'PEOPLE AND PLANTS' CONSERVATION MANUALS

Manual Series Editor:
Martin Walters

Manual Series Originator:
Alan Hamilton
Plants Conservation Officer
WWF International

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The cover illustration shows German Cayti, a Chimane indigenous person, and Quico Vaca, a park ranger, participating in an ethnobotany training workshop in the Beni Biological Station in Bolivia. They are preparing to dig roots of the palm *Scheelea princeps* (used as a remedy for intestinal parasites) and demonstrating how to dry them for phytochemical analysis. Photo: G. J. Martin.

ETHNOBOTANY

A methods manual

GARY J. MARTIN

WWF International
(World Wide Fund for Nature)

UNESCO
(United Nations Educational, Scientific, and Cultural Organisation)

Royal Botanic Gardens, Kew, UK

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Anthropology

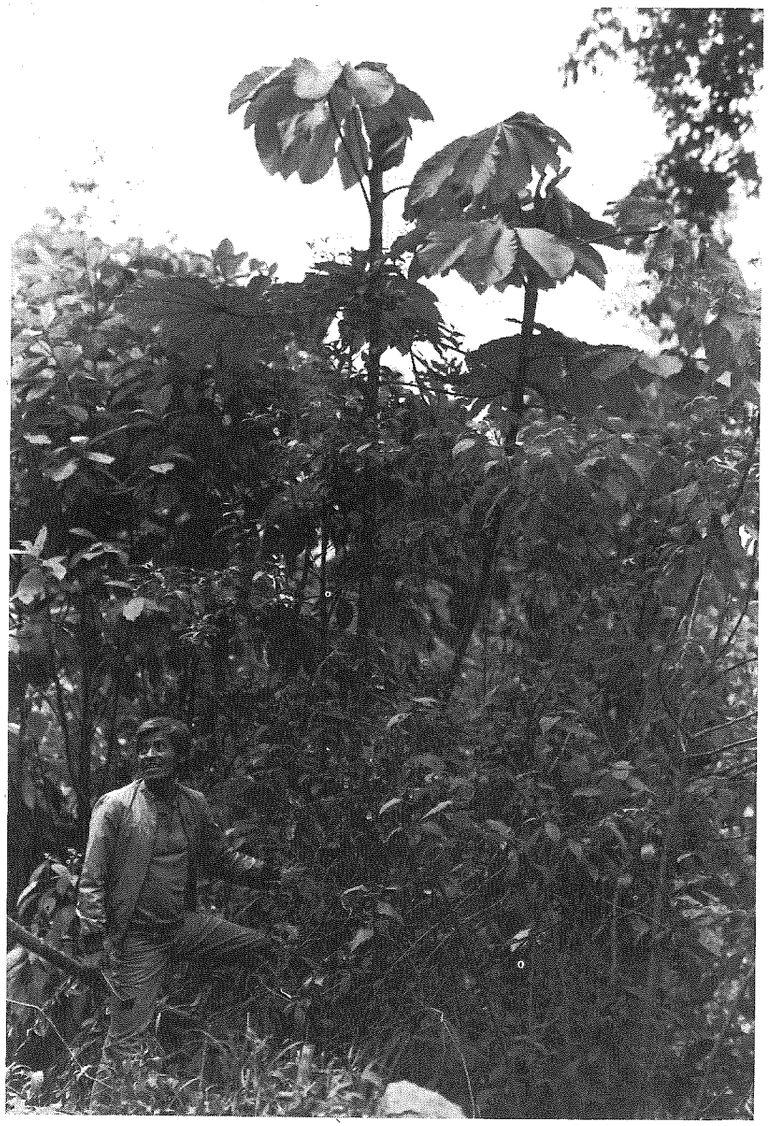

Figure 4.1. Roberto Hernández López, a traditional medical practitioner from Santiago Comaltepec, harvesting the leafy shoots of *Cecropia* trees, which he combines with other herbs to treat diabetes. Field excursions with specialists are one approach to documenting local ecological knowledge.

4.1 Talking with local people

The initial ways to gather anthropological information are to talk with people, to watch what they do and to take part in their everyday activities. Although these ethnographic skills may seem so natural as to be taken for granted, they require proficiency and forethought if they are to yield reliable data.

Anthropologists have given special names to various field techniques [56]. **Participant observation** refers to living with people and sharing with them many facets of their life, from subsistence activities such as cooking, farming or gathering firewood, to ritual occasions such as marriages, religious celebrations or initiation rites.

Interviewing refers to asking people about their beliefs and lifestyles. In **open-ended or semi-structured interviews**, respondents give extensive responses to a series of general questions, some of which have been prepared in advance and some of which arise naturally during the course of the conversation. In-depth interviews may be held with a **local expert** or **key informant**, someone who has a profound knowledge of a particular aspect of local culture. Some anthropologists record the **life history** of these specialists, recounting the person's experiences as he or she grew up and attained expertise. These approaches, which are often referred to as **informal** or **qualitative methods**, yield responses that are used to write up general ethnographic accounts of the community and its culture. If the researcher wishes to analyze the responses with statistical methods, they must be coded and categorized before being interpreted.

Systematic or **structured interactions** involve asking a group of selected informants to respond to the same set of questions. These approaches, which are often referred to as **formal** or **quantitative** methods, yield verbatim answers that can be analyzed using various statistical methods without coding or categorizing the responses [57, 58].

Semi-structured and systematic interviews can give us good ideas of the ways people describe their lives and their natural surroundings, while participant observation allows us to see how people put their knowledge into practice. Let's say you are interested in how people use edible plants from their home gardens. In an open-ended interview, you might ask them how they select which species to cultivate, how the plants are harvested and how they are prepared for eating. A systematic interview could consist of asking informants to rank their preference for a number of edible plants that are grown in home gardens. In addition to these interviews, you might also observe directly the plants grown in gardens and the ways in which they are cultivated, harvested, cooked and eaten, perhaps by joining in these activities yourself. Each way of gathering data complements the others to give a holistic idea of how humans interact with the botanical world around them.

The precise methods of data collection you employ will change through the course of the study. You will likely begin a project by just living within a community for a while, taking the time to observe general characteristics of the local culture.

After getting to know people, you start to have exploratory interviews during which you attain familiarity with basic concepts and categories. After you have selected an issue for in-depth study, you can apply formal methods that allow you greater precision in selecting whom you interview and what you ask them.

Ethnobotanists working within their own culture can modify the methods according to their own needs. Keep in mind that recording oral traditions and applying other methods discussed in this manual may be unusual in your community, requiring you to take on the perspective of an outside observer of your own culture. It is often appropriate to seize this opportunity of acting as an outsider to gain a different view on local beliefs and customs, particularly when you cross generational, gender or class lines in your community.

4.1.1 Selecting local counterparts

The local people who share their cultural and ecological knowledge are called **informants** by most anthropologists. In some countries and social contexts, people find this term derogatory and prefer to use alternatives such as interviewees, subjects, participants, respondents, collaborators or local counterparts.

Whom do you ask about plants, animals and other elements of the natural environment? Stefano Varese, a Peruvian anthropologist, recalls his first visit to an indigenous village in the mountains of Oaxaca, sufficiently remote that he had to arrive by small plane. Soon after he descended from the aircraft, he was greeted by a villager who asked, 'Are you an anthropologist?' When Stefano responded yes, the eager villager said, 'Well, I'm an informant.' Although such a person might be able to provide a wealth of information, he is unlikely to be a typical villager.

Many ethnobotanists are casual in their choice of local counterparts. They speak to the first person encountered, ask for the individual who knows the most about plants in the community or interview anyone who is willing to talk with them.

Although it is acceptable to talk with the first people you meet when starting a project, many anthropologists recommend that informants be selected in a systematic way as the study progresses. If you are planning on using statistics to interpret your data, it is best to select a **random sample** that embodies a representative cross-section of the community. Choosing your informants randomly implies that all members of the population have an equal statistical chance of being included, ensuring that your sample will not be **biased** in favor of any particular social group (for example, more men than women or more old people than young people). This is particularly important in situations where the dominant social group – men, elders, wealthy or highly educated people – tends to be the first to come forward to be interviewed. Picking a random sample, or at least one that represents the diversity of the community, will ensure that you speak with the silent majority which often includes women and children, the poor and other groups who have often been ignored by fieldworkers.

Table 4.1 Some sociological variables used to describe the local participants in an anthropological study

Age
Ethnicity
Religion
Place of birth
Gender
Occupation
Migration to other regions for work or marriage
Age at marriage
Kinship and marriage relations
Number of children
Number of people in household
Number of generations in household
Literacy
Education
Language ability

There are many different ways of choosing a random sample. From a list of people or a map of houses, you could select every second (or third, or fourth, or fifth) person or house. You could also assign numbers to the people or houses, prepare slips of paper on which each identification number is written and then pick out as many slips as people or houses you wish to visit. The same result can be achieved by using a **random numbers table**, which allows you to choose numbers in an arbitrary way. Alternatively, you can flip a coin for every person or house, heads meaning that you will interview, tails meaning that you will not. These four approaches are illustrated in Box 4.1.

Choosing a random sample of informants is feasible when you are recording the general knowledge about plants in a community. In other cases, the choice of informants will be dictated by the subject of the study, such as when you are recording specialized knowledge held by traditional healers or by certain social groups such as children, women or the elderly.

Whether or not you choose your sample in a random way, you should characterize the local people who work with you and show how they represent the overall population of the community. Some of the different ways that a sample can be characterized and compared with a broader population are summarized in Table 4.1. These characteristics, called **sociological variables**, can be used to analyze the way people behave and the beliefs they hold. After noting the informant's name and residence (address or community), you should record gender (whether the person is male or female) and place and date of birth, from which his or her age can later be calculated.

Several questions may be asked about education and literacy: 'Is the person able to read and write?'; 'How many languages does he or she speak?'; 'How many years

Box 4.1 Choosing a random sample of households or people

Genstown is an imaginary village that comprises 30 households (Figure 4.2). Some people speak French, some speak English and some households are bilingual. French-speakers tend to be Catholic and live in the northern part of the village, while most English-speakers are Protestant and live in the southern part of the community (Table 4.2).

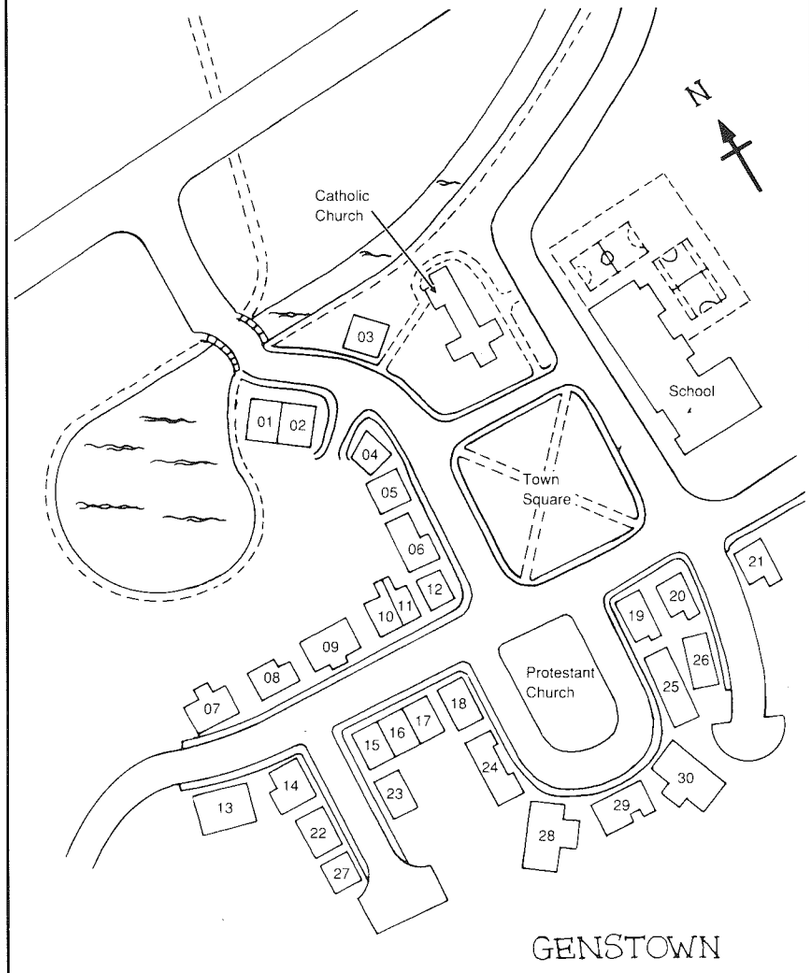

Figure 4.2 Map of houses in the imaginary village called Genstown.

