Alyawarra Ethnographic Database: A Guide to Contents, Structure and Operation

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Introduction

In 1971-72, I conducted field research with an isolated, semi-sedentary population of 264 Aboriginal people of the Alyawarra tribe of Central Australia. Although there are several conflicting definitions of “tribe” with regard to Australian Aboriginal societies (Peterson, 1976 *passim*), I will not enter that controversy in this paper. Here, it is sufficient to define the term as something like “dialect group”.

I designed the project as an experiment in quantitative research methods, and modeled it along the lines of exploratory observational studies of free-ranging nonhuman primates. However, I also capitalized on the fact that humans can talk, and recorded several kinds of information that are difficult or impossible to obtain in primate field studies.

The principal objectives of the project were the following:

- to generate a large, richly interconnected, numerically coded data base containing information on a broad range of topics often of interest to anthropologists, ethologists, and others concerned with social behavior of humans and nonhumans
- to organize the data in such a way that anyone with a legitimate scientific need for access to the material could use them
- to see if this approach to ethnographic fieldwork could be useful both for describing a specific population and for testing hypotheses concerning many different aspects of social behavior.

The fieldwork yielded eight distinct numerically coded sets of data:

- vital statistics
- genealogies
- kinship data
- censuses
- maps
- group compositional data
- observational behavior stream records
- meteorological records.

The sets are linked with each other in multiple ways, and all of the data - approximately 440,000 numerically coded items - have been placed on a fully documented magnetic tape for computer-assisted analysis.

This paper is a detailed description of the database and the research methods used to generate it. The methods described here can be generalized and adapted to a broad range of field settings, but they can be described most easily and understandably through specific references to the research site and population with which they were developed. Hence, the first part of the paper is a general ethnographic description of the physical and social setting in which the research was performed. It should be scanned rapidly for background information. The second part explores the conceptual foundations of the data base; describes the structural and coding schemes that
characterize the individual data sets and integrate the data base as a whole; discusses
data acquisition, sampling, and quality control procedures; examines questions of
validity and reliability; and presents a technical description of the data tape. The final
part demonstrates some of the ways in which the data base can be used for teaching
and research.

Throughout the paper, I emphasize general problems related to computer-oriented
ethnographic fieldwork that employs behavior stream recording as a major research
tool, paying attention to both the limitations and the advantages of this kind of research.
At the same time, however, the paper is sufficiently detailed to serve as an instruction
manual for anyone who wishes to design a similar project or to use the Alyawarra data
tape for research or teaching purposes.

The taped version of the database is available, with the manual, from Human Relations
Area Files, New Haven, Connecticut. (In 2003 the entire Alyawarra Ethnographic
Archive is scheduled to become available on CD-ROM and the World Wide Web).
Chapter 1. Setting

Physical Setting

Prior to White Australian settlement in Central Australia around the beginning of the Twentieth Century, Alyawarra-speaking Aboriginal hunter-gatherers occupied land surrounding the Bundey and Sandover Rivers northeast of the present town of Alice Springs. My evidence indicates that their country traditionally extended from the headwaters of those two rivers in the west to the site of Mada Bore, seven miles east of Argadargada Homestead in the east, and from Elkedra Creek in the north to a place somewhere between the Bundey and Plenty Rivers in the south. This area of roughly 35,000 sq. km. (13,500 sq. mi.) is near the geographical center of Australia at approximately 135 East Longitude and 22 South Latitude, and at an elevation of approximately 460 m. (1500 ft.), as shown in Figure 1.

![Figure 1 Locational Map](image)

Although the introduction of alien animals and Western technology had disrupted the fragile indigenous ecosystem by 1971, it is safe to say that Alyawarra country was relatively inhospitable even before White Australians arrived there. Slater (1962)
indicates that the area receives an average rainfall of 25.4 cm. (10 in.). However, the variability of rainfall is at least as important as its average amount in an arid zone. Sketchy data available for the years 1955-1970 from ten privately operated weather stations located on cattle stations (ranches) in Alyawarra country reveal that rainfall is highly unpredictable there. Rainfall data provided by the Commonwealth Bureau of Meteorology (1972) indicates that the smallest total reported during an entire year at one of those sites was 1.7 cm. (0.67 in.) and the largest was 44.17 cm. (17.4 in.).

Generally speaking, January and February are the wettest months and July and August are the driest, but there is as much variability in rainfall timing as there is in annual totals. While the effectiveness of rainfall is determined by several factors, a rule of thumb expressed by residents of the area is that a minimum of 5 cm. (2 in.) of more or less continuous rain is necessary to bring about any important changes in vegetation. The sketchy rainfall records reveal that falls of 5 cm. or more have occurred somewhere in Alyawarra country in every month except September and November. At the same time, each site record shows at least one 2-year period during which no month had 5 cm. or more of rainfall.

So, despite an average annual rainfall of 15.4 cm. and an average monthly rainfall that is highest in January and February, it is somewhat misleading to divide the year into wet and dry seasons or to think of rainfall as a cyclical activity with a twelve-month periodicity. Rather, there are wet times and dry times, and two consecutive wet times may be separated by as little as a few dry months or as much as several dry years.

Spatial variability is yet another important characteristic of Central Australian rainfall. Summer rains that occur in conjunction with major monsoonal depressions moving inland from the Indian Ocean may yield widespread, evenly distributed falls over many thousands of square kilometers, but highly localized thunderstorms, which are much more common, generally produce flash floods along ordinarily dry river channels, sending huge quantities of water rushing along highly absorbent riverbeds through country that received no rainfall at all. They provide water for vegetation in and beside the channels and for animals that can seek out the water that is there, but have no effect on vegetation outside the small rainfall areas and the riverbeds.

Temperature, unlike rainfall, is distinctly cyclical, with regular twenty-four hour and twelve-month periods. Except for rare periods of rainfall or heavy cloud cover, diurnal fluctuations of 14-17° C. (25-30 °F.) are common, with summer highs reaching 43 °C. (110 °F.) and winter lows almost reaching the freezing point. The hottest months are December and January and the coldest are June and July.

Humidity is very low throughout the year in Central Australia, and the dew that is an important source of moisture in some arid regions is rare in Alyawarra country. With relative humidity averaging close to thirty percent, temperatures at night must fall almost to freezing before the dew point is reached (Slater, 1962).
High temperatures, low humidity, and clear skies combine to produce an average annual evaporation rate of 240 cm / 95 in, while the average annual rainfall is only a tenth of that amount. This situation, combined with geomorphological factors, means that there is no permanent, naturally-occurring surface water in Alyawarra country.

Except during the coldest months, whirlwinds move across the desert frequently, as many as ten swirling columns of dust and sand, towering hundreds of meters in the air, often being visible simultaneously from a good vantage point. Some of them are powerful enough to be dangerous, but most of them are not. Likewise, dust storms lasting three or four days sweep in from the southeast several times each year, reducing visibility to a few meters and making travel virtually impossible, but ordinarily posing no serious threat to human life.

