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Contribution to the special panel: The Scientific Mind and HIV/AIDS

The Role of Cognition in Changing Behavior: Understanding Safe Sex Practices and HIV Concepts

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Abstract

Science involves a combination of curiosity and skepticism and a search for understanding. In this way, lay people, like professionals or scientists, are involved in scientific thinking. However, the scientific method is one of questioning, making observations, testing observations, and drawing conclusions from results in a more formal way in which scientific evidence is used. We use these scientific methods to study behavior of the lay public. Lay people use evidence based on everyday knowledge and opportunistically use this knowledge to make decisions. In this paper, we present examples from our international studies from the areas of a) adult understanding of child malnutrition and of pharmaceutical instructions, b) youths' understanding of health and HIV/AIDS, and c) young adults' safe sex practices to focus on cognitive issues related to how people in different cultures think and reason about health issues. These studies will shed light on the general nature of human behavior, as well as the specificity imposed on this behavior by various cultural and educational variables. Furthermore, our understanding of human thought processes can also guide our recommendations for intervention strategies, with the aim of developing a dynamic "scientific mind" within the community.

Introduction

In Merriam-Webster's Dictionary, *science* is defined as "the state of knowing: knowledge as distinguished from ignorance or misunderstanding." The *scientific method* is defined as the "principles and procedures for the systematic pursuit of knowledge involving the recognition and formulation of a problem, the collection of data through observation and experiment, and the formulation and testing of hypotheses." The *mind* is defined as "the element or complex of elements in an individual that feels, perceives, thinks, wills, and especially reasons" and "the conscious mental events and capabilities in an organism." The *scientific mind* can then be defined succinctly as the conscious and perpetual state of knowing and systematically pursuing knowledge.

Science involves a combination of curiosity and skepticism and a search for understanding. The scientific method is one of questioning, making observations, testing observations, and drawing conclusions from results. When results are unexpected or counterintuitive, our current view of the world needs to be reorganized in order to

assimilate the new information. This definition of a scientific mind does not exclude lay people. In fact, they are reasoning with their scientific mind, but it is not based on scientific evidence, but on beliefs, past experience, and culture. The scientific method is associated with rationality and truth, whereas beliefs and culture are associated with biases in thinking and reasoning. However, science is directed by experiences, beliefs and societal and individual needs and curiosities. The better assertion to make is that lay people do not reason rationally and technically, but opportunistically, using the curiosity and skepticism of their scientific mind to make sense of their world.

Viewing the scientific mind as merely technical limits its productivity, whereas viewing the scientific mind as a dynamic, driving force characterizes the sense of urgency and curiosity inherent in the pursuit of knowledge. Our research endorses the dynamic view of the scientific mind, where cognition is integral to the functioning of an individual in communication, problem solving, and decision making. We also recognize the unique view of each individual, colored by prior knowledge and beliefs. Ultimately, observed behavior is a reflection and product of these internal processes. Cognition is an important aspect to consider within this framework. Our understanding of the generic and universal nature of cognitive processes allows us to construct generalizable models of human behavior, which can further be differentiated according to cultural and individual differences. This is how we can grow the “scientific mind” and apply our knowledge to current problems and challenges that we face today, specifically in the area of public health.

The HIV/AIDS epidemic is one such worldwide, public health problem that is a priority for resolution and amelioration. Risky behaviors, such as unprotected sexual intercourse or intravenous drug use, are prevalent methods of transmission of the HIV virus (Centers for Disease Control and Prevention [CDC], 2004). Prevention programs, such as educational campaigns, aim to decrease risky behavior (e.g., use condoms during sexual intercourse) in the lay public. However, current efforts are not sufficiently producing changes in risky behavior. For example, young adults engage in HIV risk behavior despite awareness that infection is preventable. Construction and comparison of laypersons’ cognitive models of comprehension, decision-making, and causal reasoning reveal why previous interventions aimed at increasing knowledge have been relatively ineffective in producing behavioral change. More importantly, it helps us identify factors and methods that may be critical to include in future interventions.