Table 4.2 A partial household census of Genstown, including the house number, family name, language and religion of all of the resident families

House number	Family	Language	Religion	Skip house	Coin toss	Paper slips	Random number
01	Debucourt	French	Catholic	Yes	Yes	No	Yes
02	Jardin	French	Catholic	No	Yes	Yes	Yes
03	Lapierre	French	Catholic	Yes	No	Yes	No
04	Gereau	French	Catholic	No	No	Yes	No
05	Chevallier	French	Catholic	Yes	Yes	No	No
06	Moret	French	Catholic	No	Yes	Yes	No
07	Foliguet	French	Catholic	Yes	No	No	No
08	Sureau	French	Protestant	No	No	Yes	No
09	Nourissier	French	Protestant	Yes	No	Yes	Yes
10	Dupont	French	Protestant	No	Yes	No	No
11	Moreau	Bilingual	Protestant	Yes	Yes	No	Yes
12	Corbin	Bilingual	Catholic	No	Yes	No	No
13	Hailey	Bilingual	Catholic	Yes	Yes	Yes	Yes
14	Ludlum	Bilingual	Protestant	No	No	Yes	Yes
15	Collins	Bilingual	Protestant	Yes	Yes	Yes	No
16	Robinson	English	Catholic	No	No	No	Yes
17	Miller	English	Catholic	Yes	Yes	Yes	No
18	Anthony	English	Protestant	No	No	No	Yes
19	Smith	English	Protestant	Yes	Yes	No	No
20	Colbert	English	Protestant	No	Yes	No	Yes
21	Wolfe	English	Protestant	Yes	Yes	No	Yes
22	Hermann	English	Protestant	No	No	No	Yes
23	Wells	English	Protestant	Yes	No	No	No
24	Harden	English	Protestant	No	No	No	Yes
25	Ross	English	Protestant	Yes	Yes	Yes	Yes
26	Davis	English	Protestant	No	No	Yes	Yes
27	Washington	English	Protestant	Yes	Yes	Yes	No
28	Morris	English	Protestant	No	No	Yes	Yes
29	Jones	English	Protestant	Yes	No	Yes	No
30	Harrison	English	Protestant	No	No	No	No

Imagine that you arrive at the village and want to interview half of the households about what ornamental flowers they bring to church, but you do not know the language, religion or other information about the residents. You could choose a random sample of informants by: (1) visiting every other house, going from the northwest to the southeast corner; (2) flipping a coin in front of every house and interviewing the inhabitants when the coin comes up heads; (3) numbering each house on a map and then putting the house numbers on slips of paper, shuffling them in a hat and picking 15 slips; or (4) selecting 15 houses according to a random numbers table, such as the one shown in Figure 4.3.

7797 3118 4201 0834 0983 5549 0072 7890 3532 2814 9289 7268
1812 **11**42 5613 0275 0169 4405 7658 5157 3879 8481 6746 **21**99
6271 4550 7845 8852 6899 9639 7844 3809 4759 7248 4232 **09**53
0941 9873 3438 8844 1456 8056 6827 4855 4104 6550 8971 5088
1484 8553 **13**14 0607 5870 5826 6943 8700 2543 8090 9797 8890
3526 **25**07 7409 0367 7086 7169 8315 0231 6190 1218 **16**74 **28**90
6260 **26**51 5009 3912 8249 1635 0524 2139 1739 0921 8545 8035
3292 3781 **22**53 7832 0273 0627 4029 1649 3237 4784 7863 3259
7440 **08**63 4111 4556 3050 6268 8231 8491 9138 5099 4507 8904
9186 2685 8752 4615 4282 1961 2378 8874 2478 3334 3459 9980
2471 2449 5402 7058 7201 4572 3437 2068 5257 9686 6632 5551
7350 9404 2140 4927 3497 6423 7325 8370 2288 7846 4258 2827
4457 **02**76 **01**83 4604 9967 7770 6833 6959 8239 1933 3965 7143

Figure 4.3 In using this random numbers table to select houses from Genstown, I started with the first two digits in the 11th row, and then continued until I found 15 numbers between 1 and 30. I did not count duplicates of the same number, 00 or numbers 31 and above. The selected numbers are indicated in **bold.**

I followed each of these steps and obtained the results shown in Table 4.2. By picking every other house, by choosing half of the slips of paper or by selecting the house numbers from a random numbers table, I was guaranteed to come up with 15 houses. On average, 15 houses would be selected by a coin toss, although this technique could give you a few houses more or less (by chance I came up with exactly 15 heads and 15 tails when I carried out this experiment).

If we compare the resulting samples, we find that a representative cross-section of the community has been chosen (Table 4.3), even though a different assortment of houses was selected by each technique. This would not have been the case if we had used a non-random or biased method, such as interviewing only people in the northeastern sector of town or only those who come out of the Catholic church after Sunday mass.

Table 4.3 Comparison of informant groups obtained by using four different random sampling techniques

	1. Skip houses	2. Coin toss	3. Paper slips	4. Random number
French Catholic	4	4	4	2
French Protestant	1	1	2	2
Bilingual Protestant	2	2	2	2
Bilingual Catholic	1	2	1	1
English Catholic	1	1	1	1
English Protestant	6	5	5	7
Total	15	15	15	15

of formal education were completed?' Enquire about the informant's work, including both subsistence and wage labor. If he or she has migrated, ask for what purpose and the length of absence from the community.

Other queries may be pertinent, depending on the characteristics of the community in which the work is being carried out and the focus of the research. 'What is the person's ethnicity and religion?', 'When married, does a couple reside with the husband's parents (**patrilocal residence**), with the wife's parents (**matrilocal residence**) or do they set up a new household (**neolocal residence**)?', 'Does the typical household contain just parents and children (a **nuclear family**) or does it include grandparents, cousins or other relatives (an **extended family**)?'.

Whenever possible, the above dimensions should be related to indigenous categories. For example, American anthropologist Carole Browner recorded the age of people who responded to a survey in a Chinantec community of Oaxaca, Mexico. When analyzing the results, she split the interviewed population into three classes used in the community to decide who is eligible for public office: young adults aged 18–35 years, middle-aged adults from 36–45 years old and retired adults 46 years old and over. She then compared the responses of individuals from these three groups to an interview about the plants used for controlling fertility, easing birth and other aspects of human reproduction.

After recording information about the people you have talked with, you can demonstrate how this sample compares to the overall population of the community. If available, you can refer to a **census**, a complete list of all residents which includes information on their age, gender, occupation and many other sociological variables.

As one of their first activities in a community, many anthropologists make a census. They begin by drawing a map which shows the location of all houses. After assigning a number to each house, they visit all residents to request the information described above. When possible, these data are confirmed by consulting the birth and death records of the community and other secondary sources. The number and location of the houses and the sociological variables of each household member can be included in a database which facilitates analysis of the data.

If you do not have enough time to carry out a census, you can rely on secondary information which has been collected by other people. Some villages have carried out their own censuses or have copies of surveys made by anthropologists, governmental agencies or non-profit groups. National censuses often provide information that has been extensively analyzed and is presented on community, regional and national scales.

Be aware that national censuses are not always carried out with the same care and precision as those made by researchers and the communities themselves. National surveys are often completed in a short period of time by people who are unfamiliar with the community. Although overall population figures may be roughly accurate, there is always the possibility the census-takers will overlook

people living in remote ranches or those who have nomadic lifestyles. Data on literacy rates, bilingualism and income are often unreliable, because these are issues that can invoke feelings of pride and jealousy. In countries in which fluency in an indigenous language is considered a sign of being culturally backward, people may not admit to being bilingual. Among ethnic groups in which accumulation of wealth is discouraged, household members may under-estimate their personal wealth. Some people, embarrassed that they cannot read or write, will erroneously state that they are literate. These modifications of the truth are even more common when the interviewer is a stranger who has not won the trust of local people and has no intuition about whether the responses are accurate or not. For these reasons, you should be sceptical about the information in national censuses and attempt to verify all data with community members.

4.1.2 Establishing rapport

I was once told a story, fictional I hope, about some botanists who traveled through Mexico and Central America to make germplasm collections of squashes. They would take notes and photographs of the fruits and then would break them open to harvest the seeds. At one point in their trip, they stopped to talk with a farmer who was harvesting his squash crop. After a few minutes of conversation, he selected some of his finest fruits and proudly gave them to the visitors. They thanked him, took some photographs of the fruits, smashed them on the ground in front of the farmer and scooped the seeds into a numbered bag which they threw into a box containing many similar bags. It was standard scientific procedure for the botanists, who did not stop to think that it was an inappropriate way to express their appreciation to the farmer.

Before you begin speaking with anyone, think about the impact that your non-verbal behavior has on people. Because many aspects of courtesy and good behavior are universal, common sense can guide your actions even when you have a limited understanding of local customs. In your own culture, would you accept a gift and then smash it to pieces on the ground?

Frank Lipp, an anthropologist from the United States, has given some useful advice to people who are about to begin research in a community [59]. Successful fieldwork, he writes:

> ... is dependent upon gaining entrée and establishing rapport with an indigenous group. To approach a local person with notebook and pencil and arbitrarily demand answers is the surest way to arouse resentment and reticence .... In order to create an atmosphere of trust, the field worker must exhibit a genuine sense of warmth, empathy and respect for his informants not by acting so but by being so in his actions and his words. The subject's ability to sense and respond to our warmth and/or coldness, our involvement or our facade, necessitates treating someone of another culture, ethnic group or world view as a respected equal and understanding him (or her) in terms

of his ideas and values rather than in terms of our own. Although the field worker remains committed to the values of his empirical discipline, he should behave as a human being, not as a technician, and cast aside any mask or 'professional role' that may create barriers between informant and researcher.

Your acceptance by the community will depend to a great extent on how you interact with others. You find that each element of behavior – your manner of dress, facial expressions, manner of speaking, openness to trying unusual foods and participating in new experiences – can endear people to you or make them feel estranged. The best advice is to be willing to learn about the correct way of behaving in another culture without forgetting the good manners of your own.

4.1.3 Reliability of field data

Anthropologists used to assume that by immersing themselves in another culture, they could become one of the local people, opening the way to a complete and loyal understanding of how others live. There is currently much scepticism about this belief. Many researchers now accept that no matter where they go and how long they live in a foreign land, they still retain **cultural filters** – their own personal ways of looking at the world, conditioned by how they were raised and educated.

