



Marketing Science

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To cite this article:

Eric W. K. Tsang, (2009) Commentary—Assumptions, Explanation, and Prediction in Marketing Science: “It's the Findings, Stupid, Not the Assumptions”. Marketing Science 28(5):986-990. <https://doi.org/10.1287/mksc.1080.0463>

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Commentary

Assumptions, Explanation, and Prediction in
Marketing Science: “It’s the Findings,
Stupid, Not the Assumptions”

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In his July–August 2007 editorial of *Marketing Science*, Steven Shugan argues that the realism of assumptions does not matter as long as a theory or model produces satisfactory predictions and claims further that unrealistic assumptions breed good theories. This commentary discusses the problems of his argument and presents a very different view about the realism of assumptions.

Assumptions need not be realistic if the only goal of science is prediction. However, a major function of theory is also to explain and not just to predict. The role of explanation is more important in the social sciences because it is far more difficult to produce accurate predictions in the social than the natural sciences. Assumptions, especially core assumptions, often constitute the foundation of the mechanistic explanations provided by a theory. Unrealistic assumptions may lead to faulty explanations and false predictions.

Contrary to Shugan’s view, the realism of an assumption cannot be assessed just based on the output of a theory. It has to be tested independently of or in conjunction with the hypotheses of the theory. Also, contrary to Shugan’s claim, more realistic assumptions result in better theories. As theory development advances, efforts should be directed toward making assumptions more realistic.

Key words: assumptions; explanation; prediction; mechanism; realism; research design

History: Received: June 6, 2008; accepted: September 15, 2008. Published online in *Articles in Advance* April 13, 2009.

About a decade ago, in his reflections as editor-in-chief of *Marketing Science*, Richard Staelin (1998) suspected that there would always be debates about whether analytic models need to have realistic assumptions. Steven Shugan, who recently finished his term as editor-in-chief of *Marketing Science*, took the challenge and made a rather elaborate argument that “(c)riticizing assumptions as unrealistic is absurd” (2007, p. 449) in his eye-catching editorial titled “It’s the Findings, Stupid, Not the Assumptions.” In spite of his good intention, his arguments have some problems. The objective of this paper is to discuss these problems and present a very different view about the realism of assumptions.

This commentary is organized as follows. The next section elaborates on the meaning of the term “assumption.” In his 2007 editorial, Shugan makes three major claims: (1) assumptions need not be realistic, (2) it is not necessary to test assumptions, and (3) assumptions cannot be tested independently of research findings. The following sections discuss these claims, and this paper ends with some recommendations.

What Are Assumptions?

Assumptions are the fundamental statements, or basic hypotheses, of a theory (Nagel 1963). In addition to this somewhat restrictive meaning of assumption, the term is sometimes used with other meanings. Shugan, for instance, rightly points out that assumptions can refer to “approximations, limitations, conditions, or merely premises” (2007, p. 450). This paper focuses only on assumptions that underlie a model or a theory, and not assumptions associated with statistical analysis, such as the assumption that a variable is normally distributed. Assumptions can be classified into different types (see Musgrave 1981) and are closely related to external validity, as assumptions often tend to narrow the domain of applicability of a theory.

Shugan sometimes uses the term “assumption” in an atypical way. For instance, he uses the fact that “(s)cholars are seldom prisoners, advising prisoner or advising the police” (2007, p. 450) to illustrate that the assumptions of a theory, such as the prisoner’s dilemma, need not be realistic. However, it would be more appropriate to regard the terms “prisoner” and “police” as metaphors rather than assumptions.

They are used metaphorically to construct a plea-bargaining situation.

Assumptions are not theories. As Shugan admits, “assumptions are merely building blocks of a model or a theory” (2007, p. 454). However, he argues that “(i)f data do speak, assumptions are the interpreters” (p. 451), and that “(a)ssumptions concerning which variables to observe, not to observe, their relationships, possible causality, and so on, reduce what we might call the entropy in the data” (p. 452). It is more appropriate to say that theories, rather than their assumptions, guide the interpretation and collection of data.

