



## Interdisciplinary and Cross-Cultural Perspectives on Explanatory Coexistence

Rachel E. Watson-Jones, Justin T. A. Busch, Cristine H. Legare

*Department of Psychology, The University of Texas at Austin*

Received 27 August 2013; received in revised form 26 August 2014; accepted 26 September 2014

---

### Abstract

Natural and supernatural explanations are used to interpret the same events in a number of predictable and universal ways. Yet little is known about how variation in diverse cultural ecologies influences how people integrate natural and supernatural explanations. Here, we examine explanatory coexistence in three existentially arousing domains of human thought: illness, death, and human origins using qualitative data from interviews conducted in Tanna, Vanuatu. Vanuatu, a Melanesian archipelago, provides a cultural context ideal for examining variation in explanatory coexistence due to the lack of industrialization and the relatively recent introduction of Christianity and Western education. We argue for the integration of interdisciplinary methodologies from cognitive science and anthropology to inform research on explanatory coexistence.

*Keywords:* Causal explanation; Causal reasoning; Explanatory coexistence; Vanuatu; Supernatural cognition; Cognitive science; Cognitive anthropology; Cross-cultural studies

---

### 1. Introduction

Classic research in developmental psychology proposed that young children gradually abandon a belief in supernatural causation and instead acquire a more objective, rational, and scientific appreciation of cause and effect (Piaget, 1928). Relatedly, the assumption that education and modernization accelerate various aspects of cognitive development, such as critical thinking, is a core premise of classic work in cultural psychology (Luria, 1976; Vygotsky, 1978). If accurate, these lines of research suggest that over the course of history, with more widespread access to formal education and technology a focus on natural explanations will increasingly compete with and displace supernatural explanations, a view consistent with the Secularization Hypothesis (Norris & Inglehart, 2004).

---

Correspondence should be sent to Rachel E. Watson-Jones, The University of Texas at Austin, Department of Psychology, 1 University Station #A8000, Austin, TX 78712. E-mail: watsonjones@austin.utexas.edu

Relatively few adults, however, across a wide range of cultural backgrounds, endorse an exclusively natural or rationalist worldview (Campbell, 1972; Evans, Legare, & Rosengren, 2010; Legare & Gelman, 2008; Miszta & Shupe, 1992; Raman & Winer, 2004). Whereas a distinction between natural and supernatural epistemologies may seem arbitrary in some cultural contexts (as Arthur C. Clarke's [1962] third law reminds us, "any sufficiently advanced technology is indistinguishable from magic"), we argue that an important epistemological distinction can be made between natural and supernatural explanations. From a naturalistic perspective a physical-causal explanation for a phenomenon is knowable to someone (even if it is not immediately knowable to the individual), whereas from a supernatural perspective a physical causal explanation is in principle, unknowable (Gelman & Legare, 2011; Legare & Visala, 2011). Thus, following Legare, Evans, Rosengren, and Harris (2012), we define natural explanations as those that appeal to "observable and empirically verifiable phenomena of the physical or material world" (p. 4), and supernatural explanations as those that appeal to phenomena that "violate, operate outside of, or are distinct from" the natural world (p. 5). These definitions delineate supernatural and natural explanations and do not speak to their empirical and objective accuracy. How can the traditional view of supernatural beliefs, as placeholder material in the pool of possible explanations, only to be supplanted by naturalistic explanations through education and technological advancements, be reconciled with the fact that supernatural explanations are present in many cultural contexts and are a pervasive feature of cognition for most adults?

Legare and colleagues recently reviewed the literature on domains of human experience in which both natural and supernatural explanations are frequently generated to interpret the same events (i.e., explanatory coexistence): human origins, death, and illness (Legare et al., 2012). These three domains share a number of unique properties that, in combination, make them amenable to explanatory accounts that incorporate both natural and supernatural reasoning: (a) each phenomenon can be attributed to hidden or unobservable causal agents, (b) each is associated with strong emotions, and (c) each is embedded in specific cultural scripts that predate, and continue to coexist alongside current scientific understanding (Evans et al., 2010). Illness, death, and human origins are likely not the only domains to motivate explanatory coexistence. Because previous research, however, has documented cross-cultural evidence of explanatory coexistence in the domains of illness and death (Astuti & Harris, 2008; Harris & Gimenez, 2005; Legare & Gelman, 2008; Nguyen & Rosengren, 2004; Raman & Gelman, 2004; Rosengren et al., 2014), and human origins in the United States (Evans, 2001, 2008), we chose to focus on these three domains for the current research. Based on evidence for explanatory coexistence across highly diverse cultural contexts, we predict that when individuals are confronted with scientific understandings of the world, they will integrate scientific explanations with pre-existing supernatural and other kinds of natural (e.g., folkbiological) explanations.

