

THE HOT AND COLD IN MESOAMERICAN INDIGENOUS AND HISPANICIZED THOUGHT

ELLEN MESSER

International Food Nutrition Planning Program, MIT 20A-201, Cambridge, MA 02139, U.S.A.

Abstract—While the influence of Hispanic humoral medicine on 16th century and subsequent Mesoamerican indigenous thought is undeniable, recent reexaminations of Aztec, Mayan and Zapotec medicinal and cosmological systems suggest indigenous roots in hot-cold concepts. This paper reviews and compares the growing evidence for independent hot-cold classifications in Mesoamerica, and suggests certain common lines of syncretism in structure, content and applications. Drawing on a model from cognitive psychology previously applied by the author to hot-cold data of the Mitla Zapotec, the paper explores its utility for cross-cultural comparison of hot-cold category development.

Key words—ethnomedicine, humoral medicine, Mesoamerica, cognitive anthropology

Inter- and intra-cultural variation in the hot-cold classification systems of Mesoamerica have long attracted the interests of both cultural diffusionists and cognitive anthropologists. The former group, dominated by George Foster and his disciples, argue that the hot-cold principle in the New World derives from the Spanish humoral system [1]. Their aim is to understand processes of cultural diffusion and syncretism, as well as the possible universal psychological dimensions underlying Hispanic American hot-cold categories [2, 3]. The latter cognitive, particularly medical-nutritional anthropologists, analyze the structure and function (including behavioral implications) of hot-cold 'thought' and medicinal-cultural uses by culture. Their aim is to compare and contrast Mesoamerican cultural systems of thought as well as to trace patterns of syncretism. In many cases, this involves historical analyses of the influences of the Spanish on indigenous 'world view' [4-6].

While the influence of Hispanic humoral medicine on 16th century and subsequent Mesoamerican 'traditional' thought is undeniable, recent reexaminations of Aztec [4], Mayan [7], and Zapotec [8] medicinal and cosmological systems suggest indigenous roots in hot-cold concepts. This reinforces the findings and interpretations from other areas of Latin America. In Guyana, for example, researchers identified distinctive indigenous usage of hot-cold classifications in contexts uninfluenced by Hispanic humoral medicine [9]; in the Andes, anthropologists interpret native Andean populations to use a distinctive model of ethnophysiology which differs from the Greek prototype [10]. This article, drawing on ethnohistoric and contemporary cultural, including linguistic information, reviews and compares some of the growing evidence for independent hot-cold classifications in Mesoamerica, and suggests certain common lines of syncretism in structure, content and applications. Then, employing a model from cognitive psychology previously applied by the author to hot-cold data from the contemporary Mitla Zapotec (of the Valley of Oaxaca, Mexico) [11], the paper explores the utility of this model for cross-cultural comparison of hot-cold category development in Mesoamerica.

THE EVIDENCE OF INDIGENOUS SYSTEMS

The evidence of Foster [1] notwithstanding, Lopez Austin's careful review of existing Mesoamerican literature on hot-cold and the peculiarities or singularities of hot-cold usage among the Aztecs argues persuasively for an "indigenous dual cosmovision" rather than "degenerate Hippocratic humoral principle" [4, pp. 303-318]. Lopez Austin [4, 12] rejects Foster's argument that Mesoamericans uniformly lost the wet-dry principle and degrees of hot-cold which were part of the 16th-century Hispanic humoral system. He rejects too Currier's [2] and Ingham's [3] arguments that the hot and cold principles were extensions of feelings of warmth or (idioms) of power (heat) versus weakness (coolness). Instead, he argues with Kelly [13], Ryesky [14], and Redfield and Villa Rojas [15] that hot-cold as a principle for classifying conditions of the body, medicines, and other aspects of the cosmos existed in the 16th century at the time of the conquest and prior to Hispanic influence throughout Mesoamerica [4]. Furthermore, he maintains that hot-cold differed in its structure and use in different cultural areas.

Among the Aztecs he notes first that the hot-cold system was not restricted to the fields of health, illness, food, and medicine, but the duality systematically and symmetrically encompassed the whole cosmos [4, pp. 306-307]: plants, animals, minerals, stars, days of the week, even superhumans were classified according to this dimension. While one might argue that in Europe the humoral system did cover other aspects of the cosmos, these have never been systematically argued to have been part of the Spanish legacy in the New World [16]. Instead the Hippocratic system has been considered to be largely restricted to matters of health, food, and medicines. It is unlikely that the Spanish would have suggested to their recent converts how to apply this principle not only to all plants, animals, and minerals, but also to their indigenous ideas of stars, days of the week, months, and superhuman beings. However, we do not know how the Spanish humoral system was conceived and employed at the popular level, as our 16th-century European and related Arabic data on

the humors comes from scholarly, not ethnographic reports [17].