![Figure 2 Topographic and Cultural Map](image)

As Figure 2 shows, the research site was located in country that was mostly flat to gently rolling. The western end of the Dulcie Range, a sandstone plateau with relief to 90 m. (300 ft.) at some points in the area, is one of the few conspicuous landmarks. Others are Mount Michael and Tower Rock, both of which rise about 105 m. (350 ft.) above the surrounding plains. In the southwest of Alyawarra country, the plains have an
elevation of about 550 m. (1800 ft.), and in the northeast their elevation is about 260 m. (850 ft.). The mean gradient of less than one in a thousand is not noticeable.

Since the hills are rocky with occasional patches of sandy soil, and the plains are of sand or red earth and clay, water erosion has produced many short, narrow flood channels. Most of them carry the rare rains from the hills into floodouts in nearby plains where the water sinks rapidly into the earth or evaporates. The two notable exceptions are the Bundey and Sandover Rivers. After heavy rains, they flow from southwest to northeast, merging at Ammaroo Homestead, and continuing eastward for a total length of about 400 km. (250 mi.) before disappearing into a huge floodout.

Central Australia is poor floristically, with fewer than 1200 species of vascular plants in the entire area (Perry and Lazarides, 1962). The plants that are there are generally low in stature and form simple but highly variable communities. Except for a remarkable absence of succulent and thorny species, the vegetation has much in common with that of other arid regions of the world. All of the plants are adapted in one of three ways to withstand long periods of drought.

- Perennial drought-resisting plants remain in a vegetative state even during extreme droughts. They include _acacia_ species such as mulga and gidgee, the two most common trees in Alyawarra country, and _triodia_ and related species of grasses known collectively as spinifex.
- Perennial drought-evading plants are deciduous and endure droughts in a dormant state. They include the kurrajong tree (_Brachychiton gregorii_) and a few species of grasses and shrubs.
- Ephemeral drought-evading plants go through their entire life cycles in brief periods immediately following rains, sprouting, growing very quickly, and producing a new generation of extremely hardy seeds within a few short weeks. They include many short grasses, legumes, forbs, and other low plants that frequently constitute the ground story under shrub and tree communities.

Alyawarra country in general, and the part of it where the research was conducted in particular, may be divided into three large classes based on differences in physiography and plant communities (Perry and Lazarides, 1962). They include the following divisions whose boundaries areas appear in Figure 3.

- Spinifex sand plains (vertical stripes): broad expanses of flat sand plains covered with spinifex tussocks (_triodia basedowii_) and having few or no trees
- Uplands (horizontal stripes): rugged hills and plateaus of sandstone with sparse vegetation.
- Short grass plains (no stripes): undulating plains of red earths carrying short grasses and forbs under a sparse cover of low trees such as mulga (_acacia aneura_) and witchetty bush (_acacia kemoeana_)
The spinifex sand plains are harsh and monotonous, being avoided with equal determination by kangaroos, cattle, and humans. Water is available there for only a few days following a rain, and edible vegetation ordinarily is quite rare. The uplands are physically difficult to traverse, but they offer shade and occasional patches of valuable vegetation, animal life is more abundant, and rain water collects there in scattered rock holes where it remains available for longer periods than it does in the spinifex plains. The short grass plains are quite good in comparison with the spinifex plains and the
uplands. This undulating country carrying short grasses and low trees supports a richer variety and larger quantity of animals, it is easier to traverse, and it contains most of the river channels where water can be obtained by digging deep soakages as much as several months after all surface water has disappeared. These better areas constitute a small portion - perhaps a third - of Alyawarra country.

Although the Alyawarra had given up much of their traditional hunter-gatherer lifestyle by 1971, their land still supplied them with many things that were available from no other source. These included indigenous plant and animal foods, fuel for warming themselves and cooking their food, materials for building residences and making tools and other kinds of utilitarian and ceremonial artifacts, paint stones and other art supplies, and a psychotropic drug from a plant called *pituri*. The variety of indigenous foods being used in 1971-72 was large, but the introduction of government subsidized rations of White Australian foods in 1958 had reduced all except one native food to the status of delicacy or embellishment on the standard fare of rations. The one exception was the red kangaroo (*megaleia rufa*) which served as the principal source of meat for the research population.

The plants and animals of Alyawarra country changed considerably in the century after White Australian exploration and settlement began in Central Australia. With the explorers came horses and then camels, many of which escaped or were released to live in wild herds roaming in or near Alyawarra country. Settlers brought herds of cattle, sheep and goats, most of which remained at least semi-domesticated, and they brought dogs and cats, many of which produced feral offspring in a very short time. Then there are the ubiquitous rabbits, still rare in some parts of Alyawarra country but breeding prolifically in other parts.

Introduced species have contributed to the extinction or near extinction of some native species, and they have over-grazed the vegetation in some areas. Fences erected to control the movements of cattle also interfere with the free movements of kangaroos. Vehicle tracks, graded roads, and fire breaks crosscut the fragile desert, leaving scars slow to heal even when they have an opportunity to do so.

Yet the desert retains its distinctly Australian personality. During dry times, when green plants are scarce, great mobs of kangaroos move through the shrubs and sparse trees, congregating at receding patches of edible vegetation where they are torpid and easy to hunt. After a rain, when they disperse in groups of two or three to feed on fresh plants, they are alert to the slightest movement and are very difficult to approach. Emus appear occasionally, and wallabies are plentiful in the hills. Bush turkeys and other birds are easy to hunt after rains, and a multitude of vegetable foods appear then. The spinifex plains are harsh under the best of conditions, but the good land is indeed good, if one only knows where and how to find the resources that are available there.
Social Setting

Spencer and Gillen had some contact with the Alyawarra (which they spelled Iliaura) at the end of the 19th century, but the nature and duration of the encounter are not clear (Spencer and Gillen, 1899). It seems likely that the contact occurred to the southwest or west of Alyawarra country in territory of the Aranda or others, and it seems likely that the duration of the contact was brief in comparison with the time they spent with the Aranda. Although the Alyawarra and the Eastern Aranda can understand each other if they speak slowly, the two groups use different Arandic dialects.

Homesteaders first arrived in Alyawarra country late in the first quarter of the Twentieth Century. In 1923, Charles Chalmers and his family established MacDonald Downs Station where the research site was located. It was neither the first nor the last station to be settled in Alyawarra country, but it has proved to be one of the most stable. By 1972, the several branches of the Chalmers family were raising about three head of cattle per square mile on roughly 13,000 sq. km. (5,000 sq. mi.) of Central Australian pasture lands.

Without going into any details here, suffice it to say that, by Central Australian standards, relations between the Chalmers family and the Alyawarra have been extraordinarily harmonious. The Chalmers did very little during their first half-century in Alyawarra country that could be interpreted as intentional efforts to alter Alyawarra behavior patterns or beliefs. Of course the unintended consequences of White settlement were extensive and profound, and they are discussed in considerable detail below.

