

# The Impact of Outliers: Practice Theories and Informetrics

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## ABSTRACT

This comparative case study explores the impact of four “practice theories” in the separate domains of finance, military strategy, nursing, and theology, and discusses potential “outputs” in each field that might be developed into new metrics to enrich the current practice of informetrics.

## Keywords

impact, informetrics, innovation, practice, theory

## 1. INTRODUCTION

Despite the development of important new metrics for science and technology information [7], informetrics continues to retain certain blind spots in respect to analyzing the impact of information. One of these is the implicit assumption in much analysis that there is a single theory-driven peer-reviewed publication “point of origin” for research advances, which may be tracked by the use of appropriate citation metrics and that will also eventually translate into practical innovations that can then be further measured by appropriate patent metrics [73]. However, this fails to represent the reality of “knowledge translation” today in many fields [47].

The existing emphasis on disciplinary “citation culture” [68] and widespread reliance on the Thomson Reuters databases as a sole source of data for informetric analysis [44] has also meant that the role of different kinds of practice and practitioners in the development and diffusion of theories of all kinds has been largely ignored. The overwhelming focus on citation and patent counts disregards the fact that “practices” and “processes” may be as important as “products” in many domains, and that their “outputs” may not be captured by these measures. This has already been recognized by knowledge management scholars in particular, but most of their emphasis has been on ways that organizations can appropriate the tacit knowledge of employees rather than the analysis of impacts on a broader scale [63]. Theoretical development and diffusion outside “traditional” scholarly channels remain largely a black box to informetric investigation [36].

Crowley, one of the few in the LIS field who has recognized the importance of theorizing from practice, also associates it with the tacit knowledge of practitioners that is to be identified and codified by academic researchers in order to be properly utilized [17]. However, the theories described in the present study are clearly more than the “tacit” ones of individuals unaware of their own knowledge. This exploratory research investigates the impact of practitioner-generated theories through a comparative case study of four different theories in the fields of finance, health,

military science, and theology. These four fields of practice continue to present issues of pressing importance today, and the choice of these particular theories for examination was made precisely because they did not emerge in the conventional way from disciplinary journal literature: rather, they were innovative ideas developed and diffused by practitioners in these varied fields for other, practical purposes, and only subsequently emerged in the scholarly literature through citations by academics. Their impact both on the scholarly literature and on their own domain of practice is the subject of this research. New measures of impact are also discussed in the context of each case study.

## 2. THE PROBLEM OF PRACTICE

A particular challenge for this project has been the vexed question of defining a “practice” theory. While those in the physical sciences may associate “practice” with Pickering’s account of scientists’ “mangle of practice” [52] and those in the social sciences with Schön’s account of professionals’ “reflective practice” [66], the so-called “practice turn” in the 1990s initiated a much wider view of the “practice field” as “embodied, materially mediated arrays of human activity centrally organized around shared practical understandings” [65]. There is great variation among these “theories of practice” originating in both sociology and philosophy, with much emphasis on the rules and skills, both explicit and implicit, that define a particular set of practices within a community, and, not unexpectedly, some criticism that the “practice turn” has been a misguided one for theorists [81].

In a cogent argument on behalf of practitioners themselves, Polkinghorne claims that the growing imposition of theory-driven “best practices” and “evidence-based practice” on professionals in many fields is robbing them of the right and obligation to exercise necessary judgment and reflection in their own practice [55]. And, finally, Knorr Cetina maintains that “The notion of a knowledge society suggests that knowledge-centered practice . . . is more dynamic, creative, and constructive than the current definition of practice as rule-based routines or embodied skills suggests” [31].

In accordance with Knorr Cetina, Pickering, Polkinghorne, and Schön, I maintain that, while practices are certainly not theories, practices can and do generate new theories in the minds of those who practice and who reflect on those practices. The four practitioner theorists studied here include a U.S. Air Force fighter pilot (Boyd), a Dominican priest (Gutiérrez), a registered nurse (Orem), and a Wall Street trader (Treynor). The work, especially the written work, of these “dynamic, creative, and constructive” practitioners is what I will term “practice theory.” The impact of such “practice theories” on both “practice” and “theory” is the subject of this research.