Although it is impossible to become an objective observer, there are ways to diminish the impact of your subjectivity during fieldwork. We bring to the field many attitudes and habits which must be modified if we are to learn from other people. We must re-educate ourselves to become good listeners and to speak with people in a way that allows them to freely express their ideas and opinions.

Avoid enquiries that are aimed at eliciting specific responses that reinforce your previous observations or conclusions. Emphasize interactions in which local counterparts have the opportunity to express themselves in their own words without coercion.

Without being aware of it, we often pressure people into giving preconceived answers rather than allowing them to explain their own story. In open-ended interviews, anthropologists try to avoid directed questions, which encourage people to give responses that do not entirely reflect their true beliefs. For example, it is better to pose questions such as, 'Does this plant have a name?' rather than 'What is the name of this plant?' or 'Is the name of this plant *begonia*?'. The first question allows the respondents to say that they do not know or that there is no name. The other questions demand a response and encourage people to improvise or agree with an answer.

In everyday conversation, we sometimes pose questions in a way that limits people to one of two answers – 'yes' or 'no', 'right' or 'wrong', 'here' or 'there'. Anthropologists, when beginning fieldwork, refrain from asking dichotomous questions, because the truth might lie somewhere in between. Posing questions in an open way allows informants to rephrase the enquiry, making it more relevant

to their own culture and knowledge. Instead of asking for a discrete response it is better to stimulate people to give a detailed explanation in their own words.

In order to become a good interviewer, you must first become a good listener. What might be considered normal in some contexts – interrupting people with comments or questions, helping them to answer or rewording their responses – is likely to disturb the flow and content of the interview.

The rhythm, length and content of conversations may vary from one culture to another. Make the effort to adapt yourself to the local style of interaction. Do not be in a hurry when talking with people but be aware when they are growing impatient to get back to their own work. Choose the time of the interview according to local schedules and not your own. Although your status as an outsider may allow you to pose questions that would be inappropriate if raised by a community member, be tactful when discussing situations which may be delicate, such as personal wealth or religious beliefs.

Even if you follow these suggestions, cultural bias inevitably slips into your interactions and conversations with community members. Researchers and local people, when reviewing the results of your fieldwork, may wish to examine the raw data, including how questions were posed and how interviewees responded. Whenever possible, you should tape your interviews with a cassette recorder. Alternatively, you can record the questions and answers word-for-word, leaving your own interpretation or rewording aside. Some anthropologists record visual images of their interactions with people, using either a still or video camera.

Another way of decreasing the impact of your own cultural bias is to turn the tools over to the community. With video cameras, notebooks and tape recorders in hand, people can record their own perceptions of local beliefs and customs, providing a valuable record for the community archives as well as for visiting researchers. In Comaltepec, for example, I asked a well-known Chinantec curer named Roberto Hernández López to write about his experiences. The resulting manuscript, written in Spanish, describes how he became a curer, how he diagnoses patients and how he treats various health problems. It includes a list of plants and the illnesses they treat, all called by their Chinantec names.

Even when ethnographers take care in posing questions and recording interactions, it is probable some erroneous information will be given intentionally by a few informants. In almost every community, there are a few people who give fictitious accounts to unsuspecting outsiders or who contradict what other people have said. This may be an attempt to put nosy anthropologists in their place or it may simply be a way of having fun. There are others who seek to gain prestige by exaggerating their own knowledge, making up data in the process. If compensation is offered in an inappropriate way, some informants will be tempted to embellish their stories to establish themselves as a good source of information.

Detecting erroneous data is an ability that comes with experience. After spending some time in a community, you begin to have a feeling for which answers

are valid and which people are sincere. As you become increasingly competent in the local dialect and aware of indigenous classifications, your questions will be more and more precise, encouraging people to discuss their knowledge in an accurate and elaborate way. Much insight comes from **cross-verification**, which is checking to see if what one person tells you is consistent with the versions of other informants and if what you learn from one approach reinforces what you discover with another. This process of validation is referred to by some researchers as **triangulation**, which comes from the idea that observing an object from diverse perspectives gives you the best view of all.

The best way to collect valid data is to create a good relationship of cooperation and a sense of mutual benefit in the communities where you work. When the goal is to improve local health care, safeguard natural resources, strengthen cultural knowledge or provide alternative sources of income, the few people tempted to improvise data will be quickly discouraged by their fellow villagers.

4.1.4 Keeping a secret

An important part of building cooperation is respecting local people's desire for confidentiality. At times, people will tell you something only on condition that you do not identify them when you talk to others or in written accounts of your work. Some communities which prefer to stay anonymous will request that you use a pseudonym instead of the village name in all official reports. Some individuals, fearful of political repression, will request anonymity.

In other cases, you will be given information that people do not want disclosed at any time or in any form. Jorge Luis Borges, an Argentinian author, wrote a short story about a young ethnologist in such a predicament. He is sent by his professor to learn the spiritual secrets of a North American Indian group as part of the work towards his doctoral thesis. After many months of patient observation and participation, he is initiated into a religious society and told the secrets of the tribe, under the condition that he never reveal anything to non-initiates. When he returns to the university he has a choice to make – publish his findings or give up his career as an anthropologist. He chooses to keep his promise to the Native Americans, much to the dismay of his professor.

Although this is an extreme case, you are likely to face similar decisions about the knowledge you gain from certain sources. Yíldiz Aumeeruddy, an ethnoecologist from Mauritius, was told two myths by rural Indonesians that explain restrictions on land use in Jujun, a village near Kerinci Seblat National Park in Sumatra [60, 61]. Although one legend was common to many villages in the region, the other was only known in Jujun. People feared that disclosing it to other people would create new land conflicts in the area. Although she uses the first myth in her analysis of Kerinci ethnoecology, she has decided not to reveal the second legend out of respect for this taboo.

4.1.5 Participant observation and keeping a field diary

Participant observation is a technique we all use as soon as we set foot in a community which is not our own. To overcome our feeling of **alienation** – that many things around us are strange – we begin to take stock of what is different and what is similar to our own culture, including language, eating habits and many other elements of everyday reality. We often act as children in this new context, trying to manage with a limited vocabulary, faulty grammar and limited understanding of what others say to us. There are new motor skills to learn. We are invariably clumsy when we first start using unfamiliar agricultural implements, eating with unusual utensils and playing new games.

Claude Levi-Strauss, a French anthropologist, provides several perspectives on the initiation of participant observation in his book *The Savage Mind*, which is about symbolic classification of the natural world [62]. He quotes an amusing account written by Elizabeth Smith Bowen, a British anthropologist, of her first encounter with local language and ecological knowledge in Africa [63]. It gives an accurate feeling of the first bewildering days that fieldworkers spend in a foreign land, trying to compare another culture with their own:

> These people are farmers: to them plants are as important and familiar as people. I'd never been on a farm and am not even sure which are begonias, dahlias or petunias. Plants, like algebra, have a habit of looking alike and being different, or looking different and being alike; consequently mathematics and botany confuse me. For the first time in my life I found myself in a community where ten-year-old children weren't my mathematical superiors. I also found myself in a place where every plant, wild or cultivated, had a name and a use, and where every man, woman and child knew literally hundreds of plants ... (my instructor) simply could not realize that it was not the words but the plants which baffled me.

Although this stage of field research can be frustrating, it is rich in discovery. Most anthropologists attempt to record as many observations as possible in a field diary, which includes comments on relevant events of each day. For example, if your object is to record knowledge about plants, you note the local names and uses of every species that people tell you about, that you observe being used or that you help to gather and prepare. At this stage of the research, you probably will not be able to identify all the plants or transcribe the local names, but you can review the field journal at a later date to fill in this information. Box 4.2 contains a passage that Claude Levi-Strauss quotes from the detailed field journal of Harold Conklin, an experienced fieldworker who has been studying ecological knowledge of indigenous people in the Philippines for over 30 years.

There is no strict method to guide participant observation. The most important tools are curiosity, a willingness to learn from other people and an ability to adapt to their rhythm and lifestyle. Although there is a popular idea that anthropologists

Box 4.2 Keeping an ethnobotanical journal

Harold C. Conklin, a professor of anthropology at Yale University in the United States, wrote a doctoral dissertation in 1954 entitled *The Relation of Hanunóo Culture to the Plant World*, which describes the ethnobotanical knowledge of an indigenous group in the Philippines [64]. Although never published, it is considered one of the classic works of ethnoscience because it introduced an empirical approach to studying local knowledge of the natural environment. Early in the manuscript, Conklin gives an excerpt from his field diary. After recording these notes in the field, he annotated the text with scientific names and bibliographic references when he returned home.

As Claude Levi-Strauss quotes:

> At 0600 and in a light rain, Langba and I left Parina for Binli .... At Aresaas, Langba told me to cut off several 10 × 50 cm strips of bark from an ***anapla kilala*** tree [*Albizia procera* (Roxb.) Benth.] for protection against the leeches. By periodically rubbing the cambium side of the strips of saponaceous (and poisonous: Quisumbling, 1947, 148) bark over our ankles and legs – already wet from the rain-soaked vegetation – we produced a most effective leech-repellent lather of pink suds. At one spot along the trail near Aypud, Langba stopped suddenly, jabbed his walking stick sharply in the side of the trail and pulled up a small weed, ***tawag kugum buladlad*** [*Buchnera urticifolia* R. Br.] which he told me he will use as a lure ... for a spring-spear boar trap. A few minutes later, and we were going at a good pace, he stopped in a similar manner to dig up a small terrestrial orchid (hardly noticeable beneath the other foliage) known as ***líyamlíyam*** [*Epipogium roseum* (D. Don) Lindl.]. This herb is useful in the magical control of insect pests which destroy cultivated plants. At Binli, Langba was careful not to damage those herbs when searching through the contents of his palm leaf shoulder bag for ***apug*** *slaked lime* and ***tabaku*** [*Nicotiana tabacum* L.] to offer in exchange for other betel ingredients with the Binli folk. After an evaluative discussion about the local forms of betel pepper [*Piper betle* L.] Langba got permission to cut sweet potato [*Ipomoea batatas* (L.) Poir.] vines of two vegetatively distinguishable types, ***kamuti inaswang*** and ***kamuti lupaw*** .... In the camote patch, we cut twenty-five vine-tip sections (about 75 cm long) of each variety and carefully wrapped them in the broad fresh leaves of the cultivated ***saging saba*** [*Musa sapientum compressa* Blco. Teoforo] so that they would remain moist until we reached Langba's place. Along the way we munched on a few stems of ***tubu minuma***, a type of sugar cane [*Saccharum officinarum* L.], stopped once to gather fallen ***bunga*** **area** nuts [*Areca catechu* L.] and another time to pick and eat the wild cherry-like fruits from some ***bugnay*** shrubs [*Antidesma brunius* (L.) Spreng.]. We arrived at the Mararim by mid-afternoon having spent much of our time on the trail discussing changes in the surrounding vegetation in the last few decades!

are forever observing and participating in dances, festivals, marriages, funerals and other ritual occasions, most of their work involves the everyday activities of local people. Be prepared to accompany people as they bring in the harvest, collect plants in the forest, build houses and tend to their animals. The longer you stay, the more complete your experience will be. Many anthropologists try to live in a community for at least a year, allowing them to observe the changes that come with each season.