The domains that motivate explanatory coexistence may vary across diverse cultural contexts. For example, in the United States, the issue of human origins sparks many heated debates about human uniqueness, intelligent design, and our relationship to the

natural world. In other cultural contexts, however, this is not necessarily the case. Whereas origin stories are a common feature of narratives across cultures, there is no a priori reason to expect that supernatural elements of these narratives would conflict with natural elements. For example, the Menominee tribe of Wisconsin has an origin story based on the belief that humans descended from bears (Medin, Waxman, Woodring, & Washinawatok, 2010). In this case, there is no reason to expect that there would be any conflict between evolutionary accounts of human origins and religious accounts. Indeed, the conflict between supernatural accounts of human origins and natural accounts may, at this point, be unique to Western culture. This underscores the importance of cross-cultural research, which can shed light on the universality and cultural specificity of the domains that motivate individuals to attempt to integrate multiple explanations and avoid falling prey to the over application of theory and hypotheses developed within a “Western” scientific discipline to diverse cultures (Rothe, 2012).

If individuals are motivated to use both natural and supernatural explanations to explain human origins, death, and illness they might combine these explanatory frameworks in various ways. One way would be *synthetic thinking*, which refers to a loose integration of natural and supernatural frameworks without in-depth consideration of how they might interact (Legare et al., 2012; Vosniadou, Vamvakoussi, & Skopeliti, 2008). For example, the contraction of AIDS might be explained by both witchcraft and risky sexual practices (Legare & Gelman, 2008) without specifying how the two forms of explanation fit together. *Target-dependent thinking* refers to cases in which natural and supernatural explanations are used to account for distinct aspects of a given phenomenon and involves different kinds of causality. For example, in the case of death, a natural framework might be used to explain the cessation of bodily functions whereas a supernatural framework might be recruited to explain the continued functioning of the spirit or soul (Astuti & Harris, 2008; Evans et al., 2010). *Integrated thinking* occurs when explanations become well-coordinated and is often accomplished by using natural and supernatural explanations to interpret multiple levels of causality (i.e., proximate and ultimate causes). A common example is the concept of theistic evolution, in which Darwinian natural selection may be regarded as a proximate cause and a creator is regarded as an ultimate cause (Legare et al., 2012).

To date, there has been a dearth of systematic research examining cultural variation in the use of multiple kinds of explanations to account for events across domains of human experience. Particularly, the extent to which members of different cultural groups consistently use a specific type of explanatory coexistence (i.e., synthetic, target-dependent, and integrated) to explain events across multiple domains, or if certain domains lend themselves to a certain type of explanatory coexistence across cultures is not yet known.

How do individuals across diverse cultural backgrounds conceptualize and incorporate natural and supernatural explanations? This question can only be answered through a systematic fusion of cognitive science and ethnographic research. Cognitive science provides many of the methodological tools necessary to examine how humans accommodate both natural and supernatural accounts of the world (Astuti & Bloch, 2012; Rothe, 2012). Yet a shortcoming of much of the research in cognitive science is the overreliance on samples

drawn from industrialized, Western societies, the main source of data in psychological literature (Henrich, Heine, & Norenzayan, 2010).

We argue that understanding the coexistence of natural and supernatural explanations requires situating these explanations within specific cultural contexts (Gelman & Legare, 2011; Harris & Koenig, 2006; Heyman & Legare, 2013; Rosengren et al., 2014). This is particularly important when examining content that is deeply embedded in local beliefs. We will discuss what an anthropological perspective can provide in terms of framing directions for future research and methodology, and provide examples from recent fieldwork in Tanna, Vanuatu, a remote Melanesian archipelago with low levels of industrialization and Western education. The use of information from previous ethnographic accounts, coupled with our own qualitative data, provides a more nuanced picture of unique, culturally specific effects on explanatory coexistence. Gathering ethnographic data has also allowed us to develop culturally appropriate materials for use in experimental designs.