In 1930, Cleland and Tindale visited for about three weeks with the Alyawarra at MacDonald Downs. They published no significant ethnographic materials as a result of their visit, but a film that they made at MacDonald Downs contains little visible evidence of change introduced by White Australians (Adelaide University, 1930). Eventually, White Australian settlement resulted in major changes in the distribution of the Alyawarra and a gradual decline in their self-sufficiency as hunter-gatherers, but much of the impact of settlement seems to have by-passed the tribe until the 1950’s.

A popular but accurate history of MacDonald Downs and early relations between the Chalmers family and the Alyawarra appears in Ford (1966).

As of August 1971, the Alyawarra lived at three principal locations:
- Warrabri Settlement at or beyond the northwestern limit of Alyawarra country about 325 km. (200 mi.) north of Alice Springs
- Lake Nash Station far beyond the eastern limit of Alyawarra country on the boundary between the Northern Territory and Queensland, about 525 km. (325 mi.) northeast of Alice Springs
- MacDonald Downs and Derry Downs Stations well within traditional Alyawarra country about 210 km. (130 mi.) northeast of Alice Springs.
These are straight-line distances which are approximately a third shorter than road distances. Other small groups of Alyawarra lived at camps elsewhere in the vicinity of the Sandover River and in Alice Springs.

I estimate that the total population of Alyawarra-speaking people as of 1 August 1971 was 470, a figure that is nine percent larger than the 430 people reported in the 1957 Aboriginal census cited by Meggitt (1968).

Each of the three major groups in 1971-72 lived under conditions that were significantly different from those of the other two groups.

At Warrabri Settlement, the Alyawarra were part of a linguistically mixed population of several hundred Aboriginal people living in crowded quarters on a government reservation with a sizable staff of non-Aboriginal medical and educational technicians and administrative personnel.

At Lake Nash Station, where a large majority of the Aboriginal people were Alyawarra (Yallop, 1969), many of the men were employed as stockmen by the non-Aboriginal owners of the cattle station, while other people received incomes from government sources such as old age pensions and child endowment. There seemed to be a mutual dependency there between the Aboriginal people who were firmly ensnared in the money economy and non-Aboriginal businessmen who relied on indigenous labor for the operation of the cattle station.

At MacDonald Downs and adjacent Derry Downs, a few of the Aboriginal men worked intermittently as stockmen, and many of the people received funds from the government, but they were the only one of the three major groups of Alyawarra to receive regular weekly rations and the only ones to depend almost exclusively upon kangaroo hunting for their regular supplies of meat. Although living conditions of all three groups differed greatly from those prevailing in Central Australia before White Australian settlement began there, it seems likely that divergence from pre-contact conditions was greatest at Warrabri Settlement and least at MacDonald Downs and Derry Downs.

In the course of the fieldwork, I visited Lake Nash and Warrabri as well as several other smaller camps, but all of the research to be described below was conducted with the Aboriginal people living at MacDonald Downs and Derry Downs Stations. Hence, living conditions there in 1971-72 require more attention than conditions at Warrabri Settlement and Lake Nash Station.

At MacDonald Downs and Derry Downs (abbreviated henceforth as MD-DD), the Aboriginal people lived in four separate camps, each typically occupied by 30 to 100 people. Bendaijerem and Angungera camps were less than 1.6 km. (1 mi.) from White Australian homes, Liladera camp was about 13 km. (8 mi.) from the nearest occupied White Australian home, and Gurlanda camp - the largest camp and the one where I lived and conducted most of the research - was 28 km. (16 mi.) from the nearest White Australian home.
Australian home. Figure 2 shows the locations of the camps and Table 1 Camp Populations shows their sizes on 1 August 1971.

<table>
<thead>
<tr>
<th>Camp Name</th>
<th>Number of Residents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gurlanda</td>
<td>101</td>
</tr>
<tr>
<td>Bendaijerem</td>
<td>67</td>
</tr>
<tr>
<td>Liladera</td>
<td>28</td>
</tr>
<tr>
<td>Angungera</td>
<td>38</td>
</tr>
<tr>
<td>Total</td>
<td>234</td>
</tr>
</tbody>
</table>

**Table 1.** Number of residents in each of the Aboriginal camps at MacDonald Downs and Derry Downs Stations on 1 August 1971.

Each of the camps at MD-DD was located within 800 m. (1.2 mi.) of a permanent water supply coming from a bore (well) equipped with a diesel engine or a windmill. The bores, which were drilled by the Chalmers family to provide water for livestock, brought up enough good water to meet the needs of small human groups as well.

About 234 people typically occupied the four camps. Most of them were interrelated through multiple genealogical ties, and all of them spoke the Alyawarra language as a first or second language. The camps were semi-permanent, with major changes in their locations occurring about once every three years. By “major change”, I mean abandoning a camp and the bore where it is located, and establishing a new camp at a different water supply many miles away. Less drastic changes in camp locations occurred much more frequently, and the composition of the population at each camp was highly unstable, with people moving frequently from one camp to another within the group of four. More rarely, a new individual or family arrived from outside the area, or a resident of one of the MD-DD camps moved to another cattle station, to Alice Springs, or elsewhere. A total of 264 Aboriginal people are known to have lived for at least thirty consecutive days in one or more of the camps at MD-DD, and many others visited briefly, usually in conjunction with ceremonies. The 264 who lived there for at least thirty consecutive days constitute the complete research population.

Because of the linguistic uniformity, the high density of genealogical ties, and especially the much higher rate of movements among the four camps rather than into and out of the area, it seemed reasonable for me to circumscribe this group of camps as the one to study. Including any other camps within reasonable traveling distance would have resulted in my crossing linguistic boundaries, and a population larger than the one in the MD-DD group was not required by the research design. Excluding any of the MD-DD camps from the study would have resulted in my working with a highly unstable population that would have been a little too small to yield the genealogical and kinship data that I wanted to obtain. Straight-line distances between all major Alyawarra camps on 1 August 1971 appear in Table 2.
residences: *ngundya*, *alugera* and *anoardegan*. These residence types are illustrated in Plates 1-3 (below). An *ngundya* is a single men’s residence, a sort of meeting place and “dormitory” whose residents might include widowers, young initiated unmarried men, and initiated men whose wives are absent from the camp where the men spend the night. An *alugera* is a residence for widows and their young children if they have any, unmarried young women, and married women whose husbands are absent from the camp. An *anoardegan* is a residence for a nuclear family; i.e., a man, his wife or wives, and their prepubescent children.

<table>
<thead>
<tr>
<th></th>
<th>Lake Nash</th>
<th>Warrabri</th>
<th>Angungera</th>
<th>Liladera</th>
<th>Bendaijerem</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gurlanda</td>
<td>335</td>
<td>155</td>
<td>50</td>
<td>40</td>
<td>25</td>
</tr>
<tr>
<td>Bendaijerem</td>
<td>320</td>
<td>185</td>
<td>55</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Liladera</td>
<td>330</td>
<td>195</td>
<td>40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Angungera</td>
<td>280</td>
<td>155</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warrabri</td>
<td>370</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Table 2.* Approximate straight-line distances in kilometers between the six major Alyawarra camps on 1 August 1971.

