Boundary Development in the Field of International Nutrition Science^{1,2}

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ABSTRACT

Using a sociological approach that elaborates on key observations of institutional entrepreneurs in international nutrition, this paper explores institutional boundaries and boundary work in international nutrition. Sociological concepts of “boundary making” and “situated knowledge” are applied to the boundaries between the nutrition sciences and lay nutrition knowledge in nutrition intervention. These concepts allow an analysis of how nutrition science creates boundaries between its field and other sciences and between nutrition as a science and other nutrition practices, providing additional perspective on current challenges in global food security and malnutrition. Analysis of boundary processes in international nutrition can also illuminate the development of “implementation” or “delivery science” in the field of international nutrition as it attempts to strengthen effectiveness of global efforts to reduce malnutrition. Although some risk taking in the academic world is rewarded, the analysis indicates that there are underlying processes that may inhibit full partnership with local people in the course of intervention work that builds scientific nutrition knowledge. As nutrition science becomes increasingly central to development, the boundaries that are reinforced by digging in heels over the implementation of programs with little local input or softened by inviting local stakeholders to publicly consider the problems in global nutrition together are important to consider in helping to create directions that favor viable solutions. *Adv. Nutr.* 5: 193–198, 2014.

Introduction

In 1997, F. James Levinson delivered the Martin J. Forman Memorial Lecture at the International Vitamin A Consultative Group in Cairo, Egypt, entitled *How Are We Doing in International Nutrition?* The presentation summarized the results of a state-of-the-discipline study he undertook to be able to answer a student's query about whether international nutrition was a good field to enter as a career (1). In the course of his talk, directed at the student, he suggested that the following statement from Doris Lessing might be an appropriate warning label for all nutrition courses: “What you are being taught here is an amalgam of current prejudice, and the choices of this particular culture. The slightest look at history will tell you how impermanent these might be.” In essence, Levinson was practicing social science: he recognized that the study and activities of contemporary nutrition science are rooted in culture, with a specific local and historical character

that is possessed by all social groups, including scientific disciplines.

Alan Berg and colleagues (2–4) provided a follow up to Levinson's 1997 talk in their 2008 paper *Reflections from the Front Lines: Swimming Upstream with Optimism*.⁵ In their presentation, the authors present the results of a survey of nutrition professionals and describe a distinction between 2 major paths in the field: 1) operational, program, and policy work; and 2) research, teaching, and training. This distinction illustrates what sociologists describe as a boundary between 2 domains within international nutrition sciences, separating the field into the creation of nutrition knowledge and the application of that knowledge in the context of interventions.

Using a sociological approach that elaborates on key observations of institutional entrepreneurs in international nutrition, the present paper explores institutional boundaries and boundary work (5) in this field. Such concepts allow an analysis of how nutrition science creates boundaries between its field and other sciences and between nutrition as

¹ Presented at the symposium “Exploring Culture in the World of International Nutrition and Nutrition Sciences” held 21 April 2013 at the ASN Scientific Sessions and Annual Meeting at Experimental Biology in Boston, MA. The symposium was sponsored by the American Society for Nutrition (ASN) Global Nutrition Council and the ASN Nutrition Education Research Interest Section. A summary of the symposium was published in the September 2013 issue of *Advances in Nutrition*.

² Author disclosures: M. Centrone Stefani, D. L. Humphries, no conflicts of interest.

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⁵ Leading scholars in a field, such as international nutrition, are able to describe the scope of the field and how it has changed over time. They provide critical observations and have the power to initiate changes in direction. They bring leadership and observational skills that go beyond the scope of nutrition science itself. Such “institutional entrepreneurs” (3,4) take on the problem of the direction of the field of international nutrition and the way the field is developing and interacting with bigger social problems in the international arena.

a science and other nutrition practices, providing additional perspective on current challenges in global food security and malnutrition. (We acknowledge that analysis of boundaries and large-scale patterns in a discipline requires some generalization.) Analysis of boundary processes in international nutrition can also illuminate the development of “implementation” or “delivery science” in the field of international nutrition as it attempts to strengthen effectiveness of global efforts to reduce malnutrition.

