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Marketing and Logical Deduction

Sterrett and Smith argue that deduction is ill-suited for use in argument-centered works and that deduction should not replace induction. We respond by (1) clarifying some key terms, (2) proclaiming the extreme importance of induction for marketing science, (3) showing that the demands of deductive reasoning, if properly understood, are not excessive, and (4) defanging their argument from non-ampliativity.

STERRETT and Smith raise a lengthy, sustained attack against the tools we offered to marketing science (Sterrett and Smith 1990, henceforth SS 1990; and Skipper and Hyman 1987, henceforth SH 1987). They seem to argue that these tools are ill-suited to the needs of marketers—that these tools, if accepted, might even do positive harm by supplanting other, better-suited tools. SS carry out their attack on two fronts. They claim on one side that induction is very important for marketing and on the other that “deductive validity” is too much to demand from an argument-centered work. We completely agree with the first claim, but disagree with the second. Of course induction is important; no empirical science could exist without it. To eliminate induction would be to eliminate statistics, probability, and causal explanations, the very meat and potatoes of scientific progress. But we did not suggest that marketers should

abandon any tool they already have, only that they acquire another one. The second claim can be rephrased as two questions:

1. Are the demands made on marketing scholars by deductive validity reasonable demands?
2. Can deduction extend marketing knowledge?

We welcome the opportunity to address both questions.

Let us first clarify an important misconception. An argument-centered work is simply a work featuring an argument in which the premises support the conclusion *conceptually*, not probabilistically, not statistically, not arithmetically, not algebraically, not geometrically, not set-theoretically, and so forth (we called these other sorts of works “proof-centered”). An argument-centered work therefore uses English sentences (not mathematical formulas) to explore an idea, a concept, or a theory. Now, such explorations of ideas, concepts, and theories are the very guts of philosophy. The moment marketing scholars write an argument-centered work they embark on a philosophical adventure; in this adventure, they would recklessly disarm themselves were they to cast aside the many weapons philosophers have spent the last 27 centuries honing. The many ins and outs of logical deduction are merely the first, and simplest, exercises one must

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practice before acquiring the patience of disciplined thought. Our original thesis is no more complicated than this: Marketing scholars, with every theory piece and every think piece they write, are doing philosophy, whether they know it or not. As long as they are *doing* philosophy, their own intellectual honesty should be driving them either to learn how to philosophize well or to collaborate with trained philosophers.

Clearly, because probability and statistics are formalized inductive techniques, we see *induction as a legitimate, major component of proof-centered works*. But inductive arguments, when stated without the benefit of formal inductive tools, are mere rhetoric. For example, argument by analogy and argument by metaphor are common inductive methods, and very powerful ones in the hands of great orators and essayists, but they are hardly appropriate for marketing theory pieces. Supporting a topic sentence with a couple of memorable examples may be good rhetorical style, but it is bad science.

On page 87, SS list three types of inductive argument: generalization from samples, arguments from similarity, and causal arguments. Let us consider each one. First, legitimate marketing generalizations from samples are already so rigidly controlled that they are best done in proof-centered works. Second, arguments from similarity are seldom convincing; at best they can motivate us to wonder about certain features. A theory piece built upon nothing but similarities would strike a very false note (like those ever-popular arguments hinging on the JFK-Lincoln parallels) and would never survive the review process. Third, a causal argument, that is, one with a conclusion like "X causes Y," is the only example that poses a threat to our thesis. The threat lies in the fact that causes are important, yet no one to date has found necessary and sufficient conditions for asserting that X causes Y; therefore, only induction, not deduction, will support causal arguments. In other words, *no one knows what would justify the conclusion of a causal argument, so we must and can only jump to the conclusion, we cannot reason to it*.

But already our response is clear: Any causal argument, though inductive, can be *improved* by subjection to deductive validity checks until all the important types of counterexamples have been spotted and classified. If an author has considered every imaginable scenario in which the premises are true and the conclusion false, and shows that all such scenarios are highly implausible, then critics must either accept the conclusion or defend one of the bizarre counterexamples. However, if a fairly plausible counterexample defeats the argument, the author had best rethink it.

In short, the deductive methods we suggested for evaluating and improving arguments can be used to

refine and strengthen inductive as well as deductive arguments.¹

Are Validity, Soundness, and Elegance Reasonable Demands?

In our 1987 article, we suggested that authors and reviewers could improve the drafts of argument-centered works by striving to meet the demands of validity, soundness, and elegance. Are these demands too harsh, as SS suggest?