As a second point, the Aztecs to this day have maintained a set of correspondences between heavens (high) versus earth (low) and fire/ *macho* (male)/ *caliente* (hot) versus water/ *hembra* (female)/ *frio* (cold), as well as other distinctive sets of correspondences [4, pp. 306–307].

Father		Mother
Heavens		Earth
Shining		Dark
Vital	versus	Humid, water, wind
Fecund		Fecund but also associated with death
Hot		Cool

Lopez Austin points out how Maya and the Sierra Totonac show similar divisions. In addition, maize, the sacred plant and staff of life throughout Mesoamerica, is conceived as uniting the two principles of fire and water. Indigenous practices such as pulsing for illness, cooking sacrifices below ground (cold earth oven) versus above ground (hot) and particular classifications of illness attributed not only to hot–cold imbalance but more specifically to hot or cold indigenous spirits or deities, incorporate the hot–cold principle in a distinctively Mesoamerican fashion that refers to a non-Hispanic indigenous cosmivision, which varied by culture.

Citing 16th-century texts, Lopez Austin, among others [5], has pointed out that indigenous Aztecs and Mayas seem to have classified illnesses and medicinal plants by a hot–cold principle quite apart from any Spanish introduced classification. Ancient references to the upper (hot) and lower (cold) world as origin points for illness, and to terms like “aquatic cold and wet fevers” caused by water spirits and snakes, and the God Tlaloc, are clearly native, not Spanish introductions [4, pp. 306–309], although the Spanish often translated such indigenous medicinal categorizations into their own terms, cold and wet [5].

Other indigenous health practices which appeared anomalous under the Spanish humoral system were the Aztec custom of drinking *pulque* (*cecelic*) before work in order to stay cool. The health maintenance practice stemmed from the Aztec connotation of *cecelic* (‘refreshing’) as both cooling and recreational and the parallel classification of work as ‘heating’ [4, 5]. Concepts of moisture and winds, integrally tied to Aztec and other indigenous groups’ concepts of illness and superhuman cosmology, were also departures from Spanish usage, and hardly encouraged by proselytizing missionaries. Distinctive indigenous cosmological images of the human body among the Aztecs and the Yucatec Maya [4, 7], both of which in addition incorporate the idea of ‘readjustment’ of body heat through administration of herbs, other potions, and massage, are also of great antiquity, and distinctive native, rather than Spanish introduced, ‘science’ [4, pp. 309–310].

Such evidence supports Lopez Austin’s and others’ [4, 9–10, 12–14] observations that categories approximating Spanish hot–cold concepts existed in Mesoamerica at the time of the conquest, and that these indigenous systems left an opening for the pene-

tration of the Spanish humoral system in each Mesoamerican cultural case. As a group, these scholars reject the idea that the Spanish humors uniformly degenerated into the Mesoamerican hot–cold classifications we know from colonial times and today. They also counter the idea that so many Mesoamerican groups, from separate starting points of culture, language, setting, and medical theory, would have so willingly and rapidly accepted the theory of humoral classification in medicine yet rejected the practice of using the four humors. Instead, they favor an interpretation of active syncretism between Hispanic and indigenous medicine. Particular case studies, such as Ortiz de Montellano’s [5], which suggests that the Spanish Franciscan Sahagun labeled illnesses which natives attributed to Tlaloc, or illnesses coming from the mountains, as *frias* (cold), support Foster’s position [16] that Spanish friars were most likely active in the initial process of syncretism. More generally, they indicate that the variations that distinguished Spanish humoral medicine from indigenous theories and practice did not prevent indigenous groups from rapidly accepting and incorporating Spanish terminologies and practices.

Nevertheless, the terms which Mesoamerican indigenous peoples preserved to label their cosmological ideas of heat and cold, as well as the extended referents and usages of these terms (see example of *ceceli* above), differed from the laconic Spanish *caliente* (hot) versus *frio* (cold). The next section examines some of these lexical differences with their attendant problems in translation and suggests their implications for the argument that ‘hot–cold’ concepts are indigenous to Mesoamerican cultures.

