Enhancing methodological clarity: principle-based concept analysis

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Accepted for publication 3 September 2004

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PENROD J. & HUPCEY J.E. (2005) *Journal of Advanced Nursing* **50**(4), 403–409

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Aims. The aim of this paper is to operationalize the principle-based method of concept analysis.

Background. While nursing has embraced the use of concept analysis as a valid and significant entrée into an area of research, methodological development has created strategies of inquiry that vary in purpose and in the nature of their findings.

Discussion. We propose that, as the primary utility of concept analysis is to determine the existing state of the science so that further work may be strategically and appropriately planned, the method described as principle-based concept analysis is superior in providing evidence to support subsequent inquiry into the concept of interest.

Three problematic issues are discussed in an effort to clarify and procedurally explicate the strategies employed in this approach: selecting disciplinary literatures for inclusion in the analysis; conceptually-driven sampling issues; and within- and across-discipline analytic techniques.

Conclusion. In this form of concept analysis, each principle contributes to an understanding of the strengths and limitations of the present state of the concept in the scientific literature. We believe that this perspective will enable nursing to begin to harness the power of concept analysis for *advancing* science rather than simply imagining what a concept *could be* or constructing what we believe it *should be*.

Keywords: concept analysis, principle-based concept analysis

Introduction

Nursing has traditionally valued processes of concept analysis for the identification of concepts suitable for subsequent research and as a means to determine the appropriate methodologies for investigating the concept of interest. For example, it is commonly asserted that concepts that are not well defined or integrated in theoretical formulations are best suited to qualitative studies, while clearly defined and operationalized concepts are more amenable to quantitative study (Morse & Field 1995). Although multiple methods of concept analysis are available, all methods are not equal in producing analytic results that serve researchers in processing subsequent methodological decisions for research that extends the science of nursing.

The purpose of this paper is to operationalize the principle-based method for concept analysis using criteria put forward by Morse and colleagues (Morse 1995, Hupcey *et al.* 1996, Morse *et al.* 1996a, 1996b) to produce findings that are useful in determining subsequent methods for advancing a concept. In addition, problematic issues discovered through use of this principle-based method in our own work,

supervision of doctoral students, and peer review of manuscripts describing the application of this method are addressed. We conclude that the evaluation of findings derived through a thoughtful application of a principle-based analysis provides insights into appropriate pathways for advancement of a concept and, therefore, towards greater utility in nursing science and practice.

Understanding concepts

We will present a brief summary to orient readers to our understanding of concepts as empirically-based abstractions of reality or truth. We believe that truth transcends the contextual experience of human existence, and that the collective exposition of that truth reveals our best estimate of probable truth. Thus, probable truth (as revealed in the scientific literature) is the foundation of concept analysis.

Concepts may be described as ordinary or everyday (meaning a cognitive formation that results through natural human processes that occur through being in the world with others) or scientific (meaning abstractions that are developed into more precise meaning units that, when linked together, propositionally form a theoretical representation of empirically-experienced reality). We assert that while the everyday meaning of concepts may contribute to scientific understanding, ordinary concepts (with implicit meaning) are inadequate for scientific inquiry. In turn, analytic techniques used in scientific endeavours must focus on scientific concepts. Should the scientific concept not capture the everyday notion of the concept (termed an inconsistency or gap in understanding), further development of the concept is indicated. This is done through scientific inquiry into the empirical derivation of the concept, not *carte blanche* acceptance and integration of contextual everyday meaning.

Nursing science is concerned with complex human behaviour within a continually changing trajectory of health. The concepts of interest to nursing are multifaceted, highly integrated, and at times manifest differently at different points along the health trajectory. Thus, a tapestry analogy (developed with reference to Hemple 1966) aptly captures our perspectives of the complexity of concept–theory linkages in nursing science. In this analogy, theory is represented as a tapestry of interwoven, knotted conceptual threads. This analogy reinforces the importance of theoretical context in processes of concept analysis. We assert that the power of concept analysis is to identify the existing theoretical strands that define a concept of interest and ultimately to tie and re-tie the conceptual knots to form a stronger, more coherent tapestry of theory. Theory (i.e. the tapestry) is strengthened as the individual strands (i.e. concepts) are clarified and developed.