Sociological Background: Understanding Culture and Boundaries

When social scientists speak of culture, they are referring to the symbolic elements that comprise the life of groups (6). These include values, beliefs, ideas, norms of behavior, expectations, identities, and unspoken rules of the group. Culture is enacted by individuals in the sacred moments of ritual and in the everyday practice of daily life: in public, in organizations, in the family, and in all fields of social interaction (7–9). There are spoken, behavioral, and cognitive elements of group membership that become part of identities. Group identities are important because they legitimize claims to status and ultimately resources, such as wealth and power. For example, an Ivy League degree can translate into bigger economic returns than a state college degree because of the meaning Americans give to elite educational credentials. Like symbols, material items, such as clothing, tools, and technologies, are also elements of culture. They embody a particular history and geography that signal and orient people within a particular culture (10). Mental frameworks of knowing and understanding the world that motivate and orient action in the lives of individuals comprise an even deeper layer of culture that social scientists refer to as cognitive scripts (11).

Culture is codified in our architecture, our mission statements, our networks of friends and colleagues, and how our time is collectively organized. We create and recreate our social life in the simple enacting of “the right thing to do” in particular social circumstances. For instance, knowing the unspoken rules about the respect due senior faculty members and whether in a particular university respect is to be shown through the use of titles reinforces the authority structure of a particular society as we enact those social rules (12). Symbolic and material elements of culture coalesce to identify groups and to institutionalize and maintain new areas of social activity in the formation of social boundaries.

Because science uses the scientific method, there is a tendency to differentiate its work from the realm of culture. Science tends to be viewed as exempt from the qualities, emotions, or politics and processes that characterize social fields outside of science, or these tend to be viewed as a separate factor from the production of scientific knowledge itself. However, science is indeed subject to social and cultural processes that can affect the knowledge produced (13,14). For a relatively recent example, knowledge of childbirth was professionalized in the late 19th and early 20th centuries as the medical profession was consolidating its authority over treatment of disease (15). In this process, knowledge

that was previously the domain of local women became the expertise of mostly male physicians who changed the nature of childbirth. It is only since the 1970s that a movement to restore knowledge of childbirth to women began to challenge some of the dramatic changes that resulted from professionalization of childbirth. Interestingly, the credentialing of midwifery as a professional practice is what has led to some change in the balance of power between obstetrics and midwifery. This example illustrates the social and ultimately legal and bureaucratic process that demarcate domains of knowledge and the triumph of professionalization in creating the boundaries between scientific and lay knowledge.

The continuity of nutrition science, or any scientific discipline, depends on the ability to distinguish the knowledge it produces as distinct from both science produced in other fields and from ordinary nutrition knowledge produced by nonexperts. Carpenter’s (16–19) short history of the field of nutrition provides an example of that boundary making when he prioritizes the discovery of nutrients, descriptions of nutritional deficiencies, and factors affecting nutrient availability as being most central to the history of the field of nutrition. The formation of such boundaries not only informs how various audiences—government agencies, the public—view the practice and research of international nutrition, it also structures how those practicing nutrition themselves view their field, their mission, and the scope and subject of their research (20).

Boundary work is important for nutrition science in building scientific credibility and recognition for nutrition within the hierarchy of sciences. Nutrition scientists do this not only by advancing techniques of measurement and more rich conceptualizations of nutritional phenomena but also by presenting and framing these advances as innovative and novel both within and outside the field. Boundaries need to be created and maintained by scientists in all sciences. For instance, molecular biology, as it came into being as a branch of biology, hailed itself as a “new” science, although it used techniques primarily of microbiology (21). Boundary work is clearly crucial in obtaining funding for nutrition research in an environment in which many disciplines compete for funding.

Science as Situated Knowledge

The distinction drawn by Levinson between operational, program, and policy work and research, teaching, and training corresponds to a pattern of thinking in the discipline that can be mapped onto previous debates around the primacy of scientific knowledge, over a locally developed or “situated” knowledge.⁶ The concept of situated knowledge

⁶In reality, such boundaries can be fuzzy, and the 2 paths in the field are certainly dynamic in the sense that each contributes to knowledge in the other. Indeed, other organizing principles, such as those who work on protein-energy malnutrition vs. micronutrients, as suggested by Levinson (1), might very well reassemble scholars and practitioners such that they are on the same side of the boundary. However, Levinson characterized this boundary (operational, program, and policy work vs. research, teaching, and training) and showed it to be “real” in the sense that there are important opinions that differ based on the distinction, and, therefore, it remains a strategic research site for better understanding the discipline.

was first developed in feminist studies to understand the pathways to female oppression (22). Situated knowledge is now understood to be reflected in all spheres of social life. Use and understanding of situated knowledge depends on experience in specific social settings and geographical locations.