A difference exists between how we study people and how the lay public behaves. Health behavior of the lay public is opportunistic, whereas our methods, as researchers, in exploring the behavior of the lay public are (hopefully) scientific. This distinction carries weight in conceptualizing and developing interventions and policy dealing with the lay public. The reasoning and behavior of the lay public is also evidence-based, but the nature of the evidence that is used by the layperson is significantly different (with loosely associated relations) from that of say, an expert or a specialist.

Our research employs theories and methods from cognitive science in order to characterize and understand the thought processes involved in health-related reasoning, with the goal of recommending behavioral practices that may be more effective in achieving better health care. We borrow our examples from studies from the areas of a) adult understanding of child malnutrition and pharmaceutical instructions, b) youths’ understanding of health and HIV/AIDS, and finally, c) young adults’ safe sex practices to

develop a model of how people in different cultures think and reason about health issues. We hope that these studies will shed light on the general nature of human behavior, as well as the specificity imposed on this behavior by various social, cultural and environmental variables. Furthermore, our understanding of human thought processes can also guide our recommendations for intervention strategies, with the aim of developing a dynamic “scientific mind” within the community.

The Role of Culture and Cognition

There are two assumptions we make as researchers: 1) there is something generic about human behavior that can be mapped from population to population, and 2) the cultural context influences and shapes these basic behavioral tendencies, showing the specific nature of behavior. In a study of mothers’ errors in cognitive processes during comprehension of pharmaceutical labels (Kintsch et al., 1993; Patel, Branch, & Arocha, 2002), we discovered a generic nature of certain behavior that was common across different cultural groups. Participants in this study were from varying cultural backgrounds. Findings of this study indicated that all of the mothers had many problems in the interpretation of the labels, which was independent of culture or education level; they all had difficulty calculating the dosage level from numerical information and thus, they used a common decision-making strategy for calculating over the counter medications for their children. Furthermore, the results of this study indicate that individual biases, prior knowledge and intuition were cultural-specific, and they played a strong role in interpreting instructions for medication. This example of the interpretation of pharmaceutical labels suggests a need for customizing health information for the intended audience in order to overcome errors in interpretation.

Lay Publics’ Health-Related Reasoning

In lay publics’ reasoning, knowledge is an integral component. Traditional or indigenous knowledge in a culture is organized in such a way that new knowledge can only be integrated if it is closely related to it. When two disparate types of knowledge are integrated in an attempt to understand instructions to function in daily life, people fall back on what they know best. This means that knowledge structures used in the reasoning process will be based on well grounded knowledge and practice- namely, indigenous knowledge. In our early research in rural and urban Kenya and Ethiopia, Patel and colleagues (Eisemon & Patel, 1989; Patel, Eisemon, & Arocha, 1990) studied mothers’ interpretation of instructions for the use of oral rehydration therapy solutions (ORT), used to stop the dehydration that occurs as a consequence of diarrheal disease. The results showed that, when interpreting instructions, both rural and urban mothers ignored the text information and used their intuitions or their lay knowledge to interpret instructions. When the schooled mothers used school knowledge about health and disease, there was little coherence, and health concepts were weakly related to each other. In contrast, their use of traditional knowledge to understand instructions resulted in a coherent and detailed explanation (Patel, Eisemon & Arocha, 1988; Eisemon, Patel & Ole Sena, 1987). This suggests that the possession of two possibly incongruent belief systems (e.g. traditional [older] and biomedical [newer] models of disease) were interfering with the construction of an integrated explanation and understanding of the disease. The unschooled mothers did not have this interference because they only had traditional knowledge, which was

well-grounded in the culture and in their daily practice and was well understood in this context. The lack of integration of school knowledge with traditional knowledge could be one of the reasons why the introduction of modern health technology has not been very successful in promoting change in health practices (Eisemon & Patel, 1990).

