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The Culture of Translational Science Research:

Participants' Stories

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Abstract

We apply a symbolic interactionist framework and a qualitative methodology to the examination of the everyday reality of translational science research (TSR). This is a growing scientific movement that aims to facilitate the efficient application of basic research to clinical service design and delivery. We describe the emerging culture of translational research at a mid-size medical center that received a Clinical and Translational Science Award from the National Institutes of Health. The stories related by scientists, clinicians, and students in interviews indicate that they make sense of the emerging inter- and cross-disciplinary, team-oriented culture of TSR through the refinement and redefinition of the *significant symbols* that inform their work while they attempt to master translational research by addressing the *dilemmas* it produces for them and their work. We see the strength, currency, adaptability, and energy of the core self-definition of "scientist" to be significant in shaping the emerging culture of translational research. We conclude by celebrating the value of interpretive ethnography for evaluation research.

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Keywords

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In this paper,[1] we apply a symbolic interactionist analytical framework and qualitative methodology to understanding the everyday reality of translational science research (TSR). This growing scientific movement, which is heavily supported by funding agencies such as the National Institutes of Health (NIH), has two goals. First, TSR aims to enhance the positive impact of basic scientific research on clinical service delivery. Second, TSR aims to improve the quality of medical research by encouraging inter- and cross-disciplinary research. As part of our comprehensive evaluation of TSR at a mid-size medical center, we focused on the following aspect of the culture of science: How does the culture at this medical center change to facilitate translational research? Our argument is that the long-term success of translational research is dependent upon the evolution of assumptions, everyday practices, and taken-for-granted ways of conducting research in a major health care center. Subsequently, scientists must come to see themselves, their sense of self, and the perception of their place in the broader research environment. Translational science requires a constant "re-engineering" of its total enterprise (Collins, 2011). Therefore, we raise the following research questions in our study: What is the traditional culture of research at this mid-size medical center? What is the emerging culture of translational research at the medical center? How do participants in TSR enhance the emerging translational research culture at the medical center? In the remainder of this paper, we report findings from an ongoing basic science and evaluation study of TSR at the medical center. These findings are in the form of stories that the scientists tell about themselves, their careers, their research, and their sense of change in the culture of medical research.

Theoretical Framework

Two theoretical perspectives inform this study. The first is *symbolic interaction*. Accordingly, organizational life is a process of interaction/communication among people to arrive at shared meanings (e.g., values, rules, and goals) and a unified course of action. Culture can be defined as a group or organization's way of life or way of work. The individual understands culture in terms of the ways it impacts the experience of self (Blumer, 1969). The most important object defined socially is the self, and the individual's primary motive for entering into social activity is to simultaneously fit the self into that activity while enhancing the experience of self through the activity.

Creating an innovative organizational entity such as the clinical and translational science project at a mid-size medical center involves considerable evaluative, cognitive, and affective work among all participants (Douglas & Johnson, 1977). Evaluative work focuses on establishing the rules and values for governing and coordinating activities in an organization. In terms of the Clinical and Translational Science Award (CTSA), participants

[1]An early version of this paper was presented in August 2012 at the section on "medical sociology" at the annual meeting of the American Sociology Association in Denver, Colorado.

must learn, create, refine, and apply, rules and values from a wide range of systems—medicine, scientific research, organizational management, the NIH, scientific disciplines—to establish successful translational research. Cognitive work involves making sense of new terminology, logics, roles, and definitions that accompany TSR (Kotarba, 2001, 2007). Affective work involves protecting, adapting, and developing one's sense of self while learning how to clarify and enjoy the pleasures of being a part of translational research.

The second theoretical perspective is *action theory*. Action theory is popular among researchers studying complex organizations such as hospitals, schools, and governmental agencies. Action theory is problem/solution/change oriented. Action theory welcomes the respondent into the research and problem-solving process. Action is really not a theory; it is a strategy for assembling theory that is empirically based and practical (Johnson, 2008). We employed action theory in our study of the culture of TSR because we were fully integrated into the TSR system. The administration expected us to structure our research to have practical applications to and implications for the emergence of an innovative research project that had little precedence either locally or on the national level.