Each camp consisted of three socially distinct but architecturally similar types of Ordinarily, each camp had only one ngundya that all the men in the camp used. The number of alugeras in a camp varied from one to five, with each of them serving as a focal point for the activities of the women and children from a small number of nuclear families who comprised alugera-centered subcommunities within the larger camps. The number of anoardegans in a camp ranged from two to twenty-five, and the number in any one camp changed frequently as people moved about.

In 1971-72, residential structures at MD-DD continued to be built in traditional designs, but introduced materials were intermixed with native materials in many of the structures. The structures, like the camps themselves, were constantly changing, with alterations in their configurations occurring on a daily or even hourly basis. Those changes were related to variations in daytime high temperatures and nighttime lows, the direction and intensity of wind and sun, the likelihood of rainfall, availability of building materials, and so on. On a randomly selected day, the range of variation in sizes and shapes of structures within a camp was enormous, but the assortment of structures that comprised each residence almost always included shades, shelters, and windbreaks (Plates 1-6).
Plate 1 (SL224) shows an alugera (single women’s residence) at Gurlanda Camp in cool dry weather. The alugera, which occupies the entire foreground, has two major sections. In the center and to the left is the cooking and daytime living area with shades and a couple of smaller windbreaks. To the right in the middle distance is the much larger windbreak that protects the sleeping area. Other structures include three anoardegans in the left distance and the ngundya under the more distant tree to the right of center.
Plate 2 (SL231a) shows a wet weather alugera, considerably more complex than the one in Plate 1. At the right foreground is an extended shelter with tarp roof and spinifex walls. Just beyond it to the right is a long windbreak with poles that could support additional tarps if needed, and evidence of burned-out warming fires near the windbreak. At the extreme left are a cooking pit and a pan sometimes used for cooking damper (bread). The cluster of structures near the tree includes a shade from which containers hang. In addition it contains four shelters for hunting dogs. All are well protected with spinifex walls and roofs, and two are covered with tarps. The open space in the middle of the alugera is the main activity area for the large number of women and children who use the alugera every day.

Plate 3 (SL246) shows an anoardegan (single-family residence) in hot weather when rain was expected. The shade on the left has a great deal of spinifex grass incorporated into the thick roof, while the shelter on the right uses a tarpaulin as its roof. The photograph shows several important items of Western manufacture including a shovel, water cans, clothing, blankets and cups.
Plate 4 (Pr101) shows the Gurlanda ngundya (single men’s residence) in cold weather. Main features include a long windbreak that provides protection for a large number of young and old men on cold nights, a line of sleeping depressions separated by burned out fires, poles to hold a tarp if rain surprises the occupants, remains of a kangaroo cooking fire and a great deal of open space.

Plate 5 (SL245a) shows the Gurlanda ngundya during a wet period.
Plate 6 (SL254) shows a contemporary residence at Lake Nash Station. Unlike camps at Warrabri and Lake Nash where residences were packed so close together that several of them sometimes shared common walls of corrugated metal, the camps at MD-DD were spacious places, with the light and airy residences of nearest neighbors sometimes separated by as much as 60 m. (200 ft.) and never separated by less than 8 m. (25 ft.). Since the total area of the four camps at MD-DD was about 0.155 sq. km. (0.06 sq. mi.) and the typical population was 234 people, in-camp population density was approximately 1510 people per square kilometer or 3900 people per square mile.

Figure 4 Camp Resource Areas
Immediately surrounding each camp was an area where residents collected water, firewood, and building materials, as depicted in Figure 4. At the largest and most isolated camp, these items came from Figure 4, Area 1. Government subsidized rations consisting of flour, baking powder, yeast, tea, syrup, powdered milk, sugar, rice, potatoes, onions, fruit, baby food, and laundry and bath soap, which the Chalmers family distributed at weekly intervals at MacDonald Downs homestead, had greatly reduced the importance of native vegetable foods in the Aboriginal diet, but when the residents of Gurlanda camp collected those foods, they did so in Figure 4, Area 2. Men of the camp hunted kangaroos every two or three days in Figure 4, Area 3. Similarly complex resource areas were associated with each of the other camps, and together their total area was about 520 sq. km. (200 sq. mi.). There was approximately 0.45 Aboriginal person per square kilometer or 1.2 people per square mile of regularly used resource area.

At some time within a period of sufficient length - perhaps a decade - some member or members of the linguistic group probably visited each part of the 35,000 sq. km. claimed by the Alyawarra. Occasionally they visited totemic sites that were scattered throughout the country, collected red, white, and yellow paint stones from isolated hills, and visited burial sites that were at remote points well away from camps and resource areas. Clearly these areas were very important to the Alyawarra, but the people used them in ways and with frequencies that were radically different from the behavior patterns associated with the camps and resource areas. At this scale Aboriginal population density in Alyawarra country was about 0.007 person per square kilometer or 0.025 person per square mile. Population densities in camps and resource areas and in Alyawarra country as a whole are summarized in Table 3.

<table>
<thead>
<tr>
<th>Type Of Area</th>
<th>Total Size (sq. km.)</th>
<th>Population Density (people per sq. km.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camp</td>
<td>0.155</td>
<td>1510.000</td>
</tr>
<tr>
<td>Resource Area</td>
<td>520.000</td>
<td>0.145</td>
</tr>
<tr>
<td>All of Alyawarra Country</td>
<td>35,000.000</td>
<td>0.007</td>
</tr>
</tbody>
</table>

**Table 3.** Space utilization and population densities in Alyawarra territory on 1 August 1971.

The small but regular flow of money into the Aboriginal camps at MD-DD arrived in the form of pensions and child endowment funds from the Australian government, and in wages paid to men when they worked rarely and intermittently as stockmen. Much of it was spent for extra food at the small store at MacDonald Downs homestead, and some was spent for luxury goods such as portable radios and record players that were sold by a traveling store that visited the area a couple of times a year. A sizable portion of it was spent for items of Western technology that had become important staples in the Alyawarra way of life in the early 1970's, including .22 caliber rifles and ammunition for
them, used motor vehicles, and fuel and spare parts to keep the vehicles in operation. Men almost always hunted kangaroos with rifles, and they used automobiles both for hunting and for transporting rations from the distribution point to the camps.

In addition to providing rations and money, the Australian government interacted with the Alyawarra at MD-DD through health and education programs. Health services consisted of a visit once every six weeks by two nurses poorly trained in public health and not trained at all in the cultural patterns of their Aboriginal patients. Their duties included immunizing and regularly checking the weights of babies and children to the age of five years, and providing emergency services on those rare occasions when emergencies happened to coincide with their visits. The Chalmers family provided routine first aid as required and consulted with the staff of the Royal Flying Doctor Service via short wave radio concerning more serious problems. The Flying Doctor Service air-evacuated critically ill patients when necessary. Although medical services were poor, health among those who survived the first year of life was generally good.