Is it too much to ask marketing scholars to strive for validity² when they evaluate and improve their own arguments and those of their peers? We think not. With practice, validity would become fairly simple to achieve, and when it came to guide, rather than dominate, marketers' thoughts, it would be an excellent tool for organizing scholarly presentations. After all, a convincing argument should leave little or no doubt about the author's reasoning; nor should it rely on leaps of faith, equivocation, or hand-waving. If all marketers used the "stepladder" approach (SH 1987, p. 69-70) to close the logical gaps of their own arguments, scholarly debates in marketing could focus on the important issues: Are the empirical premises true? How well does the conclusion fit with the rest of marketing theory?

Furthermore, we never suggested that all arguments must be valid; instead, we suggested that logic be used to *evaluate* arguments. We *did not* suggest that if an argument is evaluated as invalid, it should be discarded. We said it should be improved. If it is invalid yet unimprovable, the issue of *inductive strength* arises. Understanding inductive strength is a very important part of understanding argumentation, but no real grasp of induction is possible without a background in deduction. Therefore, asking marketers to understand deduction is reasonable if asking them to understand induction is reasonable.

¹We suspect that in the case of causal arguments this is a nonissue anyway. Has any marketing scholar ever argued in plain English, without the benefit of mathematics, that X causes Y? Is not the normal conclusion, as summarized in charts and tables, that X is correlated positively with Y (a safe, proof-centered result)?

²The terms "validity" and "valid," as we consistently use them here and throughout our 1987 article, and as SS also use them throughout their critique, are technical terms. "Valid" does *not* mean "OK." "Validity" does *not* mean "acceptability." As we have stated:

A *valid argument* is a string of N sentences ($N > 0$) such that it is impossible for all of the first $N - 1$ sentences (usually called the premises) to be true and the N^{th} sentence (the conclusion) to be false simultaneously [SH 1987, p. 63].

The reader should refresh his or her memory of the surprising consequences of this definition by studying the material on pages 63 and 64 of SH (1987). No one could make any sense of the present debate without a firm grasp of this highly technical usage.

SS charge us with saying that “nonphilosophers must learn to shake their initial reaction of feeling uncomfortable with calling [arguments with contradictory premises] acceptable.” *We said no such thing*; our second request of an argument (after validity) was that *all the premises be true*. Obviously, all true premises would rule out contradictions. What we said was: “An argument containing a contradiction in the premises is always *valid*” (SH 1987, p. 63, italics added). *We never said that every valid argument is acceptable*. Validity and soundness are very different things; a merely valid argument is virtually worthless without true premises; but by the same token, a set of true sentences is of little use unless it implies something.

Is it too much to ask marketing scholars to verify their evidence? We think not. *The demand for soundness is nothing but a demand that the premises be true, not that they be deduced*. This point is overlooked in SS’ critique, where we find such passages as: “The process [SH] describe involves ‘improving’ the argument by supplying new premises that would make the argument deductively valid, *and then trying to establish all the premises deductively*” (italics added). Such a demand, had we made it, would have been absurd.³

Throughout SS’ critique (see, e.g., p. 84, 85, and 86), we are chastised for allowing an induction of the premises while forbidding an induction of the conclusion. Such criticisms betray a lack of familiarity with the most elementary concepts of modern, truth-functional logic. It does not matter, logically speaking, *how* the truth of a premise is shown, only *that* it is shown. In fact, there are countless ways of establishing the truth of a premise. The whole machinery of experimental method, statistics, sampling procedure, questionnaire design—in short, everything that currently makes up the discipline of marketing research—is devoted to establishing the *mere truth* of empirical claims. The truth of the premises, though not the easiest part of our demand, is by far the most familiar to marketing scholars. Given validity, therefore, the demand for soundness is reasonable.

Finally, is it too much to ask marketing scholars to produce elegant arguments? Perhaps. Elegance is by far the most difficult feat of the three. The elegance of Euclidean geometry, for instance, was under discussion for centuries. In general, an elegant argument shows much discussion, criticism, and revision. However, as an ideal toward which marketing scholars can strive, elegance is a reasonable candidate. The

³Perhaps SS were confused by the treatment we gave P1 in our example (in SH 1987). P1 was the premise of the master argument, but it was *also* the conclusion of a subargument. We looked at the argument for P1 only because there was an argument to look at, not because there *had to be* an argument supporting it.

pursuit of elegance drives mathematics, science, and literature—why not marketing theory as well?