Methods

We used qualitative data for our analysis. This type of data reflects respondents' understandings, interpretations, and assessments of the social phenomenon in question. We conducted 39 individual interviews with scientists, clinicians, and administrators involved with the CTSA project and five focus group interviews with 22 postdoctoral and biomedical graduate students. We also conducted numerous observations of team meetings, workshops, in-services, and presentations. Respondents were asked to speak for their team members as well as for themselves, thus serving as "expert witnesses" for their peers, their departments, and their styles of research.

This report focuses on the interviews we conducted, which were by design very conversational. We were most interested in directing respondents to explain in as much detail as needed—and in as comfortable a style as possible—their understanding of the translational research project and their place in it. We encouraged the respondents to talk about themselves, their careers, and their discoveries. Above all, we engaged them in conversations about what it means to be a scientist and what the attraction of doing science is all about. Instead of simply asking the respondents to give us quick examples of these phenomena, we let them tell stories that were elegant, colorful, plausible, and illustrative. Our expectation was the assembly of portraits of the self-identity of the scientist that would help us understand the difference in doing one's work in traditional and emerging work contexts.

TSR at this mid-size medical center was initiated in 2009. The particular grant is the Clinical and Translational Science Award (CTSA) from the National Institutes of Health (NIH). There are approximately 60 CTSA projects across the United States. As is the case with all CTSA projects, the leaders at this mid-size medical center were expected to design a program that fits the resources and local procedures available at the medical center. The leaders subsequently designed the program to include two major components:

multidisciplinary translation teams (MTTs) and key resources (KRs). The MTTs are research groups that focus on one particular clinical problem or theme, such as inflammation and obesity. KRs are networks of resources, some pre-existing and some new, available to the MTTs to facilitate their work in, for example, biostatistics and novel methodologies.

The initial phase of our study supports three main principles of the interactionist perspective on complex organizations, as illustrated by the elegant stories participants forged during our conversations with them. First, the CTSA project evolves as an organizational component of the medical center as participants seek meaning for practical problems that emerge, for example, integrating CTSA project activities into pre-existing research agendas (Blumer, 1969). Second, the strength and productivity of participants' relationships in clinical and translational science work are a result of personal considerations that often preclude administrators' rational attempts to assemble research teams and create shared research interests (Smith, 1984). Third, the quality of one's voluntary participation in translational science work is strongly related to one's ability to manage multiple and somewhat conflicting self-identities, for example, prominent bio-medical researcher and a lower functionary team member on a CTSA project (Manning, 1973).

Stories about Translational Research

Symbolic interaction argues that respondents' understanding of the organization can be retrieved through *stories* they author and relay (Ellis, 2009). These stories are the dynamic culture of the organization. The stories elicited in this study allowed the respondents to describe the details of their experiences as scientists, including causal analysis of biographical and organizational events.

Respondents' stories do not, however, speak for themselves when placed within a sociological environment. Storytellers are not social scientists; they do not speak with a social scientific voice. Denzin (2001) presents a strategy for translating, or shall we say *editing*, respondents' stories:

> Interpretive ethnography …is the attempt to make problematic lived experience of ordinary people visible to the reader. The interpretive interactionist interprets these worlds, their meanings and their interpretations …. A major goal of the interpretive writer is to create a text that permits a willing reader to share vicariously in the experiences that have been captured. (p. 399, 401)

Thus, we are attempting to balance the practical objective to write a policy-relevant text that both celebrates and improves the process of translational science research with the assembly of a portrait of the *scientist(s)* conducting this research.

Following the logic of grounded theory (Charmaz, 2006), we generated analytical models derived directly from the interviews and validated by the observations. Two themes emerged from the stories that were pervasive in the everyday life in a medical research setting in general and in an innovative translational research project specifically: *dilemmas* and *significant symbols*.

Dilemmas

Dilemmas refer to problems organizational members face in doing their work. Dilemmas in and of themselves are common and expected features of any group activity. We can define *dilemma* as a situation that requires the actor to decide how to proceed (Maines, 2001). Individual and group activity, whether in terms of establishing an organization, equipping a lab, or designing a study, is not automatic or necessarily obvious. In a seminal article, Sung et al. (2003) proposed one of the most straightforward models of translational research. They presented a two-phase model of the process of moving from basic research to improved health. The first phase involves the transfer of new understandings of disease mechanisms gained in the laboratory into the development of new methods for diagnosis, therapy, prevention and their first testing in humans. The second phase involves the translation of results from clinical studies into everyday clinical practice and health decision-making. Perhaps most interesting, they also describe a number of "blocks" in translational research that include a lack of willing participants, the lack of funding, and the lack of qualified investigators, as well as regulatory burdens, fragmented infrastructures, incompatible databases, career disincentives, practice limitations, and high research costs.

