

Definitional Definitions and the Bare Minimum of Theory

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Abstract

Whereas there is a rich literature that discusses what is a good theory, in this article we focus on the much-neglected topic of how to develop the bare minimum of what can possibly be considered theory. Only by carefully studying and understanding the bare minimum can we really understand the essence of what makes a theory a theory. We draw from formal axiology to provide guidelines for developing precise, bare minimum definitions of things and then we apply these guidelines to develop a minimalist definition of a theory: an explanation of the relationship between two or more measurable concepts.

Keywords

Definitions, theory, axiology.

Introduction

There is a rich literature in information systems and related fields that has focused on providing directions of varying specificity for developing better theories (Bacharach 1989; Barki 2008; Burton-Jones et al. 2015; Corley and Gioia 2011; Doty and Glick 1994; Gregor 2006, 2006; Grover et al. 2008; Markus and Saunders 2007; Rivard 2014; Rowe 2014; Weber 2012; Whetten 1989). These are very helpful when trying to develop good theories. However, we have recently encountered an aspect of theoretical understanding where these usually staple sources have not proven quite as helpful.

Our particular research challenge was in trying to develop theory using standalone literature reviews (Okoli 2019). As we studied published literature reviews to understand what elements they held that contributed to the development of theory, we found that we did not quite understand as well as we had thought what exactly this “theory” was that we were looking for. And in the context of studying literature reviews, we found that our challenge was not only with the idea of “theory”, but was more fundamental—there might be a wide variety of definitions of any topic of interest, and various definitions vary widely in their usefulness. Various aspects of our enterprise soon revealed that we needed some precise definitions, but it was very difficult to find sufficiently precise ones for our particular purposes. Eventually, our search turned to trying to understand what exactly was the kind of useful definition that we were looking for.

In the theory development literature, there are some valuable expositions that specifically discuss good definitions (Rivard 2014; Suddaby 2010), but these are focused on developing good theoretical constructs—although we are specifically interested in definitions for theory, our fundamental interest in definitions is more general.

Whereas most articles that discuss the nature of theory focus on how to develop good theory, our focus in this article is the opposite. Rather than focusing on good theory, we focus here on the much-neglected topic of how to develop the bare minimum of what can possibly be considered theory. Why would we want to focus on the bare minimum, rather than on good theory? Because it is by carefully studying and understanding the bare minimum that we can really understand the essence of what makes a theory a theory. Without understanding the bare minimum of what is really a theory, then we might include some ideas as theory because they have many characteristics of good theory (e.g. clear concepts and interesting relationships), yet they might leave out some crucial aspects that we are not quite clear are indispensable (e.g. explanations of the relationships).

In grappling with these terms, we have found that when it comes to definitions, we might have too much of a good thing: sometimes we focus so much on the features of a good, ideal, desirable specimen that we lose sight of the critical characteristics that define the essence of the thing. In order to evaluate existing definitions of these and other terms and to develop more useful definitions when necessary, we have drawn from formal axiology (Hartman 1967) to develop a general vocabulary for understanding and describing this fundamental idea of “the bare minimum” of a thing as distinct from a “good” thing.

This article is structured thus: after this introduction, the first section presents principles of bare-minimum definitions and the idea of the “definitional definition”—a definition that simply defines, nothing else. Next, we apply these principles to develop a bare minimum definition of theory. We then conclude the article with a discussion of its implications.

The bare minimum of a thing: definitional definitions

To consider what makes for good definitions, we refer to terminology from Robert S. Hartman’s formal axiology (Hartman 1967). Axiology is a branch of philosophy that studies good and bad. Although ethics, the study of moral goodness, is an important branch of axiology (e.g. good behaviour versus bad behaviour), axiology is much more fundamental: it also answers questions with no moral implications, such as the difference between a good cake and a bad cake or between a beautiful painting and an ugly painting.

In tackling such questions, Hartman found it necessary to break down the words that we use in describing things into two categories: the *definitional* properties or attributes of the term versus the *expositional* attributes. As an illustration, “horse” could be given two sample definitions: Definition 1, “hoofed quadruped of the genus *Equus*” (Hartman 1967, p. 195); and Definition 2, “hoofed quadruped of the genus *Equus* with a mane, a tail and teeth”. The definitional attributes are those that are essential to defining the term (hoofed, quadruped, *Equus*); the expositional attributes are not absolutely essential but are important to describe a good or proper specimen of the term (mane, tail, teeth). (In formal axiology, “exposition” could be understood to mean description or details.)