Much of the scientific enterprise, scientific knowledge, and the ways in which it is communicated would be considered a form of situated knowledge by many who study culture or science and technology. First, it is representational in the models it presents of the world “out there” and is therefore subject to human interpretation. Second, the scientific profession has norms, which are ways of doing and thinking and speaking that are specific to a social arena, as well as a history and geography that both vary and evolve. A reflection of this is that scientific language is coded. That is, it is communicated in a way that only other scientists can understand and sometimes only within specific scientific disciplines. Knowing quantitative or qualitative methodologies may unite scientists across some disciplines, but the language sciences use to represent scientific work is discipline specific and part of what creates boundaries between them. For instance, terms such as “Rasch modeling,” “coping strategies,” and “HFIAS” (Household Food Insecurity Access Scale) (23) are part of a cultural code that identifies specialists in the domain of food security measurement. Knowing those terms, a scientist has situated knowledge of the contemporary field of food security measurement. The coded terminology is an important part of the culture that helps to classify knowledge as scientific and thus meaningful, authoritative, and legitimate (24,25).

Although all scientists share a standardized set of principles in which research is conducted, the scientific method, norms between scientific disciplines differ so that a scientist would have to embed herself deeply in another discipline to learn both the substance of another area of science and the specific rules and ways of doing things within that discipline. Ways of collecting data, of analyzing data that are discipline specific, writing up and presenting research, collaborations, and the process of publication can all vary between scientific disciplines. Understanding scientific disciplines and professional fields as social groups and the knowledge they produce as situated within specific local conditions allows us to examine cues in the nutrition science community that suggest how the structure of the community affects the knowledge it produces.

Scientific vs. Lay Knowledge in International Nutrition

In the field of international nutrition, there is a boundary formation process as nutrition sciences engage in research that defines the scientific facts about the functioning of human nutrition. Scientists counterpose the knowledge they produce to a local or “lay knowledge” of nutrition, built over thousands of years that connected local foods to rules about how to use them. For example, people in Mediterranean countries use local olive oil liberally as a practical

necessity and have combined the necessity with appreciation for olive oil, into a tradition in the preparation of meals. This is situated knowledge to the extent that there are rules around the use of olive oil that are part of traditions performed in everyday meal preparation. Rules on the use of this food include for which meals of the day it should be consumed, the quantity and quality of the oil to be used, as well as the best extraction methods. The flavor of the oil is an intrinsic part of the palate and economy of the region, and olive trees, branches, and groves are an intrinsic part of the landscape, identity, and culture of the Mediterranean basin (26).

Conversely, nutrition science as a science uses a systematic way of knowing, understanding, characterizing, and analyzing, such that it removes science and the scientist from having place-based knowledge. The relation of the scientist to her subject is different from an individual’s orientation to objects in their world—it is decontextualized (or delocalized) and reductionist (27). That is, it is removed from the reality of its existence and broken down into components for analytic purposes. Before a scientific study investigating the polyphenols of different olive oils (28), people local to this region would not have thought about the precise way that olive oil is good for them or whether the olive oil of their region might be higher in polyphenols than that of another region. However, research has now broken down, analyzed, and (re)presented the basic elements of olive oil scientifically and suggested the optimal way to incorporate the element into a diet. This removes the olive oil from a cultural context, appropriates and translates it, and then reinserts it back into a culture, as nutrition information, in a way that can make it foreign to cultural insiders. One of the effects of the analytic process is for science to claim to have knowledge that can be perceived as more generalizable or empirical. This example, of how a staple food becomes a polarizing point for different forms of knowledge, is easily extended to maize, a sacred food that is threaded into every aspect of life in Mesoamerica, including diet, religion, and architecture (29). In contrast, the scientific approach is exemplified in a study measuring calcium absorption from maize flour with traditional lime processing before being made into tortillas to identify the tortilla preparation method that maximizes calcium absorption (30).

