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# Social and cultural influences on causal models of illness

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## Abstract

Causal models of illness vary extensively across socio-cultural groups. The current paper describes two studies that were designed to explore the role of universal domain-specific causal knowledge in causal models of illness. The first study compares illness causal models in three American groups: registered nurses, energy healers, and college undergraduates. The second study examines illness causal models in a group of Maya in Guatemala. In all groups illness models are composed of systematic combinations of domain-specific causes. It is argued that analysis of causal models in terms of domain-specific causal types reveals similarities in illness models that would be obscured by comparison of specific, detailed causes. The analysis of illness models as patterns of domain-specific causes suggests that American energy healers have models of illness that are more similar to those of the Maya than to illness models of American undergraduates and RNs.

## Introduction

An issue of interest to both anthropologists and psychologists is the extent to which conceptual representations are affected by socio-cultural factors and the mechanisms by which this influence occurs. The extent to which thinking varies across cultures depends in large part on the content of the domain. For example, the domain of folkbiology is characterized by striking similarities across cultures, while less consistency has been observed in social attribution (Choi, Nisbett & Norenzayan, 1999) moral reasoning (Miller, Bersoff, & Harwood, 1990, Haidt, Koller, & Dias, 1993), and reasoning about illness (Murdock, 1980; Kleinman, 1978). In general, theories of cultural knowledge transmission that explain diversity of knowledge are distinct from ones that explain uniformity.

Explanations for cultural diversity often assume that the mind is a “blank slate,” open to any form of knowledge (Atran, 2001; Pinker, 2000; Sperber & Hirschfeld, 2004). In contrast, explanations of uniformity in knowledge across cultures appeal to a view of the mind as a highly structured, modular information-processing device. As Pinker (2000), Atran (2001), and Sperber & Hirschfeld (2004) argue, the view of the mind as a blank slate is almost certainly wrong. There is plenty of evidence that the mind is not a blank slate, but is structured in a modular way such that qualitatively distinct reasoning processes are utilized for different kinds of phenomena (Carey & Gelman, 1991; Hirschfeld & Gelman, 1994, Pinker, 2004).

The mind, like other parts of the natural world, evolved in an environment with a particular structure. The modular nature of the mind is the result of evolutionary adaptations to the objective structure of the world. The mind evolved

different cognitive processes in order to effectively predict the behavior of ontologically distinct objects. This view predicts and explains cross-cultural universals in human thinking. Sperber and Hirschfeld (2004) argue that stability of cultural knowledge results from the universal structure of the human mind, in particular the fact that all minds process information in similar, highly constrained ways. For example, there is striking cross-cultural uniformity in folkbiological knowledge. Medin and Atran (in press) argue that cross-cultural uniformity in thinking and behavior with regard to plants and animals is due to the existence of a universal cognitive module, the folkbiology module, that evolved specifically to process information about plants and animals. Despite differences in experience or environmental input, minds are universally constrained to construct a particular kind of representation of plants and animals – hence, cultural uniformity and stability.

The current paper presents two descriptive studies that demonstrate how universal domain-specific knowledge is expressed in causal models of illness, which are characterized by cross-cultural diversity rather than uniformity. Domain-specificity theory implies that, just as there are different ontological kinds of objects in the world (e.g. mental and physical objects), there are also different kinds of causal mechanisms. For example, there are psychological causal mechanisms, like intentionality, which explain behavior of animate objects, and there are physical causal mechanisms which explain the behavior of inanimate objects. One role of cognitive modules is to constrain the search for causal explanations by delimiting the range of possible causes for a particular phenomenon. Thus, causes can be divided into types based on the module with which they are associated. For example, *blocked arteries* and *chemical imbalance* are physical causes of illness. *Low self-esteem* and *problems in love relationships* are psychological causes. These causes differ in specific detail but are of the same type. Causal models of illness can be analyzed in terms of the kinds of causes of which they are composed.