Hartman made this distinction mainly to explain that his focus in axiology was on expositional attributes rather than on definitional attributes, but in this article we use this basic distinction to identify or develop definitions that cleanly distinguish class membership, focusing mainly on the definitional attributes rather than on the expositional ones.

It is important to note that definitions are not one-size-fits-all. People have different reasons for which they might need a definition, and some of these different reasons call for different definitions of the same thing. Without attempting to develop a taxonomy of purposes of definitions, in this article we focus on two specific, fundamentally different goals that might call for alternate definitions of the same thing. Most definitions not only try to define what a thing is, but simultaneously they also aspire to some degree to describe a good, ideal or desirable example of the class; that is, they include one or more expositional features. However, sometimes we need a different, very particular type of definition, one that strictly distinguishes between which things are members of the class being defined and which things are not. We will call definitions that strictly achieve this “definitional definitions”, since they use nothing but definitional properties to describe the class.

In fact, we can summarize our difficulty in finding appropriate definitions as this: although we often need definitional definitions that discriminate clearly between members and non-members of a class, most definitions that have been developed intermix expositional features; that is, in describing desirable characteristics of the class, it is unclear where the strict boundaries of membership versus non-membership lie.

In general, a definitional definition presents all pertinent definitional features and nothing but definitional features. Suddaby (2010) and Rivard (2014) mentioned similar principles for clear definitions in presenting theoretical concepts, but a definitional definition goes beyond simply including all essential (that is, definitional) properties to also being very careful to exclude any features that are not strictly definitional. Specifically, to qualify as a “definitional definition”, a definition must exhibit the following definitional characteristics:

- It must include all necessary definitional features; it should not leave any out. Otherwise, some inappropriate members might be erroneously accepted as belonging to the class being defined.

- It must not include any other definitional features that are not strictly necessary for the definition of class membership. Otherwise, some valid members might be erroneously excluded from the class.
- It must not include any expositional characteristics at all. These could be easily mistaken for definitional features, thus erroneously excluding some valid members from the class.

Based on these criteria, we offer a definitional definition of “definitional definition”: **a definition of a class of things that lists all the necessary definitional features of class members and does not mention any feature that is not strictly definitional.**

Beyond these absolute (definitional) requirements, a definitional definition that hopes to be useful for cleanly distinguishing class membership should go further to additionally have some recommended expositional characteristics if it is to be useful for a wide variety of purposes:

- It should be as concise as possible. This is mainly for convenience of use, but excessive wordiness is often a sign of expositional descriptions rather than definitional precisions. A key aspect of achieving concision is that if some features necessarily imply the presence of other features, then there is no need to specify the prerequisite features; only the final ones should be specified. For instance, there is no need to say, “a horse is an ungulate [that is, hooved], a mammal and an animal”; it is sufficient to concisely say, “a horse is an ungulate” (since all ungulates are mammals and all mammals are animals). This requirement of concision is the aspect that requires the most literary skill in crafting a good definition: it is not easy to express rich meaning in just a few, appropriate words.
- Suddaby (2010) additionally noted that a good definition of a theoretical concept should not be tautological (defined in terms of itself) or circular (that is, a definition of one concept should not incorporate a distinct antecedent or consequent concept into its definition). We note that these points are distinct from our previous criterion of concision: it is possible to be concise yet tautological.
- It should explicitly say that it is a definition. If it is not explicitly labeled as such, it is not always obvious to readers whether a statement is meant to be a definition (definitional) or rather a description (expositional).
- It should be stated in one grammatical sentence. Otherwise, readers might be confused as to when the definition begins or ends.

With these principles, we can now consider what theory is from a definitional perspective.

The bare minimum of a theory

We must first explain our understanding of theory so as to clarify which characteristics we consider definitional versus expositional. Among numerous sources that we have consulted, we can distill the development of our operational view of theory that we adopt here to three or four major influences.