One study of decision making by the lay public, conducted in rural India, showed how the understanding of pediatric illnesses influenced mothers' choice of treatment for their children (Sivaramakrishnan and Patel, 1993). They found that prior well-grounded and traditional knowledge and beliefs played an important role in interpretation and reasoning, which led to decisions that were influenced by non-scientific traditional ideas. Instead of rejecting traditional explanations, the mothers developed different conceptual structures, which they used in an opportunistic manner (i.e., based on either modern medicine or traditional medicine as they saw fit) (Eisemon et al., 1987; Rogoff & Lave, 1984). There is not a strong link between theory and evidence in use of this opportunistic strategy by lay people as it is by scientists (Kuhn, 1989; 1995; Chinn & Brewer, 2001).

In summary, investigations of lay publics' health-related reasoning came to similar conclusions; their use of opportunistic strategies consists of a reliance on prior knowledge and beliefs, which is largely reflective of the cultural context. These studies reinforce the importance of knowledge organization and integration in lay public's health-related reasoning. Our understanding of the universality of how humans behave and the cognitive processes that support such behavior make its application to different populations around the world valid and advantageous.

Youths' Understanding of Health and HIV/AIDS The use of opportunistic strategies is even more prominent in children and adolescents' reasoning, as they have less prior set knowledge and construct their reality almost solely based on recent experiences within the cultural context (Brown, Collins, & Duguid, 1989). In addition, it is difficult for youth to understand the relationship between hypothesis and evidence when reasoning (Ruffman, Perner, Olson, & Doherty, 1993). In research conducted in India and Colombia, children, aged between two to fourteen, were assessed for higher-level cognitive performance in comprehension and problem solving with four health-related cognitive tasks (Sivaramakrishnan, Arocha, & Patel, 1998). The study was conducted in two different cultures in order to evaluate the role of culture in their performance. The other related factor that was assessed was nutritional and parasitic status of the children. In the sample from Madurai, India, the healthy children performed better than the children who were sick or malnourished, suggesting a positive association between nutritional status and cognitive performance. The children approached the cognitive tasks with a host of prior experiences, and cultural practices, which determined what they did while performing the task.

In subsequent research, Keselman, Kaufman, and Patel (2004) investigated the relationship between adolescents' conceptual understanding of the biological basis of HIV and critical reasoning. Middle and high school students were interviewed about their understanding of HIV and were subsequently asked to evaluate scenarios that contained myths about HIV. Students' understanding was categorized into three models: *naive*, *intermediate*, and *advanced*. The models were based on students' understanding of the concept of HIV, mechanism of infection, and disease progression. The results indicated that students with different models of HIV knowledge reasoned in qualitatively different

ways about the myths. A significant relationship was found between students' understanding of HIV biology and the level of biological reasoning that they employed in discussing the scenarios.

In other HIV research, Patel et al. (in press) examined the relationships among knowledge, decision-making strategies, and risk assessment about HIV by first-year college students in the context of peer focus groups, where discussions centered around real life HIV scenarios. Through qualitative analysis, it was found that students negotiated their perspectives through justification, elaboration, and concrete prior experiences. A cycle of conflict, followed by negotiation, worked to shape the youths' understanding of HIV-related concepts. For example, upon introduction of the topic of risk perception, there was agreement, but further discussion revealed disagreements on the issue. These disagreements were resolved through elaboration and relation of personal experiences. This study suggests the importance of prior beliefs and experiences in the understanding of these concepts, and that active discussion among peers can broaden and deepen this understanding. This study provides evidence of the lack of scientific methods employed in youths' understanding and reasoning, but also provides us with a "scientific" method of data collection (i.e., semi-structured interviews) to gather information from young adults about potentially sensitive areas in their lives. These findings suggest that peer focus groups could be used as a means for increasing understanding and shaping the behavior of young adults in dealing with topics such as HIV/STD prevention, that are sensitive to the knowledge and values shared by youths.

