechanisms. One could, of course, hypothesize that infants are born knowing Bayes' law, but this seems rather farfetched. Indeed, there is little empirical support for the claim that *adults* are perfect Bayesians.

A leading experimental economist summarizes the evidence on this point as follows:

> Much research in cognitive psychology suggests that the way in which people form judgments of probability departs systematically from the laws of statistics and from Bayesian updating. (This should not be surprising, because there is no reason to think that evolution of brain processes like memory, language, perception, categorization, and reasoning would have adapted us to use a rule that Bayes only "discovered" a couple of hundred years ago.) Some research points toward systematic departures, or "biases", which spring from a small number of "heuristics", like anchoring, availability, and representativeness (Camerer, 1998, p. 171).

Thus, the *theoretical* value of herding models – the intriguing demonstration that what appears to be conformity behavior in the aggregate is consistent with perfectly rational action of individuals – should not be confused with *empirical* confirmation of its micro-postulates. As a purely theoretical point it is interesting to recognize that perfect information-processing by individual agents is, under certain circumstances, consistent with conformity-like behavior. But we suspect that to the extent that such models receive empirical support, the support will be weak in the sense that the data on conformity or herding will also be consistent with a wide variety of other sensible-though-suboptimal forms of individual information-processing. Again, Camerer's assessment of Bayesianism is pertinent:

> As a descriptive theory, Bayesian updating is weakly grounded in the sense that there is little direct evidence for Bayesian updating which is not also consistent with much simpler theories. Most of the evidence in favor of Bayesian updating boils down to the fact that if new information favors hypothesis A over B, then the judged probability of A, relative to B, rises when the information is incorporated. This kind of monotonicity is consistent with Bayesian updating but also with a very wide class of non-Bayesian rules (such as anchoring on a prior and adjusting probabilities up or down in light of the information) (Camerer, 1998, p. 171).

In this paper we propose a model that is consistent with all of Camerer's observations and so is an alternative to canonical herding models. Thus our agents exhibit normatively desirable and empirically plausible monotonicity properties: in particular, the more the social cues favor innovation A over B, the more likely it is that an agent will select A, ceteris paribus. Yet the reasoning that underlies such choices is adaptively rational rather than fully rational: it can be executed by feasible psychological mechanisms and it is consistent with the hardnosed experimental studies of imitation mentioned above. Moreover,

[2] Boyd, Richerson and their colleagues have constructed models that explain the evolution of what they call *conformist transmission*, i.e., imitation or social learning (Boyd and Richerson, 1985; Henrich and Boyd, 1998). This work provides an evolutionary foundation for the psychological mechanism posited by Festinger.

[3] There is now a large literature on informational cascades triggered by fully rational agents: see the annotated bibliography of Bikhchandani et al., available on the Web (Bikhchandani et al., 1996). For seminal papers in this line of work see (Banerjee, 1992; Bikhchandani et al., 1992; Welch, 1992).

[4] There is also considerable evidence that we follow social cues automatically, i.e., without conscious thought (Dijksterhuis and Bargh, 2001). Further, this ability seems to be hardwired in humans: "infants as young as forty-two minutes old successfully imitate adult facial gestures" (Meltzoff, 1999, p. 389). Dijksterhuis et al. (2005, p. 195) summarize the evidence bluntly: "The tendency to mimic is, in other words, a capacity people are born with". Moreover, imitation seems to have a neurophysiological foundation: a set of brain cells called mirror neurons are dedicated to embodying memories associated with imitation (Meltzoff, 1999, p. 390). Finally, as noted earlier there are plausible models (Boyd and Richerson, 1985; Henrich and Boyd, 1998) that explain why the ability to imitate would evolve. All this points toward the conclusion that following social cues is a basic, species-wide competency of human beings: a specialized mental module, in the terminology of evolutionary psychology.