First, according to Whetten (1989), a theory has four basic components: “what”, referring to what concepts are identified and specified; “how”, referring to the relationships between the concepts; “why”, referring to the logically-argued explanations for the relationships; and “who, where, when”, referring to the bounding contextual conditions within which the theory operates, outside of which no claim is made for the theory to hold. We consider that Whetten (1989)’s first three elements (concepts, relationships and explanations) are absolutely essential for any theory; these are definitional properties of a theory. However, we consider his fourth element of a theory (“who, where, when”, that is, the bounding contextual conditions) to be expositional. That is, if a presentation includes concepts, relationships and explanations of those relationships, but it omits to specify the conditions under which the relationships are valid, we would not disqualify such a presentation as a theory; we would rather consider it as an insufficiently specified theory. Thus, the boundary conditions should be part of an expositional definition of a theory, but not part of a definitional definition. We now proceed to discuss the definitional elements in some more detail.

Concerning concepts and relationships, a second major influence on our thinking about the definition of “theory” is Burton-Jones’ et al. (2015) identification of three forms of theoretical perspectives that are employed in information systems research. Concepts in variance theories may be either simple variables or composite variables (as in a construct, configurational concept, etc.). Concepts in process theories are primarily events, which are composite variables with at least two simple variables: a time indicator (when

the event's occurrence is being evaluated; it might represent chronological time or a relative order in a sequence of events) and a binary indicator of occurrence (whether or not the event occurred at the specified time); it may also include other simple variables that indicate various details about the event. Concepts in systems theories are primarily systems, which are composite variables with at least two simple variables: at least one property variable of some sort plus a system state variable that indicates the current state of the system.

Although Burton-Jones et al. (2015) only marginally referred to his work, their perspective is quite consistent with the holistic theorizing framework that Weber (2012)—our third major source—presented that essentially considers everything to be a system (thus, all theories are essentially systems theories); but theorizing might focus only on the varying states of the system attributes and the relationships between these varying states (that is, variance theories); or theorizing might focus on the changes between stable states of the system objects (that is, focus on events, which results in process theories). Of course, from Weber's perspectives, theories could include various forms of these types of concepts, which is consistent with one of Burton-Jones' et al. main arguments that theories could successfully mix any meaningful combination of variance, process and systems concepts and relationships. For the purposes of our present article, the main implication that we draw from the work of Weber (2012) and Burton-Jones et al. (2015) is that the idea of “concept” should not be restricted to only mean a “variable” or a “construct”—this is certainly the case for variance theories, which represent the vast majority of theories in information systems (IS) research, but these words do not include the possibilities of systems or process theories. Thus, we prefer the word “concept” in our definition of a theory, otherwise the definition might inadvertently exclude other valid approaches to theorizing.

Although these different kinds of concept might seem somewhat confusing, when reduced to the bare minimum, a theoretical concept is actually very simple: it is simply something that can be measured. If it is measurable, then it is a theoretical concept. If it is not measurable, then it is not a theoretical concept. It might be a number, a binary value, a textual category, a date, or a complex combination of any of these. As long as it can be measured, it is valid as a theoretical concept, once integrated into a theory. So, for example, the concept of “e-government” is not measurable and so is not a theoretical concept. However, it could be conceptualized in different ways so as to be measurable and thus available for use in a theory: “e-government maturity level” (measured on a scale of 1 to 10); “percentage of online services offered to citizens” (measured from 0 to 100%); “availability of an open government data portal” (measured as true or false); “attitude towards net neutrality” (measured as pro, against, or no opinion). Another example: the concept of “big data” is not in itself a measurable theoretical concept, but it can be operationalized as such: “percentage of organizational databases greater than 100 GB” (measured from 0 to 100%); “use of at least one NoSQL database” (measured as true or false); “datatypes stored” (measured as a complex array of binary values [dates, natural language text, images, videos, geographical coordinates], where each item in the array can have a true or false value to indicate existence in a big data database).

So, the difference between a theoretical concept and a non-theoretical one is simply whether or not it is expressed in a way that permits concrete measurement or not. That is the simple criterion that determines if a concept can be related to other concepts as part of a theory. Indeed, the simplicity of the criterion might surprise some readers; thus, we invite our reader to think of a concrete counterexample, that is, a theoretical concept that is *not* measurable. After careful reflection, we are confident that the reader will find that all theoretical concepts that they can think of meet this simple criterion.

The idea of theoretical relationships is fairly straightforward, but we note that although a relationship might possibly be causal (that is, A causes B), it is not necessarily so in a theory. A relationship may be merely correlational (A is correlated with B), or it might even be bidirectional (A and B simultaneously affect each other). As long as an explanation is offered for the relationship between the measurable concepts, then such a relationship is a theoretical one.