In the context of these everyday activities, ritual events will give you a special insight into aspects of the culture that are not evident at first sight. Alejandro de Avila, a Mexican researcher, had spent much time in Coicoyán, a Mixtec village in western Oaxaca, before he was able to participate in the ritual of San Marcos, celebrated every year on April 25th [65]. He accompanied a group of residents to the top of a local hill, where they burned incense, lit beeswax candles and sacrificed chickens near the shrine of San Marcos. An elderly man whispered prayers and left specially prepared bundles of rushes around the shrine. This and other special occasions allowed Alejandro de Avila to understand the use of several ritual and hallucinogenic plants, currently used less and less by the Mixtec people, which he had not seen as he observed everyday life in the village.

4.1.6 Open-ended conversations

Intuition and experience are the best guides to informal ways of gathering information. When beginning fieldwork, we are drawn into a broad range of conversations. With inspiration and good luck, we find ourselves asking the questions that open the way to understanding a foreign culture. Although these initial dialogues will cover some issues not clearly linked to ethnobotany, you will find that observations about local agriculture, medicinal herbs, hunting and other relevant subjects will naturally arise. Through these first open-ended interviews, you will develop a sense of what needs to be asked in more structured interviews.

As people begin to understand what interests you, discussions are likely to drift more and more towards ethnobotany. As you walk in the forest, work in agricultural fields or go hunting with local people, they naturally talk about their perceptions of the environment around them. When you visit people in their home, they show you unusual medicinal herbs in their home gardens, artifacts made from natural materials or fruits brought back from the forest, all of which spark conversations about local botanical knowledge.

Even in the absence of these props, you can easily guide the conversation towards ethnobotany because plants and animals have an important role in all subsistence and ritual activities and are a natural focus of attention. One option is to bring your own plants with you, either fresh or dried. Many researchers show pressed specimens when interviewing informants. Even though the plants are removed from their ecological context and are missing some of their morphological features, most can be recognized without difficulty.

You can take walks through home gardens, agricultural fields or forested areas to enquire about plants that attract your attention or that of your local counterpart. Some fieldworkers plan **forest or garden transects** in advance, ensuring that they pass by plants and vegetation types of particular interest. James Boster, an anthropologist from the United States, planted dozens of local varieties of manioc (*Manihot esculenta* Crantz) in a garden near an Aguaruna community in the Peruvian Amazon [66, 67]. After the plants grew to maturity, he led informants through the garden, asking for the name and the main morphological characteristics of each cultivar. From this exercise, he was able to learn that women, the cultivators in the community, know much more about manioc than men and that knowledge about the cultivars varies significantly from one family group to another.

Another approach is to choose a particular **ethnobiological artifact**, an object made from plants or animals, and discuss all of the species associated with its manufacture and use. Sandra Banack, an American ethnobiologist, used this tactic when studying boat-building in Polynesia [68]. Although the making of outrigger canoes is a rare event these days, she encouraged a group of Fijian men to reconstruct the various steps. She identified the wood used for the main body and the outrigger and the fibers used for the mast. She documented the special foods eaten by the boatmakers, which were prescribed by **cultural taboos**, or restrictions on diet and behavior. Finally, she recorded how foods were prepared for sea voyages. In this way, starting with a single artifact, she discovered the use and name of dozens of plant species.

4.1.7 Semi-structured interviews

All these approaches will lead you to **semi-structured interviews**, in which some questions are determined beforehand and others arise during the course of the conversation. Before you begin an interview, prepare a checklist of topics and questions that you would like to cover. As the discussion gets under way, new lines of enquiry will arise naturally and you will let some of your prepared questions fall to the wayside, left for a future discussion. The inspiration for the questions will come from your previous interactions in the community, including participation and observation of everyday activities as well as informal conversations guided by artifacts, plant specimens or transects. This background will allow you to ask culturally appropriate questions, understand answers and improvise follow-up enquiries.

At some point in the interview, ask your partner for his or her age, name and other personal information which will help in the interpretation of the responses. Although you may wish to request these data at the beginning to ensure that you record the same variables for each person, it is often less imposing to weave these questions into the flow of the discussion.

Keep in mind that the dynamics of interviews are determined not only by the respondent but also by the interviewer. Differences in age, gender, social position, ethnicity or religion affect the quality of the interaction. Depending on the topic, women interviewers may get more personal information from other women, whereas men may prefer talking to other men about certain issues. Young interviewers may have difficulties eliciting information from older, more prestigious people. When possible, interviews should be carried out by a team of co-workers who are culturally diverse. These interviewers can go together to the selected households or they can visit sequentially over a period of days, thus achieving well-rounded information.

Personal rapport is affected not only by the social standing of the interviewer but also by his or her attitude towards the respondent. Attempt to sit on the same level and in the same position as community members. Begin and end the conversation with polite talk, if this is the local custom, and respect other norms of socializing that you observe in the region. Whenever possible, adopt local ways of speaking, using expressions and words that people can readily understand. Learn to understand gestures used locally and to read other body language of your local counterparts.

Most semi-structured interviews are conducted with a single person at a time. This allows people to express personal viewpoints, discuss disagreements in the community and speak freely without being interrupted or contradicted by others, as often happens in group interactions. Sensitive information concerning personal income or health conditions is more likely to come out in the intimacy of individual interviews than when many people are around.

Group interviews also have their place in anthropological fieldwork. Participants can build consensus by discussing an issue amongst themselves and agreeing on an answer – or agreeing to disagree. This allows a broad view of the scope of opinions in a community and possible points of contradiction. Be aware of the dynamics of the group interaction and seek individual interviews with people who do not have a chance to express their opinion during the meeting.

Although the group interview may be held with a randomly-assembled group of people, you may wish to arrange some meetings between specialists who are particularly knowledgeable about a certain topic. These **focus interviews** can build upon previous meetings with key informants whom you have identified during the course of the fieldwork, creating a unique opportunity for specialists to share expertise and discuss their knowledge in greater depth.

Posing questions, listening to answers, reading body language and studying the

dynamics of the interaction will keep you busy during the course of the dialogue. Keep in mind that, even while doing all of these things, you must also record as literally as possible people's responses and your own impressions. Although many researchers tape all of their interviews, there are disadvantages to this approach. Some local people may be reticent to express freely their opinions when they are being recorded. And taping requires double work, because each cassette will probably take twice as long to transcribe as it did to record. The traditional alternative is to write all questions and answers in a field notebook. Some researchers divide each page into two sections, one side for the literal answers of informants and the other to record interpretations and observations. At the end of the day, review your notes to see if you have any additional observations to record.

No matter which technique is chosen, you should explain to your local counterpart how and why you are recording the conversation and what will be done with the results. Although you should show discretion by using a small notebook or recorder, never attempt to hide the fact that you are recording the dialogue. Leave copies of your notes or cassette tapes with the people you interview, if they so request.

4.2 Searching for ethnobotanical information in folklore

Although conversations, interviews and participant observation will be the source of most of what you learn in the field, be aware of the unique perspective provided by **myths and legends** as well as songs, ritual incantations and sayings. Myths and other traditional stories recount often fantastical historical events which are said to explain natural phenomena, such as the birth of the sun and the moon or the origin of cultivated plants, as well as cultural practices, including dietary restrictions, hunting taboos and agricultural rituals.

The French anthropologist Claude Levi-Strauss, who has written extensively on how to analyze myths, suggests gathering as many versions as possible and then comparing them to discover which events and elements are common to all. These recurring features reveal the underlying structure and meaning of the myth. Levi-Strauss observed that there is often an interaction between the natural and the human world in myths and that a symbolic parallel is drawn between the two. Box 4.3 explores the symbolic and empirical aspects of myths concerning the origin of ***kava***, a psychoactive plant used in Polynesia.

Box 4.3 Polynesian origin myths of *Piper methysticum* Forst. f.

Piper methysticum is a psychoactive plant which has been cultivated in many parts of the Pacific, from Papua New Guinea eastward to Tahiti. Known by the Polynesian name ***kava*** and by numerous other local names, it is the source of a drink that is consumed by Melanesians, Micronesians and Polynesians during public ceremonies and private gatherings. Botanists link

its origin to a wild species, *P. wichmanni*, which is endemic to New Guinea, the Solomon Islands and Vanuatu. Long before the arrival of Europeans to the area, local people brought this species into cultivation. *Piper methysticum* is now completely domesticated. It never produces seeds and is entirely dependent on vegetative reproduction, carried out by cultivators, for its survival.

Vincent Lebot, a French botanist who has studied in depth the phytochemistry, morphology and cultural use of ***kava***, recounts several myths about its origin that he recorded during his fieldwork or found in ethnographies [69]. He gives examples of related myths from four different islands.

> A very long time ago, orphan twins, a brother and a sister, lived happily on Maewo. One night, the boy, who loved his sister very much, had to protect her from a stranger who asked to marry her but whom she had refused. In the struggle, the frustrated suitor loosed an arrow which struck the boy's sister and killed her. In despair, the brother brought his sister's body home, dug her a grave and buried her. After a week, before any weeds had grown over her tomb, there appeared a plant of unusual appearance which he had never seen. It had risen alone on the grave. He decided not to pull it up. A year passed and the sorrowful boy had still not been able to quell the suffering he felt at his sister's death. Often he went to mourn by her grave. One day, he saw a rat gnaw at the plant's roots and die. His immediate impulse was to end his own life by eating large amounts of these roots, but instead of dying he forgot all his unhappiness. So he came back often to eat the magic root and taught its use to others. [Maewo island in Vanuatu]

> ***Kava*** first came to Samoans through Tagaloa, the first *Matai* or chief. Tagaloa had two sons, Ava and Sa'a. As Ava lay dying, he murmured to Sa'a that from his grave would come a plant of great value to the Samoan people. Ava died and was buried. Sa'a and his children watched the grave and on the third day after Ava's burial, two plants were seen growing from the head of his grave. As Sa'a and the children watched, a rat came and ate the first plant. It then moved to the second one and began to eat, but quickly became intoxicated. The rat went staggering home as the people watched in astonishment. They named the first plant ***Tolo*** or sugarcane and the second ***Ava*** in honor of the man from whom it sprung. [Upolu Island in Western Samoa]

> On the Island of Euaiki, the chief Loau recognized human flesh at a meal and told people not to eat it – it should be planted in the ground and brought to him when it matured into a plant ... the body grew up into a ***kava*** plant arising from different parts of the body. And when

it matured he noticed that a rat chewed on the ***kava*** and became paralyzed. [Tonga]

In one legend, the discovery of ***sakau*** is attributed to a rat nibbling a root and acting quite intoxicated. In another legend, more detailed, the origin is traced to Pohnpeian god Luk. The skin of a heel of a mortal man, Uitannar, was given by Luk to a woman in payment for her kindness. She was told to bury the skin and a plant would grow in its place. The juice of the plant would make people intoxicated and change their lives. This was done and ***sakau*** plant was later spread throughout Pohnpei. [Pohnpei]

Even though the stories are slightly different, they have several elements in common. They refer to not only symbolic interactions between humans and the natural world but also empirical methods used to discover the medicinal and psychoactive properties of plants. In each case, a human grave gives rise to a plant which is useful to people because it is intoxicating or has magic properties. Rats – wild animals that live near human communities – teach people how to use the plants.

This mixture of natural and cultural phenomena and the occurrence of species which are on the edge between wild and domesticated are common elements of myths which explain the origin of agricultural crops, medicinal herbs, domesticated animals and other organisms which play an important role in the lives of local people.