### 3. METHODOLOGY

The methodological framework employed for this study is the comparative case study method [59], as that allows each of the four cases studied to contribute equally towards illuminating a general model. Though chosen from different fields of practice, the theories selected for this research originated in a single decade (the 1970s) in order to provide sufficient history for the comparative analyses, as suggested by Martens and Goodrum [41]. All of these theories are being actively utilized at present in one or more domains.

Additionally, these theories provided numerous textual artifacts such as textbooks, briefings, homilies, accounting rules, taxonomies, professional articles, and popular books to enrich this study. Specific methodologies employed included standard bibliometric analytic techniques for tracing the diffusion of theories through citation networks [19], content analytic techniques for tracing the diffusion of theories through other networks [82], and conceptual analytic techniques for studying the theoretical texts themselves [51]. In addition, at least partial bibliometric or diffusion studies of these theories have been performed by others, and the results of these studies helped to form the conclusions presented here.

### 4. CASE STUDIES

The specific cases examined are taken from work in finance [79], military strategy [9], nursing [49], and theology [28]. All references to the works by the four theorists in this study were identified and downloaded from the Thomson Reuters databases to form the corpus of the scholarly citations to be analyzed for each theory. The data examined included the text of the theories themselves, the text of many of the scholarly articles citing the theories selected from each decade beginning with the theory's original publication, as well as selected text from a variety of other materials that employed the theories.

#### 4.1 Self-Care Deficit

Nurse educator Dorothea E. Orem developed the "self-care" theoretical framework for the practice of nursing over the course of the past four decades. Her framework is comprised of three subsidiary theories that involve the interlocking concepts of self-care, self-care deficit, and nursing systems. These theories deal with the various levels of self-care that people may or may not be able to provide for themselves during the lifespan, the associated needs for nursing care, and the systems of care that are thus required in that particular individual's environment.

Orem's work was grounded in her experience in nursing practice, representing her attempt to present a formal conceptualization of nursing as a domain during a period when the practice of nursing lacked much explicitly nursing-oriented theorizing to support a nursing curriculum [75]. This is exemplified by the fact that Orem's theory was first published as a nursing textbook that has now gone through six editions, the primary source for all subsequent references to her work [15].

As a practice discipline, nursing has spent a great deal of effort in considering the importance and implications of such "situation-based" theorizing [43]. However, the bibliometric study of Orem's theory is complicated by the fact that until recently the contents of only a very few peer-reviewed nursing journals were routinely input into the predecessors of Thomson Reuters's

current databases. Most bibliometric analysis of nursing theories are, therefore, performed by using the CINAHL indices [70]. Almost all of the citations to Orem's theory appear in nursing or health-related journals. While nursing imports a wide variety of theories from other fields, it is far less apt to export its own [1].

In addition to the current study, three bibliometric studies of self-care deficit theory [6, 71, 76] have indicated that, while citations to Orem's work clearly indicate that it is a foundational theory in nursing, empirically-based studies that test its constructs are surprisingly few and largely superficial, given the number of references to the theory in published journal articles. This observation is clearly related to the well-known difficulties of practice theory, especially in reference to the vulnerable populations which are the central "subjects" of nursing research, with regard to the norms of clinical and scientific research practice [78].

This is an ongoing issue in nursing, exacerbated by the increasing influence of the requirements for "evidence-based" research in the medical field [40]. Although some nursing theorists are dismayed by its "colonization" of nursing [56], evidence based on the practice of nursing itself may also provide an opportunity to better employ the nursing diagnostic taxonomies constructed from Orem's theoretical framework [22]. While nursing-specific taxonomies continue to be both complex [4] and contested [8], their use may represent a necessary compromise in the face of the increased pressure for accountability at all levels in the health sector. Properly de-identified to protect individual patient privacy, the use of diagnostic and intervention data by nurses may also serve to generate more useful evidence from actual nursing practice to better inform nursing theory and, accordingly, nursing practice. Information scientists interested in classification as a form of theorizing might also find opportunities to explore the impact of nursing theories through this lens of practice by using the NANDA, NIC, and NOC taxonomies [32].