## 2. Field site

Vanuatu, a Melanesian island nation in the South Pacific, is one of the most remote, culturally and linguistically diverse, and understudied countries in the world (Norton, 1993). Vanuatu provides a unique opportunity to explore explanatory coexistence in both educational settings and home environments, ranging from villages that maintain traditional ways of life, to those accepting of Western cultural institutions and practices (Gregory & Gregory, 2002). Vanuatu consists of 65 different islands, each with villages that speak their own languages and maintain distinct cultural traditions.

Tanna is one of the larger islands located in the Tafea province of Vanuatu and was selected for our research for several reasons. First, Tanna has low levels of industrialization. We believe that this will be an important factor for the presence of explanatory coexistence as previous research has shown that the establishment of a nation state reduces material insecurity (Lanman, 2012), which might influence the extent to which supernatural explanations exist within populations. Second, it was only relatively recently that Christianity was introduced to Tanna. Much of the population was converted to Presbyterianism between 1910 and 1930. During World War II the John Frum Cargo Cult emerged. Part of the message of the John Frum cult was that people should leave the churches and return to their custom ways of life and in return, they would receive cargo (Gregory & Gregory, 2002). Thus, despite the influence of Presbyterianism on the island, many villages have maintained *kastom* (custom), or “ancestrally enjoined rules for life” (Keesing, 1982, p. 360).

Finally, formal education is an even more recent institution on the island. Whereas missionaries set up what they called schools in the early 1900s (Gregory & Gregory, 2002), there was no standard curriculum until the last three decades when British and French run schools began providing primary and secondary education (Peck & Gregory, 2005). Additionally, parents in Tanna often have to pay to send their children to school,

and children from kastom villages have only recently begun to attend. Thus, a Western scientific epistemology has only recently become accessible for use in explaining events. Examining explanatory coexistence in Tanna provides insight into the unique effects of the recent implementation of formal education, including teaching about germ theory and evolution. The recent rise in children attending school in Tanna will have important implications for how people incorporate folkbiological knowledge with knowledge gained through the scientific method.

The objective of the following sections is to demonstrate how qualitative data can inform new directions for research in explanatory coexistence. We will discuss evidence for different kinds of explanatory coexistence by examining data from semi-structured interviews on how participants explain human origins, death, and illness. We will conclude with directions for future research suggested by the data from our interviews in Vanuatu.

### 3. Examining different kinds of explanatory coexistence across domains in Tanna, Vanuatu

In this section, we describe how data we collected through semi-structured interviews informed our understanding of explanatory coexistence in Tanna. The interviews were conducted with a sample of seventeen Ni-Vanuatu adults (11 males, 6 females) from diverse backgrounds, and ranged in reported age from 20 to 64 years (5 out of the 17 respondents did not report their age). Specifically, we collected responses from ten Christian informants; the other seven informants did not explicitly identify as Christian. Two of the respondents reported participating in formal Western-style education as children while the remaining fifteen informants reported none. The interviews we conducted in Tanna were designed to examine coexistence thinking across three domains, human origins, death, and illness. We asked multiple questions about these topics (examples of the types of questions asked are presented in Table 1).

Most of the interviews were conducted in Bislama (the national language) with local translators. A small number of the interviews were conducted in English. The interviews were transcribed by research assistants and coded by research assistants and the first and second authors. To provide a preliminary indication of the nature of explanatory coexistence in Tanna, below we provide examples of responses across domains indicative of

Table 1  
Examples of questions from the semi-structured interviews conducted in Tanna, Vanuatu, by domain

| Human Origins   | Illness                                  | Death                              |
|---|--|------------------------------------|
| "Where did the very first person on Earth come from?" | "How can a person prevent getting sick?" | "What happens when a person dies?" |
| "How long have people been on Earth?"                 | "What causes a person to get sick?"      | "Why do people die?"               |

different types of thinking associated with explanatory coexistence (i.e. synthetic, target-dependent, and integrated). We also present potential hypotheses generated from the interviews. These interviews provided insight into how individuals in Tanna conceptualize the natural and supernatural and warrant future ethnographic and experimental research.