TERMS FOR HOT–COLD

In comparing and contrasting different cultural concepts and usages of hot–cold, one can consider the names of terms; the relative degrees of hot–cold mentioned in the classifications and identifications of items; whether such classifications involve principles of binary oppositions or a continuum in hot–cold assignment; and whether there is a labeled intermediate (temperate, neutral, balanced) category. These are in addition to considering with what other dimensions of classification hot–cold corresponds; in what contexts hot–cold is applied; and the social division of knowledge and consistency in usage surrounding hot–cold [see also 6]. Both Spanish and Mesoamerican humoral systems conceived of hot–cold qualities as a continuum, in greater and lesser degrees [17]. Beyond such commonalities, ethnographic and ethnohistoric sources, which report hot–cold terms and usage in indigenous, Spanish, or both languages, again support the view that hot–cold concepts are indigenous to Mesoamerican cultures.

Foster [18], in his classic ethnographic work on Tzintzuntzan, reported that natives identified three categories of foods: *comidas irritantes* or hot foods, cold foods, and “a third category rather vague in the minds of informants” labeled “‘cordial’, neither hot nor cold. Hot and cold elements may be mixed to form a *cordial* meal” [18, p. 51]. He went on to note that in nearby Tarascan hamlets people recognized three categories: *irritantes* (hot), *frescas* (medium),

and *frias* (cold). In Foster's later writings [19], he indicated seven terms for four commonly recognized degrees of hot and cold: *irritante* or *muy caliente* ('very hot'), *caliente* ('hot'), *frio* or *fresco* ('cold'), and *muy frio* or *muy fresco* ('very cold'); he interpreted 'neutral' as an 'ambiguous' category, since not all informants agree on when and to what this category should be assigned, and also because it is ambiguous whether heat and cold are both absent or both present and therefore neutralizing. In his sample, he found that up to ten lexemes were used to describe (or encode?) the neutral category, the most frequent being *templado* and *cordial*. He also noted that certain persons used neutral terms more frequently than others. 'Neutral' was most often applied to *tortillas*, the staple food, but he nevertheless concluded that it was the residual category when respondents conflicted over the hot-cold identity of an item. (Unfortunately, he did not probe 'why' respondents reached this conclusion.)

Among the Yucatec Maya, Redfield and Village Rojas [15] noted two classes: [ziz u cuch] ('the cold class') and [choko cuch] or [kinal cuch] ('the hot class'). Items may be more or less ('very') cold; they also mention an intermediate or 'half-cold' class (p. 161). The cold foods were accounted cold because they were good for nerves and bad for chills; or, in the case of plants, because they were green, fresh, and suggestive of water (grow near cenotes) or remained green when others seasonally dried. Lands were classified as either hot or cold: hot lands dried quickly after rain; mists rose up from them at night, while cold lands remained moist. Additionally, hot-cold had ritual usages. Cold things were used in ceremonies since hot things—like hot winds which were believed to bring fevers and hot drought, 'fever of the milpa'—were generally thought of as evil, or punishment of the gods. Cooking below ground produced 'cold' food; above ground 'hot', particularly for ritual contexts. An additional usage sorted humans and animals into 'hot' and 'cold' classes; humans classified as having 'hot' [choko] hands and blood preferably did not intermarry, and their hot or cold qualities also influenced their occupational and ritual participation (p. 212).

William Hanks [20], working in a nearby area of Yucatan, noted the use of [siis] ('cool', 'damp'), [chokow] ('warm', 'hot'), [chokow-il] ('fever'), [k'iinam or kiinil] ('warm') and [ooshol] ('heat', as in [uyooshol k'iin] ('the heat of the sun')). The Spanish terms *fresco* and less frequently *caliente* also were used for cool and hot respectively. Each hot-cold term might be used with modifiers glossed 'very' or 'a little'. The 'qualities' [kuch] of foods and medicinal substances; of states of the body or of individual organs, of ways of being sick or the power of certain spirits; of cosmic elements; of personality traits, and of certain activities might all be described in these terms. In this case, the healthy state of the human body was described as an equilibrium, one in which the physical aspect of the body (its [lu'um] 'earth') was naturally [chokow] as a result of the sun's action on it; balanced by the [i'ik'] or [i'ik'al] ('wind, life-force') which is naturally [siis]. Together they produced a state labeled *templado* or 'balanced'. Foods were also classified as [siis], [chokow], or *templado*.