#### 4.2 Integration Hypothesis

The so-called "integration hypothesis" was introduced in *The Financial Reality of Pension Funding Under ERISA*, a 1976 book by Treynor, Regan, and Priest, one of the first examinations of the potential impact of the newly legislated Employees Retirement Investment Security Act on corporate accounting and actuarial practices with regard to pensions. Their hypothesis was that corporations would shortly begin to consider these new legally-enforced corporate liabilities (previously considered to be unenforceable "gratuities" to retiring employees) as assets to be managed within the corporate portfolio, making particular use of the new "pension put" more or less unwittingly created by the existence of the Pension Benefit Guaranty Corporation. The book created an entirely new "integrated" framework for viewing corporate pension plans, with both positive and negative ramifications for the stakeholders involved.

Treynor may be said to represent the ultimate "reflective practitioner": he is renowned for having developed (and not published) a version of the Capital Asset Pricing Model that actually preceded Sharpe's 1990 Nobel Prize-winning effort, as well as for later having inspired Fischer Black to work on the options pricing model that helped win Merton and Scholes their Nobel Prize in economics after Black's death [45]. While displaying substantial interest in portfolio theory, Treynor

consistently emphasized the practical side of finance, as he is also noted as a pioneering proponent of financial engineering departments within banks and brokerages: the so-called “quants” that have transformed American finance over the past decades [35].

A brief condensation by Treynor of the book’s main points also appeared in a special issue of the *Journal of Finance* in 1977. The publication counts, therefore, include both citations to the book and to this article by Treynor. Initial scholarly citations to the book were immediate: the first was in *Harvard Business Review* [77], and continue into the present, long after the book itself has gone out of print [27, 61]. Because of its revolutionary, options-oriented view of the PBGC’s unforeseen role as the captive buyer of a corporation’s unfunded pension liability, the book became an almost obligatory reference in any work dealing with pension funding. Amsbachteer commented that fully understanding the implications of this practical approach to pension management still forms part of the “next frontier of portfolio theory” [2].

Whitley has chronicled the development of portfolio theory and financial economics as “a particularly interesting example of new ‘occupation-oriented’ scientific fields since it combines a high degree of practitioner interest and support with a high degree of theoretical abstraction and coherence, which is unusual in such fields, particularly those concerned with social phenomena” [83]. More recently, MacKenzie [37, 38] has speculated that financial engineering actually creates markets through these abstract models and the various mathematical products that embody them. Relatedly, “enterprise risk management” has become a critical part of the firm’s thinking, due both to the risks involved in financial markets and the financialization of risk management itself [57].

Again, information science could provide a beneficial set of informetric tools with which to examine not only the texts, but the so-called “market devices” of algorithms, pricing models, trading protocols, financial instruments, and the aggregate data that “make” financial markets beyond the insights provided by purely econometric models [48]. Surprisingly little informetric interest has been shown so far in what is clearly a “bull market” of potential data points for the broader impact of particular financial theories.

### 4.3 Liberation Theology

Gutiérrez’s book, *A Theology of Liberation*, was originally published in Spanish in 1971, with an English translation published by Orbis Books in 1973. Considered a founding work in so-called “liberation theology,” this theory emerged from a controversial series of meetings held by Catholic bishops in Latin America regarding the role of the post Vatican-II Catholic Church in the often tortuous economic and political “development” of their countries. Gutiérrez, an attending priest, articulated his insight that theology is “critical reflection on praxis in the light of the word of God” and that the mission of the Church regarding poor and oppressed people worldwide should be “liberatory” rather than simply “developmental.” Simply stated, his theory is that such liberation should be on three levels: individual (the liberation by Christ from sin), social (the liberation of entire communities from the selfish refusal to love one’s neighbors) and global (the liberation of humankind from the historical acceptance of misery, despoilation, and alienation as a “natural” condition of

human existence as propounded by the Church). Gutiérrez has been continually engaged in dialogue regarding his theological writings with the Vatican’s Congregation for the Doctrine of the Faith, most particularly with its head (now Pope Benedict XVI), who published an “Instruction” regarding the relationship of so-called “liberation theology” to accepted Church doctrine [60].