### 3.1. *Human origins*

In the domain of human origins, the cultural context in Tanna may not necessitate the synthesis of natural and supernatural explanations on this topic because the ideological rift between these two types of explanations may be less prevalent than in the United States. Two possibilities emerge: (a) If there is no perceived conflict, people may readily and easily integrate explanations or (b) the lack of conflict may make people in Tanna less motivated to engage in attempts at integrating explanations for human origins. In our interviews, we found evidence in support of the second possibility. For example, no respondents gave accounts of human origins that resembled theistic evolutionary accounts common in the United States. Our interviews in Tanna most frequently revealed Biblical creationist accounts for the origins of life, which were mostly void of reference to natural processes (10 respondents, 59%). For example, in response to where the first humans on Earth came from, one respondent told us: “Because of Adam and Eve. . . God created first day, second day, and then he created all animals.” Many respondents indicated that “God created everything.”

Whereas creationist accounts for the origin of life were by far the most common, one participant (6%) endorsed an exclusively naturalistic explanation of origins. This respondent stated that humans “came up from the mammal” and that “the first animal came from the sea. . . . That brings all the other animals on the land that generate. I mean descendants from all other animals.” This was not the only participant to recognize the possibility of an evolutionary account for the origin of life, but it was the only respondent to endorse such a perspective. Three additional respondents mentioned that evolutionary theory can account for the origin of life on Earth, but stated that they did not endorse such a view. One of these respondents explicitly stated, “As a Christian, I don’t believe human beings came from animal[s], but I’m sure that many people believe Darwin’s theory of evolution” and this sentiment was expressed by the other two participants who acknowledged an evolutionary account but prescribed to a Biblical account. Other respondents also indicated that people once believed that humans may have “come from stones” or “from the earth.” The formation of stones plays a central role in the traditional oral histories of the creation of Tanna (Bonnemaison, 1994). Thus, people were willing to point out explanations different from their own (i.e., humans evolved, humans came from rocks) and assert that others may believe those explanations.

Interestingly, of the remaining six respondents (35%) who did not provide a Biblical or evolutionary account, four (24%) only seemed to have theories concerning how humans first arrived on Tanna, not on Earth more generally. Two of these respondents indicated that the first human had come from another country at some point in the past; one believed that the first human had come from the ground, and one stated they did not

know where the first human had come from. No participants provided evidence of explanatory coexistence in regard to the domain of human origins (see Table 2 for percentages of each type of response by domain). With increasing exposure to evolutionary explanations through the introduction of Western formal schooling and especially continued exposure to Christian narratives, we hypothesize that explicit attempts to integrate evolutionary and creationist accounts will become more prevalent. Alternatively, the rift between science and religion may be specific to Western ideological debates, in which case individuals in Tanna may not be concerned with reconciling evolutionary and religious accounts of human origins and may engage in synthetic explanatory accounts. These possibilities should be examined through continued ethnographic research.

### 3.2. Death

In contrast with theories regarding human origins, the proximate causes of death are observable within a human lifespan. Furthermore, explanations for death can be obvious, much more obvious than evolution by natural selection, which has been shown to be highly counter-intuitive (Rosengren, Brem, Evans, & Sinatra, 2012). Disease and accidents are both proximate explanations of death. Knowing that an accident resulted in a person's death, however, does not provide an ultimate explanation for why such an accident should have befallen a specific individual at a specific time. We predicted that explanatory coexistence within the domain of death in Tanna would reflect the range of explanatory coexistence accounts available in this cultural context.

Indeed, many of our Tannese respondents provided explanations in terms of natural processes for the reasons for death and what happens to the body following death. For example, eleven respondents (65%) referred to illness, accidents, or old age. Seven respondents provided exclusively natural explanations for death (41%). Common responses when asked why people die were things, such as they "do not take care of themselves," or "because they are old and sick." Three respondents provided strictly supernatural explanations for death (18%). Seven respondents (41%) provided both supernatural and natural explanations for death. Finally, two respondents (12%) provided

Table 2  
Percentage of type of explanatory coexistence response by domain

|                | Exclusively<br>Natural (%) | Exclusively<br>Supernatural (%) | Integrated (%) | Target-<br>Dependent (%) | Synthetic (%) |
|----------------|----------------------------|---------------------------------|----------------|--------------------------|---------------|
| Human origins* | 6                          | 59                              | 0              | 0                        | 0             |
| Death          | 41                         | 18                              | 12             | 29                       | 0             |
| Illness**      | 23                         | 8                               | 23             | 0                        | 31            |

Notes.  $N = 17$  for human origins and death questions.  $N = 13$  for illness questions.