In the present study, we found that the concept of the *block* to be a bit too oversimplified, final, and either/or. The concept does not, for example, explicate the degree to which problems can be overcome and, methodologically, how that might occur. Put differently, the concept of *dilemma* fits the symbolic interactionist approach by focusing attention on the *process* by which problems are perceived, defined, and addressed (Waskul, 2009). Instead, the emergent nature of the CTSA project is such that the process by which dilemmas emerge —are identified as such—and are approached should be monitored over time.

We should note that our notion of *dilemma* differs from NIH's notion of *barrier*. A barrier is a problem in translational research as perceived externally by local administrators and NIH project directors. In contrast, a *dilemma* is a problem as perceived and experienced by an actor, that is, the scientist directly involved with the work. Put differently, a dilemma refers to a problem as it affects one's own work, self, or identity—whether or not it impacts the overall conduct or success of the translational research project. We will begin with summaries of the major dilemmas discovered through the respondents' stories as well as our policy-relevant interpretations.

Routine and Tradition vs. Experiment and Innovation

This dilemma exists in the minds of both prospective CTSA project participants and those already committed to the program. The policy of the CTSA project is to change both the means and the end of biomedical research. Some scientists are not sure whether they could —let alone should—convert.

One scientist noted that the scientific method in which he was trained and which he has pursued for several decades has served him well in terms of discoveries, publications, prestige, and grants.

> Good science has to take place at its own pace. Adding this translational component simply makes the discovery and application process take longer …. You see, to the layperson, scientists seem to apply for the same grant over and over again. We're not reinventing the wheel; we're sanding it and polishing it.

For him and other scientists, especially among basic science researchers, the objective of translation should require only a partial revision of the scientific method at the medical center. This revision would most likely occur at the end of the research process when scientific discovery is turned over to engineers, patent attorneys, and corporations (e.g., pharmaceutical and medical technology companies). These traditional scientists still perceive science philosophically as a linear process to be tinkered with when and where necessary. The scientists who have seriously bought into TSR, however, agree with the NIH argument that the entire research process needs to change to achieve positive results. Input from engineers, patent attorneys, and corporations should emerge at any point in the research process, when relevant.

Commitment vs. Time Constraints

Another aspect of the linear perception of the scientific method is the juxtaposition of CTSA project activities in the scientist's total work agenda. Some scientists see two time-related issues that may be difficult to overcome. A common commitment to a CTSA team project, for which the scientist in question is only a part-time member and not a principal investigator, is 10%. First, there may simply not be any surplus time available in many scientists' agendas, especially if they are already working on federally or foundation-funded projects. Second, the collaborative nature of clinical and translational science projects is such that a 10% time commitment requires at least twice that time for the scientist to make a meaningful contribution to TSR. Researchers who also have clinical appointments and responsibilities feel that their time is especially crunched. One scientist relates the time crunch dilemma for researchers who not only have time-intensive clinical appointments but also feel professionally obligated to work with patients.

> The problem with working on research while maintaining clinical commitments is that it's really difficult to do both, to do both well …. Just because we're doing both does not mean we're translating one to the other. I do rat research on [specific disease], and it's gonna be a while before that gets to the bedside. But, I'm not bothered by that. I'm a doctor first and a scientist second.

Scientists can also address this dilemma by (1) using time constraints as a reason for declining the invitation to join a new CTSA project; (2) agreeing to join the team but having a postdoctoral student or graduate student attend team meetings and conduct other team duties on their behalf; or (3) work for more than 100% total time, which is common for most good, productive scientists.