The two English editions of the book reached an audience far beyond the pastoral community in Peru. “Liberation theology” was perceived to carry strong political implications, due to its connections with Marxist thought, especially by the use of the term “praxis.” Although Gutiérrez’s use of the term was intended to denote “Christian praxis” as “orthopraxis” (right practice, consistent with Catholic orthodoxy), many supporters of “liberation theology” were indeed actively Marxist in their political aspirations [69]. The decade after the birth of “liberation theology” saw the increasing involvement of Catholic clergy in the struggle against political repression in South America [5]. However, as the political situation changed, many “liberatory” bishops were replaced by less radical ones, and many liberation theologians were rebuked for their writings by the Vatican [34].

Citations to Gutiérrez’s book, however, appear to continue strongly, even though a more comprehensive bibliometric approach would entail using the ATLA (American Theological Library Association) religion database, as similar concerns about the extent of the Thomson Reuters indexing of peer-reviewed theological journals exist as the ones described above for nursing journals. While the majority of the citations are in theological journals, particularly Catholic-oriented ones, the theory has also been used in a wide variety of contexts: for example, behavioral science [29], law [58] political science [26], and social psychology [13].

While Gutiérrez’s work has received sufficient scholarly citations to qualify it as a citation classic, its real *raison d’être* was to challenge the magisterium (the official teachings of the Catholic Church) regarding the Church’s special obligation to the poor, which is why it has received so much attention from the Vatican over the decades. While the so-called “ordinary universal magisterium” involves revealed matters of faith and is properly promulgated only by the Pope and the college of bishops, the “ordinary magisterium” is the one through which theologians raise contemporary issues of innovation and interpretation that may affect both the theory and practice of the faith [74].

What bibliometric analysis has not done is to examine the intricate interplay of how these intellectual innovations by theologians can influence and be influenced by the magisterium [23]. The critical role of theological literature in this process of “complementary charisms” [64] is largely unexplored by secular scholars. Further, the ongoing importance of religious teachings has been neglected, but clearly their impact has been felt both politically and socially, not only through Catholicism and in Latin America, but through Islam and in the Middle East. Gill [25] suggests that the study of theories such as liberation theology and their diffusion both inside and outside doctrinal channels would also allow the building of more general theories of how such ideas and institutions interact.

### 4.4 OODA Loop

Boyd’s “OODA loop” theory represents an intriguing case of a highly specialized practitioner theory that went largely unnoticed

in the scholarly literature for the first two decades of its existence, while becoming increasingly influential in the military domain in which it was practiced, and which has now given rise to new uses in several disciplines. This “observation, orientation, decision, action” systems-based approach to strategic cognition as a time-based theory of conflict was grounded in Boyd’s practical knowledge as a Navy fighter pilot of how to outmaneuver an enemy in aerial combat [50].

Boyd helped to codify his tacit knowledge of air maneuvers in a series of Air Force reports, but the OODA loop theory was an separate outgrowth of his realization that this tacit knowledge, synthesized with existing explicit knowledge about strategy, could also be applied to operational service practices [30]. This so-called “operational art” occupies the middle ground between tactics and strategy, all of which are considered uniquely military types of theorizing [21]. The primary mechanism for dissemination of the OODA loop was Boyd’s famous in-person six-hour “briefings” to various levels of military command, illustrated by his series of slides, which intensified after his formal retirement from the military [46].

Boyd’s efforts in promoting the theory throughout the Pentagon and various branches of the services eventually resulted in the OODA loop achieving what Latour [33] would term “black box” status: that is, the OODA loop itself has become reified and is often referred to without mentioning Boyd at all. Some of Boyd’s associates eventually began to employ his ideas in a business context, and the OODA loop is now frequently referred to in popular management literature as well [62].

Scholarly citations to the OODA loop via Boyd’s unpublished papers began in 2000, with such varied applications as software agents, fleet navigation, trauma medicine, and disaster management. One of the manifest difficulties in citing Boyd’s work is that he continued to work on the theory throughout his lifetime without producing a definitive published document, and so there is an unusual variation in references to his works, ranging from the “Destruction and Creation” document [9] to various other permutations of his presentations and reports about the presentations. Clearly, however, the most critical views of the OODA loop come from within the military itself, which can be considered the “peer review” process for this theory: other scholarly uses appear to incorporate the OODA loop without similar reservations.