Assumptions are not research methods. Shugan argues that “(m)ost often, assumptions are sufficient conditions that guarantee the validity of the subsequent findings but whose violation by no means necessarily invalidates those findings” (2007, p. 450). If the “validity of the subsequent findings” refers to issues associated with internal validity, external validity, content validity, and so on, assumptions cannot guarantee the validity of research findings. Only error-free research procedures, measurement methods, and statistical analysis can. In short, Shugan has somewhat overstretched the meaning of the term “assumption” in his discussions.

Need Assumptions Be Realistic?

Nagel (1963) argues that assumptions may be said to be realistic in at least three senses. First, an assumption is considered unrealistic because it does not give an exhaustive description of some state of affairs. In this trivial sense, it is impossible for any finitely long statement to be realistic. By analogy, no map is realistic. Another sense in which an assumption is said to be unrealistic is that “it is believed to be either false or highly improbable on the available evidence” (Nagel 1963, p. 214). This is the sense of “unrealistic” that Shugan primarily refers to in his editorial. Last, theoretical relations are often stated under highly purified conditions between highly idealized objects or processes, none of which exists in the real world. As Shugan says, “Most published research assumes continuity when virtually no variables are infinitely divisible” (2007, p. 450). That is, the assumption of continuity is unrealistic in this sense. Because, according to the first and the last meanings of assumptions as “realistic,” assumptions are necessarily unrealistic, the discussions below focus on the second meaning.

Shugan claims, “Given that all assumptions are unrealistic per se, the claim of unrealistic assumptions is empty” (2007, p. 449). The problem with this claim is that the realism of an assumption is a continuous, instead of binary, variable. Even if we accept his premise that all assumptions are unrealistic,

some assumptions are more unrealistic than others. For instance, the assumption of perfect rationality is more unrealistic than that of bounded rationality. Yet bounded rationality is not totally realistic either because not every individual on earth is boundedly rational. At least people who are insane are not. The realism of an assumption may also change as technology and market evolve. For example, with powerful information-search tools available over the Web and with increasingly crowded product categories, the assumption of compensatory decision making by consumers becomes less realistic, and research has begun to explore noncompensatory decision making that may help to identify new opportunities in product development (Hauser et al. 2006).

Whether assumptions have to be realistic depends on the goals that we attribute to science. If the only goal is prediction, assumptions need not be realistic. All that matters is that a model or theory “works” in the sense of producing accurate predictions (Sayer 1992). Shugan not only stresses prediction over explanation but also has great faith in the ability of models to make accurate predictions: “Without models, every situation at every time on every variable would be unpredictable” (2007, p. 449). His view is too optimistic. As Kaplan states, “If we look at the explanations which actually occur in science as well as in everyday life, and not only at what an ideal explanation would be or what all explanations are ‘in principle,’ it appears that we often have explanations without being able to predict” (1964, p. 347). A good example is the ability of geologists to explain earthquakes *after* they have occurred, rather than to predict their occurrence.

Caldwell forcefully claims that “(p)hilosophers of science since the 1940s have been unanimous in their rejection of the notion that the only goal of science is prediction” (1980, p. 369). Because successful prediction often cannot be distinguished from correlation, scientific knowledge is produced only through explaining observable phenomena (Stanley 1985). Even in astronomy, which has an enviable record of successful predictions, explanation is still much treasured. For instance, when Kepler worked on the orbit of Mars, he tried very hard to find plausible explanations for his astronomical hypotheses (Miller 2008). Moreover, it is far more difficult to generate accurate predictions in the social than the natural sciences mainly because social science studies are rarely conducted under the conditions of a closed system, which Bhaskar defines as “one in which a constant conjunction of events obtains; i.e., in which an event of type a is invariably accompanied by an event of type b” (1978, p. 70). Thus, Shugan’s (2007) emphasis on prediction at the expense of explanation in marketing science is inconsistent with the situation that researchers generally face.