Mentoring vs. Freedom

This dilemma emerged constantly in interviews with graduate and postdoctoral students. The dilemma comes from interpreting, defining, and managing relationships with mentors. Students seem to prefer somewhat contradictory features in their mentors. They want their

mentors to teach them good scientific and career skills, but they are also anxious to strike out on their own, with the highest goal, of course, being "building one's lab." This dilemma is particularly difficult for those students who, given the great difficulty in obtaining faculty positions, are resigned to searching for jobs in industry. They are concerned that few mentors have the practical experience in industry to teach them how to be successful there. A female graduate student discussed her relationship with her mentor:

> I have a really great mentor now. He is also my boss. He doesn't lecture me on how to be a scientist. [The mentor] gives me clear instructions on how to manage the experiment, then leaves me alone …. He spends most of his real time writing proposals—he's the P.I. [principal investigator].

She goes on to describe her strategy for managing her mentor:

> I learned early on that he does not like to be bothered with little things. He'll answer all my questions, but I know to save his time for serious problems …. Serious problems are those that only relate to the experiment—nothing personal is allowed.

Of course, these student concerns are common in graduate medical school settings. A particular dilemma regarding clinical and translational science work is gaining access to CTSA project funding. Students note that they can take advantage of CTSA resources only if their mentors are themselves involved in CTSA work.

P.I. vs. Team

Migrating one's work to a team configuration can place stress on a scientist's self-identity. Some scientists, as well as program leaders at this mid-size medical center in particular, feel the clinical and translational science concept in general can be insensitive. Seasoned researchers with lengthy track records of scientific and career accomplishments suddenly find themselves as regular members of seemingly homogeneous teams where their expertise is not exploited fully. As one scientist put it, it's really difficult for many scientists at the medical center to park their egos at the door at team meetings.

The team concept is central to the translational science research philosophy. One of the problems facing new teams at the medical center is the risk individual success poses to the team. *The most successful teams tend to have the strongest, most creative, most successful, and therefore most valuable team leaders*. This irony emerged during leadership change in one particularly vibrant team:

> I don't think anybody really saw it coming. It's something that you should expect, especially at [the medical center] …. Well, so if someone is successful, they will of course get offers from other institutions ….

In cases like this, young and energetic researchers—unfortunately with thin vitae—can be passed over for team leader positions because a team appears stronger if its leadership is seasoned and has a positive track record. The irony here is that the traditional vertical/hierarchical authority structure is reinforced, the very authority structure the translational research model intends to replace with the interdisciplinary team.

There is yet another organizational dilemma related to the movement to the team concept. The team concept at the medical center seeks the integration of research and clinical talent so the translation process can occur efficiently within the team. When the overall budget gets tight, the medical center administration may decide to place increasing resources into nurturing the clinical faculty to increase overall revenues at the expense of the research faculty that is expected to be self-supporting during a time when public and foundational support for research is shrinking.

Organizational vs. Scientific Expertise

A number of scientists, especially project managers, are frustrated over the dramatically new and extensive organizational work and skills suddenly expected of them. They believe they are inundated with paperwork and organizational logic that has little to do with their mastery of scientific logic. One implication of this dilemma is the resentment some scientists have over the imposition of *rationalist* values in team formation, in contrast to more traditional *personalistic* values. As one senior researcher put it:

> We have a hard time dealing with a team leader deciding who we need to bring into the team, what specialty is missing. In science, you simply cannot work closely with someone because they look good on paper. I've been very successful over the years deciding to work with someone because of the ability to talk face-to-face over a beer.

Scientific Work vs. Clinical Work

The primary goal of translational science research is to facilitate expeditious and efficient application of creative science to the development of effective clinical tools. This process is imbedded in and driven by the team concept at the medical center. In turn, clinical workers such as nurses, technologists, and other traditional support personnel are invited to join TSR teams. There are three major dilemmas possible in this phenomenon. First, although clinical workers may see participation in TSR teams as a personal and professional opportunity, they may not have the research skills to comfortably contribute to the teams' work. Second, although teams are supposed to be somewhat egalitarian, the status privileges held by physicians is difficult to overcome. Third, some clinicians note that they are leery of investing time and energy into translational science research if their traditional role in similar activities—locating and assembling subjects (e.g., "tissue samples") for scientists—remains their contribution.