That said, while it is uncontroversial that concepts and the relationships between them are essential parts of any theory, there is some controversy concerning explanations. Notably, Gregor (2006) classifies five types of “theory” observed in IS research. While each of these various perspectives has its own value, only three of them (“theory for explaining”, “theory for explaining and predicting”, and “theory for design and action”) include explanations. In contrast, two types (the so-called “theory for analyzing”, that is, purely descriptive “theory”, and “theory for predicting”) are explicitly devoid of explanation. However, consistent with most other theorists, we believe that explanation is definitionally indispensable to anything that might

possibly be called a theory (see, for example, Bacharach 1989, p. 501; Corley and Gioia 2011, p. 12; Weber 2012, p. 5; Webster and Watson 2002, p. xix; Whetten 1989, pp. 491–492). Thus, we do not admit the analytic-only or predictive-only types as valid theories.

In its very simplest form, a theory is the specification of two measurable concepts, concept A and concept B, accompanied by the specification and explanation of a relationship between A and B. The specification of a relationship could be merely an observation of the existence of the relationship, or it might be a estimate of the value, existence or state of concept B based on the observed value, existence or state of concept A. Regardless of the nature of the specified relationship, there must be some explanation offered concerning how or why such a relationship exists or operates. More complex theories specify more than two concepts and more than one relationship; however, all theories share these three definitional characteristics.

Source	Definition	Definitional criteria			Definitional definition	Comments
		Concepts	Relationships	Explanations		
Our definition	an explanation of the relationship between two or more measurable concepts	Yes	Yes	Yes	Yes	Clarifies meaning of “concept”; explicitly mentions minimum acceptable number of concepts
Bacharach 1989, p. 496	“A theory is a statement of relations among concepts within a set of boundary assumptions and constraints.”	Yes	Yes		Yes	No mention of explanations; includes boundary conditions (expositional criterion) as definitional
Gregor 2006, p. 616	“... Theories [are] abstract entities that aim to describe, explain, and enhance understanding of the world and, in some cases, to provide predictions of what will happen in the future and to give a basis for intervention and action.”					Rich in expositional features, but no specific mention of any of the three definitional constituents of a theory; moreover, according to the article, explanations, predictions, intervention and action are all optional, and thus, expositional
Jaccard and Jacoby 2010, p. 28	“A theory is a set of statements about the relationship(s) between two or more concepts or constructs.”	Yes	Yes		Yes	No mention of explanations; however, explicitly mentions minimum acceptable number of concepts
Corley and Gioia 2011, p. 12	“Theory is a statement of concepts and their interrelationships that shows how and/or why a phenomenon occurs”	Yes	Yes	Yes	Yes	Meets all definitional criteria, no expositional criteria
Weber 2012 P. 4	“A particular kind of model that is intended to account for some subset of phenomena in the real world.”			Yes	Yes	Explanations are implicit in “account for”

Table 1. Selected Definitions of “Theory”

Based on this understanding, it was difficult to find an appropriate existing definitional definition of a theory; we list some influential definitions in Table 1 (Bacharach 1989; Corley and Gioia 2011; Gregor 2006; Jaccard and Jacoby 2010; Weber 2012). On one hand, we do consider some of these to be definitional in that the authors seem to present them as an exhaustive list of essential features of a theory (Bacharach 1989, p. 496; Corley and Gioia 2011, p. 12; Jaccard and Jacoby 2010, p. 28; Weber 2012, p. 4). On the other hand, most of these omit to mention one or more of the features that we have argued are definitionally indispensable. Note that when we consider a definition to be definitional, it is not based on the authors’ listing of all the features that we judge to be definitional from our perspective; it is based on whether the authors present their definition as definitionally exhaustive and non-superfluous from their own

perspective. Thus, we accept any definition as meeting the bare minimum requirements of a definitional definition as long as the authors give it that intention. However, inasmuch as we feel that such definitions either miss one or more indispensable features or add one or more nonessential features, we do not consider them to be satisfactory definitional definitions. Again, when we say this, we do not mean that they are bad definitions in themselves; we simply mean that these expositionally deficient definitional definitions lack some desirable benefits of a good definitional definition.