Thus, as the state of a concept is first fully understood and subsequently advanced, so is the science advanced (Penrod 1999, September). We propose that well-developed concepts advance the discipline of nursing beyond the realm of purely theoretical science. Clearly-developed, empirically-based concepts are the basis of useful theory in nursing. Well-developed theory has the potential to guide clinical practice to new levels of human interaction that promote health and well-being. We believe that such praxis theory (that is, theory that produces *thoughtful* action) demands the primary attention of nurse scholars.

Morse *et al.* (1996b) and colleagues have proposed the term 'maturity' to label a concept's level of development. What can a label of the level of maturity tell us about the state of the science surrounding a developing concept? Level of maturity ranges on a continuum from immature to mature, yet few descriptive labels are available to describe the variations among these levels. In addition, assignment of an evaluative label of maturity does little to inform scientists of gaps or limitations in understanding. Rather than relying on a label of maturity, we assert that careful evaluation of the state of the science represents scholars' best estimates of probable truth surrounding the concept at that point in time. The caveat to this statement is the evolutionary nature of science – as science evolves, so does the evidence available to support the criteria-based evaluation of a concept. Therefore, concept analysis is not a static product.

The evolutionary path of the advancement of science may be more accurately illustrated by Kuhn's (1962, 1970) work. Contrary to the received view of science as accumulation of knowledge, Kuhn emphasizes paradigm shifts or revolutions during which the path of normal science takes a radical turn. The maturity of a discipline is reflected in the shared paradigms of the scientific community. Similarly, a well-developed concept reflects the state of the science and, as such, can only be as advanced as the science itself. Therefore, conceptual evolution is a process of change over time as the science develops new methods or perspectives of puzzle-solving. A scientific concept is not a static entity – it is dynamic, with the state of the science representing the most current state of scientific understanding.

Within this philosophical perspective of science, a threat to concept development is the use of shared examples. As the discipline derives exemplars and uses these to teach young scientists models for puzzle-solving, we run the risk of creating conceptual dogma; that is, attributes or aspects of the concept are carried forward without further investigation or consideration of the changing context of the science or

practice. As a result, we teach students how to think 'within the box' of the discipline rather than to analyse critically the conceptual roots of the discipline. Such institutionalized thinking is difficult to re-direct, according to Kuhn's (1962, 1970) perspective of the *revolutionary* nature of scientific advancement. However, conceptual dogma can be revealed through systematic analysis and advancement of scientific concepts.

Methods of concept analysis

Concept analysis methods might focus on quantitative techniques, qualitative techniques, or a mix of these techniques. For example, a concept could be analysed using quantitative meta-analysis or psychometric testing of measurement tools. Conversely, purely qualitative methods, such as Morse and colleagues' methods of advanced concept analysis might be used (Morse 1995, Hupcey *et al.* 1996, Morse *et al.* 1996a, 1996b). Or, per Walker and Avant (1995), different strategies (qualitative and quantitative) might be used at different points in the analysis within one over-arching procedural method.

It is important to note, however, that the purposes for using such techniques differ, and that the nature of the findings that each method produces will contribute differently to the advancement of a concept. For example, the types of quantitative projects described above aim to explore derived associations or measurement of attributes across a body of scientific literature. These methods may be appropriately used when a concept is adequately developed. If, however, a concept is poorly developed, such studies face serious threats to validity. Thus, it is desirable to have some form of principle-based analysis that assists in determining the most appropriate methods of concept advancement according to the current state of the science.

We use the term principle-based concept analysis to refer to the application of the philosophical principles as cited by Morse and colleagues in a series of papers (Morse 1995, Hupcey *et al.* 1996, Morse *et al.* 1996a, 1996b). Discussion of this method of concept analysis represents an expanded interpretation of the evolving methods derived through our research (Hupcey 1998, Penrod 1999, 2001a, 2001b, Penrod *et al.* 2000, Hupcey *et al.* 2001). We hope to extend the utility of this method by detailing operational concerns that we have experienced in our own work, our supervision of doctoral students, and our peer review of manuscripts on concept analysis. To achieve this goal, we first provide an overview of the principle-based method of concept analysis. We then focus on operational issues that we have identified in relation to this method. We conclude that processes of concept analysis must be dis-entangled from those of concept advancement in order to clarify the progressive nature of this type of inquiry.

Principle-based concept analysis

The basis of this method is the analysis of a concept according to four broad principles – epistemological, pragmatic, linguistic and logical – in order to determine and evaluate the state of the science surrounding the concept (for further discussion of the principles, see Morse *et al.* 1996a, 1996b). In this paper, we operationalize the method through a discussion of issues that have arisen during implementation.