Young Adults' Safe Sex Practices

Our most recent work is in the construction of cognitive models of decision making in relation to young adults' safe sex practices, specifically their patterns of condom use. This study, conducted in New York City, focuses on the precise conditions under which such health-related decisions are made and how these risky decisions are linked to the reasoning processes of young urban heterosexual adults. We collected qualitative and quantitative data from two weeks of daily diaries, chronicling the young adults' sexual encounters, and an in-depth semi-structured interview that elaborated on sexual encounters recorded in the diaries, past and current relationships and sexual experiences, values, and social influences.

We found that participants' decision processes were constrained by cognitive (memory, knowledge, inferences, strategies), socio-cultural (group norms), and situational (environmental) factors. Through our detailed analysis, we identified four patterns of condom use, taking into account changes in behavior over time (Patel, Gutnik, Yoskowitz, O'Sullivan, & Kaufman, 2005). The patterns were 1) consistent condom use, 2) inconsistent condom use, 3) shifting from consistent to inconsistent condom use (due to changes in trust and perceptions of commitment of relationship), and 4) shifting from inconsistent to consistent condom use (due to a significant negative experience, such as pregnancy, abortion, or infection with STD). These patterns of behavior were influenced by perceptions of the young adults' relationships and partners' commitment, as well as situational factors (i.e., condom availability), and emotions (e.g., fear, love).

Participants' decisions regarding condom use reflected their beliefs and perceptions and in turn shaped their beliefs and perceptions (Yoskowitz, Gutnik, O'Sullivan, Kaufman, & Patel, 2005). For example, individuals expressed trust in their partners and consequently did not use condoms. The non-use of condoms in turn led to

greater perceptions of intimacy and an increase in trust, which served to sustain the behavior, becoming a natural validity for their behavior. We found that the young women used feelings to justify why they consider their partner as safe, and the young men used appearance and other sensory impressions in order to justify whether their partners might be promiscuous and, therefore, “carry something.”

We found that participants consistently rated their sexual encounters (recorded in daily diaries) as low risk and highly safe (O’Sullivan, Udell, & Patel, 2005). Most of these encounters consisted of unprotected sexual intercourse. However, this reality was not taken into account when making decisions about condom use. They relied heavily on perceptions of monogamy, partner’s commitment, and trust in the relationship. The young adults in our study were more sensitive to categorical changes (from low to high or high to low) in benefits and risks of (non-) condom use, than actual changes in the exact numerical probability of these benefits and risks. Even if they based their decisions on a number, their estimations of the number were usually inaccurate. Therefore, these young adults were not acting as “good scientists” when making their decisions about sexual behavior.

In summary, young adults are frequently making decisions that lead to risky sexual behavior. Our research has explored the cognitive factors that have influenced these decisions. More specifically, certain patterns of condom use behavior are associated with the use of different reasoning strategies. This suggests that targeting young adults’ cognitions and reasoning strategies may facilitate behavior change.

These studies have implications for developing predictive models based on qualitative data, which characterize the conditions that are likely to result in the desired or undesired behavior. Because these models are descriptive, we will be able to 1) pinpoint the errors in the reasoning process, 2) understand the nature of evidence used by the lay public in making decisions, and 3) build the general and specific nature of interventions. Interventions need to be general in that there is a component that is common to most populations and specific in that we can tailor and customize the intervention for use with different populations from different cultures. This strategy will allow us to influence behavior change through cognitions, without changing the cultural context.

Conclusions

There is something generic about human behavior, upon which culture and social norms exert their influences. It is our responsibility, as scientists, to characterize these general laws of behavior and study them under “real world” conditions, which are constrained by social, cultural and environmental aspects of the situation. Our findings can be used as the foundation for interventions that can be applied generally to health-related behavior, while also being tailored for use in different cultures. By promoting the “scientific mind,” we are attempting to extract cohesive and generic mechanisms of human behavior as well as identifying those constraints that influence and shape human behavior.

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