Among these definitions, only Corley and Gioia (2011, p. 12) provided a definitional definition with the complete list of definitional features of theory (concepts, relationships and explanations): “Theory is a statement of concepts and their interrelationships that shows how and/or why a phenomenon occurs”. However, although that is a very good definitional definition, it could still be improved on in at least two points. First, the word “concept” alone might not be sufficiently clear to communicate what exactly is a *theoretical* concept. Second, their definition does not explicitly specify that the minimum possible number of concepts is two (cf. the definition of Jaccard and Jacoby (2010) in Table 1). Although this certainly does not compromise the definitional quality of Corley and Gioia’s definition, we believe that it is sufficiently important to warrant explicit mention, simply because it is not obvious to everyone that two connected concepts are sufficient to qualify as the bare minimum of a theory.

Based on these considerations, we have developed a definitional definition that incorporates the essential points we have mentioned in the preceding discussion: **a theory is an explanation of the relationship between two or more measurable concepts.**

Discussion and conclusion

The validity of many empirical studies depends very much on the precision of their definitions. That is, reliable measurement of concepts necessarily requires precise definitions of these concepts to make sure that only appropriate representatives of the phenomenon being studied are included (otherwise, results would be mixed in with those of non-members), and that appropriate members are not excluded (otherwise, results would not be representative of the full class of members).

Definitions are particularly important for literature review projects. Every literature review needs to work with carefully developed (or verified) definitional definitions, even though that might not often be done in practice. A literature review necessarily focuses on a specific topic. To do this, the review authors must necessarily decide what is within the scope of their topic and what is beyond the scope. For such a discrimination, they need a good definitional definition of their topic of focus. Without a good definitional definition, in searching for suitable articles, the review authors might include some inappropriate articles and might exclude some appropriate ones, not because they did not find such articles, but because their working definition of the topic is insufficiently precise to clearly guide the inclusion decision. This is especially a concern when the review authors work as a team: without a good definitional definition, different team members might apply different inclusion criteria because of their inconsistent interpretations of their fuzzy working definition.

One [perhaps extreme] illustration of the challenges of definitions is a literature review on the meaning of the word “information” in information systems research. Yoos & McKinney (2010) started broadly by quoting a typical dictionary meaning of “information”, but they quickly noted that “dictionary definitions of information are typically more inclusive than precise” (Appendix A, p. A1). By carefully studying the precise uses of the word in a selection of 60 IS articles, they discerned at least four distinct views of information that led them to develop four distinct definitions of the word (and we note that each of the four is an excellent definitional definition according to the criteria that we present in this article).

We note that not all published articles need to be so insistent as we are on definitional definitions. In particular, articles whose goal is primarily to promote best practices would more likely use definitions that include expositional, desirable characteristics, rather than purely definitional definitions such as we have described here. Ironically, this is the case for every single article and book that we have drawn upon to help us understand what “theory” means. That is, an article whose goal is to help readers to develop better theory will normally present a definition that succinctly points readers in the right direction to create better theory; it would normally not give readers a definition that lets them check a box because they have crossed the threshold of the bare minimum of what could possibly be called a theory (which is essentially the purpose of our definitional definition). Thus, it is not surprising that we have had difficulty finding satisfactory

definitional definitions in the excellent sources we have consulted to understand the best qualities of theories. That said, we believe that it would be helpful for even such methodological guides to provide definitional definitions, as we do here: this simply clarifies the scope of what is being talked about.

The major contribution of our article is specifying how to develop definitional definitions, that is, definitions of the bare minimum of things. This skill is particularly valuable to literature review authors because every literature review project needs definitional definitions to clarify the scope of their coverage and criteria for including or excluding primary studies in their review. But beyond literature review authoring, clear definitional definitions are valuable for almost any kind of scholarly work. Both empirical and non-empirical studies depend integrally on clear specifications of terms and ideas. Our criteria for good definitional definitions provide tools for evaluating and refining the existing definitions in the literature, and for creating new ones if necessary.

Specifically, we have applied these principles to specifically contribute to theorizing by clarifying the very nature of theory by focusing on the bare minimum of its required elements. Our focus on the minimum definitional elements of theory is an important and necessary complement to the abundant literature on the desirable, expository elements. Specifically, our description of theoretical concepts, the most atomic element of a theory, is important for helping researchers understand what are the core elements of theory. We hope that the clarity that definitional definitions bring will help researchers to better understand not only the theories that they develop, but the essential nature of the phenomena that they study.

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