

Ethnobotanical Knowledge Shared Widely Among Tsimane' Amerindians, Bolivia

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To preserve humanity's patrimony and diversity and avoid misappropriation by outsiders, laws should protect indigenous knowledge. Firms producing pharmaceutical, agricultural, and cosmetic goods have used ethnobotanical knowledge of indigenous people to develop commercial goods (1, 2). The commercial use of ethnobotanical knowledge raises concerns about payments owed to indigenous peoples who supply the knowledge (3). Indigenous peoples and their advocates say that ethnobotanical knowledge is held communally (4) and that firms should share the benefits

is a 3-hour walk to the nearest town). Panel data served to develop a survey applied to 511 Tsimane' in 59 villages. In villages with ≤ 12 households, we surveyed all households. In villages with 13+ households, we randomly selected 12 households for interviews. For the interview, we randomly selected one household head. The average distance of the 59 villages to the closest town was 35 km (SD = 24.16, max = 100.5, min = 0.0).

To construct the knowledge test, we used published literature and data from free listings of useful plants ($n = 50$) used by the Tsimane'. From the list, we randomly selected 21 plants to

average cultural consensus of the 59 villages was 90.60 (SD = 6.18). All villages but one fitted the consensus model, all informants had positive competence scores, and the ratio between the first and second eigenvalue was >3 . Results suggest that people in the same village share more ethnobotanical knowledge than between villages.

We pooled people in the sample to compare individual agreement for all Tsimane'. When people were compared with the whole group, the average cultural competence was 0.62 (SD = 0.11), 20% lower than when compared with people in the same village. Cultural consensus of ethnobotanical knowledge among the Tsimane' was 66.3, lower than the average within villages. All informants had positive answers; the ratio between the first and second eigenvalues was 3.38. Results confirm the idea that ethnobotanical knowledge is a consensual domain among Tsimane' of different villages.

There is growing international and national agreement about the need for prior consent and benefit sharing with indigenous peoples when outsiders use ethnobotanical knowledge. As indigenous peoples have advocated and as this research shows, the collective nature of traditional knowledge should be considered when outsiders use indigenous knowledge commercially. Laws to protect indigenous knowledge must also acknowledge the communal endowment of indigenous knowledge and the traditional rights and responsibilities over such knowledge.

Table 1. Summary of cultural competence and consensus in 59 villages and 511 subjects.

Village average	Ratio first/second factor	Consensus	Average competence	SD competence	Number interviews
Within	20.80	90.60	0.83	0.10	8.70/village
Between	3.38	66.30	0.62	0.11	511 (total)

from commercial uses of indigenous knowledge. Despite these claims, we do not know how much indigenous peoples share ethnobotanical knowledge. Here we use a cultural consensus model (5) to show that Tsimane' Amerindians share much ethnobotanical knowledge.

The Tsimane' number ~7000 people and live in ~100 villages in the Bolivian lowlands (6). Habitats range from savannas to wet, moist, and gallery forests. Tsimane' show large variation in socioeconomic attributes. Some live in small villages without schools, speak only Tsimane', and forage and practice shifting cultivation. Others speak Spanish, live in large, accessible, permanent villages with schools, and sell crops and labor. Because Tsimane' contain much variation, they are ideal to estimate the amount of shared ethnobotanical knowledge in an indigenous group.

We collected socioeconomic and ethnobotanical knowledge data during 18 months (May 1999 to November 2000) in two villages with different habitats and market exposure, Yaranda (which is a 3-day canoe trip from the nearest market town) and San Antonio (which

construct a multiple-choice questionnaire. We asked all subjects whether each plant could be used for medicine, firewood, tools, construction, and/or food. We collected responses in a matrix with plant names on the x axis and their uses on the y axis.

We define knowledge as agreement between informants and use cultural consensus and cultural competence to measure this parameter. Cultural competence is the proportion of questions each person answered correctly; we equate correct with the most frequent response in the population or group. Cultural consensus refers to the group average similarity in responses. Data are consensual if the first eigenvalue is at least three times larger than the second, provided no estimate of knowledge is <0 . To estimate whether agreement was larger among people in the same village than among all subjects, we first estimated the agreement of each informant with people in the same village and then with the entire sample.

When comparing subjects with people in the same village, we found that on a 0 to 1 scale, the average individual cultural competence was 0.83 (SD = 0.10) (Table 1). The

References and Notes

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