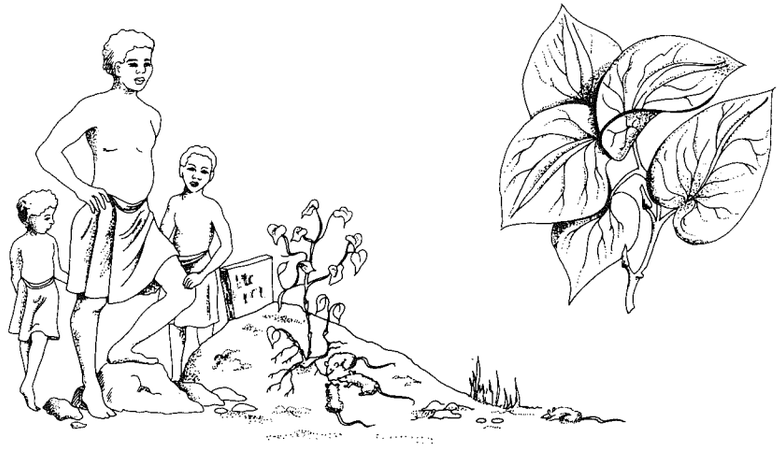

Figure 4.4 Line drawing of *Piper methysticum* Forst f., a domesticated beverage plant of Polynesia. In many local myths, the narcotic effect of the plant is said to have been discovered by watching the behavior of rats which either became drugged or died after eating the roots.

Following this comparative method, some researchers have sought to understand the medicinal and ritual uses of plants and animals by exploring in depth the symbolic interaction between culture and nature in myth. Plants and animals which are considered to be **anomalous** – abnormal in their behavior or morphology – often serve as symbolic **mediators**, known for their special ability to cure, nourish and protect people. These include domesticated species which, because they depend on people for their survival and have special morphological features which distinguish them from wild species, are thought to be on the interface of culture and nature. This is exemplified by the ***kava*** plant which, from a mythical perspective, arises from human flesh and is dependent on humans for survival, yet is similar to wild species which grow in the forest. Animals and plants which are **anthropogenic**, living near communities and in ecological niches created by human disturbance, are also considered as symbolic mediators. In the ***kava*** myths, rats – wild animals that forage in and around communities – show humans how to use a plant with medicinal and curative value. This relationship between wild and domestic things is just one of a series of opposites that symbolic anthropologists look for when they analyze cultural traditions. Many myths also draw contrasts between day and night, sky and earth, men and women, plants and animals and many other paired concepts that reveal a people's **cosmology**, or how they perceive the origin and order of the universe.

It is simpler to give examples of symbolic analysis than to explain how to carry it out. There is no set methodology. It is a matter of using intuition to gain insight into the meaning of another culture, which many symbolic anthropologists say they read and interpret as if it were a literary text. Nigel Barley, a British anthropologist who has written an amusing and perceptive account of his fieldwork among Dolawayo people of Cameroon, has spoken of his own struggles to analyze the symbols of another culture [70]:

> The problem of working in the area of symbolism lies in the difficulty of defining what is data for symbolic interpretation. One is seeking to describe what sort of a world the Dolawayo live in, how they structure it and interpret it. Since most of the data will be unconscious, this cannot simply be approached by asking about it. A Dolawayo, when faced with the question, 'What sort of a world do you live in?' is rather less able to answer than we ourselves would be. The question is simply too vague. One has to piece it all together bit by bit. Possibly a linguistic usage will be significant, a belief or the structure of a ritual. One then seeks to incorporate it all into some sort of a scheme.

In addition to the symbolic relationship between nature and culture, myths reveal many aspects of people's empirical knowledge of plants, animals and other elements of the natural environment. In the ***kava*** example, each myth made reference to people's observation of the rats which, after feeding on the roots of

the plants, became intoxicated or died. Apart from the behavior of animals and the properties of plants, traditional stories reveal how people classify living organisms. For example, cultivated plants and their wild relatives may be considered as related pairs, indicating an appreciation of the relationship between similar species.

Most myths have a moral which focuses on the consequences of acting in a socially acceptable or unacceptable way. Good behavior, such as protecting relatives or burying the deceased in the proper way, brings rewards whereas poor behavior – breaking cultural taboos and deviating from social norms – is punished. Researchers have recorded many stories that describe the effects of not respecting traditional ways of caring for the natural environment. These legends often describe people who suffer misfortune because they have polluted a lake, cut a tree in a sacred grove or killed an animal without first asking permission from its soul. In this way, myth provides a code of behavior that allows people to get along with each other and to live in harmony with nature.

Some myths which describe correct social behavior have the secondary effect of encouraging people to preserve and manage natural resources. Yildíz Aumeeruddy has recorded an incest myth from the Indonesian villages of Jujun and Keluru, which are located near Kerinci Seblat National Park in Sumatra [60, 61]. It relates the story of a brother and sister who fall in love with each other through the misuse of a love potion made from bamboo oil. Although this myth is primarily about the taboo on incest, it has played an important role in preserving a managed forest that lies between the two villages. The sinning couple is said to have been thrown in a deep valley called *lura pungok* and this is the reason the villagers of Jujun give for restricting their activities in this forest to collecting plants and hunting wild pigs.

If you plan to collect myths as part of your research, try to collect versions from as many different people as possible. Once you have heard the story once, you can ask other people in the community or in the region if they could tell it to you in their own words. There are many details in a myth that may seem insignificant at first, but later serve as keys to understanding its underlying meaning. For this reason, be careful to write down the stories you hear with precision. Better still, tape them with a cassette recorder so that you can later transcribe them word for word. Although people will not always be able to tell you the moral of the story, it is worthwhile asking what each tale means. As you come up with an interpretation based on comparing numerous versions of the myth, ask local people what they think about your impressions.

4.3 Surveys and analytical tools

4.3.1 Structured interactions

The open-ended and semi-structured interviewing techniques discussed above are readily adapted for structured interactions, in which a selected group of people are requested to answer the same series of questions or to perform the same tests. These

Table 4.4 A model table showing how to construct a matrix that compares the responses of m informants on n plants or artifacts (the letters m and n are used to indicate indefinite numbers; in a real example the table would show the total number of informants and plants or artifacts involved in the study)

	Response on plants or artifacts				
Respondent	1	2	3	4	n
1	1, 1	1, 2	1, 3	1, 4	1, n
2	2, 1	2, 2	2, 3	2, 4	2, n
3	3, 1	3, 2	3, 3	3, 4	3, n
4	4, 1	4, 2	4, 3	4, 4	4, n
m	m, 1	m, 2	m, 3	m, 4	m, n

interactions yield comparative data which can be arranged in a matrix, a rectangular table in which the response of each informant to each inquiry is given. This matrix, modeled after the one shown in Table 4.4, can then be used as the basis for various statistical analyses.

There are two general forms of structured interactions. In **surveys**, selected informants give answers to a number of specific questions that are either written down in questionnaires or are posed in person by the interviewer. Surveys are the primary tools of sociologists, who seek to gauge the variation in responses between different groups of people in large and complex societies.

Through the use of various **analytical tools**, participants show their cultural preferences and empirical ecological knowledge by ranking objects or sorting them into piles based on criteria such as similarity or relative quality. Many of these techniques were developed in the 1960s by cognitive and linguistic anthropologists who were seeking systematic methods of collecting data which would reveal how people perceive and classify the world around them. Some of these approaches have been modified for use in participatory rural appraisal by simplifying both the methodology and the analysis of results.

Some fieldworkers shun surveys and tasks, because they consider them an impersonal way of collecting data. They argue that because they are based on brief interactions between the researcher and a number of respondents, it is difficult to establish the rapport that a fieldworker usually builds with local people during open conversation and participant observation.

Keep these criticisms in mind if you decide to carry out surveys and tasks as part of your research. These approaches are most effective when they are employed after you have become better acquainted with the people of a community. If you have limited time, put emphasis on carrying out the work in a participatory way. Design and carry out the surveys in collaboration with local counterparts with whom you can later analyze the results. If participants understand the goals and

methods of the study and acquire skills they can use in community projects, these structured interactions become much more personal affairs.

4.3.2 The results of surveys and analytical tools

Four different types of results are obtained by surveys and analytical tools, exemplified by the following questions [58]. There are **inventories**: 'What are all native plant categories?'; 'What are the names of all the woody plants used for firewood?'. There are **rankings**: 'Among all fruits eaten, which are considered to be the best?'; 'Of all herbal remedies for headaches, which are the most effective?'. There are assessments of **similarities**: 'In an assortment of ornamental flowers, which are most alike?', 'Do people from one kin group classify plants in the same way, and differently from other people in the community?'. And there are **competencies**: 'Does everyone know the right name for a certain plant?'; 'Can all respondents accurately identify the curative properties of a series of medicinal plants?'.

The more structured an interaction, the more sophisticated are the statistical methods that we can use to analyze the results. But keep in mind that a highly structured interview yields data on a very limited part of local knowledge and takes much time and patience on the part of the researcher and local people. Sceptics of these empirical approaches feel that when a task removes people from familiar activities and habits, the results are likely to be an artifact of the method used. They say, for example, that when you ask someone to identify herbarium specimens, the responses will be affected by the fact that local people are not accustomed to looking at dried plants flattened in two dimensions and removed from their ecological and social context. In response to these doubts, verify if your results are consistent with the data collected through open interviews, participant observation, surveys and other tasks. Remember that this cross-verification allows you to look at local knowledge from several different perspectives, attaining a well-rounded view of how people interact with their environment.

4.3.3 Surveys

There are two types of surveys. A **questionnaire** is used when gathering comparable information from a broad range of literate informants, usually in an urban setting. The respondent fills in the questionnaire alone, which implies that there is little or no contact with the researcher. An **interview schedule** is a set of questions, usually written on a prepared form, that guides interviews with literate or non-literate individuals. These forms are used by the researcher in face-to-face interactions with informants, implying some degree of personal rapport. Both questionnaires and interview schedules are typically printed on paper, ensuring that the same questions are presented in the same way to all participants [71, 72].

One section of the survey is dedicated to recording the sociological characteristics of each individual, as discussed above in the section on selecting informants. The other parts are devoted to requesting the specific information that you wish

to record. After the survey is completed, you may need to take additional steps to verify and further understand the responses. For example, if you request a list of medicinal plants, you will need to make herbarium vouchers of all the species mentioned. If informants give you the names of folk illnesses, you may need to hold separate interviews with local curers to document in more detail the symptoms and treatment of each.

The surveys of TRAMIL (discussed in Box 3.6), are prepared by a diverse group of colleagues – health care professionals, researchers and local people – who focus on herbal remedies used to treat the most important illnesses that affect a specific region. In some of the surveys, general data are collected on the informants, including their school attendance, living conditions and access to health services. The respondents are asked whether the chosen illnesses are treated at home, by a traditional curer or by a Western medical practitioner. For conditions treated with household herbal remedies, specific information is requested about the plants employed, preparation, parts used and other ethnobotanical data.

Lidia Giron, a Guatemalan pharmacist, carried out an ethnobotanical survey with other Guatemalan colleagues as part of her participation in TRAMIL [73]. With an interview schedule that followed the general TRAMIL format, they recorded verbal responses given by 403 people from four distinct ethnic groups in Livingston, Guatemala. Of these, 259 (64.3%) used plants for medicinal purposes, while 144 (35.7%) said that they did not employ herbal remedies. By studying the sociological data collected as part of the survey, Lidia and her colleagues discovered that the people most familiar with medicinal plants were middle-aged to older women, many of them housewives. Most of them could read and write Spanish and many still spoke *garifuna*, an indigenous language. The researchers took care to collect a fertile specimen of each plant mentioned by the respondents and they deposited these in an ethnobotanical herbarium in Guatemala City. This allowed them to identify quickly the species name of 102 of the 119 medicinal plants.