Nevertheless, the future role of clinical/ancillary/health professional workers in translational science research is bright. These participants bring two skills to the table that are increasingly recognized and valued by all CTSA project participants. As one nurse administrator/researcher put it:

> Nurses are increasingly being trained to contribute to (translational) research …. Graduate training now goes in two directions. Some nurses focus more on research, while others focus on the lucrative field of nurse practice. Either way, we all generate two skills really needed to do a good job [in translational science

> research]. We have always been interdisciplinary, and we are very holistic in our philosophy …. Does that sound like team research to you?

She concludes with a philosophy of modern nursing conducive to translational research:

> When I was in nursing school, we were taught to *care* for patients and leave management to others. We were taught to be good teammates. Now, caring for patients involves concern for the content as well as delivery of care. Now, that's a bench-to-bedside approach, if you ask me.

Significant Symbols

The concept of *significant symbol* refers to words, images, phrases, or ideas that serve to define what an organization is, who the members are, what activities take place there, and what are the core values that guide those activities (Mead, 1934). In interviews, respondents highlighted several significant symbols that they use to define and make sense of the CTSA project. These symbols are often responses to questions such as "What is the most important aspect of CTSA project?" or "How would you characterize the CTSA project at this point?" These symbols also emerged naturally in conversation with respondents. These significant symbols can serve as mechanisms for locating problems and opportunities in clinical and translational science. Clinical and translational research is interpreted in terms of one's own work, discipline, training, experience, needs, status on the team, and status at the medical center. We present three of the most interesting and potentially important significant symbols to give us clues as to how the scientists cognitively map the CTSA project. They serve as examples of the many significant symbols that will be explored in the ongoing evaluation research. Similar to our presentation of organizational dilemmas, we present strategies for integrating understanding of significant symbols in the ongoing design of team management strategies.

"***The meeting***" The member concept of "the meeting" is used many different ways to summarize the scientists' cognitive mapping of the CTSA project. The meeting is perceived concurrently as:

- The major component of the CTSA project.
- The situation where people get to meet each other and interact.
- The situation for the dissemination of important information about the CTSA project.
- Something to blame for personal problems, such as lack of time and confusion over the meaning of translational research (e.g., "I would understand what they want from the team leaders if they explained it better in the meetings.").
- A good situation to get subordinates and mentees involved with the CTSA project.
- A situation to enhance one's status at the medical center.
- A situation to potentially demean one's status at the medical center.

"***My lab***" The member concept of the lab serves as a cognitive bridge across the CTSA project, a scientist's work agenda, and a scientist's career. "My lab" refers to much more

than the physical space and equipment used to conduct scientific research. “My lab” has been used in interviews and conversations to refer to:

- The location for one’s actual work (e.g., a biomolecular researcher describing the problems associated with assembling a “makeshift” lab following Hurricane Ike).
- Progress in one’s career (e.g., a cancer researcher describing how he had secured the necessary laboratory resources to conduct NIH-funded research in his specialty).
- A career goal for graduate and postgraduate students (e.g., “I can’t wait until I have my own lab so I do not have to work in two or three other labs at the same time”).
- An oasis where a scientist can go to escape the discomforts of meetings, bureaucratic mandates, proposal writing, etc. (e.g., “I can’t wait to get back to my lab, where I know exactly what’s going on”).
- One’s status among others (e.g., “I need certain types of postdocs to work in my lab…my work there is pretty complex and I need assistants who can follow directions and do the lab tasks competently”).
- A scientist’s problems with administration (e.g., “They promised me informatics support when I came here, but my lab is always tied up because we cannot get that help”).
- An empirical benchmark for one’s career (e.g., “I have one of the largest and best equipped labs on campus—it doesn’t get any better than that.”)

Positive Features of the CTSA

Respondents’ stories about the implementation of the CTSA project were peppered with discussions of the positive features of clinical and translational science. Scientists have had the opportunity to discover, meet with, and in some cases collaborate with other scientists with complementary scientific interests at the medical center. The CTSA project has created opportunities for members of clinically oriented units (e.g., Nursing and Allied Health) to interact with and hopefully work with established, funded researchers. The CTSA project has given a number of junior researchers the opportunity to join projects through positions such as multidisciplinary translation team managers.