The Northern Territory Administration was aggressively pursuing a policy of enrolling Aboriginal children in schools established for them on or near cattle stations where they lived. But the schools operated in such a way that they were incompatible with the expressed interests and needs of the Aboriginal people in the research population. One of them was in operation at Utopia Station, about forty miles away from Gurlanda and Bendaijerem camps, but the Alyawarra at MD-DD refused to attend it. Some of the children at MD-DD had been exposed to White Australian schooling at Lake Nash, Warrabri, and elsewhere, but they were in a tiny minority and their exposure had been minimal.

In other parts of the Northern Territory, Aboriginal people had felt strong missionary influence, but it was negligible at MD-DD. There were no missions in or near Alyawarra country, and the nearest one was almost 1480 km. (300 mi.) by road from MacDonald Downs.

Likewise, beer and other alcoholic beverages, which caused enormous problems among some Aboriginal groups in Central Australia in the early 1970’s, caused no problems at all in the camps at MD-DD. Both the Aboriginal people and the Chalmers family strongly discouraged their importation, and the nearest source of supply was about 200 km. (125 mi.) from MacDonald Downs.

An exhaustive bibliography of publications that mention the Alyawarra is available from the Australian Institute of Aboriginal and Torres Straits Islands Studies, P.O. Box 553, Canberra City, A.C.T. 2601, Australia.

**A Typical Day**

This section describes a hypothetical day in the life of the people at Gurlanda camp, with each example of behavior selected to contribute to a composite picture of life
among the Alyawarra at MD-DO in the early 1970’s. Generally speaking, the examples were chosen in order to suggest the kinds of activities in which people of various ages of each sex might engage at different times of the day. The activities observed during any real day were affected to a great extent by temperature, rainfall, wind speed and cloud cover, and by the presence or absence of an operative motor vehicle. Special factors including Alyawarra ceremonies and essentially non-Alyawarra activities such as the distribution of rations and the arrival of health officials also influenced daily routines. Since I disregarded most of the important special events in preparing the following description, the composite day is somewhat artificial; however, I discuss some of the special events separately at the end of this section.

The day begins at or shortly after sunrise when people begin to unroll from their blankets and put on any clothing they might have removed before going to sleep. Even in midsummer, the hour just before sunrise can be uncomfortably cool, and the windbreaks and blankets at every residence encourage people to stay still until the temperature begins its rapid rise. Often it is as much as two and a half hours after sunrise before the last late-rising child is up and about.

People urinate on the porous sand in the immediate vicinity of their residences shortly after waking and at other times during the day. They leave the camp alone intermittently throughout the day to defecate well away from and out of sight of all residences.

The first job of the morning, done ordinarily but not exclusively by women, is collecting a few dead limbs from open areas between residences or from the countryside adjacent to the camp, and using the wood to build up the small cooking fires that died away overnight. As soon as a fire is going again, someone sets a can of water in it to make the morning tea which, with kangaroo meat and bread or damper (an unleavened bread) from the previous day, is breakfast.

Although most people eat breakfast at the residences where they spend the night, there usually are a few people who go to other places for breakfast. Young men who have been initiated but who have not married yet obtain their breakfasts from their parents, either by going to their parents’ anoardegans or by having their fathers bring it to them at the ungundya. Married women and their children who spend the night at an alugera may return to their families’ anoardegans for breakfast. A young man with a young wife may live near the wife’s parents, in which case the wife’s mother may provide breakfast bread for the new family; if the husband’s parents live in the same camp, his mother may provide them with food now and then. The widowers who live at the ungundya never make bread; rather, their bread and breakfast tea are prepared by the wives of another man, and that other man delivers the food to the widowers each morning.

After breakfast, men from all over the camp congregate at the ungundya for their regular, relaxed and informal discussion of the upcoming day. They arrive singly over a period of perhaps half an hour, and after about an hour - at about 0900 - they disperse more-or-less simultaneously to begin their morning’s activities. If there is a functioning motor vehicle in the camp, perhaps half a dozen men between
the ages of twenty-five and forty-five years depart in it with two or three rifles to hunt kangaroos. If there is a disabled but repairable vehicle available, two or three men begin to work on it. Some of the older men may leave the ungundya and go about 180 m. (600 ft.) away from the camp to spend the morning making bullroarers, boomerangs, shields, and a large assortment of other traditional items, either for use within the camp or for sale via the Chalmers family to tourist shops in Alice Springs. A few of the young men between fifteen and twenty-five years old may stay at the ungundya where they play cards or checkers.

The women and children spend their mornings very differently. Shortly after 0800, those who are at anoardegans begin to gather at alugeras. From each of these focal points of the camp’s socially distinct subcommunities, parties of women and children depart for the bore carrying empty cans, and return about an hour later with the morning’s water. On these 1.6 km. (1 mi.) round-trips, infants are carried in /coolamons/ wooden bowls by their mothers, and children between the ages of one and five years are carried in various ways by their mothers, their older sisters, and their mother’s sisters (see Denham 1974a for a detailed discussion of infant transport among the Alyawarra). Of course many of the children walk, getting rides with bigger people whenever they get tired. From three to fifteen people comprise a water hauling group, and since people from each alugera make several trips to the bore each day, most of the women and children in the camp visit the bore at least once a day.

Some of the women spend part of the morning doing purely domestic chores such as putting blankets and bed rolls into storage areas on top of the shades, hanging cans and clothing out of reach of the dogs, and sweeping the floors of their residences with brooms made of spinifex, sticks, and string. By 1000, they are ready to collect another supply of firewood to use in cooking bread or damper for the midday meal. To cook bread made with yeast, they place the dough in a large cast iron pan with a metal cover and bury the container in hot sand and embers from a cooking fire, but they bake damper in hot sand without a protective container. In an hour or so, the food is ready to eat. Since the actual cooking requires very little activity or supervision, most of the women and children are free to do other things after mid-morning.

Men do the initial construction and subsequent modification and repair of the structures that comprise the ungundya, but women build and maintain both the alugeras and, with a few notable exceptions, the anoardegans. When a new alugera or anoardegan is to be built, most or all of the women and children who live in the affected subcommununity contribute time and energy to help the person who will live in the new residence. At mid-morning, as many as fifteen women and children may leave the camp carrying axes, and go to the stand of mulga trees growing in the floodout to the east of the camp, or to the banks of the creek bed just above the floodout where other species of trees are more common. An hour or so later, they return to the camp carrying eight to twelve strong poles to make the frame and strengthen the roof of the new shade, and enormous loads of leafy limbs to cover the roof. With digging sticks made of sharpened tie rods from defunct vehicles, they quickly dig the necessary post holes in the sand, and suddenly the frame is up. Laying the cross pieces and leafy limbs to form the roof is
just as quick and easy. After a shade is completed, it receives a new covering of leafy limbs about once every two weeks. The people who build shades also build shelters and windbreaks with the same materials, and with the same apparent ease and rapidity. When rain threatens, they integrate large quantities of spinifex grass into the tops and sides of the shelters, and put tarpaulins in place as rain deflectors, thereby making the structures water-repellent but not waterproof.

