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Functions of Theory in an Empirical Study

Abstract

This article describes three functions of theory in the process of empirical investigation. The first step involves defining the theory. The second identifies and explains its role in the process of forming a research problem, illustrating how theory links the empirical field to the scientific explanations sought. The third step discusses the role of theory in the operationalization process, emphasizing the relationship between theoretical and observational terms, as well as the formulation of research questions and hypotheses, justifying their observational language. Additionally, it is shown that interpretation can potentially transform the theory itself. The article is a presentation of the author's way of thinking about the relationships between theory and empirical research in the methodology of social research.

Keywords: empirical theory, methodology of social science, social research.

Funkcje teorii w przebiegu badania empirycznego

Abstrakt

W artykule opisano trzy funkcje teorii wobec procesu badania empirycznego. W pierwszym kroku zdefiniowano teorię. W drugim wskazano i opisano jej rolę w procesie problematyzacji, pokazując, w jaki sposób teoria wiąże pole empiryczne z wyjaśnieniami naukowymi, które są w nim poszukiwane. W trzecim kroku opisano rolę teorii w procesie operacjonalizacji, kładąc nacisk na związek terminów teoretycznych z terminami obserwacyjnymi oraz na formułowanie pytań i hipotez badawczych, uzasadniając ich język obserwacyjny. W trzecim kroku opisano rolę teorii w interpretowaniu wyników badania. Pokazano jednocześnie, że interpretacja posiada także potencjał zmieniania samej teorii.

Słowa kluczowe: teoria empiryczna, metodologia badań w naukach społecznych.

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Introduction

In the context of this study, a theory can be defined as a contextually and formally related system of definitions, hypotheses, assertions, and scientific laws that explain a particular universe. This universe comprises all the objects encompassed by the theory. These objects have definitions and form sets and relationships both within and between sets. The relationships that describe the dependability between objects in the universe take the form of laws, assertions, and hypotheses that elucidate the universe. The universe is logically (formally) and factually (content-wise) linked in a coherent system, whereby the logical link need not be factual, although it often is, particularly in arranged relevance. What theory offers to empirical research are theoretical sentences that can be employed to derive the core of the study, namely observational sentences. The functions of theory in an empirical study will be described by analyzing the processes of problematization, operationalization and interpretation.

Problematization — linking the empirical field to an explanation

The first step in formulating the research question is to isolate the empirical field that requires clarification. This field contains facts and objects whose relationships are not transparent and cannot be explained using current knowledge encoded in scientific theories. This issue concerns the scope of the theory, the conceptual system it employs, and the relevance of existing laws, theorems or hypotheses to a particular empirical condition (Ajdukiewicz 1985). These inconsistencies, or the limited resources of theory, may reduce the potential for explanation but do not eliminate it, because theories are provisional, subject to constant revision and often modification, due to verification studies and diagnostic, evaluative or exploratory ones. Moreover, theories guide a study, stemming from the principle that research does not deal with naked or pure empirical data. It encompasses facts defined in a specific manner and analyzed in a particular language (Pawłowski 1986). The content of sentences defining phenomena from the empirical field and the language used to describe empirical reality are constructs present in the theories. Thus, theories 'illuminate' the phenomena under study, albeit not from all angles, as they are conventional and not universal. The choice of a theoretical convention and the language of description activate a specific, individual and reduced aspect of the reality under study. This choice determines which theory guides the research and, at this stage, which problematizes the empirical field. Problematization links the empirical field to the explanation, providing the empirical field with its meanings through the design of the explanation. Since the study aims to explain the phenomena in the empirical field, the criteria that the guiding theory must meet should be derived from this aim (Crespo 2016). These criteria must consider the relationship between the facts and the designators of the concepts that form the theory's universe. The theory's conceptual network should encompass the empirical field so that each phenom-

enon studied can be assigned meaning. Since modern scientific knowledge offers multiple meanings for single facts, when designing research, we must select specific meanings that are internally consistent, i.e. derived from a single theory or a group of theories emerging from the same ontological, epistemological and methodological metatheses. This aligns with the principle of paradigmatic inconsistency (Kuhn 1985). Once the criteria have been established based on the research purpose, the available theories should be systematically evaluated in terms of their ability to fulfil these criteria. Full compliance is unattainable; if it were, there would be no need for research. Both empirical field-specific and universal criteria are included. The crucial universal criterion is possibly the theory's operability. A theory should either have the main variables operationalized or provide opportunities therefor; it cannot guide empirical research if it does not meet this criterion.