One important dimension of variation among cultural belief systems about illness is whether illness is attributed to psychological causes – human or spiritual agents – or to natural causes (Murdock, 1980, Foster, 1976). In a world survey of illness theories, Murdock (1980) found that every cultural group in his sample (which did not include industrialized societies) explained (at least some) illness in terms of spirit aggression. Spirit aggression is a psychological cause. In contrast, biomedical theories of illness (used by medical doctors) explain illness using physical causes. One explanation for this difference is that

different cultural groups use different cognitive modules to process information about illness. That is, some cultural groups think about illness as a psychological phenomenon, and generate psycho-social attributions, while others construe illness as a physical phenomenon, and generate physical explanations. On this account, cultural environment influences the domain in which individuals search for causes of illness. Perhaps, some cultural groups use the domain of folk psychology to explain illness where other groups use the domain of folk physics (or folk biology). An alternative possibility is that multiple domains are used to process information about illness. Sperber & Hirschfeld (2004) suggest that some belief systems, like religion, maintain stability by being “anchored” in several cognitive domains at once. Thus, different cultural groups may combine different kinds of causes in different ways in their causal models of illness (Ahn, 1998).

The current paper will look at use of psycho-social causes and physical causes in the causal models of illness of three groups of participants. The groups were chosen precisely because they have different beliefs systems of illness. The first group consisted of registered nurses (RNs) who work as medical practitioners in professional medical settings and practice standard scientific biomedicine. The second group of participants consisted of energy healers. These individuals believe that illness is caused by a disruption or imbalance of “energy” in the body and that illness can be treated by balancing that energy. Energy healers often explain illness as the result of psychological problems (Eden, 1999). RNs and energy healers were chosen because they practice healing within belief systems that vary in the kinds of causes to which illness is attributed. Variation along the dimension of psychological versus physical attribution is cross-culturally salient, as mentioned above. While findings from these groups cannot be automatically generalized to other cultural groups, current findings can generate hypotheses about the causal models of other cultural groups which can then be tested. Study Two in the current paper demonstrates that this framework can be usefully extended to very different cultural settings.

### Experiment One

The question of interest is how domain-specific causes are invoked in illness causal models of different groups. To measure causal models, causal chains leading to depression and heart attack were elicited from each participant in an open-ended format. The key feature of this study is the elicitation of causal chains rather than lists of causes. Elicitation of causal chains will provide evidence for distinguishing between three possible patterns of use of domain-specific causal information. The three possible patterns are:

1. Different groups use different domains of knowledge to construct causal models of illness. This hypothesis predicts that the causal chains of energy healers will

consist of psychological causes while the causal chains of RNs will consist of physical causes.

2. Illness models are anchored in several domains. Causal models of illness are composed of both psychological and physical causes which are patterned systematically within groups.

3. A third possibility is that there is no systematicity in use of domain knowledge in illness models. That is, mental and physical causes may be distributed in different ways across different individuals and/or across different illnesses.

It is expected that energy healers will cite psycho-social causes of both illnesses more often than RNs. The question that will distinguish between the first and second alternatives above is whether illness models consist of a single kind of cause or multiple kinds of cause. The question that will distinguish between the second and third alternatives is whether different kinds of causes pattern systematically within groups.

In addition to the two practitioner groups, a group of undergraduates was also interviewed. Because the nurses may have had more experience with illness than the energy healers, undergraduates were included as an independent measure of the effect of experience on concepts of illness.

### Method

**Participants** This study included three groups of participants. The first group consisted of 13 registered nurses (RNs) with an average age of 41 and an average of 13 years of nursing experience. The second group consisted of 14 energy healers with an average age of 48 and an average of 8 years of energy healing experience. Practitioners had an average of four years of college education and there was no difference in level of education across groups. The final group consisted of 23 undergraduates (UGs) with an average age of 18 and no energy or medical experience. Some undergraduates did only a single illness and others did both (5 did both illnesses, 10 only heart attack, 8 only depression). No differences were observed among those who did one versus both illnesses.

**Procedure** All participants were asked about heart attack, a physiological illness, and clinical depression, a psychological illness. The order of the illnesses was counterbalanced across participants. For each illness, participants were first asked to list all the causes of the illness and then, for each cause, were asked for causal chains linking each elicited cause to the target illness. To elicit the causal chain linking cause X to the illness, the experimenter asked, for example, “How does X cause illness A” (e.g. How does high blood pressure cause a heart attack?). The participant responded with an intermediary cause, Y. The experimenter then repeated the probe with

cause Y: “How does Y cause a heart attack?” This process was continued until the participant said the causal chain was complete. All interviews were recorded and transcribed.