Instead of building, repairing, or altering residential structures, a group of women and children may leave camp to collect small lizards and plant foods. Such foraging trips may last only a couple of hours, or they may last almost all day and cover as much as fifteen miles. I never observed any of the people from two of the camps' subcommunities depart with digging sticks, can, sacks, and coolamons ordinarily used in collecting foods, nor did I see any of those people return to camp with berries, seeds, tubers, fruits, sugar deposits, lizards, or grubs that were readily available in the vicinity of the camp. Members of the third subcommunity averaged about one foraging trip per week, and members of the fourth went as often as three or four times each week.

All of the people in camp at midday temporarily suspend their activities to have their second meal of the day, and often to go to sleep for a while. After lunch and a nap, the men may resume making artifacts or repairing a vehicle. If there is no chance of getting the vehicle to operate well enough to use it for a kangaroo hunt later in the day, one of the men may go on foot for meat. The much more likely solution to this problem is to postpone the hunt in hopes of getting the vehicle to operate the next day.

When the men hunt in a vehicle, they return to camp with the meat at or before sunset. The number of animals killed on a hunt ranges from zero to ten, depending upon the numbers and behavior of the kangaroo, the luck of the hunters, the size of the camp's population, and the length of time since the last successful hunt. A hunt that yields no meat is rare.

A kangaroo hunt typically involves almost every adult male in the camp, even though only a few of those men actually participate in the hunt. A hunting party usually consists of two or three men with rifles, a driver for the vehicle, and a few others who assist in spotting game, killing wounded kangaroos, and so on. Men who play vital but indirect roles in the hunt include the two old men who jointly own the vehicle but cannot drive it, the older men who own the rifles but prefer to leave the hunting to younger men, and those who contribute funds toward purchasing ammunition and fuel. It is not surprising that meat from a hunt almost always reaches every household in the camp.

After a heavy rain, when the ground is much too soft for a vehicle to drive across it, older women hunt kangaroos with huge and extremely vicious dogs that they raise exclusively for this purpose. On dry ground, a kangaroo can outrun a dog, but on soft wet ground, the opposite is true. Since the ground is dry in Central Australia most of the time, the Alyawarra use this technique infrequently, but when they use it, it is highly effective.
When a group of men, hunting with a vehicle, kill several kangaroos, they may distribute the whole, uncooked carcasses to various households; they may cook them in ember-filled pits at the ungundya then distribute them to the alugeras where women cut them up for final distribution to anoardegans, or they may cook them at the hunting ground or the ungundya, immediately cut them into family-sized portions, and distribute them piece by piece to the alugeras and anoardegans. When a man or woman hunting alone brings in a kangaroo, he or she cooks it at his or her own residence, and distributes the meat only within his or her own subcommunity.

When the night promises to be cold, several men leave camp with axes in the afternoon and return a while later with dead logs up to 25 cm. (10 in.) in diameter and 3.5 m. (12 ft.) in length. They cut the logs horizontally in halves or thirds and use them to make two or three small fires strategically located in each residence to keep everyone warm all night.

The women spend their afternoon making and cooking bread or damper for the evening meal, making clothes of material bought at the station store, and talking together at the alugeras while the children play. They must replenish the water supply, and they may wash some clothes - and some faces and hair - on the afternoon trip to the bore. They collect more armloads of wood during special wood gathering excursions away from the camp, and women returning from foraging trips bring firewood with them. The wood they gather near residences early in the morning tends to be small and characterized mainly by its convenient location, while the pieces they bring in during the afternoon tend to be about a meter long, dry and straight. The stack well and weigh little, so that a woman can carry a large pile of them in a sling of natural fibers or in a belt hanging under her arm.

As sunset approaches, the men reassemble at the ungundya where they talk together until a few minutes after sunset, at which time they return to their anoardegans for the evening meal and prepare for the night’s sleep.

The children of the camp spend the day going places and doing things with their mothers and older sisters, and playing in groups within their own subcommunities. Old automobile tires are among the most conspicuous toys, and adults and children make a large variety of playthings from convenient materials. For example, they construct “motorcars” by filling two-pound syrup cans with sand and attaching stiff pieces of wire to serve as axle, steering column, and steering wheel. Likewise, metal cans become windmills. Making string figures is a popular pastime, and puppies are ever-present playmates. Trees big enough to climb are scarce in the camp, but the children spend a lot of their time in climbing bushes, the few small trees that are available, and the posts with which residential structures are built. And as soon as they are old enough to carry tiny buckets, they begin to do their part in hauling water from the bore.

The oldest people are the least active members of the population, but their continuing importance in the society is insured by an interesting combination of traditional and introduced factors. Old men’s responsibilities in ceremonial matters are virtually
unchanged from those that Spencer and Gillen (1899) and many others described among Central Australian tribes many decades ago. The old women are equally important in a number of ceremonial contexts and in their roles as senior members of the alugera-centered subcommunities. Western practices support traditional practices, since much of the money that enters the Aboriginal community comes in the form of government pension checks to men and women who, according to government records, are at least sixty-five years old. The funds, which enter the community at large through the old people, are necessary for purchasing and operating the motor vehicles and rifles that are essential for the continuation of life in partially-provisioned, semi-sedentary groups of sizes much greater than those that nomadic groups in Central Australia could have maintained continuously before Western settlement began.

Occasionally, some of the men return to the ungundya after dark to sing songs of their dreamings, and women and children may congregate at one of the alugerars for the same purpose. Although the topics of the songs may be important events in the Dreamtime, these evening get-togethers have the relaxed air of parties, and there is no restriction on who may hear the songs. When ceremonies are in progress, such activities are much more formal.

Ceremonies that I observed among the Alyawarra fell into three main classes: a) initiations, b) funerals, and c) a variety of activities related directly to the preservation and rejuvenation of the natural world - the physical science, animal husbandry, and agriculture of a people whose physical and biological theories are radically different from those of the Western world, but are well-suited to the Central Australian ecosystem. Among the Alyawarra, as among all Central Australian tribes, ceremonies are extremely important, but the extent to which they have been discussed in the anthropological literature has made them disproportionately prominent. In this regard, it is important to note that such events were known to occur within the MD-DD area on only twelve percent of the days during the field session, and that they occurred in addition to, not instead of, the ordinary day-to-day activities already described here.

Rations, distributed by members of the Chalmers family every Sunday morning from a shed near the Chalmer’s home, have had a direct impact on diet and food acquisition. One of their side-effects has been to introduce the Western calendar to the Alyawarra. While the Aboriginal people still refer to wet times and dry times when talking about the natural world, they now have a regular seven-day cycle that begins anew each Sunday, and a twelve-month cycle that begins anew each Christmas Day, a sort of super-ration day.