For foods with no known quality, people pointed to their effects on the body; for instance, foods which were heavy or hard to digest tended to be viewed as [siis] or 'cold'. Medicines were classified as [siis], [chokow], *templado*, [siis chokow], and [chokow siis]. Medicines were also classified as 'high' or 'low' depending on their proximity to the sun (source of heat) or earth (a major source of cold). Spirits were classified as either hot or cold depending on their relationship with fire or rain/earth/cold weather.

Among the Maya of highland Chiapas, the idiom of heat is particularly developed in relation to 'soul' or 'ritual' power, heat accumulating with maturity, knowledge, and mastery of ritual order [21, 22], but these researchers have not published a set of data to contrast with the Yucatec data on food and medicine.

For the historic Aztecs [4, 5, 12], cold illnesses were conceived as caused by intrusion of 'cold' quality [cep] (*frio*) [celic, cecelic] (*fresco, verde, tierno*) or [itcal] (*frio*) while hot illnesses were generated by internal heat [totonqui] (*caliente*) or overexposure to 'heat'. Indigenous Aztec classifications seem to derive, in general, from the recognition of dual influences: heat of the sun versus cooling moisture; or the refreshing (equilibrating) influences of certain substances such as *pulque* on (too much) internal ('soul') [tonalli] heat [4, p. 295]. Things of dark color, pican- cy, sweet fruits, and things which produce burning sensations were all generally 'hot', while things related to the night or sun resistant, including wild animals, sour fruits, thick skinned fruits and light colors were 'cold'. Irritation was generally a sign of 'heat' or 'hot' illness, aching of 'cold'. Moist lands were classed as 'cool'; drier lands, where the sun is believed to strike more, as 'hot'. An overheated state generally rendered one vulnerable to illness although many illnesses were classified as due to unhealthy penetration of excess cold and moisture [12, pp. 16–25, 26–38 passim; 4, pp. 289–303]. Such hot-cold usages appear to have continued among 20th-century Nahua [23, pp. 161–179]: foods, medicines, humans, superhumans, units in time, and cultural activities are all classified within the hot-cold system. Degrees of 'very hot', 'hot', 'temperate', 'fresh', 'cold', and 'very cold' are recognized; the world of nature and man is viewed as combining hot and cold elements to produce a 'temperate' environment (p. 162).

Among Mitla Zapotec of the Valley of Oaxaca, Mexiöc [6, 11], hot-cold terms in Spanish and Zapotec are used interchangeably depending on the principal languages of the speakers. There are seven categories (though not separate lexemes) on the hot-cold continuum of relatively graded qualities rather than a dual opposition. From the hot pole, people gloss herbs, conditions of the body, and certain other elements as 'very hot', 'hot', 'very warm', or 'warm', glossed by the two Zapotec terms [naNla] ('hot' as in heat of the sun or temperature of the air) and [naja] (the usual term for designating the internal hot quality of herbs and other foods and medicines). Either is modified by [duš] 'very'. On the cold side of the continuum there are also two Zapotec terms: [nyelyuh] 'cool' and [Nahl] 'cold' either of which may be modified by [duš] 'very'. Foods are classified according to a number of factors, chief among which is digestibility. Since illness is conceived as being due

to too much of one quality, hard to digest foods are classified as (very) hot or cold depending on whether the suffering classifier perceives her body to be overly hot or cold in quality at the time. At the center of the continuum is the neutral term *templado* which designates the quality of herbs and other items which are neither hot nor cold, or mixtures which are balanced. The major staple grain, maize, in the form of tortillas, is usually classified as 'neutral' as is bread. People also tend to classify other unsliced grains and tubers as *templado* (in this context meaning 'harmless' as well as 'balanced'), while some items also have digestibility qualities which fall outside of the hot-cold system. An example is potatoes, which are considered to be hard to digest—particularly for young children—but are classified as 'heavy'.

When communicating about hot-cold quality in Spanish, people use the terms *caliente* 'hot', *fresco* 'cool', less frequently *frío* 'cold', with the modifier *muy* ('very') for emphasis. *Fresco* carries the same connotations of 'cool, wet, refreshing' as the Zapotec [nyelyuh] which also is used more frequently in glossing the non-hot qualities in plants and ailments. The major difference between Zapotec and Spanish usage is that *caliente* carries both senses of heating and warming glossed by [naNla] versus [naja] in Zapotec; the single Spanish term thus fails to translate exactly Zapotec 'hot'/'warm' concepts. *Tibia* ('warm') is not used, nor is there regular usage of the Spanish term, *irritante* rather than *caliente* in contexts where Zapotec speakers would have used [naja] [24]. [Templad] (*Templado*) is used equivalently in both languages. Both [nyelyuh] and *fresco* carry the senses of cool, wet, and refreshing.