\*35% of the sample provided responses indicating how humans arrived on Tanna, that they came from the ground, or that they did not know.

\*\*Three responses that could be indicative of explanatory coexistence were left unclassified because too little information was provided.

explanations that indicated the role of supernatural forces in the cause of death, which did not invoke a Christian God, one stating that if you make mistakes in your job you might die, and the other stating that doing bad things or making trouble can lead to death.

Of the eleven respondents who provided natural explanations for the causes of death, such as illness or accidents, five (29%) also stated that the spirit or soul lives on after death when we queried them further about what happens to the body, mind, and soul. With these four respondents, there was no attempt to incorporate these two types of explanations in a systematic fashion, indicative of target-dependent thinking; in other words, each explanation was used to account for a distinct aspect of the processes that occur after death. Another prime example of target-dependent thinking was provided by a man who stated that “a body, that go down to the ground, but life goes back to God.”

Two respondents (12%) provided examples of integrated thinking in their responses. One of these participants stated that sickness or old age was the cause of death, but the affliction that would occur was part of God’s plan. The other participant stated that God gives us a time to be born and a time to die; however, God does not deem that people should die young and therefore a person who died young died as a result of “not looking out for themselves.” In all, seven respondents explicitly engaged in some form of explanatory coexistence when interviewed about their beliefs on death. It is possible that access to information about the proximate causes of death make it more likely to invite target-dependent and integrated explanations. Because concepts of the body and soul often involve a view of them as distinct, yet entwined entities, death invites explanations indicating that, while the body may decompose (as can be empirically observed), there is something about the person that persists following death.

### 3.3. *Illness*

In recent years, there have been increased efforts by the World Health Organization to limit the transmission of disease on the island by educating citizens about how malaria and tuberculosis are spread. Additionally, the Tannese increasingly frequent the local hospital. Because taking steps to limit the transmission of disease, or seeking treatment from Western medicine, is becoming a common aspect of life in Tanna, we expected that we might encounter explanations of illness based on “kastom” medicine as well as Western medicine. Indeed, ideas about pathogens learned in school and via WHO interventions and advertising were readily available to explain sickness and death. Given greater access to information about proximate causes for illness, we predicted that we would find more evidence for explanatory coexistence reasoning in the domain of illness than in human origins.

Participants were asked what they thought caused people to get sick and whether people could get sick from the way they treat other people and their actions. Overall, three respondents (23%) provided exclusively natural explanations for illness and one respondent (8%) provided an exclusively supernatural explanation. Ten respondents (77%) provided natural explanations for illness but also indicated that people could get sick from



their behavior and the way they treat other people in such a way that indicated a role for supernatural punishment via illness. In three of these cases (23%) responses were left unclassified because the participant indicated that people could get sick because of the way they act and treat other people with no indication of why this would be the case. Four of the 10 individuals who provided both a natural and supernatural account (31%) gave explanations that were indicative of synthetic thinking, appealing to both natural processes and supernatural processes, but it remained unclear how these two processes might interact with one another. For example one participant stated that illness might be caused by eating something that “is not fit for their body,” but then went on to provide an explanation that appealed to more supernatural processes, such as, “if you disobey God, you will die. . . If [people] have faith in God to heal them, he will heal them.”

Three participants (23%) provided explicitly integrated explanations for illness. For example, one participant reported that, in kastom, if a rule is broken then a small fine must be paid to the chief. If the fine is not paid, then a pathogen will cause the person who broke the rule to get sick. This last example illustrates the use of a proximate, natural cause (pathogen) and an ultimate, supernatural cause (breaking a rule and not paying a fine) within the same explanation for illness. Another respondent stated that sins can bring about illness because if one does not “repent for the bad things [they’ve] done, [they’ll] never have forgiveness in [their] heart,” which can result in illness. A final example of this type of integrated explanation comes from the same respondent who endorsed a strictly naturalistic explanation for the origin of life, “if a person is “not behaving well in the community, and most people, they hate him . . . That causes him sickness.” This suggests that at the individual level, the type of explanatory coexistence employed may differ across domains.

Thus, whereas evolutionary concepts have not been systematically incorporated into explanations for human origins, many people in Tanna readily endorse the spread of disease through germs. These differences in explanations for the domains of human origins and illness may be the result of Christianity’s influence on ideas of human origins, or that germ concepts may be more cognitively intuitive (Legare, Wellman, & Gelman, 2009) and more easily incorporated with pre-existing knowledge than evolutionary concepts (Coley & Tanner, 2012; Kalish, 1996; Kelemen, Emmons, Schillaci, & Ganea, 2014; Rosengren et al., 2012).