Popper argues that “the scientist aims at a true description of the world, or of some of its aspects, and at a true explanation of observable facts” (2002, p. 154). Scientists offer what Bunge (1996) calls “mechanismic explanations” of empirical phenomena, unveiling the phenomena’s actual or possible mechanisms. An assumption, especially a core assumption, is often a constituent of the mechanistic explanation of a theory.¹ The assumption of opportunism in transaction cost economics, for instance, affects the perceived transaction costs associated with various modes of governance (Wathne and Heide 2000). Similarly, the assumption that people act in their own best interests forms the foundation of the standard prisoner’s dilemma game. The dynamics of the game will change if we assume that, for example, people are altruistic (see Hu and Liu 2003). Thus, contrary to Shugan’s assertion that “(g)ood theory requires unrealistic assumptions” (2007, p. 458), unrealistic assumptions will likely lead to faulty mechanistic explanations and thus defective theories (Lawson 1997). Because prediction is derived from or closely associated with explanation, unrealistic assumptions also will likely, although not necessarily, generate false predictions (Melitz 1965).

Shugan points out “the value of assumptions that abstract reality” (2007, p. 455) and argues that “praise for realistic assumptions is unwarranted” (p. 455). Many assumptions are indeed designed to exclude certain real-world complications (Boland 1979). However, this function itself is not a license for using whatever assumptions one wishes. Relatedly, Shugan raises a valid point that “(m)aking supposedly more realistic assumptions often results in more variables, relationships, indeterminacy, and complexity” (2007, p. 456). Researchers do have to maintain a balance between the explanatory and predictive power of a theory on the one hand and its complexity on the other. That said, a theory that is based on grossly unrealistic assumptions is not likely to explain anything in the real world.

Need Assumptions Be Tested?

Shugan argues that it is not necessary to test the realism of assumptions: “Assumptions are analogous to the basic ingredients in a gourmet recipe. Only the final product of the recipe dictates whether the ingredients suffice. ...Output matters far more than

input” (2007, p. 449). In other words, it is not necessary to examine the input (i.e., assumptions) because examining the output (i.e., findings) is sufficient. This point, which has been stressed a few times in his editorial, is questionable.

In a caustic critique of Friedman’s (1953) argument that it does not matter whether the assumptions of an economic theory are realistic so long as the theory yields sufficiently accurate predictions, Bunge puts forward the following analogical reasoning: “All humans are vegetables. All vegetables are mortal. Ergo, all humans are mortal” (1996, p. 55). The product or output of this logically valid reasoning, “all humans are mortal,” is faultless, but one of the ingredients or input is nonsensical. Contrary to Shugan’s (2007) view, the final product does not dictate whether the ingredients suffice. That is, we cannot judge the adequacy of the assumptions of a theory by evaluating the findings of a test of the theory. To assess whether and how far assumptions are realistic, we often need to test them directly.

Can Assumptions Be Tested?

Shugan also maintains that it is not possible to test assumptions in isolation from the findings of the theory concerned: “Judging the realism of an assumption, in isolation from the findings, is an arbitrary unscientific exercise in personal taste rather than an objective step in any scientific process or methodological development” (2007, p. 454) because “(n)o corresponding objective scientific methods exist for evaluating the realism of assumptions” (p. 458). First, he does not explain why the realism of assumptions cannot be tested in isolation from the findings of the theory in question. Second, his point is problematic on both logical and empirical grounds.

Logically, the assumption of one hypothesis may be the conclusion of a prior set of assumptions (Boland 1979). Opportunism is a core assumption of transaction cost economics but constitutes a prediction in Jap’s (2007) study of the impact of online reverse options on buyer-supplier relationships. If Shugan (2007) agrees that predictions can be examined in isolation from assumptions, which he should, he has to explain why the same construct cannot be tested independently when it is an assumption but can be so tested when it constitutes a prediction.