Overview of principle-based method of concept analysis

As in most forms, the first phase of principle-based concept analysis is to determine the concept of interest and to collect the scientific literature from disciplines that are considered applicable to the inquiry. Then, this literature is treated as data that are assessed according to the criteria espoused by the epistemological, pragmatic, linguistic and logical principles, discussed below. Finally, these assessments are integrated into a unified perspective on the current state of the scientific literature. The questions in the following sections are derived from the work of Morse *et al.* (1996a).

Epistemological principle: is the concept clearly defined and well differentiated from other concepts?

Epistemology refers to the nature of knowledge. The related analytic criterion is rooted the rationalists' reliance on reason as a source of knowledge. When applied to concept analysis, the epistemological principle focuses on the discipline's distinction of a concept within the knowledge base. A concept that is epistemologically mature is well-defined, well-differentiated from other concepts through that definition, and is clearly positioned in the body of literature (Penrod 2001b).

Pragmatic principle: is the concept applicable and useful within the scientific realm of inquiry? Has it been operationalized?

Focusing on pragmatics, that is, on the concept's applicability in explaining or describing phenomena encountered within the discipline, the data are analysed from the perspective of *usefulness*. For a concept to be pragmatically mature, members of the discipline should be able to recognize manifestations of the concept; it should *ring true* with experience. Operationalization is a high level of pragmatic development, reserved for rather mature concepts (Penrod 2001b).

Linguistic principle: is the concept used consistently and appropriately within context?

Linguistics refers to human speech and language and, when applied to concept analysis, this principle evaluates the appropriate use of the concept. In this assessment, consistency in use and meaning are considered. There is also a more oblique consideration of context, examining the fit of the concept within context (Penrod 2001b). Concepts should be appropriate to their use in context; however, in this sense, context is a more complicated issue than merely the setting. Concepts may be context-bound (that is, limited to a prescribed setting or theoretical use) or stripped of context (stripped of contextual ties, of broader scope, more abstract).

Logical principle: does the concept hold its boundaries through theoretical integration with other concepts?

Derived through the philosophical perspectives of logic, that is, focused on correct and incorrect reasoning, this principle refers to the integration of the concept with related concepts. Focusing on conceptual boundaries, the data are analysed to determine if the concept becomes blurred when positioned theoretically with other concepts. Ideally, a concept 'holds its boundaries', meaning that it remains clear or tight, and permits the derivation of systematic interrelationships without getting lost in the theory (Penrod 2001b).

Issues in applying principle-based concept analysis

Earlier discussion of the analytic criteria on which this method is based has focused on structural features of a concept (Morse *et al.* 1996b). After using this method it has become apparent to us that focusing on structural features is a very limited use of the principles (Hupcey 1998, Penrod 1999, 2001a, 2001b, Penrod *et al.* 2000, Hupcey *et al.* 2001). Persistent issues surrounding principle-based concept analysis must be addressed in order to maximize the utility of the method. Recall that our purpose for concept analysis is to produce evidence that reveals scholars' best estimate of 'probable truth' in the scientific literature. In this method of concept analysis, findings are summarized as a theoretical definition that integrates an evaluative summary of each of the criteria posed by the four over-arching principles. Careful consideration of three methodological issues contributes to the utility of the method: selection of disciplinary literatures for review, sampling techniques and analytic techniques.

Selection of disciplinary literatures

One of the most important preliminary decisions that researchers must make is a determination of which literatures may contribute to the analytic perspectives of the concept. A multidisciplinary perspective is especially important in nursing because other related disciplines can add to nursing's understanding of the concept of interest. For example, in a study of trust employing this analytic technique (Hupcey *et al.* 2001), discipline-specific literatures from sociology, medicine, psychology, and, initially, business were analysed because each of these disciplines was believed to contribute a unique perspective to our understanding of trust. For example, sociology could inform the research regarding how interaction within the society might yield feelings of trust. Herein lies an important distinction from the work of Morse (2000), in which she describes a search strategy focused on shared conceptual attributes. In her discussion, disciplinary perspectives are not broached until the researcher is engaged in processes of exploring pragmatic utility, which we would call a technique for concept advancement not concept analysis.