The insight gained from the collection of these semi-structured interviews with a diverse sample of individuals in Tanna, coupled with previous ethnographic accounts, provided insight into the diversity of thought surrounding human origins, death, and illness. The breadth of diversity on an island as small as Tanna highlights the importance of collecting information from a sample of individuals that can speak to the concepts of interest (Medin & Atran, 2004); in our case with both Christian and custom respondents as well as respondents that have experience with formal education and those that do not.

The examples we have provided from Tanna suggest that explanatory coexistence may vary by domain and cultural context. In the domain of human origins, we observed almost no coexistence reasoning, starkly different from what we observe in the United States. Our Tannese participants were satisfied with one explanation for human origins

(most frequently a Biblical account) and did not attempt to reconcile these beliefs with other types of explanations. The conflict between creationism and evolution may be a culturally specific ideological debate. Without this conflict, our respondents may not have felt the need to reconcile what are typically portrayed as conflicting worldviews. Similar to previous findings in diverse cultural contexts (Legare et al., 2012), in the domains of death and illness, however, participants provided examples of synthetic, target-dependent, and integrated thinking. These findings, however, are preliminary and are meant to provide the groundwork for additional research with a greater diversity of cultures and individuals to examine the individual and cultural factors that impact explanatory coexistence.

Additionally, the insight gained from these interviews provides the impetus for further research on the incorporation of more recent natural and supernatural explanations with pre-existing cultural frameworks. For example, experimental research on the cognitive foundations of religious syncretism could help inform a rich historical and anthropological literature on this topic.

#### **4. Future directions and conclusions**

A central goal of research on explanatory coexistence is to establish a more culturally inclusive view of the coexistence of natural and supernatural explanatory frameworks across domains of fundamental human concern. We have argued that the human mind often incorporates both natural and supernatural explanations for phenomena in an integrated and noncompeting manner and highlighted the importance of ecological and cultural differences in this process.

Our ongoing research seeks to provide an account of explanatory coexistence that is rooted in an understanding of how socialization and early learning environments affect cognition (Bang, Medin, & Atran, 2007; Callanan, 2006; Cole, 2005; Rogoff, 2003). As a cultural species, humans are apt to trust what they are told (Harris, 2006; Harris & Koenig, 2006) and readily develop culturally specific mental models of the world. There may be, however, particular patterns of thought associated with different domains of human experience. For example, on the one hand, our interviews provide evidence that the domains of death and illness lend themselves to explanatory coexistence. People are often unsatisfied with natural explanations for these phenomena and seek to understand *why* these things happen to them and their loved ones. On the other hand, our interview data indicate that explanations for human origins may be more tied to particular cultural ideologies. These data indicate a “starting point” for future experimental research to more rigorously investigate the universality and cultural specificity associated with explanatory coexistence across domains (Whitehouse & Cohen, 2012, p. 405).

We propose that the way cultural frameworks scaffold the development of explanatory coexistence should be explored both ethnographically and experimentally. Examining explanatory coexistence cross-culturally provides an understanding of how variation in cultural input and socialization affects the development of explanatory coexistence. We

also found evidence that the introduction of new natural and supernatural explanations affects the types of responses people in Tanna provide to explain human origins, illness, and death. Whereas germ concepts are readily available to explain illness and death, evolutionary concepts have not yet been incorporated into explanations of human origins. How formal education and the introduction of Christianity interact with indigenous kastom beliefs warrants further cross-cultural qualitative and quantitative investigation.

Integrating the findings from cognitive science with an anthropological perspective is essential in understanding the ecological validity of conclusions drawn from data. To understand how individuals in diverse cultures incorporate both natural and supernatural explanations for events, we must have an understanding of the types of natural and supernatural explanations individuals tend to provide. We propose that insights from ethnography and close collaboration with anthropologists and local communities are vital to informing the development of hypotheses and predictions as well as designing culturally appropriate scales and tasks. Collecting qualitative data allowed us to develop culturally appropriate experimental materials to examine how people in Tanna engage in explanatory coexistence in future research.