Operationalization — linking theoretical terms to empirical ones

Operationalization encompasses two sequences of research activities in which theory plays a crucial role. One sequence involves the construction of observational concepts or indicators, including indicators of theoretical concepts. This occurs under definitions that link the theoretical concept to the observational one. It is a link based on a greater-than-average probability and the uniqueness of the relationship that connects the indicated phenomenon with the indicating one. Ultimately, indicators redefine theoretical concepts (variables); they define them in an empirical sense, meaning that the indicators are the phenomena they denote. They assume the form of protocol sentences describing the state of the variable under study. Consequently, they serve as indicators of observational variables. In the social sciences, six groups of tools can be filled with empirical content. Generally, these tools fall under six methods of data collection: testing methods (situational and task-based tests), questionnaires, quantitative observation, qualitative observation, interviewing (including ethnographic interviews), and desk research methods. In the first three cases, indicators are constructed as a battery of situations, sentences and tasks arranged in systems of observation (recording phenomena through the senses) or systems of questionnaire items and worksheets with tasks (Cohen, Manion, Morrison 2017). The construction stage precedes the indicator recording stage. In the next three methods, indicators reveal themselves, recorded in natural research situations through the spontaneous verbal or non-verbal behavior of the objects under study or in the form of content recorded from various sources that exist independently of the research. In both cases, observations are converted into words or numbers. These words, numbers or observational concepts are linked to theoretical concepts. The accuracy of this link is evaluated using separate qualitative and quantitative procedures. Consequently, theory is connected to empiricism by a double knot: observational sentences are derived from theoretical sentences (constructs), and theoretical sentences explain the phenomena described in observational sentences. However, for a theoretical sentence

to explain empirical events, an observational sentence must logically (implication) stem from the theoretical sentence (Marciszewski 2005).

The second sequence of activities describing operationalization involves the construction of research questions and hypotheses, both of which encode an explanation. We inquire about relationships between observable variables that elucidate aspects of the studied empirical field. Concerning problematization, the content of the research question—specifically, which variables are confronted and what relationships can be projected—follows logically and factually from the guiding theory. Starting from the theoretical terms that provide meanings to the empirical field, we refer to experience, the activation of which, during data collection and analysis, ultimately verifies the question, creating an explanation. Thus, an observational sentence derived from experience is a posteriori, becoming the source of explanation. It is acknowledged as accurate if it contrasts content-wise with a theoretical sentence (in the role of an a priori sentence). An a priori sentence, independent of experience, cannot be maintained if it differs from a sentence that records experience (a posteriori). Precisely because the answer to a research question is a posteriori, a record of experience, the formulation of the research question is part of the operationalization, meaning that the question must be articulated in observational language. One cannot inquire about theoretical constructs when the anticipated answer is a posteriori. This essence of operationalization and the role of theory in this process also apply to hypotheses. Hypotheses become observational sentences logically derived from theoretical sentences (e.g. by implication or equivalence) by relating theoretical sentences to empirical conditions. A hypothesis describes the procedure for confronting theoretical sentences with empirical conditions in this context. Similarly, the research question is articulated in observational language. If we seek an explanation, we encode it in a research question rather than a hypothesis, as there is no rationale for its derivation in a search situation. Conversely, if we are verifying a theory or a claim thereof, we construct a hypothesis that describes the operationalization, i.e. the reference of this claim or theory to experience.

Interpretation — linking the empirical results of the research with the theorems of the theory

Explanation, as an observational sentence constructed through problematization and operationalization, requires interpretation, meaning that meanings must be assigned thereto. These meanings are derived from the theory guiding the study or from other paradigmatically and contextually incompatible theories. The results of the interpretation can vary; they may relate to the theory as a whole, its individual components or separate individuates, and the sets or concrete relations that comprise it. This referencing may entail broadening or narrowing, thereby modifying certain theoretical constructs and claims, or it may challenge or reinforce judgements about their relevance. The meanings assigned to the experience also serve as

a source of new hypotheses, which can, in subsequent studies, expand the universe of the analyzed theory or spawn a new one. A distinguishing feature of interpretation, vis-a-vis the analysis of survey results, is the ability to transcend the data. The potential for generating new theoretical constructs refers to theoretical concepts outside the theory being examined. History shows that this can lead to successive versions of theories often labelled with the prefix 'neo' (e.g. neobehaviourism, neopsychoanalysis). On the other hand, interpreting a given experience, particularly in the social sciences, which are not devoid of axiological explanations (constructed from value judgements), influences the perception of its role in social and cultural life. If models of practical activity are created based on the study, the theory, through interpretation, contributes to the application of the empirical study results in creating new qualities of life. These represent potential sources of further modifications, as they create a new empirical field for numerous research projects that require theory.

In summary, the links between theory and empirical research are reciprocal. The two categories mirror each other. However, when empirical theory is involved, as is the case in the social sciences, despite its indispensability in the research process, it must ultimately yield to experience.

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Krzysztof Rubacha – professor of humanities and social sciences, specializes in the methodology of scientific research, including the analysis of qualitative and quantitative data, the use of fuzzy set logic in generalizing research conclusions, the basics of constructing measurement tools, data collection methods and the creation of empirical theories.

Krzysztof Rubacha – profesor nauk humanistycznych i społecznych, zajmuje się metodologią badań naukowych, w tym analizą danych jakościowych i ilościowych, zastosowaniem logiki zbiorów rozmytych w generalizowaniu wniosków z badań, podstawami konstruowania narzędzi pomiarowych, metodami zbierania danych oraz tworzeniem teorii empirycznych.

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