



## Review

# Like ripples on a pond: Behavioral spillovers and their implications for research and policy



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## ARTICLE INFO

## Article history:

Received 30 March 2014  
 Received in revised form 15 December 2014  
 Accepted 18 December 2014  
 Available online 5 January 2015

## JEL classification:

C18  
 C91  
 C93  
 D03

## PsycINFO classification:

2260  
 2346  
 2360  
 3040

## Keywords:

Behavioral spillovers  
 Policy-making  
 Nudges  
 Crowding in/out

## ABSTRACT

No behavior sits in a vacuum, and one behavior can greatly affect what happens next. We propose a conceptual frame within which a broad range of behavioral spillovers can be accounted for when applying behavioral science to policy challenges. We consider behaviors which take place sequentially and are linked, at a conscious or unconscious level, by some underlying motive. The first behavior leads to another behavior which can either work in the same direction as the first (*promoting* spillover), or push back against it (*permitting* or *purging* spillover). Looking through this conceptual lens at the existing evidence, we find pervasive evidence for all kinds of spillover effects across a variety of fields and domains. As a result, behavioral scientists, especially those seeking to inform policy, should try to capture all the ripples from one behavior to the next when a pebble of intervention is thrown in the pond, and not just at the immediate behavioral splash it makes.

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## 1. Introduction

Policymakers have begun taking seriously the results of behavioral research (Camerer, 1999; Camerer, Issacharoff, Loewenstein, O'Donoghue, & Rabin, 2003; Congdon, Kling, & Mullainathan, 2011; Dolan et al., 2011; Shafir, 2012; Sunstein, 2011; Thaler & Sunstein, 2003). This trend is to be welcomed but the various discussions of the evidence are typically made in 'behavioral silos', focusing on one specific behavioral response at a time (Thøgersen, 1999a). Yet no behavior sits in a vacuum and we need to consider the possible spillover effects from one behavioral response to the next.

Imagine an intervention that successfully reduces energy consumption in the home, e.g. by installing LED light bulbs, but that has the spillover effect of increasing energy use elsewhere, e.g. through leaving more lights on at work. Some or all of the benefits from the reduction in CO<sub>2</sub> emissions could be lost (Gillingham, Kotchen, Rapson, & Wagner, 2013; Jacobsen, Kotchen, & Vandenberg, 2012; Thøgersen & Crompton, 2009; Tiefenbeck, Staake, Roth, & Sachs, 2013). To inform policy, we should ideally capture all ripples of behavior when a pebble of intervention is thrown in the pond. The 'mapping of these ripples is now one of the most exciting pursuits in psychological research' (Kahneman, 2011, p.53).

## 2. Behavioral spillovers

We propose a conceptual frame within which a broad range of 'behavioral spillovers' (Thøgersen, 1999a) can be systematically interpreted when applying behavioral science to policy challenges. Our framework is based on three building blocks.

First, we begin by assuming that two *different* behaviors take place sequentially: *behavior 1* is followed by *behavior 2*. This differentiates the analysis of behavioral spillovers from the long-established, distinct, literature on *adaptive learning*, which typically focuses on the repetition of the *same* behavior over time (e.g. learning in repeated games, as opposed to playing one-shot games, Fudenberg & Levine, 1998; Goeree & Holt, 2001; Vega-Redondo, 1996).

The typical situation we have in mind is a sequence of two different behaviors where *behavior 1* is the target of an intervention. An intervention is defined broadly here: it could be a policy intervention by a public decision-maker, or an experimental manipulation by a researcher. Implicitly, the following discussion is conducted on the presumption that we can compare a 'treatment' case where *behavior 1* is targeted by an intervention with a 'control' group where there is no intervention. What we would like to emphasize, however, is that the key focus of our interest here is what happens to *behavior 2* as the consequence of the intervention.

It is not uncommon, in fact, to find studies in the economics and psychology literatures where it is looked at when and how a policy intervention could 'backfire' in the sense of having unintended compensatory or offsetting effects with respect to the ones originally envisaged by the decision-maker (e.g. Schultz, Nolan, Cialdini, Goldstein, & Griskevicius, 2007). For instance, for interventions in the context of risk and safety (e.g. seat belts in cars), the theories of *risk compensation*, *risk homeostasis*, or *behavioral adaptation* have since long argued that people can adjust their behavior in response to the perceived level of risk (Asch, Levy, Shea, & Bodenhorn, 1991; Bhattacharyya & Layton, 1979; Cohen & Einav, 2003; Evans & Graham, 1991; Garbacz, 1990a, 1990b, 1991, 1992; Peltzman, 1975; Rudin-Brown & Jamson, 2013; Schoemaker, 1993; Viscusi & Cavallo, 1994; Wilde, 1982a, 1982b, 1998; Wilde, Robertson, & Pless, 2002). This is an interesting but distinct question, the difference with our focus here being that those analyses typically look at the impact of the intervention on the *same* behavior originally targeted, not at what happens to *another* behavior occurring later on.

To narrow further down the scope of our analysis, we exclude from our remit two types of 'interventions' that deserve separate investigation. The first one refers to all those situations where *behavior 1* is not conceptually distinguishable from the intervention itself. Some archetypical examples of these situations refer to the literature on *priming* (Bargh, 1990; Gollwitzer, Heckhausen, & Steller, 1990). Priming occurs unconsciously when 'the passive activation of trait categories in one situational context carried over to influence social judgments in subsequent, ostensibly unrelated contexts' (Bargh, 2006, p.148). Among the many examples, more self-sufficient behavior was prompted by the mere presence of a pile of Monopoly notes or a screensaver with various denominations of currency (Vohs, Mead, & Goode, 2006), whereas more cooperative, or competitive, behavior was prompted by the mere presence of a backpack, or a briefcase, respectively (Kay, Wheeler, Bargh, & Ross, 2004). As another 'ideomotor' example, subjects shown pictures of a library spoke more quietly thereafter than subjects shown pictures of a railway station (Aarts & Dijksterhuis, 2003).

While in all these priming situations, the intervention clearly affects a subsequent behavior, it is also clear that '*behavior 1*' consists of the mere exposure to the priming manipulation itself which, more often than not, is a subliminal presentation of words or images. In other words, rather than a triplet '*intervention – behavior 1 – behavior 2*' most priming situations consist of a manipulation and a *single* behavior.

The second area excluded from our analysis pertains to *price mechanisms* and financial incentives. For instance, the overall use of energy can increase in response to an environmental policy intervention that results in lower costs of the energy. We

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