Moving forward in the shared endeavor of anthropology and psychology to understand human behavior, “it is important that both anthropologists and psychologists are willing to look both ways and learn to respect, speak, and read each other’s language” (Astuti & Bloch, 2012, p. 458). Toward this endeavor, our data provide insight into how explanatory coexistence is influenced by local ecologies and the content of cultural belief systems as well as aid in the development of theory-driven and culturally situated hypotheses.

## Acknowledgments

We would like to thank Chief Peter Marshall, Chief Kaimua, Chief Yappa, George, Jimmy Takaronga, Teana Tufunga, and Jean-Pascal Wahe, as well as the Tafea Cultural Center for assistance conducting the interviews in Tanna. We would also like to thank Irene Jea, Courtney Crosby, Viviana Wan, Riley Little, Sarah Mohkamkar, Emily Shanks, Casey Brown, Alexa Perlick, Annabel Reeves, and Rithika Yogeshwarun for their assistance with data transcription. This research was supported by grants 37624 and 40102 from the John Templeton Foundation to the third author.

## References

- Astuti, A., & Bloch, M. (2012). Anthropologists as cognitive scientists. *Topics in Cognitive Science*, 4, 453–461.
- Astuti, R., & Harris, P. L. (2008). Understanding mortality and the life of the ancestors in rural Madagascar. *Cognitive Science*, 32, 713–740.
- Bang, M., Medin, D. L., & Atran, S. (2007). Cultural mosaics and mental models of nature. *Proceedings of the National Academy of Sciences*, 104, 13868–13874.

- Bonnemaison, J. (1994). *The tree and the canoe: History and ethnogeography of Tanna*. Honolulu: University of Hawaii Press.
- Callanan, M. A. (2006). Cognitive development, culture, and conversation: Comments on Harris and Koenig's 'Truth in testimony: How children learn about science and religion. *Child Development*, 77, 525–530.
- Campbell, J. (1972). *Myths to live by*. New York: Viking Penguin.
- Clarke, A. C. (1962). *Profiles of the future: An inquiry into the limits of the possible*. New York: Harper & Row.
- Cole, M. (2005). Cross-cultural and historical perspective on the consequences of education. *Human Development*, 48, 195–216.
- Coley, J. D., & Tanner, K. D. (2012). Common origins of diverse misconceptions: Cognitive principles and the development of biology thinking. *CBE-Life Sciences Education*, 11, 209–215.
- Evans, E. M. (2001). Cognitive and contextual factors in the emergence of diverse belief systems: Creation versus evolution. *Cognitive Psychology*, 42, 217–266.
- Evans, E. M. (2008). Conceptual change and evolutionary biology: A developmental analysis. In S. Vosniadou (Ed.), *International handbook of research on conceptual change* (pp. 263–294). New York: Routledge.
- Evans, E. M., Legare, C. H., & Rosengren, K. S. (2010). Engaging multiple epistemologies: Implications for science education. In M. Ferrari & R. Taylor (Eds.), *Epistemology and science education: Understanding the evolution vs. intelligent design controversy* (pp. 111–139). New York: Routledge.
- Gelman, S. A., & Legare, C. H. (2011). Concepts and folk theories. *Annual Review of Anthropology*, 40, 379–398.
- Gregory, J. E., & Gregory, R. J. (2002). Breaking equilibrium: Three styles of education on Tanna, Vanuatu. *Journal of Human Ecology*, 13(5), 351–356.
- Harris, P. L. (2006). Trust. *Developmental Science*, 10(1), 135–138.
- Harris, P. L., & Gimenez, M. (2005). Children's acceptance of conflicting testimony: The case of death. *Journal of Cognition and Culture*, 5, 143–164.
- Harris, P. L., & Koenig, M. (2006). Trust in testimony: How children learn about science and religion. *Child Development*, 77, 505–524.
- Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The weirdest people in the world? *Behavioral and Brain Sciences*, 33(2/3), 1–75.
- Heyman, G. D., & Legare, C. H. (2013). Social cognitive development: Learning from others. In D. E. Carlston (Ed.), *The Oxford handbook of social cognition* (pp. 749–766). New York: Oxford University Press.
- Kalish, C. (1996). Preschoolers' understanding of germs as invisible mechanisms. *Cognitive Development*, 11(1), 83–106.
- Keesing, R. (1982) as cited in Linnekin, J. & Poyer, L. (1990). *Cultural identity and ethnicity in the Pacific*. Honolulu: University of Hawaii Press.
- Kelemen, D., Emmons, N. A., Schillaci, R. S., & Ganea, P. (2014). Young children can be taught basic natural selection using a picture-storybook intervention. *Psychological Science*, 29(4), 893–904. doi:10.1177/0956797613516009.
- Lanman, J. (2012). The importance of religious displays for belief acquisition and secularization. *Journal of Contemporary Religion*, 27, 49–65.
- Legare, C. H., Evans, M. E., Rosengren, K. S., & Harris, P. L. (2012). The coexistence of natural and supernatural explanations across cultures and development. *Child Development*, 83, 779–793.
- Legare, C. H., & Gelman, S. A. (2008). Bewitchment, biology, or both: The coexistence of natural and supernatural explanatory frameworks across development. *Cognitive Science: A Multidisciplinary Journal*, 32, 607–642.
- Legare, C. H., & Visala, A. (2011). Between religion and science: Integrating psychological and philosophical accounts of explanatory coexistence. *Human Development*, 54, 169–184.