One of the tensions between the larger field of nutrition science and the field of international nutrition is that an understanding of the local context as a set of theoretical interests that are important for implementing effective interventions lies outside of the domain of nutrition science itself. Levinson describes the challenge as the lack of an institutional home for international nutrition, in part because of the attention to programmatic and cultural issues that do not fit into any 1 ministry or department (31). In the field of international nutrition, “lay” knowledge, which Berg sees as site specific—“applying to one program at one place at one time” (2)—is contrasted with the “universal” knowledge that exists as a generalizable scientific principle. The definition of scientific knowledge as generalizable then challenges

the application of scientific principles in the context of customizing interventions.

Over the past 25 y, there has been a call to expand nutrition programs to include policy, implementation, and organizational knowledge that have historically been peripheral to the field of nutrition science (1,32,33). Incorporating these programmatic and operational elements into nutrition departments and subjecting them to rigorous evaluation and scientific study is an important step.

Scientific Knowledge in Nutrition Interventions

Nutrition information regarding the importance of vitamin A or iron and in which foods it might be concentrated is scientific knowledge in the sense that evidence exists that demonstrates the importance of vitamin A and iron and measures the concentrations in different foods. However, the communication, integration, and application of this information requires nonscientific, cultural rules around work, organization, social process, and therefore of situated scientific culture. The anticipated appropriation of scientific knowledge in a community likewise requires situated lay knowledge.

An example of the complexity of interventions in the face of Western rational models of thinking from the 2011 American Society for Nutrition annual meeting examines culture and illustrates how a boundary between situated and scientific knowledge is at play and how the 2 kinds of knowledge are opposed to one another. A presentation on an intervention to improve nutrition during pregnancy presented some cultural beliefs to show the context of the intervention. As part of the intervention, pregnant women were asked to go to a center 6 times a week for a 600-calorie nutrition supplement and to stay at a health center while they consumed it to ensure compliance. During the course of what was a normal scientific talk, the boundary-making process in nutrition intervention was at play: beliefs of pregnant women were classified and displayed in a chart, alongside photos of the field site that (re)presented the environment where the intervention took place. The contrast of the classification charts with the photos of the natural setting at the field site demarcate the boundary, one that divides the space of the field from the scientific domain as (re)presented by researchers giving a talk at a conference. The beliefs of particular concern to the presenter were those that prohibit pregnant women from going outside or straying too far from home, whereas photos of the environment showed a wooden twig bridge and a handmade boat. The photos suggested that pregnant women would have to traverse potentially difficult terrain to obtain their supplement. The cultural beliefs restricting women's travel were presented as barriers to the intervention, not as potentially protective of pregnant women or rational within the cosmology of beliefs and the environment of that region. Indeed, a foundational assumption of many scientific interventions is that scientific information is rational, and the inability of the target population to see the cause/effect relation between a problem and the proposed solution indicates an irrational

and therefore dangerous belief that stands as an obstacle to the intervention. Boundary work in the field of nutrition in this example comes in the representation of local beliefs as a set of barriers within the unique and limited landscape of the intervention itself. The goal of this and other similar interventions is to overcome such beliefs with scientific knowledge. Although the manifest goal of the research presentation was to describe the results of a nutrition intervention, the underlying structure of this talk illustrated how scientific knowledge of nutrition principles aligns with a model that reinforces scientific knowledge as rational and superior. An approach incorporating lay knowledge would also consider how potential behavioral changes interface with local beliefs, customs, and environment, as demonstrated in a recent article on maternal anemia and iron supplements on Pemba Island in Zanzibar (34).

The version of intervention based on the application of some of the limited style of intervention described above is predicated on the diffusion of individualistic, Western, rationalist models in higher education (35,36) and the application of those models of human behavior and thought processes to a whole range of social fields of action, including nutrition. There is an implicit application of a rationalistic, scientific mode of decision-making to local people in nutrition interventions, yet accepting nutrition information and new food practices are based on a logic that lies outside of the way human decision-making tends to happen. The logic of action, in terms of the relation between thinking and acting in the course of everyday life, is a much less rational and conscious decision-making process than is assumed by such models (7,8,37).