Ration day, a time when some or most of the people from all of the camps in the MD-DD area congregate at the MacDonald Downs homestead, offers an excellent opportunity for observing the integration of traditional and nontraditional behaviors. Within a camp, the presence of alugerars for the women and ungundyas for the men enables the community as a whole to function well with virtually no contact between adult males and adult females except within nuclear families, and this extremely rigid separation of the sexes is maintained on ration days. Male heads of households
congregate near the ration shed, while women whose husbands are dead or temporarily absent from MD-DD congregate about 60 m. (200 ft.) away with the children. After the men receive rations for their families, they move away and the single women go to the shed to receive their food. When the store opens later in the morning, the same separation of the sexes occurs, but with an interesting difference. While the women sit in the shade awaiting their turns at the store, their husbands and fathers stay very busy making trips between the store and a neutral area where they meet their wives and daughters with merchandise that the women requested for immediate delivery from the store.

The harmonious relations that exist at the ration shed and store characterize every aspect of Alyawarra life as I observed it at MD-DD. During my stay with the Alyawarra, I neither saw nor heard of a single fight among adults, and I know of only one argument that led to shouting. This situation is radically different from the perpetual conflict that prevails in Alice Springs and on Aboriginal reserves (e.g., Meggitt, 1962), and it may be taken as one of the best indicators of social stability among the people at MacDonald Downs and Derry Downs in 1971-72.

This informal sketch of the physical and social setting in which the research was conducted provides the background against which methodological issues can be examined most conveniently in the remainder of the paper.

My project as a whole is described in considerable detail in the field journal keyed to all photographs and other records made in the field (Denham, 1972).
Chapter 2. Research Design

Foundations

In recent decades, and especially since 1960, behavioral biologists with a wide range of interests and conceptual orientations have performed a great many quantitative field investigations of social behavior among animals as diverse as colonial microorganisms, social insects, cold blooded vertebrates, birds, and most of the larger orders of mammals including carnivores and nonhuman primates. Although much of the work has been in the tradition of natural history, some of it has focused on theoretical issues. Very little of it, however, has confronted the problems or capitalized on the advantages inherent in conducting similar observational studies with human populations. The research presented here addresses this issue.

Specifically, I designed the project in order to obtain a comprehensive, reliable, systematic, and quantitative body of data pertaining to ecological, demographic, relational, and nonverbal behavioral characteristics of a small human population. The data were to be strictly comparable, both formally and substantively, with data that had been and could be collected in studies of any human or nonhuman population. Additional objectives were to develop and test a new research methodology with which to obtain the required data, and to develop computer-based procedures for analyzing the fully integrated set of data files generated during the fieldwork.

In order to obtain a comprehensive view of life within the research population, I designed the project explicitly as a broadly focused preliminary study. I made no attempt to focus sharply on narrowly defined problem areas, on the assumption that narrowly defined problems can be examined meaningfully only after their context is reasonably well known. I selected ecology, demography, social relations and nonverbal behavior as the four general foci of the project because of their importance as basic dimensions of life among all social species, their common occurrence both in ethnographies and in studies of nonhuman primates, and the paucity of systematically recorded data of these kinds for Australian Aboriginal populations.

I anticipated that the project would demonstrate its scientific value by yielding a data base that I, and others, could use to generate quantitative descriptions of observed behavior, thereby improving the quality of cross-cultural and cross-species comparisons in areas common to many human and nonhuman societies, to test hypotheses, and to contribute to the development of theories that might improve our understanding of the social behavior of all animals, including humans.

The project can be described most accurately as exploratory research. Kaplan (1964), in a discussion of experimentation in the social sciences, describes heuristic and exploratory experiments as follows:
“[The heuristic experiment] is designed to generate ideas, to provide leads for further inquiry, or to open up new lines of investigation … [The exploratory experiment] is frankly intended just to see what would happen IF ______. Often it is associated with new techniques …. In general, it invites serendipity, the chance discovery; it is part of what we do to deserve being lucky.”

His comments apply to field research as well as to laboratory research; in particular, they apply to the project described here.

In designing and conducting an experiment, it may be useful to simplify the setting as much as possible. Hence, physicists often conduct experiments under near-vacuum conditions and psychologists often perform operant conditioning experiments in settings free of distracting stimuli. In keeping with this tradition of simplification in experimental research, I decided that I could conduct my research most effectively with a human population that lived in an open habitat and used a relatively simple technology. I believed that this would allow me to study typically human social complexity, but at the same time would not overload me with observational data collection problems that I could handle more effectively at a later stage in the development of the work.

Specifically, I wanted to work with a more or less self-contained population of approximately one-hundred people who lived in an isolated and technologically simple society, where visibility of most ordinary daily activities would not be limited by structures and other opaque objects such as trees and hills. The people and location described in the first part of the paper met these site selection criteria satisfactorily but far from perfectly.

Introduction to the Alyawarra Ethnographic Data Base

In the course of the fieldwork, which I conducted in the period of 300 days from 1 June 1971 through 26 March 1972, I assembled eight major sets of numerically coded data

<table>
<thead>
<tr>
<th>Name Of Data Set</th>
<th>Number Of Variables</th>
<th>Number Of Observations</th>
<th>Number Of Data Cells</th>
<th>Recording Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BEVRECS</td>
<td>9</td>
<td>41,809</td>
<td>376,281</td>
<td>193.4</td>
</tr>
<tr>
<td>Censuses</td>
<td>33</td>
<td>264</td>
<td>8,712</td>
<td>80</td>
</tr>
<tr>
<td>Genealogies</td>
<td>5</td>
<td>377</td>
<td>1,885</td>
<td>150</td>
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<td>Vital Statistics</td>
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<td>4,901</td>
<td>320</td>
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<tr>
<td>Kinship</td>
<td>225</td>
<td>104</td>
<td>23,400</td>
<td>120</td>
</tr>
<tr>
<td>Group Compositions</td>
<td>7</td>
<td>2,912</td>
<td>20,384</td>
<td>60</td>
</tr>
<tr>
<td>Maps</td>
<td>6</td>
<td>351</td>
<td>2,106</td>
<td>60</td>
</tr>
<tr>
<td>Meteorological Data</td>
<td>6</td>
<td>146</td>
<td>876</td>
<td>20</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td></td>
<td></td>
<td><strong>438,545</strong></td>
<td><strong>1,000</strong></td>
</tr>
</tbody>
</table>

Table 4. Contents of the data base.
that constitute the data base described here, and several other sets that are not considered here. The names of the eight numerically coded sets, the number of variables and the number of observations in each set, and the total number of filled data cells in each set appear in Table 4 Contents of the Data Base. Each item in Table 4 is described in detail later in the paper; they are presented here so the list can function as a “table of contents” and “summary” of the remainder of the paper.

The observational behavior stream (BEVRECS) data set consists of 41,809 records, each containing nine items, all of which I recorded at Gurlanda camp where I lived throughout the project. In addition to recording the BEVRECS data, I performed a complete census twice each month of all members of the research population, noting both the camp and the residence in which each person lived on each of sixteen census days; constructed genealogies to the greatest achievable depth (as much as five generations) for all 264 members of the population and for 113 of their deceased ancestors; obtained thirteen kinds of vital statistics for each of the 264 residents and their deceased ancestors; systematically recorded kinship terms used by 104 people for referring to 225 people; recorded five kinds of data for each of 2912 casual groups of people observed during the project, including the identities of all members of each group; and made seventeen maps of the camps, including eleven maps of the camp in which the observational protocols were recorded. A weather station in Gurlanda camp recorded meteorological data automatically.