4.3.4 Survey questions

What kinds of questions are commonly posed in surveys? Unlike open-ended and semi-structured interviews, surveys usually involve queries that require short responses, often drawn from a set number of options. **Dichotomous questions**, those which can be answered 'yes or no', 'true or false' or 'agree or disagree', are common. These are a simple form of **multiple-choice questions**, in which the respondent is given a limited number of possible answers. For example, you might ask if a plant is used for 'medicine', 'food', 'condiment', 'firewood', 'construction' or 'ornament'. Whenever possible, it is preferable to draw the various possible responses from an **emic** perspective, that is, in a way that reflects local perception and classification of the natural world. In addition, you should give people the option to respond 'other', to indicate categories they feel are missing or to answer 'none of the above'.

If these questions are to be avoided in informal interviewing, why should they be acceptable in surveys? Most researchers agree that if questionnaires are to be used at all, they should be applied towards the end of a project. This leaves plenty of time at the beginning of fieldwork to experience the culture on its own terms and to learn by asking open-ended, spontaneous questions. Before a survey is attempted, the researcher should have an idea of the range of possible answers to a question. Dichotomous and multiple-choice questions provide a way of probing more deeply into matters that have already been discussed in free-format interactions. For example, you may pose the question 'Do you use chamomile tea as a medicine?' if you have discovered that there are people who do use the herb and others who do not and you wish to verify the relative frequency of use in the community. Including a query in your survey such as 'Which is the best source of firewood? [] oak, [] pine, [] mahogany, [] other_____' implies that you have already explored with people the range of woods that are available and which are preferred by local people.

Another important element of surveys is the **fill-in-the-blank** format, which consists of questions followed by a blank (_____) that the interviewer fills in with the answer given by the respondent. This type of query, which is used casually in open-ended and semi-structured interviews, includes all questions that begin with the six openers Who?, Why?, What?, Where?, When? and How? In surveys, these questions are written out and are posed systematically to a selected group of informants. Many questions familiar to ethnobotanists are fill-in-the-blank type, including: '*What* is the name of this plant?'; '*How* is it prepared?'; '*When* do these birds migrate through the community?'; '*Who* taught you about the medicinal properties of plants?'; '*Where* can this animal be found?' and '*Why* do you use this remedy instead of that one?'.

As with dichotomous and multiple-choice queries, fill-in-the-blank questions are posed only after you have gained some idea of local practices and knowledge and have established rapport with informants. Asking these questions during your first days in a community could lead people into improvising responses to please you or not to appear ignorant. Once you have established the ground rules of the research and local counterparts feel comfortable about sharing their knowledge, increasingly precise questions can be posed.

One of the main advantages of using short-answer queries is that they are much easier to analyze with statistics than the results of open-ended interviews. Conversational responses must be interpreted, categorized and coded before they are analyzed, which is time-consuming and creates the possibility of introducing researcher bias into the results. Survey answers, and the results of tasks described below, are **verbatim responses**. The exact words or opinion of the informant can be directly analyzed with only minimal polishing of the data.

Statisticians rate these various types of queries according to the related concepts of ease of guessing the answer and information content. For dichotomous questions, there is a 50–50 chance of guessing the right answer. This rate decreases somewhat with multiple-choice questions and even further with fill-in-the-blanks. Although some speculation is a normal part of any conversational answer, there is little probability than an open-ended response would be totally a result of guesswork. When people are given the opportunity to express themselves freely, they tend to focus on what they know.

The easier it is to guess an answer, the lower is the information content of the response. For this reason, fewer multiple-choice and fill-in-the blank queries are needed to obtain results that are statistically significant than is the case for dichotomous questions. When there is a high probability of guessing an answer, there is also a relatively high chance that agreement between informants is a matter of coincidence, which means that a large number of questions must be asked to prove that a result is statistically significant. An overview of the various types of questions employed in interviews and surveys is given in Table 4.5.

4.3.5 Analytical tools

Researchers use various analytical tools to obtain detailed quantitative data on subjects that have emerged during the course of fieldwork. For example, they may ask interviewees to rank fruits from most preferred to least preferred, rate the qualities of various types of firewood or sort a series of flashcards containing the names of animals into piles that reflect perceived similarities in morphology.

These exercises are often combined with interviewing techniques. Participants are asked to explain why they prefer a certain type of fruit over another or what the objects in each pile have in common. The tasks may be integrated into a survey, such as when local counterparts are asked to compare the properties of various medicinal plants in a structured interview about health care in the community.

Although each of the tasks described below is carried out in a slightly different way, there are some techniques and general advice that apply to all. Each analytical tool typically depends on the use of **props** that can be handled by the participants. These include dried or fresh specimens of plants, pictures of landscapes, notecards on which the local names of animals have been written and other visual aids which ensure that the interviewer and interviewee are referring to the same object. These

Table 4.5 Characteristics of various types of questions posed in anthropological research

	Appropriate stage of research	Information content	Ease of statistical analysis	Number of queries needed to explore subject	Breadth of subject covered
Open-ended	All stages	Very high	Low	Low	Very broad
Fill-in-the-blank	Middle to late	High	Medium	Medium	Broad
Multiple-choice	Late	Medium	High	High	Narrow
Dichotomous	Late	Low	High	Very high	Very narrow

props correspond to the members of a single **domain**, or class of objects, which is the focus of the research. A set of props might include, for example, a dozen types of firewood, ten kinds of bird skins or five varieties of corn.

Although tasks can be carried out without props, most researchers believe the best results are achieved with objects that respondents can see and touch rather than just think about abstractly.

Pay attention to factors that might affect the way people answer, including the limits on their attention span, the quality of the props and the order in which the items are presented. If the participants become bored, their answers will be less consistent than when they are focused on the task. Take this into consideration when choosing how many objects to include in each set, keeping in mind that for some tasks the amount of time needed increases rapidly in relation to the number of items included. The sequence of the objects should be randomized before each task to minimize the possibility that people's choices are influenced by the order in which they see the items. Cards can be shuffled, pairs of specimens presented in different sequences and the arrangement of the objects within each set changed.

Be careful that each prop you present is of good quality and is typical of the object you are seeking to represent. Let's say that you offer someone a choice between a green banana, a ripe apple and a rotting pear. Their selection will be likely to reflect their perception of the maturity of the fruits rather than preference of one species over the others. Blurry photographs, incomplete specimens and poorly written flashcards all detract from the quality of the data you will obtain. Pictures should show all the morphological characteristics needed to identify an object and differentiate it from other similar things. Biological specimens should contain most of the features that local people are accustomed to seeing. Combine specimens, pictures and other stimuli into a single prop if this increases people's ability to recognize the object. For example, show people photographs of birds, let them listen to recordings of the birds' songs and give them bird skins which they can feel with their hands. Mounted plant specimens can be accompanied by a drawing of the plant and a small bag of dried fruits or leaves that the participants can taste or smell.

Do your best to ensure there is no confusion over the identity of each object. If you are using name cards, be sure there is consensus about what is referred to by each label. As discussed elsewhere in this manual, many names are **polysemic** – referring to more than one object or concept. In addition, plant and animal names do not always have a one-to-one correspondence with scientific species, which means that the researcher may be thinking of one organism while the informant is visualizing another. If the task assumes that the respondents can recognize each specimen without difficulty, ask them to name and describe all the objects before ranking or sorting them.

If you are attempting to carry out the tasks in a scientifically rigorous way, interviews should be held with one individual at a time and with no onlookers

present. This guarantees that the opinion of the interviewee is not swayed by the comments of others and that people who participate in the task in the future do not give pre-conceived answers.

There are both formal and informal ways of using the analytical tools presented below. In the informal approach, exemplified by participatory rural appraisal, it is customary to use small sets of items well known by all members of the community. These items can be sorted and characterized in a relatively short time. Researchers are casual in their approach to randomizing the order in which objects are presented and are relaxed about having people observe and comment on the tasks. At times, the tasks are administered in a single meeting to a large group of people who reach a consensus through discussion or who express their diverse opinions by voting. Props are used when available but often the exercises are carried out orally or written on a blackboard. Analysis of results is usually limited to summation of the responses, with little use of statistical approaches. The goal is to stimulate a dialogue with local people about their knowledge and management of resources or about other subjects which have been chosen by the community.

The formal approach, as pioneered by cognitive anthropologists, yields data which is analyzed using a variety of statistical measures. Psychologists, linguists and anthropologists who use this approach insist on randomizing the sequence of the objects and holding each interview in private. Emphasis is placed on the quality of the props. Although small subsets of items may be used at times, it is more common to carry out exercises which include all members of a certain domain or category. For tasks that focus on the classification or use of plant and animal resources, there can be hundreds of items that take many hours to sort or rank. The objective is to discover, in a scientifically rigorous way, how people perceive and classify the natural world.

4.3.6 Preference ranking

One of the simplest analytical tools involves asking people to think of some five to seven items in a category which is the focus of the research or of an issue which is being discussed in the community. Each person arranges the items according to personal preference, perceived importance in the community or another criterion. Each rank is given an integer value (1, 2, 3 and so on) with the most important or preferred item being assigned the highest number. For instance, in a set of five objects the most preferred is rated '5' while the least liked is '1'. These numbers are summed for all respondents, giving an overall ranking for the objects by the sample group of respondents.

Whenever possible, this order of preference is cross-checked with data obtained from interviews and other sources to see if there is consistency in the responses. In preference ranking of a few widely-recognized items, the task can be carried out orally or can be sketched on a large piece of paper which everyone can see. As the

number of items grows it is preferable to have actual samples in hand and to randomize their order before asking each participant to rank them.

Preference ranking can be used, for instance, to elicit a list of plant resources that people feel are becoming increasingly rare in their communal forests. Each participant is asked to arrange the plants from least to most scarce. Another application of preference ranking is to ask people to make a list of the most valuable non-timber forest products in the region and then rank them in terms of the amount of income they yield.

Let's take the latter example, using the case study of Motisingloti village that is described in Box 6.4 (p.189). Shashi Kant and Neel Guarav Mehta reported that the total of some 126 000 rupees a year earned from selling forest products was derived from the following sources (100): timru leaves (39% of the total), mahua flower (23%), mahua seed (18%), bhindi seeds (15%) and sag seeds (5%). In Table 4.6, I have improvised answers for five fictional participants in a preference ranking exercise based on the income they earn from these forest products. The respondents rank the various plants in different ways but the overall order reflects the true income the village has earned from selling these resources.

4.3.7 *Direct matrix ranking*

Direct matrix ranking is a more complex version of preference ranking. Instead of arranging a series of objects on one characteristic such as 'value' or 'desirability', informants order them by considering several attributes one at a time. In other words, preference ranking is based on a single dimension whereas direct matrix ranking draws explicitly upon multiple dimensions.

After choosing a class of objects and defining its members, participants define the good and bad aspects of each. In the example given in Table 4.7, people might offer various observations – 'You can't make charcoal from palms, but you can from eucalyptus, acacias and pines', 'The fruits of eucalyptus aren't very useful' or 'Acacias yield good fodder'.