Hot-cold terms are used to classify medicines, foods, and states of the human body, which in turn are determined by age, occupation, temporary exposure, and illness. The infant is conceived to begin life as cold, and then increase heat as he/she matures toward sexual maturity. Bitterness is often associated with warmth, and sweetness with coolness, in describing and identifying the hot-cold quality of herbs. Additionally, bitterness may be associated with heat and strength, and coolness and sweetness with weakness, in the case of curers, who drink bitter brews to increase their strength (resistance to illness and evil), in contrast to infants, who are conceived to be cool, have sweet blood, and to be vulnerable (attractive) to witchcraft and evil eye, both hot concepts in this Zapotec culture.

DISCUSSION

Although incomplete descriptions of Mesoamerican hot-cold terms and their contexts of use make firm comparisons problematic, the evidence suggests certain lexical and cosmological differences between Hispanic and indigenous usage. One difference involves the coding of 'hot' in Spanish and indigenous dialects. At least in the cases of Yucatec Maya and Mitla Zapotec, Mesoamerican languages indicate separate concepts (words) for heat of the sun versus internally generated heat, both of which are ordinarily glossed *caliente* in Spanish [25]. In the Mesoamerican indigenous languages having two lexemes for heat/warmth, one ordinarily says that

herbs are 'warm' in the sense of causing the body to warm or in the sense that the fire is 'warm', but 'hot' when there is something 'out there' producing heat, like the sun or air [26]. A separate question is how significant such lexical differences are for certifying cosmological differences. At least in the 20th century, bilingual native-Spanish speakers employ the Spanish hot-cold vocabulary without difficulty, even if they do not supply 'exact' translations; either they extend *caliente* to cover the foods, medicines, sicknesses, personality traits, and activities as well as other referents of 'hot' which in indigenous dialects are encoded in two separate lexemes; or they employ *irritante* to label the humoral quality of heat [24–26]. We need more complete descriptions of native cosmologies, physiology, and illness etiologies in both indigenous and Spanish idioms to understand the contexts in which hot-cold is employed in health, nutrition, and other domains, and whether *irritante* or other terms might have developed in complementary opposition to *caliente*, analogous to the dual set of terms for heat in Zapotec, Yucatec Maya, and perhaps other Mesoamerican languages.

A second issue is the use of one or more terms for 'neutral'. Contemporary Mesoamericans in all areas seem to use the Spanish *templado* (with native tones) to denote an intermediate, balanced, or physiologically harmless quality. William Hank's example suggests the possibility that native languages may express (or have expressed) the concept, 'neutral', by juxtaposing terms for heat/cool or cool/heat. An additional alternative is the term, *fresco*, which among some Mesoamerican groups is interpreted to mean 'neutral' [19], among others to denote 'nourishing'. Cosminsky [27, 28] argues that for certain Guatemalan Highland Maya groups, certain items glossed *fresco*, including certain basic grains and other comestibles which people interpret to be 'nutritious' or 'vitamin-rich', have been construed conceptually as outside of the hot-cold classification and belong to a new neutral-'nourishing' (*alimento*) category. Foster [19] suggests that neutral terms like *fresco* and *templado* may be 'residual categories' which are increasingly used in certain areas by individuals who know fewer and fewer hot-cold classifications. This interpretation, however, may underestimate the extent of cosmological-health balancing in recent Mesoamerican thought, as well as the idea of hot-cold as a continuum from cold to heat, which his own Tzintzuntzan data suggests. In line with Cosminsky's interpretation, what may be going on is a new syncretistic process which attempts to join traditional hot-cold knowledge to modern nutritional wisdom. Alternatively, people may be glossing the balanced state in food as 'healthy' in the same manner they gloss the balanced state of the human body as 'healthy' rather than 'temperate' [see 18, p. 183].

Finally, the cool/cold qualities which in Spanish were translated *fresco* or *frío* appear to be tied to Mesoamerican indigenous cosmological and body concepts at variance with Spanish humoral and religious/cosmological ideas. Bilingual speakers adopted Spanish glosses such as *bilis* and *fríaldad* to label concepts of body ills, such as digestive disorders, interpreted to be due to hot-cold imbalance.