Perhaps the greatest contribution to translational research at the medical center has been the introduction, dissemination, and contribution of scientific services previously not available to many scientists, especially those working on shoestring budgets. For example, bioinformatics involves a very sophisticated use of computers to characterize the molecular components of living things and allows scientists to examine body processes at the genetic level. The CTSA grant provides funds to maintain several bioinformatics experts whose services are available to all CTSA researchers in terms of what is referred to as *key resources*.

Conclusion: Making Sense of Scientists' Stories

The stories presented by the scientists at the medical center as processed and packaged in this report are obviously not as romantic and literary as the exemplars in the growing autoethnographic and narrative traditions in qualitative methods (e.g., Ellis, 2007; Kotarba, 2012). As Denzin (2009) argues, a story is largely shaped by the writer's purpose and context. As we noted above, our purpose was to assemble respondents' stories as resources for the organizational task of creating an evaluative story of a highly sophisticated research setting. A major feature of the context shaping our work was the need to maintain confidentiality of the respondents. Thus, the stories and interpretations we present may seem a bit disembodied and nonbiographical.

Nevertheless, our interpretations of respondents' stories result in an inventory of evaluative statements and suggestions for change of great interest to the scientists and, hopefully, of policy relevance to the CTSA project leadership. Respondents were willing and eager to put closure on their stories with suggestions for change and improvement. We asked respondents to list the problem, indicate the potential solution, and suggest strategies for implementing the solution. Following the spirit of action theory, we assembled the following list of suggestions that followed from the above dilemmas and significant symbols:

- Leadership should consider establishing a key resource specifically focused on team design, assembly, and management. This would be a nonscientific group that provides services such as team calendar maintenance, team staffing, meeting scheduling, agenda management, personality management, evaluation procedures, and budget management.
- Leadership should consider limiting the number of grants to increase the amount of reward and to encourage researchers to design long-term, truly translational projects.
- Leadership, however, should also set aside funds, albeit limited, for discrete/non-seed money projects. For example, there are several community-oriented projects in the Center to Eliminate Health Disparities that, if brought under the umbrella of the CTSA project, could provide high visibility in the broader community, illustrate the goal of inclusiveness in the medical center community, and expand the range of translational care platforms.
- Leadership should more thoughtfully assemble teams based more on researchers' personal preferences for colleagues with whom they can work successfully.
- Leadership should operationalize the NIH mandate for *innovation* by following the biomedical engineering model. Their discipline, training, and work begin and end with innovation. In fact, the CTSA project leadership should consider having the biomedical engineers teach innovative research design to other participants, such as the value of and process of locating and working with industrial companies who translate discoveries to patent and to product.
- Concepts such as *multidisciplinary* and *interdisciplinary* should be demystified. Some respondents noted the inaccuracy in the way these terms are used in the

CTSA project. Members of an interdisciplinary team do not surrender their particular disciplinary optic to some common or communal consciousness. Instead, people maintain their own perspective and hopefully *contribute* to problem solutions. The concept of *transdisciplinary* may be a useful alternative, one that is gaining currency in the literature.

- Team building should be more thoughtfully designed. Strategies from external resources such as administrative science, sociology, and organizational psychology should be consulted.
- The formation of new teams should involve, from the beginning, a discussion of the distribution of resources, rewards, and incentives among members.
- The CTSA project leadership should continue if not expand on the successful policy of allocating some of the project funds to purchase equipment and services available and valuable to a wide range of scientists, clinicians, and educators—even those not directly affiliated with the project. The best example might be the bioinformatics program.
- The training of graduate students and postdoctoral students should include explicit discussion of the private-sector employment opportunities many of them seek after graduation. For example, biochemistry majors who get jobs with pharmaceutical companies are, in fact, working at one of the end points of translational research.

In conclusion, we began our study of translational science research hearing and reading about the particular procedures and practices needed to do TSR. Our social scientific approach, however, led us to immediately suggest that a successful shift to TSR requires a change in the *culture* of research at the medical center. There are many theories of organizational/cultural change in sociology. Some writers argue that one can change a culture through resocialization, whereas others contend that one must change practices and behavior first and culture will eventually follow (Scott et al., 2003). The point for the present study is to observe cultural change taking place in the common and everyday life world of research through empirical phenomena such as *dilemmas* and *significant symbols* and assume that the best explanation lies somewhere in between. In any event, translational science research is the current policy at influential agencies such as NIH and is thus worthy of social scientific interpretation.

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