- Legare, C. H., Wellman, H. M., & Gelman, S. A. (2009). Evidence for an explanation advantage in naïve biological reasoning. *Cognitive Psychology*, 58, 177–194.
- Luria, A. R. (1976). *Cognitive development: Its cultural and social foundations*. Cambridge, MA: Harvard University Press.
- Medin, D. L., & Atran, S. (2004). The native mind: Biological classification and reasoning in development and across cultures. *Psychological Review*, 11(4), 960–983.
- Medin, D. L., Waxman, S., Woodring, J., & Washinawatok, K. (2010). Human centeredness is not a universal feature of young children's reasoning: Culture and experience matter when reasoning about biological entities. *Cognitive Development*, 25, 197–207.
- Misztal, B., & Shupe, A. (1992). Making sense of the global revival of fundamentalism. In B. Misztal & A. Shupe (Eds.), *Religion and politics in comparative perspective* (pp. 3–9). Westport, CT: Praeger.
- Nguyen, S., & Rosengren, L. (2004). Causal reasoning about illness: A comparison between European- and Vietnamese-American children. *Journal of Cognition and Culture*, 4, 51–78.
- Norris, P., & Inglehart, R. (2004). *Sacred and secular: Religion and politics worldwide*. Cambridge, England: Cambridge University Press.
- Norton, R. (1993). Culture and identity in the South Pacific: A comparative analysis. *Man*, 28, 741–759.
- Peck, J. G., & Gregory, R. J. (2005). A brief overview of the Old New Hebrides. *Anthropologist*, 7(4), 269–282.
- Piaget, J. M. (1928). *Judgment and reasoning in the child*. London: Kegan, Paul, Trench, Trubner & Co.
- Raman, L., & Gelman, S. A. (2004). A cross-cultural developmental analysis of children's and adults' understanding of illness in South Asia (India) and the United States. *Journal of Cognition and Culture*, 4, 293–317.
- Raman, L., & Winer, G. A. (2004). Evidence of more immanent justice reasoning in adults than in children: A challenge to traditional developmental theories. *British Journal of Developmental Psychology*, 22, 255–274.
- Rogoff, B. (2003). *The cultural nature of human development*. New York: Oxford University Press.
- Rosengren, K. S., Brem, S. K., Evans, E. M., & Sinatra, G. M. (Eds.) (2012). *Evolution challenges: Integrating research and practice in teaching and learning about evolution*. New York: Oxford University Press.
- Rosengren, K. S., Miller, P. J., Gutierrez, I. T., Chow, P. J., Schein, S. S., Anderson, K. N., & Callanan, M. A. (2014). Children's understanding of death: Toward a contextualized and integrated account. *Monographs of the Society for Research in Child Development*, 79(1), 1–162.
- Rothe, A. (2012). Cognitive anthropologists: Who needs them? *Topics in Cognitive Science*, 4, 387–395.
- Vosniadou, S., Vamvakoussi, X., & Skopeliti, I. (2008). The framework theory approach to the problem of conceptual change. In S. Vosniadou (Ed.), *International handbook of research on conceptual change* (pp. 3–34). New York: Routledge.
- Vygotsky, L. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.
- Whitehouse, H., & Cohen, E. (2012). Seeking a rapprochement between anthropology and the cognitive sciences: A problem-driven approach. *Topics in Cognitive Science*, 4, 404–412.