## Results

Across illnesses causes were collapsed into four types: physiological, psycho-social (henceforth called mental), behavioral, and energy. Depression models included an additional cause type, external environmental.

**Depression** Table 1 lists the average proportion of each type of cause in the models of participants from each group. Anovas were used to compare the proportion of each type of cause across groups. Because these measures are not independent a Bonferroni adjustment set the p-value for significance to 0.01. With this adjustment, only the difference in proportion of energy causes was reliably different across groups [F(2,40)=17.77, p<.001]. Proportion of physical causes [F(2,40)=.925, p=.41], mental causes [[F(2,40)=4.12, p=.024], and environmental causes [F(2,40)=2.15, p<.13] did not differ across groups. Proportion of behavioral causes [F(2,40)=5.24, p=.01] was marginally different across groups. Tukey post hoc tests showed that the Energy group cited slightly more behavioral causes than the UG group.

Table 1. Proportion of depression cause types by group.

CAUSE	UG	RN	EN
Physical	0.33	0.43	0.32
Mental	0.66	0.53	0.43
Behavioral	0.00	0.02	0.11
Environmental	0.01	0.02	0.10
Energy	0.00	0.00	0.19

The next set of analyses measured the types of causal relations in the conceptual models of each group. Systematic differences in the types of causal relations across groups indicates the extent to which groups represent different patterns of causal types within their models of illness. The majority of causal relations within the depression models of all groups consist of physical and mental factors (UG=99%, RN=96%, EN=75%) so analysis of causal relations focused on physical and mental causes only. Table 2 shows the proportion of each type of causal interaction among physical and mental causes across groups.

Table 2. Proportion of relations in depression models.

Causal Relation	UG	RN	EN
Physical-Physical	0.10	0.28	0.16
Mental-Mental	0.80	0.47	0.43
Physical-Mental	0.03	0.12	0.02
Mental-Physical	0.07	0.14	0.40

These measures are not independent so with a Bonferroni adjustment the p-value for significance was adjusted to 0.013. There were no differences between groups in the proportion of causal interactions among physical causes [F(2,40)=1.4, p=.257], nor in the proportion of physical-mental causal interactions [F(2,40)=2.1, p=.13], which were quite low across groups. The key difference between groups was that energy participants were more likely than other groups to cite mental-physical interactions [F(2,40)=5.26, p=.01]. Tukey post hoc tests showed that Energy healers cited more mental-physical interactions than RNs and UGs, who did not differ from one another. Undergraduates were more likely than RNs and Energy healers to cite interactions among mental causes [F(2,40)=5.28, p=.01]. Interactions among mental causes made up the bulk of undergraduate depression concepts.

The most important finding in depression models is that all groups included equal proportions of mental and physical causes in their conceptual models of depression but showed systematic differences in the patterns of causal interaction among them. Specifically, the RNs and UGs placed mental and physical causes on separate causal chains but Energy healers included both types of causes on a single causal chain.

**Heart attack** Table 3 shows proportions of causes in heart attack models across groups. Energy participants cited proportionately fewer physical causes of heart attack than RNs or Undergraduates [F(2, 42 = 14.9, p<.0001]. Post hoc tests indicated that the RNs and UGs cited equal proportions of physiological causes and EN participants cited fewer than both groups. Energy participants cited a greater number of psychological causes of heart attack than did either of the other groups, who were equivalent [F(2, 42 = 34.9, p<.0001]. These differences were reliable with a Bonferroni adjustment. Not surprisingly Energy participants cited a greater proportion of energy causes.

Table 3. Proportion of causes in heart attack models.

Relation	UG	RN	EN
PHYSICAL	0.70	0.77	0.45
PSYCHOLOGICAL	0.08	0.08	0.27
BEHAVIORAL	0.16	0.15	0.17
ENERGY	0.00	0.00	0.10

The next set of analyses explores patterns of causal relations in models of each group. A majority of the causes in heart attack models of all groups were ones with physical effects (RN=0.98, UG=0.99, DUAL=0.88, ENERGY=0.77), so the following set of analyses compares the proportion of physical effects that have either physical, mental, behavioral, or energy causes. Table 4 shows the distribution of these types of relations in individual models of participants in each group.