Boundary work in nutrition is accomplished by upholding standards of science in the course of normal scientific or programming activities. Maintaining the distinction between what is scientific knowledge vs. what is lay knowledge is part of the social activity of creating or doing science. It is not a conscious or articulated process on the part of scientists or nutrition planners. Boundary work allows scientists the authority to speak publicly and consult officially in a public's interest in matters concerning nutrition because scientific knowledge is seen as corresponding to the world as it exists "out there" (38), that is, to an universal reality. In contrast, lay knowledge is considered to have specificities that are assumed absent from the scientific process. Ultimately, knowledge derives many of its features from the way knowledge-producing communities are organized (20).

The seemingly oppositional nature of lay knowledge with nutrition science knowledge has implications for how nutrition scientists understand the application of scientific research in a field setting. A bridge called "implementation science" is seen as uniting the 2 separate knowledge domains, associated with scientific research and program development (39,40). Highlighting this social process of boundary development, which tends to relegate lay knowledge as an obstacle to better human nutrition, may help move some nutrition efforts forward by illustrating that scientific and lay knowledge share qualities as cultural

communities of knowledge creation and transmission and can be viewed as both having the capacity to contribute to scientific knowledge, although they result from different social processes. This is substantively different from building a bridge to unite the 2 in the project of implementation science.

One potential model for the integration of different forms of knowledge or for the incorporation of lay (nonscience) constituencies (stakeholders) has been investigated in the area of AIDS treatment research (41). During the early phase of the AIDS epidemic in the mid-1980s, among the many stakeholders in the research and treatment of the new epidemic were patients and community activists, who watched friends suffer devastating declines and death. Activists became engaged in the science around the treatment of AIDS in the course of forcing national agencies and the research establishment to release experimental medications. Activists were able to play with the boundary of what was considered “credible” information, establishing themselves as legitimate contributors to the substance of important scientific problems around treatment by becoming expert in the literature of the disease and mastering the language of biomedicine. This compelled the community of researchers to address activists’ concerns based on their merits. A number of important differences exist in this comparison, in particular the social status of the “disease constituency,” who were “unusually articulate, self-confident, and well educated” (41), and in the use of a medical treatment model for the application of virology. However, it remains a good example of the development of lay expertise in that it refers to the application side of basic science research and to the degree that allowed the inclusion of noncredentialed individuals to inform substantive scientific questions that developed within the circumscribed realm of the conduct and interpretation of clinical trials.

There is a growing recognition of the importance of local knowledge in the search to successfully and sustainably improve nutrition (33). However, maintaining the boundaries of international nutrition as a scientific discipline values scientific knowledge over lay knowledge. Both lay and scientific knowledge are partial knowledge, and both are crucial. Nutrition intervention may be viewed as an attempt to soften the boundaries of lay knowledge toward the end of better nutrition outcomes. When an intervention becomes “sustainable,” the structure of a local setting has been altered by incorporating both new rules and new knowledge into that setting based on scientific knowledge. In turn, creating more sustainable interventions could require softening the boundaries of the discipline itself—incorporating lay knowledge to understand differently what nutrition science is overall.

Conclusions

Understanding that there is a scientific discipline of nutrition is to distinguish it from other bodies of knowledge. This is an implicit part of the process of the formation of expertise (5,8,42). Boundary reconfiguration occurs in all scientific disciplines. During the professionalization process,

understanding of the natural world is appropriated by science, credentialed, and codified in specialized language so that it becomes the domain of experts: science and scientists, who are authorized through universities, professional organizations, and the state through licensing to speak legitimately on whatever is their topic of study. When the social and ultimately legal and bureaucratic elements are recruited to demarcate domains of knowledge, the symbolic boundaries become institutional or structural boundaries that serve identity and gate-keeping processes that block out the noncredentialed. Although the terminology used to describe the different areas of research and work in international nutrition reflects a sort of institutional instability, tracking the creation of boundaries allows a view into the continued changes in an organizationally complex discipline.

As nutrition science becomes increasingly central to development (43), the boundaries that are either reinforced by digging in heels over the implementation of programs with little local input or softened by inviting local stakeholders to address the problems in nutrition together (44) are important to consider in helping to create directions that favor viable solutions.

Acknowledgments

We are grateful to colleagues in the international nutrition community for numerous frank and open discussions that underlie some of the thoughts and analysis reflected herein. All authors read and approved the final manuscript.

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