Table 4.6 An improvised preference ranking of the value of forest products for five households based on the case study of the economics of Motisingloti village in Gujarat, India (5, most valuable; 1, least valuable)

	Respondents					Total score	Ranking
	A	B	C	D	E		
Timru leaves	5	4	5	5	5	24	a
Mahua flower	4	5	3	4	3	19	b
Mahua seed	2	3	4	3	2	14	c
Bhindi seeds	3	1	2	2	4	12	d
Sag seeds	1	2	1	1	1	6	e

Table 4.7 The results of one person's direct matrix ranking of four tree species on seven use criteria, used as an example in participatory rural appraisal training in the Middle East and North Africa described by J. Theis and H.M. Grady (4, best; 1, worst)

	Eucalyptus	Palm	Acacia	Pine
Fuelwood	4	1	2	3
Building	4	1	2	3
Fruit	1	4	2	3
Medicine	4	1	3	2
Fodder	3	-	4	2
Shade	4	3	1	2
Charcoal	2	-	3	4
Total score	22	10	17	19
Rank	A	D	C	B

List these criteria along the left-hand size of a piece of paper and write the names of the items along the top. To simplify the scoring, rephrase negative statements as positive criteria. For example, 'The fruits of eucalyptus aren't very useful' is turned into a general criterion 'fruit' on which eucalyptus is given a low score.

Once the table is ready, people can rank the items according to each criterion, using a numerical scale in which the highest number is equal to the 'best' object and the lowest number to the 'worst'. The results of numerous individual responses can be added together to create a matrix that is representative of the community. Alternatively, direct matrix ranking can be done as a group exercise in which participants reach consensus on the ranking of each item or vote according to their individual assessments.

4.3.8 *Triadic comparisons*

In triadic comparisons, items are presented to participants in sets of three, as exemplified in Box 4.4. After defining the domain and identifying its most important members, triads are set up so that each item appears in every possible combination of three with the other items. After the sequence of the triads and the order within each triad are randomized, informants are shown each set of three and are asked to rank the items 'best to worst', 'most preferred to least preferred' or in another comparable way. Alternatively, the participants can judge the three items on overall similarity, selecting the item which is the most dissimilar to the others or the two that are most similar to each other. By posing questions such as 'Which fruit is the most dissimilar in taste to the others?', the interviewer can document patterns of similarity based on a particular attribute.

Because this test is more complicated than the previous ones, it is a good idea

Box 4.4 Judging the similarity of French pulses with triads test

In order to demonstrate the triads test for this manual, I purchased the following pulses (edible legume seeds) in a French market and assigned them numbers according to the alphabetical order of their names: (1) *chevriers* [the mature, dry seed of string beans (*Phaseolus vulgaris* L.)]; (2) *haricots rouges* [kidney beans (*Phaseolus vulgaris* L.)] (3) *lentilles blondes* [light-colored lentils (*Lens culinaris* L.)]; (4) *lingots blancs* [large navy beans (*Phaseolus vulgaris* L.)]; (5) *pois cassés* [split peas (*Pisum sativum* L.)]; and (6) *pois chiches* [chick peas (*Cicer arietinum* L.)]. I then made a table of all possible combinations of three for these pulses (Table 4.8).

Table 4.8 Alphabetized list of all possible combinations of six types of legumes into sets of three

Number	Order	Items
1	1,2,3	*Chevriers, Haricots rouges, Lentilles blondes*
2	1,2,4	*Chevriers, Haricots rouges, Lingots blancs*
3	1,2,5	*Chevriers, Haricots rouges, Pois cassés*
4	1,2,6	*Chevriers, Haricots rouges, Pois chiches*
5	1,3,4	*Chevriers, Lentilles blondes, Lingots blancs*
6	1,3,5	*Chevriers, Lentilles blondes, Pois cassés*
7	1,3,6	*Chevriers, Lentilles blondes, Pois chiches*
8	1,4,5	*Chevriers, Lingots blancs, Pois cassés*
9	1,4,6	*Chevriers, Lingots blancs, Pois chiches*
10	1,5,6	*Chevriers, Pois cassés, Pois chiches*
11	2,3,4	*Haricots rouges, Lentilles blondes, Lingots blancs*
12	2,3,5	*Haricots rouges, Lentilles blondes, Pois cassés*
13	2,3,6	*Haricots rouges, Lentilles blondes, Pois chiches*
14	2,4,5	*Haricots rouges, Lingots blancs, Pois cassés*
15	2,4,6	*Haricots rouges, Lingots blancs, Pois chiches*
16	2,5,6	*Haricots rouges, Pois cassés, Pois chiches*
17	3,4,5	*Lentilles blondes, Lingots blancs, Pois cassés*
18	3,4,6	*Lentilles blondes, Lingots blancs, Pois chiches*
19	3,5,6	*Lentilles blondes, Pois cassés, Pois chiches*
20	4,5,6	*Lingots blancs, Pois cassés, Pois chiches*

Since the triads in this table have an artificial order that might affect the results of the study, I randomized the sets in two ways: (1) by changing the sequence in which the triads are presented and (2) altering the order of the items within each triad. For the first step, I referred to the random numbers table presented in Figure 4.3. Starting at the beginning of the third row and moving downward, I scanned the first two digits for numbers between 1 and 20, which correspond to the numbers of the triad sets in Table 4.8. Because not all the combinations were found after consulting the first two numbers,

I continued the search using the middle two numbers and then the final two numbers, always beginning at the top of the third column. I obtained the following arbitrary order: 13; 01; 08; 02; 06; 03; 09; 14; 16; 19; 05; 20; 17; 12; 18; 11; 07; 10; 15; 04.

For the second step, I used slips of paper numbered 1–6 to randomize the order of the objects in each set. I decided arbitrarily that if the slip of paper came up (1), the order would be 1st object, 2nd object, 3rd object, based on the alphabetized table; and that (2) = 2nd object, 1st object, 3rd object; (3) = 3rd object, 1st object, 2nd object; (4) = 1st object, 3rd object, 2nd object; (5) = 2nd object, 3rd object, 1st object; (6) = 3rd object, 2nd object, 1st object. When I pulled slips of paper for this task, I had the following results: 4; 1; 4; 6; 2; 2; 5; 5; 4; 5; 3; 6; 1; 3; 3; 5; 6; 6; 6; 1.

Table 4.9 A fully randomized list of all possible triads of six types of pulses. One informant's assessment of the most dissimilar object of each set is indicated in **bold**

Number	Order	Items
13	2,6,3	*Haricots rouges, Lentilles blondes,* **Pois chiches**
01	1,2,3	*Chevriers, Haricots rouges,* **Lentilles blondes**
08	1,5,4	*Chevriers,* **Pois cassés,** *Lingots blancs*
02	4,2,1	*Lingots blancs,* **Haricots rouges,** *Chevriers*
06	3,1,5	*Lentilles blondes,* **Chevriers,** *Pois cassés*
03	2,1,5	*Haricots rouges, Chevriers,* **Pois cassés**
09	4,6,1	*Lingots blancs,* **Pois chiches,** *Chevriers*
14	4,5,2	*Lingot blancs,* **Pois cassés,** *Haricots rouges*
16	2,6,5	*Haricots rouges,* **Pois chiches,** *Pois cassés*
19	5,6,3	*Pois cassés,* **Pois chiches,** *Lentilles blondes*
05	4,1,3	*Lingots blancs, Chevriers,* **Lentilles blondes**
20	6,5,4	**Pois chiches,** *Pois cassés, Lingots blancs*
17	3,4,5	*Lentilles blondes,* **Lingots blancs,** *Pois cassés*
12	5,2,3	*Pois cassés,* **Haricots rouges,** *Lentilles blondes*
18	6,3,4	**Pois chiches,** *Lentilles blondes, Lingots blancs*
11	3,4,2	**Lentilles blondes,** *Lingots blancs, Haricots rouges*
07	6,3,1	**Pois chiches,** *Lentilles blondes, Chevriers*
10	6,5,1	*Pois chiches,* **Chevriers,** *Pois cassés*
15	6,4,2	**Pois chiches,** *Lingots blancs, Haricots rouges*
04	1,2,6	*Chevriers, Haricots rouges,* **Pois chiches**

Table 4.9 shows the resulting randomizations for the sequence of triads and for the order within each triad. Once the fully randomized table was ready, I showed each triad of objects to the editor of this manual and asked him to indicate the most dissimilar item. His responses are shown in bold in Table 4.9. Because each pair of legumes appears a total of four times in the full set of 20 triads, they can be ranked in terms of similarity on a scale of

0–4. These results, presented in the matrix shown in Figure 4.5, reflect the morphological similarity (or dissimilarity) of the pulses. The three species of *Phaseolus vulgaris* are frequently matched because they all have kidney-shaped beans. The split peas and the lentils are grouped together as much for their similar size and rounded shape as for their dissimilarity to beans and chickpeas. The chickpeas are in a class of their own. This result is confirmed by observing that chick peas were considered the most dissimilar item nine out of the ten times they appeared in the triads. The other legumes were considered to be the most dissimilar item between one and three times.

The results of triadic comparisons by different individuals can be added together to obtain an aggregate matrix. The combined responses, which give a quick idea of the majority opinion in the community, can be further analyzed with sophisticated statistical techniques such as multidimensional scaling and clustering to reveal patterns of agreement.

Keep in mind that triadic comparisons can also be used as a tool for ranking. Every item that appears in the set of three is given a rating of 1, 2 or 3, with three being the highest. The ratings of each item are added together to obtain the overall rank. In the case of the six French pulses, each item appears ten times in the set of 20 triads and would thus have an overall score which ranges between 0 and 30.

Triads are usually carried out with relatively few items because the time needed to carry out the task increases exponentially as additional objects are added. The total number of triads needed is given by the formula $n!/3!(n\text{-}3!)$, where n is equal to the number of items. A number followed by ! is referred to as a **factorial** and is obtained by multiplying the series of integers between the number and 1. Thus, 3! is computed as $3 \times 2 \times 1 = 6$, whereas 6! is calculated $6 \times 5 \times 4 \times 3 \times 2 \times 1 = 720$. The example of six pulses requires 20 triads [6!/3!(6–3!) = 720/36 = 20], whereas eight items would necessitate 56 triads [8!/3!(8–3!) = 40 320/720 = 56] and ten items would result in 120 triads [10!/3!(10–3!) = 3 628 800/30 240 = 120]. This rapid escalation in the number of triads means that presenting more than ten items in a single triadic comparison is impractical. A variation on this technique, the balanced incomplete block design, allows up to 25 items to be compared in triads in a reasonable amount of time.

to begin each exercise with a few sample questions so that the local participants can become familiar with the procedure. These questions should be drawn from a subject different from the one you are exploring so that the answers do not affect the participants' performance on the real triadic comparison. For example, if you are testing for similarity of firewoods or preference for different fruits, begin the task with some triads of ornamental flowers, seed types or some other familiar

object. Once people understand how the triadic comparison works, start the exercise using the items that you have selected.

Some interviewers ask respondents to explain, either during the task or after it is finished, the choices they make in specific triads. Depending on whether the triads are being used for ranking or for assessing similarity you can pose questions such as 'Why do you think these two items are similar?', 'What makes this item different from the others?' or 'Why do you prefer this item over the other two?'

The responses for similarity comparisons can be tallied in a matrix such as the one in Figure 4.5. For preference ranking, an overall ranking for each item is obtained by adding together the ranks it is given in each triad in which it appears. In a triadic comparison of four items such as apples, oranges, peaches and pears, each object appears in three different triads. If the pears were rated as '3', '2' and '3' in the three triads in which it appears, its overall rating would be '8'.