Each cultural linguistic group, however, has retained its distinctive set of ideas on the structure and function of the human body, relations of specific organs to soul(s), and manners in which various external influences—including the social and super-human environments—influence health, wealth, and well-being. In explicating possible processes of syncretism in hot-cold classification and reasoning from culture to culture, it will be useful to add to the investigations of researches like Colson and de Armellado [29] and specify exactly what were the medicinal terms related to hot-cold introduced by the Spanish, and how these were incorporated into native physiological and cosmological reasoning.

Additionally, hot-cold in indigenous Mesoamerica was always used in combination with other dimensions of correspondence. In the case of the Aztecs, duality was cosmologically important, but so were notions of deities and their characteristics, upper and lower worlds and their inhabitants, and numerical counts associated with days, months, and years. Cosmological associations with deities, along with sensory attributes like taste, smell, and irritation, were used to judge medicinal plants. Only by analyzing such correspondences can we achieve an accurate account of similarities and differences among classifications and cultural usages of the hot-cold dimension immediately subsequent to conquest and colonization. Through such explorations, one can further explore the process of syncretism, "... whereby adoption and adaptation are made selectively from incoming systems; where essential indigenous elements may be reinforced and modified by the incoming elements, but where basic structures, objectives, and characteristics of the indigenous remain identifiable and a continuity is achieved" [9, p. 1229]. Analysis of cognitive dimensions of judgments of similarity potentially also may contribute to this exploration.

COGNITIVE DIMENSIONS

Cognitive psychologists have suggested various possible frameworks for evaluating how children and adults learn to make judgments of similarity. Oliver and Hornsby [30], for example, asked people why or how they grouped common objects as similar; the researchers then grouped the possible responses into the attribute categories: perceptible, functional, affective, nominal, and fiat. This model potentially should be useful for demonstrating cognitive attributes people use in judging medicinal plants similar

in hot-cold qualities. As correlaries, it may also be useful in illustrating how people learn to classify, and in identifying which cognitive groupings might change most readily once a competing or complementary hot-cold principle (or set of classifications) is introduced [31].

Figure 1 shows how these categories can be productively used to analyze responses to the question: "Why are these (herbs) hot/cold?" Objects may be judged as similar (hot) if they share some intrinsic perceptible quality, such as color (red) or extrinsic perceptible quality, such as location (growing in the sun). Alternatively, similar objects may be construed to share an intrinsic function (action) [hot herbs 'cook' uncooked food in the stomach, and 'heat' a cold stomach (ache)] or extrinsic function (hot herbs are applied to a headache classified as cold).

Another basis for judging similarity is affective. Herbs or foods may be judged to be 'bad' or 'good' depending on whether they do nor do not make you sick. In cultural contexts in which the normal state of the body is conceived to be slightly to the warm side of neutral, hot foods may be judged to be 'bad' (i.e. they will produce indigestion by causing too much heat). Nominal judgments, without specifying attributes, recognize that there is a category called 'hot' and that particular items are similar because they belong to that category. Alternatively, judgments of similarity by fiat are arbitrary statements which do not necessarily imply knowledge that there are factors which go into the makeup of the nominal category. The differences between nominal and fiat judgments is that the former implies knowledge that items are similar because they are hot, which means that they share one or more attributes of the hot category; the latter simply implies knowledge that individual items are called hot.

Distinctions among judgments of similarity can be observed easily in children. I found that children's earliest criteria of similarity were based on judgment by fiat. When presented sequentially with a number of herb names and asked in each case, if it were hot or cold, they indicated that they had heard that some herbs were classified as hot, others as cool, but knew only that certain herbs belonged to a category called 'hot', others to a category called 'cold', but did not know what the categories meant. They next learned to talk about affective, then functional attributes in judgments of similarity. Only later did they proceed to learn and analyze perceptible attributes which entered into judging items hot and cold. They progressed from 'inherited knowledge' (by fiat, nom-

<i>Kinds of attributes</i>		
Perceptible	Intrinsic	They are all red (=hot).
	Extrinsic	They all grow in the sun.
Functional	Intrinsic	They cook uncooked food in the stomach.
	Extrinsic	You apply them to ('cold') headache.
Affective		They are bad. They make you sick. They are good they do not make you sick.
Nominal		They are all 'hot' herbs.
Fiat		They are all called 'hot'.