The OODA loop diffused through a variety of military channels [3] and is recognized as a foundational “timing” concept in operational art [18]. Although it has been suggested that the OODA loop theory is of diminished utility in so-called “fifth-generation warfare” [67], other commentators argue that this opinion is grounded in a superficial understanding of the theory [54]. Despite its manifest flaws as a cognitive model [12], the OODA loop remains prominent in so-called “Command and Control” military doctrine [10]. The OODA loop remains one of the few contemporary examples of “bottom-up” theoretical innovations in military doctrine, which are the most understudied examples of military innovation, as most diffusion studies in this field tend to focus on examples of historical interest, high technology, or grand strategy [20].

Although there has been much interest in both research and

development inputs to the military [11] and research and development outputs by the military [53], there has been surprisingly little interest in how ideas diffuse through the military itself, with the exception of a small cadre of theorists in strategic studies [16]. This may be due to the perceived difficulty in gaining access to the necessary documents, either because they are classified [24], in the under-indexed “gray literature” [14], conform to different stylistic conventions than those in academic writing [42], or simply because it is not generally understood that, as “weapons that think” [39] military organizations engage in practical theorizing at all levels of leadership [72]. These are issues related to innovation and information that will be increasingly pressing in the current era of so-called cyberwar, and information scientists could begin to examine them through the texts of military doctrines, military operational concepts, and actual military orders as these become available for research use.

## 5. CONCLUSIONS

Most informetric studies begin rather than end with the actual citation counts of the theories analyzed. I have deliberately placed Figure 1 at the end of this article in the hopes that the discussion here has illuminated some of the weaknesses of citation analysis in considering the overall importance and impact of practice theories, especially when utilizing a single data source such as Thomson Reuters. The number of citations listed for each of these theories fails to indicate their impact on their own fields of practice, nor, presumably, on society at large. These impacts vary by case:

- Orem’s work has had significant impact on both theory and practice in the emerging field of modern nursing, but little influence on the broader medical field
- Treynor’s work has had roughly equivalent influence on both pension portfolio theory and pension fund practice
- Gutiérrez’s work has had more influence both on theological theory in general and on the theories of other disciplines than on the practices of the Catholic Church
- Boyd’s work has had significant impact on the practices of his own military hierarchy and those of related organizations, while having some very limited influence outside the military

Clearly, the impact of practitioner-generated theories can be as disparate as those of academically-generated theories, ranging from non-existent to highly influential. The current lack of interest and exploration in these areas by informetricians is somewhat surprising, given the increasing importance of innovations in these particular fields.

Tukey [80] famously urged researchers to explore what statistical outliers might reveal about the data being analyzed. Practice theories continue to be the “outliers” in the assessment of innovation and impact. Informetricians might well take into account the methods of dissemination and the contributions of practice theories as they contemplate new indicators and indicator theories [84].

**FIGURE 1. DATA ANALYSIS OF PRACTICE THEORIES**

<b>Theory:</b>	<b>Citation counts in Thomson Reuters:</b>	<b>Data analyzed:</b>	<b>Primarily diffused via:</b>	<b>Possible “practice” outputs:</b>
<b>Self-care deficit</b> [Nursing] Orem	781	Nursing taxonomies Nursing textbooks Professional articles Scholarly articles	Nursing textbooks	Nursing diagnoses  Nursing interventions
<b>Liberation theology</b> [Theology] Gutiérrez	456	Popular articles Popular books Religious texts Scholarly articles Theological books	Religious literature (including homilies)	Religious doctrines
<b>Integration hypothesis</b> [Finance] Treyner	96	Financial textbooks Professional articles Scholarly articles	Financial publications	Portfolio holdings
<b>OODA loop</b> [Military] Boyd	9	Management books Military briefings Professional articles Scholarly articles	Military briefings  Management books	Military doctrines  Business strategies

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