Shugan’s (2007) point is also questionable empirically. The following suggestion, for example, is proposed in his study of film critics: “We assume that word of mouth involves the movie rather than the critic’s review. Further research should investigate this issue” (Eliashberg and Shugan 1997, p. 72). It is obvious that investigating whether word of mouth involves only the movie and not the critic’s review

¹ Both former editors-in-chief of *Marketing Science* express a somewhat similar view in this respect: “When models become theories, assumptions dictate the processes resulting in causality” (Shugan 2007, p. 450), and a model has to rest on realistic assumptions so that it “helps one better identify and understand the underlying factors driving the solution” (Staelin 1998, p. 300).

can be done in isolation from the competing hypotheses of the study—film critic as influencer versus film critic as predictor. In fact, a core assumption underlying the study is that the greatest impact of a movie review is during the first few weeks after the review appears. Again, this assumption can be tested independently of the two competing hypotheses.

Even if an assumption is not tested directly, existing theories may throw light on its realism. This assessment is based on the rationale that if a hypothesis fits in well with established theories, it gains credibility (Hempel 1966). For example, the cognitive hierarchy model of Camerer et al. (2004) assumes that every participant in the game is “overconfident” about his or her depth of reasoning relative to others. Prelec (2006) comments that while this assumption draws some support from the social psychology literature on overestimation of personal abilities, the extent of overestimation that the model assumes is not realistic.

Looking Ahead

Shugan rightly highlights that “understanding the role of assumptions is critical for the advancement of knowledge, understanding, and application” (2007, p. 449). However, this role has not received sufficient attention from marketing researchers and is “widely misunderstood” (p. 449). Shugan’s editorial raises the issue at an opportune moment and should be applauded. However, his claims that assumptions need not be realistic, that it is not necessary to test assumptions, and that assumptions cannot be tested independently of research findings are problematic.

From the perspective of editor-in-chief, Shugan cautions that when reviewers challenge the realism of assumptions, they should provide “an explicit explanation of how those assumptions adversely impact the subsequent findings, predictions, or implications” (2007, p. 454) and that “authors should never claim advantage by merely asserting that their assumptions are more realistic” (p. 458). Although his concern is valid, authors have to shoulder an onerous responsibility related to their assumptions. Authors should discuss the probable impacts of the assumptions on their findings, predictions, or implications, and if possible, test the sensitivity by varying the assumptions and compare results. This requirement is especially crucial if an assumption is blatantly unrealistic compared with those adopted by similar prior studies. The burden of proof should lie on those who use the assumption. Maynes (1992), for example, challenges that Ratchford and Gupta’s (1990) model of price-quality relations contains highly unrealistic assumptions. Ratchford and Gupta (1992) admit that Maynes’ (1992) criticisms have merit and explain that within the model’s limited domain of applicability, the assumptions, although unrealistic, do not

affect any of their qualitative conclusions. Had they provided a discussion of their assumptions, Maynes (1992) would not have written the critique.

In relation to authors’ responsibility, there are some heuristic steps that marketing researchers can follow. First, assess the realism of the core assumptions of a model (or theory) against the existing literature. If any one of them appears to be highly unrealistic, estimate its impact on the mechanisms proposed by the model and consider whether the assumption needs to be revised. Second, if the model offers a satisfactory explanation or prediction of the phenomenon under study, provisionally accept its assumptions. If not, examine whether the realism of the assumptions is a cause of the failure, paying particular attention to the role played by the assumptions in the mechanisms.

During the early stage of model building or theory development, other concerns may override the realism of assumptions. As the field advances, efforts should be directed toward making assumptions more realistic. Along this line, Shugan rightly points out that the “diagnostic task of linking assumptions to reality might be a critical step in the creative evolution of theory” (2007, p. 455). More realistic assumptions result in better theories. In their review of new product diffusion models, Mahajan et al. (1990) describe how some of the assumptions of the original Bass model are made more realistic by subsequent research to strengthen the model’s explanatory and predictive power.

To conclude, although Shugan (2007) rightly stresses that it is inappropriate to dismiss a model or a theory based only on the realism of its assumptions, realism does matter, and it matters a great deal for model building and theory development.

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