Fig. 1. Possible groups in judgment of similarity (of 'hot') (adapted from ref. [30]).

inal categories, judgments of affect and function) to perceptible attributes that ultimately allowed them to put together the 'system' of evaluating health and curing by the hot-cold principle. In describing how she 'learned the system', a young mother, for example, described how as a child she had watched her mother cure, but had paid little attention to which foods and medicine were classified as hot or cold. She only knew that some were called 'hot' and others 'cold' and that one cured a hot or cold condition by applying or introducing internally a herb or medication of the opposite quality. Later, with three young children of her own to cure, she began to pay more attention to the attributes of foods and medicines, and to reason through the system in dosing her youngsters. For example, cold foods, particularly if taken in quantity, were taught to be bad for very young children (infants and toddlers are classified as physiologically cool and tender). Therefore, when her youngsters suffered diarrhea after eating grapes, she concluded that grapes were bad (cold) because they made the boys sick. AlkaSelzer was taken as the cure, since it was hot (nominal), because it warmed their cold stomachs, and it boiled (functional, perceptible). She was learning additional functional and perceptible characteristics of herbs and patent medicines to aid her in curing her sick children. As she learned these varied sets of characteristics, this enabled her to expand her nominal categories of hot herbs.

In evaluating intracultural variation, I found the greatest variety in judgments of similarity for the category of perceptible attributes. For example, people might judge squash leaves to be 'hot' because they grow in the sun, or 'cold' because they grow in the rainy season (extrinsic perceptible attributes) although both sides might agree that, while edible and a preferred food, squash leaves are 'bad' in that many people cannot digest them. In a cultural context which judges bodies to be hot or cold depending on age, physiological state, emotional state, and occupational and temporary exposure, people chose a nominal category, and perceptible attributes to justify it, that would explain how too much heat or too much cold made one ill.

Possible applications of the cognitive model

In studying syncretism in hot-cold usage, one can use this model to identify which aspects of judgment are most easily transferable between cultures; which are stable and which others undergo systematic change. In each cultural case in Mesoamerica, there are items labeled 'hot' and 'cold'. Prior existence of hot-cold categories in the existing local cultures would make judgment by fiat or by nominal assignment ("there are things which are called 'hot' or 'cold'; there are categories 'hot' and 'cold' which have certain members") the simplest and most direct route for accepting Spanish medicinal science and lore. Indigenous notions of affective, functional, and perceptible attributes, which lead to or predict hot-cold classifications of particular items and also make each individual cultural usage distinctive, would condition what other components of the new humoral system would be readily adopted.

The affective notion that particular foods or herbs cause hot-cold excess, imbalance or illness, and are

'bad' is shared among Mesoamerican cultural groups. Classifying one polar body state as 'good' and all items of the opposing quality as 'bad', however, has not been generally characteristic of Mesoamerican usage. Since Spanish humoral thought shared these notions, 'affective' attributes would also have been easily translated among humoral systems. Had Mesoamericans been confronted, by contrast, with a pattern of hot-cold reasoning which consistently interpreted either hot or cold to throw health out of balance [32], they might have rejected that aspect of affective reasoning.

Beyond fiat, nominal, and affective judgments, the particular functional and perceptible attributes used to describe and judge hot-cold qualities vary among and within Mesoamerican cultures, and are closely tied to their other concepts of body, health, and cosmology. Following along the lines of Lopez Austin [4], Ortiz de Montellano [5], Villa Rojas [7], and others [9, 10], specific intrinsic and extrinsic perceptible and functional attributes can be compared among individual Mesoamerican and reconstructed Spanish humoral systems to tease out common attributes and possible lines of syncretism [33].

CONCLUSIONS

Mesoamerican and other hot-cold classifications may be compared according to basic structure, conceptual structure and meanings, and the cognitive attributes used in judging items similar. Further research is needed on each aspect—lexical and semantic, cosmological, and cognitive—to identify more clearly common and variable elements in recent Mesoamerican usage, as well as the processes by which Mesoamerican cultural groups adopted and adapted Hispanic usage to their own.

In concluding, two points made by Peter Worsley [34] in his review on the hot-cold opposition in non-Western medical systems might be emphasized. First, the hot-cold opposition may be a universal, primordial opposition, like male-female, which is likely to be seized upon in all cultures as 'good to think' and therefore, good to classify with. Second, even where elaborate 'elite' or scholarly formulations of hot-cold exist in combination with other elements, humors, and correspondences, the 'common people' may conflate or simplify scholarly complexity into just the two terms, hot and cold. This seems to have been the case for 'popular' hot-cold beliefs in India and to some extent among Chinese. This may also be the case in contemporary Mesoamerica. By delving further into the composition of the categories, however, one can reveal subtle differences in structure and usage. By careful analysis, one can investigate which aspects of usage are most unchanging, and which are variable yet not threatening to the persistence of hot-cold classifications and usage. In such a manner, we can continue to document the infinite variations on such universal human propensities to classify.