Non-Ampliative Knowledge Extension

SS conclude with this remark: “Our main point is that it is the study of inductive, rather than solely deductive, inferences that applies in the evaluation of ampliative (knowledge-extending) arguments.” Surely, there must be more to such a lengthy critique. After all, they *define* “ampliative” to be a certain feature of induction. If SS’s final remark contains any interesting point, it is the one coyly tucked away within the parentheses: namely, that *all and only ampliative arguments are knowledge-extending*.

Throughout their critique, SS make much of the technical notion “ampliativity.” In fact, their entire critique stands or falls on the merits of this property. According to SS,

... the conclusions of deductive arguments *do not contain any more information* than is already contained, even if only implicitly, in the premises⁴ (Salmon 1984). . . . Such arguments are called “non-ampliative” [italics added].

Induction is ampliative, deduction is non-ampliative, and therein seems to lie the drawback of deduction: deduced conclusions must contain no more *information* than the conjoined premises. SS seem to use the expressions “ampliative,” “containing more information,” “advancing knowledge,” and “knowledge-extending” interchangeably. Marketers, it would seem, need ampliative methods for their arguments if they ever hope to extend marketing knowledge.

Unfortunately, SS fail to show a link between *information-increasing* and *knowledge-extending*, and in fact there is no such link. Information is not knowledge. In fact, unlike knowledge, *information may just as easily be false as true*.

SS have rested their entire case on a technical point about formal languages, namely that a consistent set of inference rules is information-preserving. The statistic “information” is a measure of message probability—how drastically an actual message reduces the number of messages possible in a given transmission.⁵ Information is simply a measure of how surprising a message is, and is independent of truth.⁶ Thus, a sur-

⁴To avoid confusion, this should read, “in the *conjunction* of the premises.”

⁵ $I(x_i) = -\log_2 p(x_i)$, where $I(x)$ is the amount of information contained in a message, x is a message, and $p(x_i)$ is the probability of x_i being selected.

⁶One textbook explains it this way: “It is the probability of a message’s delivery—and not its content—that determines its information value. . . . For example, in the above illustration, it is the unusualness of the message . . . that makes it convey a lot of information (not its truthfulness)” (Coombs, Dawes, and Tversky 1970, p. 309).

prising lie contains more information than does an obvious truth. Knowledge, in contrast, must be true; and the more obvious to us a bit of knowledge is, the more confidently we will use it. Hence, knowledge and information, having such different properties, must be different things.

What does this mean for deduction? A few examples may help. Consider the famous rule of thumb, GIGO: garbage in garbage out. No more comes out of a computer than is put in, simply because a computer is a *deduction* machine that makes only deductively valid inferences. *This non-ampliative feature of computers is precisely what makes them so valuable for knowledge development.* Computers do not increase the *information* we give them, but they dramatically increase our *knowledge* about that information as well as our *understanding* of it. For another example, if Ed learns the rules of chess one day, he then has the same *information* about chess as the current world chess champion. What the world chess champion has, and Ed lacks, is a *knowledge* of chess.

A marketing scholar who has a set of empirical data can extend the *information* contained in that set by adding more data. The scholar can extend his or

her *knowledge* about the dataset by running it through multivariate analyses, econometric analyses, and so forth. These tests, because they are analytical, are non-ampliative. Even so, they are useful to marketing scholars. Far from being the price we pay for certainty, non-ampliativity is the benefit we reap.

In sum, we agree that deduction is non-ampliative; we agree that deduction does not increase information; we even agree that good arguments should extend knowledge; but we deny that induction is the only way of extending knowledge.

Whatever plausibility SS may seem to possess disappears when one sees that deduction can be both non-ampliative and knowledge-extending at the same time.

Conclusion

We have met the main criticisms raised against our 1987 article. But we are concerned lest our original message be lost: Marketing theory needs the sort of conceptual discipline that analytical philosophy can lend it. Unless we marketers add modern deductive skills to our repertoire, we will never have a marketing theory worthy of scientific respect.

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ADVERTISERS' INDEX

The Burke Institute	Cover 4
The Dryden Press div. of Holt, Rinehart & Winston	Cover 2
The Free Press, A Division of Macmillan, Inc.	F-2
Houghton Mifflin Company	Page 120
Richard D. Irwin, Inc.	B-1
Macmillan Publishing Company	F-1
South-Western Publishing Company College Division	F-2, Cover 3