Literature selection must be processed as an analytic decision. Which disciplines may contribute to a deeper understanding of the concept? What theoretical perspectives may be useful in extending the utility of the concept? In another concept analysis employing this method, uncertainty was studied (Penrod 2001a, 2001b). In this example, anthropology (with a focus on culturally based patterns of human behaviour) was examined to reveal different manifestations of the concept of interest. Sociology was thought to contribute an understanding of group-level interpretations of the concept, in contrast to an intra-individual perspective offered in psychology literature. Medicine and nursing were explored to provide deeper interpretation of patient states and the professional experience of uncertainty. These analytic decisions were not based in a consideration of shared conceptual attributes but in varied disciplinary perspectives of the concept of interest.

At other times, the multidisciplinary literatures may be so broad that their scope exceeds researchers' purpose or resources. Morse (2000) emphasizes that full articles (not abstracts) must be retrieved, and details methods for tracking a 'large' literature base (p. 338). This presents a special concern for novices and independent or solo researchers. The final data sets in the studies of uncertainty and trust were modest for the scope of those projects (uncertainty included 83 articles, while trust examined 107 articles). These data sets were derived from a preliminary review of literature that included hundreds of papers. Given researcher constraints, an analytic decision to limit the breadth of the review may be made legitimately; however, as the analysis proceeds, this limitation must be respected to avoid threats of overgeneralization of the analytic findings. This is an especially

salient caution to educators and students who undertake concept analyses as part of graduate education.

Decisions about which disciplinary literatures should be included in the analysis are guided by an initial, broad literature search and review that informs researchers about the more global state of the shared science surrounding the concept. Selection of disciplinary literatures should be based on the potential for contribution to the understanding of the concept, not a rote listing of inter-related disciplines, nor conceptual attributes *per se*. If the potential for a disciplinary literature's contribution is questionable, it is recommended that the discipline be included in the initial review and, later, deleted if fruitless. Thus, selection of disciplinary literatures for inclusion in a concept analysis is a preliminary analytic decision that critically affects the product of the analysis.

Conceptually driven sampling

The second issue in principle-based concept analysis work concerns obtaining the sample of literature to be included in the review. As the literature is being used as data in the concept analysis, adequacy and appropriateness of the derived sample are important evaluative criteria (Morse & Field 1995, Morse 2000). Adequacy addresses the volume of data available to support the research endeavour, while appropriateness has to do with the degree to which the data informs the research. In concept analysis work, adequacy is particularly related to deriving the sample of literature to be included in the analysis, especially when a large volume of literature is available. Appropriateness of the derived sample of literature is assessed both in the initial literature search procedures and in the preliminary review of the data.

Researchers initiating a concept analysis are sometimes faced with huge bodies of literature that would require resources that greatly exceed those available. Random selection of the initial sample of literature is clearly not an acceptable technique for delimiting the sample because the most appropriate pieces of the literature may be omitted. As in any other research endeavour, constraints must be realistically assessed and then methodologically addressed in ways that do not threaten the validity of the conclusions. Literature selection must be conceptually driven, not statistically driven. Thus, the evaluative criterion that must be considered when facing exceptionally large data sets is appropriateness of the derived sample.

Conversely, researchers may be faced by a paucity of literature on the concept of interest. Remember that the point of concept analysis is to determine the state of the science surrounding the concept; therefore, a small sample does not invalidate the method. Adequacy of the sample is not violated by a small data set if that data set is an accurate representation of the state of the science. However, appropriateness of the derived sample may be an issue, or, in other words, is the sampling technique capturing the literature that best informs the research? This requires the researcher to further evaluate the conceptual label being searched. Is the most suitable term being used in the keyword search? Are there other forms of the conceptual term that may produce more useful results? In these cases, researchers should investigate multiple forms of the conceptual label to ensure that the most adequate and appropriate sample is retrieved.

As the literature search is conducted, it is important to keep an audit trail of the selection of literature (i.e. derivation of the sample used in the concept analysis). This can be done by recording (and later, reporting) the search parameters used. For example, which databases were used in the search? How many 'hits' were retrieved when only the concept was used as the keyword? If the search was focused using date restrictions or other keywords in combination, what were the results? Was the decision to delimit the search using date restrictions theoretically driven by knowledge of the concept's historical evolution or by convenience? Conversely, if entering multiple forms of the conceptual label expanded the search, what were the results?

These sampling decisions ultimately affect more significant conceptual issues, for example, how do processes of delimitation of the sample affect the representativeness of the findings? Were critical evolutionary developments of the concept omitted through such delimitations? Or, did the expanded search yield multiple related concepts? Thus, sampling techniques used in concept analysis are as important as those in other forms of research. The quality of the findings is directly related to the quality of the sampling design.