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17. Both Spanish and indigenous systems interpret(ed) hot-cold qualities as existing in relative degrees, although the Spanish scholars codified these more systematically (with numbers) and perhaps consistently than does Mesoamerican oral tradition [see also 16]. Consistency in categorization, as well as rapid dissemination of information, would have been facilitated by literacy (see Goody J. *The Domestication of the Savage Mind*. Cambridge, New York, 1977), although the literate traditions of Greek-Arabic-European humoral medicine themselves indicate considerable scope for variation according to personal characteristics and social relations of health-seekers, seasons of the year, whether herbs are administered as food or as medicine, etc. [11]. Such built-in tolerance for variable interpretations may have facilitated the syncretistic process.
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24. I was unable to discover regular use of *irritante* in contexts where [naja] rather than [naNla] would have been used in Zapotec. Interestingly, monolingual Spanish speakers who were not born in Mitla but currently resided there, alternated in their use of *irritante* and *caliente* when describing the hot-cold qualities of food.
25. In Mitla Zapotec, the two words [naja] ('warm') and [naNla] ('hot') are sometimes used interchangeably. One ordinarily says that herbs are 'warm' in the sense of causing the body to warm or in the sense that the fire is 'warm' but 'hot' when there is something 'out there' producing heat, like the sun or air. One may use the adjective to describe the hot-cold quality of the 'warm' herbs, either as a piece of information in the case of 'hot' versus 'warm' or as an alternative which may be 'correct' although one would ordinarily use 'warm' in the medicinal context. The usage is unexpected, but not incorrect (see the discussion of English hot and warm in the next reference). Alternatively, since bilingual Zapotecs are used to responding *caliente* in Spanish for all things which in Zapotec are either 'hot' [naNla] or 'warm' [naja], Spanish may encourage an interchangeability of the two terms in Zapotec usage. They also use [naja] to describe the temperature of water as 'warm' (*tibia*) as opposed to 'hot'.
26. We can identify similar problems (or non-problems) in English, in that either 'warm' or 'hot' may be correct in certain contexts, even if one seems more fitting.
For example, the word 'warm' in the context 'This sweater is warm' connotes both a piece of wool which is 'hot' outside and a piece of wool which will cause the body to heat up or retain its heat. Usually we say 'This sweater is warm' rather than 'the sweater is hot' unless the hotness is in the context of a hot room or a hot day. In this case, we may say 'hot' though the word 'warm' would carry the same meaning, and may be used. To say in a cold room, 'This sweater is hot' would seem to be less correct. If we were talking about a day, we could say that the day was warm, but hot would connote great heat and thus, it is possible to give a greater contrast of meaning. Before a fire, one could say the fire is warm, in the sense of causing the body to warm, or hot, in the sense of the heat of the fire out there [11, p. 478].
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29. Two excellent examples of such comparisons from South American indigenous groups are Colson and de Armellado's [9] discussion of the Akawaio of Guyana, and Bastien's [10] discussion of Andean body concepts. Among the Akawaio, wet-dry is not part of the indigenous medical theory; bitter/sweet, high/low, and strong/weak oppositions—along with hot/cold—were, and have been retained as aspects of syncretized creole medicine. Among the Qollahuaya, the model of ethno-physiology emerging from native data, indicates a body/mountain correspondence, a model of land/body mass divided into high, center, and low zones. An idea of fluids flowing through both characterizes either. The key energy principle is fat; blood is classified variously as hot (flowing too fast), cold (too slow), wet (too thick), or dry (too thin); sickness is attributed to loss of fat, which can then be described in terms of some of these other correspondences.
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31. I used this model to discuss different dimensions of classification—more specifically, variations in hot-cold reasoning among individuals—in Mitla, Oaxaca, Mexico in my 1972–75 studies of herbal medicine. The model and data are drawn from my dissertation, pp. 425ff [11].
32. See Laderman C. Destructive heat and cooling prayer: Malay humoralism in pregnancy, childbirth, and the post-partum period. *Soc. Sci. Med.* **25**, 367–376, 1987.
33. There is significant debate on the sources of cognitive variation *within* cultures, but this must be the subject of another paper.
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