Table 4. Proportion of causal relations across groups.

Causal Interaction	UG	RN	EN
Physical-Physical	0.54	0.61	0.21
Physical-Mental	0.11	0.11	0.42
Behavioral-Physical	0.35	0.27	0.27
Energy-Physical	0.00	0.00	0.09

These measures are not independent but all effects are reliable with a Bonferroni adjustment. An ANOVA showed that Energy participants cited proportionately fewer physical – physical causal interactions (PP relations) than RNs and UGs [F(2,42)=20.31, p<.0001]. ENERGY participants mentioned the greatest number of mental-physical causal interactions in their heart attack models [F(2,42)=23.73, p<.0001]. There were no differences across groups in the frequency of behavioral-physical relations [F(2,42)=.68, p=.51]. Finally, Energy participants mentioned a greater number of energy-physical relations [F(2,42)=9.79, p<.0001]. In all causal relation analyses, Tukey post hoc tests showed that RNs and UGs were equivalent and both were different from Energy participants.

As in models of depression, energy healers and RNs and UGs showed different patterns of causal relations among the causes in their conceptual models of heart attack. Like in depression models, Energy healers cite causal interactions among mental and physical causes whereas RNs and UGs do not.

**Summary** Experiment 1 provides compelling evidence for Alternative two cited above – that illness models are anchored in several domains. Alternative One predicted that illness models would consist of a single kind of cause. This was not supported by current findings. All groups used both psycho-social and physical causes in illness models. Alternative Three was also ruled out, because mental and physical causes patterned systematically, rather than randomly, across participants within a group. Causes also patterned similarly across illnesses for each group. Across both illnesses energy healers frequently cited causal relations in which mental (psycho-social) causes led to physical effects. RNs and UGs rarely mentioned causal interactions between mental and physical features. For depression, mental and physical causes were conceived as distinct causal chains. For heart attack, these participants rarely mentioned mental causes at all. While energy healers combined mental and physical causes within a single causal chain, RNs and UGs kept mental and physical causes on separate causal chains. Further, they did not conceive of heart attack as psychologically caused.

## Experiment Two

Whereas Experiment One included groups from a single cultural environment, the current experiment uses the same method to measure concepts of illness in individuals from a very different cultural environment, Peten, Guatemala. The question of interest is whether Maya have systematic

patterns in their conceptual models of illness, and if so, whether their concepts correspond to either of the American groups.

## Method

**Participants** Participants were 13 illiterate Itza' Maya adults living in Peten, Guatemala. All participants spoke Spanish as their primary language. Peten is a very different cultural environment from Chicago, IL where participants from Experiment 1 reside. None of the Itza' participants was trained in medicine.

**Procedure** Causal models were elicited in Spanish for the Itza' illnesses which most closely resemble depression and heart attack. The illnesses were *tukul* (meaning “thought” and glossed “pensiveness” in Itza', a wasting illness) and *derrame* (glossed as the verb “to spill” in Spanish; derrame cerebral is the Spanish gloss for “stroke”).

## Results

Itza' explain *tukul* as the result of separation from a family member which leads to dilution of the blood and rashes on the skin. 100% of Itza' participants attributed *tukul* to social causes (85% to separation from a family member), and 77% stated that social causes led to a change in the state of the blood (62% said the blood thinned, or was diluted, by too much thinking). 85% specified physical effects that result from the thinning of the blood, usually skin rashes (69%). Every Itza' participant explained *tukul* as the result of psycho-social factors leading to physical changes in the body.

*Derrame* is also seen as the result of an interaction of mental and physical causes. Itza' explain *derrame* as resulting from anger, which slows the blood, causing it to “spill” into the brain or nerves. 100% of Itza' participants attributed *derrame* to strong emotions (85% to anger), and 70% claimed that strong emotions cause the blood to change state in some way (e.g. blood stops circulating or gets cold), which causes it to mix inappropriately with some other substance of the body (85%), usually the brain or nerves (70%). Every Itza' participant explained *derrame* as the result of the deleterious effect of strong emotions on the state of the blood in the body.

**Summary** Itza' concepts of *tukul* and *derrame* were structurally similar to energy healer concepts of depression and heart attack. Specifically, their conceptual representations of both illnesses included causal interactions in which psycho-social factors led to physical ones.