4.3.9 Paired comparisons

In paired comparisons, interviewees are shown items which have been arranged in sets of two. Based on discussions with the participants or on previous interviews in the community, define five to ten important options or objects which characterize the subject to be explored. Make written notecards for each option or, in the case of objects, prepare good quality specimens.

	Chevriers	Haricots	Lentilles	Lingots	Pois cassés
Chevriers					
Haricots	3				
Lentilles	1	1			
Lingots	4	3	1		
Pois cassés	0	1	4	1	
Pois chiches	0	0	0	0	1

Figure 4.5 Tabulation matrix for triads test using six pulses. The number of matches between any two items ranges from 0 to 4.

Box 4.5 Paired comparisons of some common fruits

In order to provide an example of paired comparisons, I asked the editor of this manual to state his preference for five common fruits – apple, banana, grapefruit, orange and pear – which I showed him in pairs. Starting from an alphabetical list, I randomized both the sequence of the pairs and the order within each pair. The sequence can be decided by numbering the pairs from 1 to 10 when they are in alphabetical order and then reordering them by reference to a random numbers table or by pulling numbered slips out of a hat, as previously explained. The order within each pair is given by flipping a coin. If heads, the original order is maintained but if tails, the items are switched around. The results of this reordering and the editor's choices are shown in Table 4.10. The responses can be tallied by hand or in a pairwise matrix such as the one shown in Figure 4.6.

Table 4.10 Paired comparisons for five fruits that have been randomized for the sequence of the pairs and the order within each pair. The informant's preference within each pair is shown in **bold**

Pair	Order	Items
9	5,3	**Pear**, Grapefruit
5	3,2	Grapefruit, **Banana**
6	2,4	Banana, **Orange**
8	4,3	**Orange**, Grapefruit
10	5,4	Pear, **Orange**
1	1,2	**Apple**, Banana
4	1,5	**Apple**,Pear
2	1,3	**Apple**, Grapefruit
7	5,2	Pear, **Banana**
3	4,1	Orange, **Apple**

Apple	Banana	Grapefruit	Orange	Pear		Score	Rank
	Ap	Ap	Ap	Ap	Apple	4	A
		Ba	Or	Ba	Banana	2	C
			Or	Pe	Grapefruit	0	E
				Or	Orange	3	B
					Pear	1	D

Figure 4.6 A pairwise ranking matrix for five fruits.

By creating a chain of preferences based on the ranking, you can see if the relationships of preference are consistent throughout the exercise. Given the results in Table 4.10, we can arrange the fruits as follows: Apple > Orange > Banana > Pear > Grapefruit. There is perfect **transitivity** in these

results, which means there are no logical contradictions such as finding that the informant likes bananas better than pears and pears better than grapefruit, but grapefruit better than bananas. Perfect transitivity adds credibility to the data. Inconsistent results would lead you to believe the answers are arbitrary, people do not have strong preferences, the objects are classified on multiple conflicting dimensions or that pairwise ranking is not an appropriate analytical tool for the cultural domain tested.

Adding responses of a representative group of informants allows you to make statements on general cultural trends. You can do this quickly by adding the overall number of times a fruit is chosen by each informant, as reflected in the 'score' column of the pairwise ranking matrices. A more elaborate method is to add together the results within each cell of the matrix, thus breaking down the overall score into its components. These combined results will allow you to state community preferences in a way that is statistically significant. The aggregate scores can be analyzed with a statistical tool called **clustering** to discover if patterns of preference exist within the community. Clustering techniques allow you to evaluate the similarities and differences in the way that informants respond.

Pairwise ranking is normally used with relatively few items because the time needed to carry out the task increases exponentially as you add additional objects. The total number of pairs required is given by the formula $n(n-1)/2$, where n is equal to the number of items. The example of five fruits required 10 pairs [$5(5-1)/2 = 10$], whereas 10 items would necessitate 45 pairs [$10(10-1)/2 = 45$] and 15 items would yield 105 pairs [$15(15-1)/2 = 105$]. The total number of items you choose will depend not only on the complexity of what you are studying but also on the patience of the participants.

Before you begin, compose either a list or a matrix of all possible combinations, as discussed in Box 4.5. This will allow you to keep track of the responses and to ensure that all pairs are shown during the course of the task. After randomizing the order of the pairs, present them to the interviewee, who will choose the one he or she prefers or considers most important – 'the best fruit', 'the highest quality firewood', 'the major cause of deforestation' or another response that is appropriate for the question posed.

In order to gain insight into people's reasoning, you can ask the participants to describe why one option is better or worse than another. In addition, you can ask if the preferred item has any negative qualities or if the one not chosen has any positive aspects. Some researchers ask for these comments after each choice, whereas others prefer that respondents complete the entire task before giving their general observations on the overall pattern that emerges. If you ask someone to

say why they like one fruit better than another after each choice, they might respond with statements such as 'grapefruits are too sour' or 'bananas are too slimy but I like their flavor' or 'pears taste good because they are sweet and juicy'. If you asked for their opinion after finishing the exercise, they may be able to synthesize these observations into a general statement along the lines of 'I like sweet, juicy fruits but I can't stand sour or slimy ones'. Although these conclusions may be obvious for some domains – including favorite fruits – they often allow both the interviewer and the respondent to discover underlying rules or tendencies that explain people's behavior.

After the task is done, you can ask the participants if they have thought of any additional items or criteria left out of the original listing. If so, these can be merely inserted at the appropriate place in the ranking or you can create a new set of possible pairs for the informant to review and comment upon.

On another day, you can verify the consistency of the answers by asking respondents to carry out a preference ranking with the same fruits. A simpler way to check is to pose directly the question, whether in an interview or in open conversation, that was addressed in the exercise: 'What is your favorite fruit?' or 'What is the greatest cause of deforestation in the community?'.

4.3.10 Pile sorting

In the pile sort task, participants divide objects into a number of groups according to the overall similarity of the items. Imagine that someone asks you to sort the produce from a home garden into piles containing similar objects. You might start by creating separate mounds of fruits, vegetables, medicinal herbs and ornamental flowers. If you were asked to continue, you might divide the fruits into a series of piles that contain berries (raspberries, strawberries, blueberries), citrus fruits (oranges, grapefruits, lemons) and pome fruits (apples and pears). Finally, you may make distinct piles for oranges, grapefruits and lemons. This would be continued for the other fruit, vegetable, medicinal herb and flower piles until all objects are classified.

In practice, pile sorts are usually carried out with cards, which allows large numbers of concrete or abstract things to be classified in a relatively short period of time. After defining the domain that interests you, write the name of all relevant items on small notecards, using large and legible print. If you are working with non-literate informants, you will be obliged to use picture cards or real objects, ensuring that they include the key features that people use to recognize and classify the items.

Each participant shuffles the cards and then proceeds to make piles according to his or her notion of similarity. In some cases you may want to specify that the items be sorted according to a certain attribute that interests you, such as commercial value, scarcity or utility. Some researchers allow as many piles as the interviewee chooses, whereas others workers restrict the number by asking 'Please sort

Pile 1	Pile 2	Pile 3	Pile 4
Carrots Potatoes Beets	Corn	Oranges Lemons	Bananas

Figure 4.7 A pile sort of produce harvested from a home garden.

the cards into two (or three, four or more) piles of similar objects'. You can obtain additional information that will help you to interpret the results by asking the participants what the objects in a single pile have in common or what differences there are between two separate piles. Most people do this after all the piles have been formed so that the participants do not change the way they sort in the middle of the exercise.

After the piles have been made, the results are tabulated in a similarity matrix like the ones used in triadic and pairwise comparisons. In order to demonstrate this, let's return to the example of home garden produce with which this section began. If you were asked to sort out a harvest of bananas, beets, carrots, corn, lemons, oranges and potatoes into an unlimited number of piles, you might come up with the arrangement shown in Figure 4.7.

Draw a matrix, such as the one depicted in Figure 4.8, that gives a pairwise comparison of all these items. Pairs found in the same pile are scored with a one. If the two items are found in different piles, the corresponding box in the matrix is filled with a zero. As additional people complete this task, community-wide patterns of the perceived similarity between the objects will emerge which can later be analyzed using various statistical approaches. By comparing the matrices presented in Figures 4.5, 4.6 and 4.8, you can see that triadic and pairwise comparisons yield more data per person than sorting tasks. For this reason, 20 or more participants are needed in pile sorting to achieve statistically reliable results, whereas less than 10 are acceptable in triadic and pairwise comparison tasks.

There are many variations on the pile sort that add flexibility to the technique, allowing you to adapt it to your own study. For example, if someone believes that

	Bananas	Beets	Carrots	Corn	Lemons	Oranges
Beets	0					
Carrots	0	1				
Corn	0	0	0			
Lemons	0	0	0	0		
Oranges	0	0	0	0	1	
Potatoes	0	1	1	0	0	0

Figure 4.8 A similarity matrix based on the results of a pile sort of fruits and vegetables harvested from a home garden.

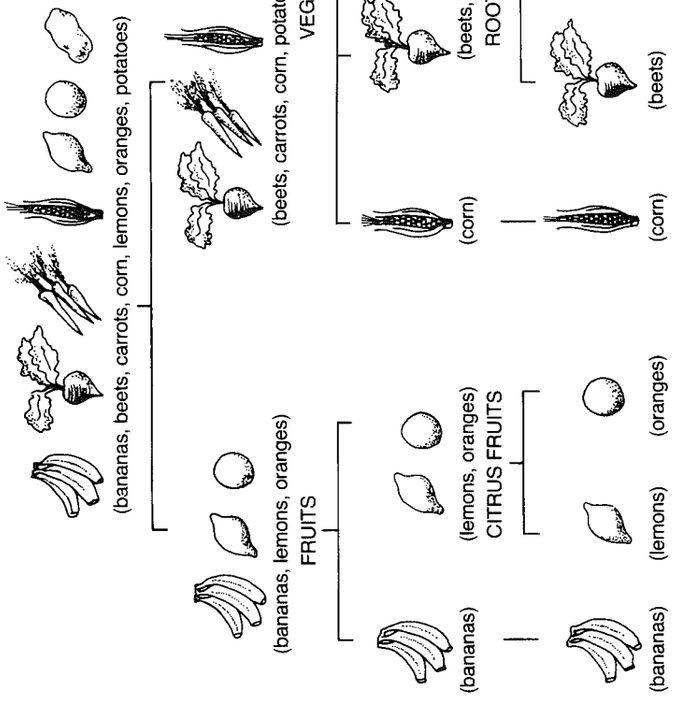

Figure 4.9 Taxonomic structure derived from a pile sorting of home garden produce. Piles are indicated by parentheses ( ) and named subgroupings are shown in capital letters.

an item belongs in more than one pile, additional cards can be made and placed in the various groupings, effectively allowing people to split their vote. During the course of the exercise, people may think of additional items that were left out of the original set of cards. These can be written onto cards and included in the appropriate piles at any point during the task. After participants make a first sort, you can ask them to break down the resulting piles into ever smaller ones. This successive sort is scored in the same way as a single sort. Pairs that remain together in the same pile after the second sort are given a value of '1', which is added to the value in the appropriate matrix box. If they are still together after the third stage of sorting a '1' is again added and so on until they are split into different piles or the sorting task ends.

If the sorting continues until every pile contains just a single item, it gives a complete taxonomy of the items which can be sketched out on paper. As you construct this tree with local counterparts you can ask if the various subgroupings have names. An improvised example of a complete successive sort and a resulting taxonomic structure is given in Figure 4.9. This technique is particularly useful in studies of local classification of plants and animals, a subject that is discussed in greater detail in Chapter 7.