Within- and across-discipline analytic techniques

The third issue is related to analysis of the concept when a multidisciplinary approach is employed. The data set must be analysed according to the four analytic principles both within each discipline and across the disciplines. For example, in the multidisciplinary study of trust, the data first were analysed by discipline; that is, all four principles were applied to sociology, to psychology and so on. Then data were re-analysed, examining the combined evidence related to each principle culled from all of the selected disciplines. In this form of secondary analysis, the epistemological principle was analysed through the insights about trust derived from the nursing, medicine, psychology, and sociology literatures combined.

What is already known about this topic

- Concept analysis is a valid and accepted method for opening an area of inquiry in nursing.
- Concept analysis produces an integrated perspective of the state of the science that serves as a baseline for further inquiry to strategically synthesize new knowledge.

What this paper adds

- Operationalization of principle-based concept analysis through a discussion of issues faced in implementation.
- Multidisciplinary literature may augment conceptual understanding but must be carefully selected for inclusion in the analysis.
- Sampling within large bodies of literature must be conceptually-driven rather than using convenience or statistical sampling.
- Analysis of the state of the science must include within- and across-discipline analyses to fully integrate what is known about a concept.

Within-discipline analysis informs researchers of differing degrees of conceptual development among varied disciplinary perspectives. Across-discipline analysis reveals insights with potential for integration that may produce a more comprehensive theoretical definition. While this is a complex system of analysis, it is one of the most thorough and comprehensive methods available for analysing the state of science.

Product of analysis

Using this method, the product of concept analysis is a theoretical definition that integrates scientific understanding of the concept. Recall that this definition is evidence-based, not intuitively or creatively derived, and that evidence is culled from the scientific literatures, not popular press, art forms, or other representations. The theoretical definition derived through this process re-creates the theoretical tapestry of the concept of interest. As described earlier, the conceptual threads must be carefully woven to present a coherent theoretical landscape of the concept.

In our experience, the derivation of the theoretical definition of a concept often approaches what others may call a 'theory' instead of a 'concept'. We do not dispute this notion, as we believe that the accurate portrayal of a concept is theoretically-based and, therefore, may be best described in terms of relationships between and among related concepts and their attributes. However, it is important to explicate the most meaningful conceptual insights (or evidence) through the process of analysis and then to integrate these into the most cohesive whole that is permitted by the data. It is only through such integration that gaps or inconsistencies in the scientific conceptualization can be identified. From this perspective, the theoretical definition reflects the state of the science that was analysed according to the four principles outlined earlier. An examination of these principles, in turn, guides the selection of appropriate techniques for concept advancement.

Conclusion

The importance of concept analysis is to establish the state of the scientific understanding of the concept of interest. The findings of a concept analysis should help researchers to identify and pursue avenues to advance the concept. From this perspective, concept analysis is an essential prerequisite to concept advancement. In the principle-based form of concept analysis, each principle contributes to an understanding of the strengths and limitations of the present state of the concept in the scientific literature. Notice that we are dealing with the scientific literature. While we value insights gained through studying the everyday experience and lay speech, we believe that careful integration of such meaning through planned strategies for advancement is critical to the development of precisely-defined scientific concepts representing complex human behaviours.

However, unlike the process of critically appraising the literature described by Morse (2000), we assert that concept analysis must be held as a *separate* and *unique* research endeavour. We believe that the method of analysis directly influences the utility of the findings and, therefore, recommend the principle-based method of concept analysis described here and based on the work of Morse and colleagues. Overall, concept analysis is focused on integration of what is known. The findings reflect the state of the science. It ends there.

As a discrete strategy, concept analysis does little to advance the concept. Yet this important preliminary work provides important evidence for the selection of appropriate techniques for progressively developing the concept. Concept advancement shifts the focus of the research towards identified conceptual gaps and strategic projects to move the concept towards theoretical development. Herein lies an important distinction: while concept analysis relies on the integration of what is known in the state of the science, concept advancement techniques actually move the state of the science forward through synthesis of new insights.

Concept analysis yields greater understanding of what is known. Concept advancement synthesizes new knowledge. We believe that this perspective will enable nursing to begin to harness the power of concept analysis for *advancing* science, rather than simply imagining what a concept *could be* or constructing what we believe it *should be*.

Author contributions

Study conception and design/Drafting of manuscript/Critical revisions of manuscript for important intellectual content/ Administrative, technical or material support – JP, JH.

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