## General Discussion

The current experiments show that, rather than being processed from within a single domain, illness knowledge is anchored in multiple domains. Illness models can be explained as specific combinations of domain knowledge. In Experiment 1 illness concepts of energy healers, RNs and Undergraduates showed systematically different causal patterns among mental and physical features. Specifically,

RNs and undergraduates rarely mentioned causal interaction between mental and physical causes. Energy healers, on the other hand, saw both illnesses as resulting from psycho-social causes which result in physical changes. Experiment 2 showed that the Itza' also view these illnesses as resulting from the physical effects of psycho-social factors.

Results from both studies clearly distinguish between the three alternatives presented above. Alternative Three, which was that mental and physical causes would be distributed in unsystematic ways in illness models, was ruled out. Evidence from RNs and undergraduates was also inconsistent with the first alternative, which proposed that illness models would be composed of causes from a single domain. RNs and undergraduates used psycho-social causes in explanations of depression, and physical causes in explanations of heart attack and depression. Thus, these participants utilized causes from distinct domains. However, for these participants a single causal chain consisted of only one type of cause. Data suggest that depression is construed both psychologically and physically for RNs and undergraduates, and heart attack is construed physically. Stress was the only psychological cause utilized in heart attack models of RNs and undergraduates. Stress may be a cause that is flexible, and can function as either psychological or physical. When RNs and undergraduates mentioned stress in the context of heart attack, they usually discussed physiological aspects of stress, such as increased adrenalin. However, because the nature of stress was ambiguous in the current study, it was coded as a psychological cause. For RNs and undergraduates, some illness models are constructed from within the cognitive domain of folk psychology, and others are constructed from within the domain of folk physics. For these participants, cultural factors influence whether an illness should be construed in psychological or physical terms. In this sense, Alternative Two is correct. Knowledge about illness is anchored in both domains.

Energy healer models are also consistent with Alternative Two. But in the case of energy healer models, single causal chains were composed of knowledge from different domains. For these participants causal chains are composed of psycho-social and physical causes. Further, when causal chains contain both kinds of causes, psycho-social causes are the distal causes and physical causes are proximate. The fact that domain boundaries are not preserved in causal chains of energy healers might be taken to suggest that domain knowledge does not constrain models of illness for energy healers. However, the systematicity in the models of energy healers is reflected in the uniformity with which individual participants combined psycho-social and physical causes. That is, the coherence of illness models across participants and across illnesses is precisely in their systematic use of causes from different domains. Participants cited different specific causal factors for heart attack and depression, but all participants were committed to the belief that some kind of psycho-social factor was the initial, distal cause of both illnesses and that physical,

mechanical factors were the proximate cause. Analysis at the level of causal types reveals more agreement across individuals and illnesses than analysis at the level of specific, detailed causes.

Similarity in the causal models of energy healers and Maya is also revealed by analysis of patterns of causal types rather than analysis of overlap in specific causes. There was virtually no overlap in the specific causes cited by energy healers and Maya. In fact, it is not even clear that the illnesses being explained were conceptualized as precisely the same (biomedically defined) conditions across groups. But when analyzed as patterns of domain-specific causal types, it is clear that Maya and energy healers have similar causal models of illness. For both groups illnesses are caused by psycho-social factors which lead to proximate causes which are physical in nature. It would be unreasonable to expect that Maya, who have little or no formal education, would independently derive the same specific causes of illness as energy healers or undergraduates who live in a completely different cultural context. Analysis of illness models as patterns of domain-specific causal types reveals uniformities in thinking across cultures that are obscured by exclusive focus on specific, detailed causes.

In sum, cultural knowledge about illness may take the form of learning the culturally appropriate heuristics for combining domain specific knowledge to construct causal models of illness. Diversity among illness models reflects differences in the ways that different cultural groups combine information from different domains. For RNs and undergraduates, illness explanations are constructed from single causal types and culture specifies which type of cause is relevant to which illness. For energy healers and Maya, all illnesses are presumed to be caused by psycho-social factors which lead to physical changes. Thus, diversity in models of illness across cultures may be analogous to diversity in language across cultures where an overlapping set of categories, for example nouns and verbs, are combined in different ways.

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