All of these data are in numerical form and all eight sets are tied directly to each other by several structural and coding schemes. Three of the sets (vital statistics, genealogies, and kinship data) are rectangular matrices with the 264 living and 113 deceased members of the population as the items (rows) and a great many characteristics of those people as the features (columns). Four of the sets (BEVRECS, group compositions, maps, and meteorological data) are rectangular matrices in which it is most convenient to think of units of time as the items and characteristics of those time units as the features. The eighth set (census data) is at the intersection of the “person-based” and “time-based” sets, with people as the items and time units as the features.

Figure 5 lists the three person-based sets in abbreviated outline form. Figure 6 lists the four time-based sets in similarly abbreviated form. Figure 7 contains an abbreviated outline of the census data. Together, these three Figures suggest the overall conceptual structure of the Alyawarra Ethnographic Data Base.
Figure 5 Person Based Data

<table>
<thead>
<tr>
<th>Personal Identification Number</th>
<th>VITAL STATISTICS</th>
<th>GENEALOGIES</th>
<th>KINSHIP TERMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID 3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Living**:
  - m: 001
  - w: 140

- **Living**:
  - m: 100
  - w: 281

- **Dead**:
  - m: 300
  - w: 470

**Figure 6 Time Based Data**

<table>
<thead>
<tr>
<th>Day Number</th>
<th>Time on 24-Hour Clock</th>
<th>BEVRECS</th>
<th>GROUP COMPOSITION</th>
<th>MAPS</th>
<th>METEOROLOGY</th>
</tr>
</thead>
<tbody>
<tr>
<td>001</td>
<td>0000</td>
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<td></td>
<td></td>
<td></td>
</tr>
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<td>2400</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>2400</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
Figure 7 Census Data

Coding schemes crosscut the structural arrangements and facilitate an integrated analysis of data sets having dissimilar structures. For example, I assigned each person a unique personal identification number that I used consistently in all six of the data sets in which people appear; hence, it is possible to “follow” a person from BEVRECS to kinship data to vital statistics to genealogies to group compositions to censuses, in any order and any direction, checking for and analyzing all pertinent relations within and between sets on the basis of the personal identification numbers. Likewise, unique Residence Identification Numbers tie together maps, censuses, group compositions, and BEVRECS data; and camp identification numbers link maps and censuses. Because of these and other kinds of structural and coding linkages within and among the data sets, it is possible to go directly from any single entry in any set of data to all other related entries in all other sets.

The organization and coding of the data, along with the data recording techniques used in the field, made it possible for me to transfer all of the numerically coded data directly from field records to 80-column electronic data processing cards and then to magnetic tape for computer analysis. The sheer volume of the data (slightly more than 1,000,000 numeric characters) and the overwhelming complexity of the analyzable relations within and among the eight sets made computerization not only desirable but essential if the data were to be analyzed both thoroughly and accurately.

The total amount of time devoted to data collection was approximately 2,000 hours, or about eight hours per day for 250 of the 300 days in the field. Because of extensive overlaps among various data collection activities, it is not possible to prepare a precise tabulation of the amount of time allocated to each activity. Generally speaking, however, I spent my time in the following ways:

- becoming minimally competent in the Alyawarra language
• observing or being a participant-observer in a broad range of activities that do not appear in the computerized data base, such as hunting kangaroos, collecting vegetable foods, visiting sacred sites, attending ceremonies, recording music beside campfires, photographing people, places, things, and activities, mapping residences and clan countries, and repeatedly visiting all residences in the Alyawarra camps in order to familiarize myself with everyday life in Alyawarra households
• doing preliminary work in direct preparation for recording data in the eight sets listed in Table 4
• recording the data that constitute the data base.

The amount of time expended in recording each of the eight sets of numerical data in the data base appears in the right-hand column of Table 4. The BEVRECS time is exact, but the other entries are approximations. I worked out all data collection procedures in detail before I arrived at MacDonald Downs, so it was not necessary for me to devote scarce field time to that very time-consuming task. All together, I devoted about 1000 hours exclusively to recording the contents of the data base, and another 1000 hours to more traditional kinds of ethnographic fieldwork.3

The remainder of this paper deals exclusively with the eight sets of data that are listed in Table 4. Topics emphasized below include the conceptual structure of the data base as a whole, the organization and contents of each set of data, data collection procedures, data quality control, and the file structure of the data tape.

**Person-Based Data Sets: Vital Statistics, Genealogies and Kinship Data**

**Photodeck** I recorded all vital statistics, genealogies, and kinship data on specially printed 6 x 8 inch cards, with one card assigned to each person in the population. Figure 8 shows a sample card that is basically the same as the cards used in the field, but it embodies several minor improvements that resulted from the field experience. It can be modified in a great many ways to fit diverse requirements. See Rose 1960 for a similar design.

The upper right-hand corner of the front of the card in Figure 8 contains a space for a Polariod photograph of the person to whom the card is assigned, the upper left-hand portion contains provisions for recording vital statistics and genealogical data, and the lower half contains a form for recording kinship terms used by the person in the photograph. The back of the card is used for recording census data, the results of various kinds of sortings to be discussed below, and miscellaneous notes about the person.
During the early weeks of the project, I made two photographs of each of 225 Aboriginal people at MD-DD. I mounted one of them on the card assigned to the person and gave the other one to the person for his or her own use.

Forty-three people officially joined the research population fairly late in the project, resided in the MD-DD area for only a little more than the minimum period of 30 consecutive days required for inclusion in the resident population, or who for other reasons were not photographed. I recorded vital statistics and genealogies for all of
them, but for reasons that appear below, the absence of their photographs made it impossible for me to record kinship data concerning them.

Four people moved out of the research population shortly after the photographs were made, after having been at MD-DD for less than 30 consecutive days. Their photographs remained in the photodeck and were used in eliciting kinship terms as described below, but all other references to these four people have been deleted from the data base. They are not among the 264 people who comprise the "official" research population.

Vital Statistics  When I photographed a person, or when a person officially joined the population without being photographed, I assigned a unique Personal Identification Number (ID) to the person and entered that number in designated spaces on each side of the card.

I entered the following on the person's card:
- name, sex (SX), current marital status (M1), patrilineage or clan (C) and section (S) membership
- the names of his or her father (FA), mother (MO), spouse(s) (SP1,SP2,SP3), and all known children (Ch)
- the day on which the person was known to have joined the population (IN).

If some of this information was not available then, I obtained it by other means or from other sources later in the project.

And whenever any of the following events occurred, I recorded them:
- date of birth (D0B), date of puberty (DP), or date of change in marital status (M2,M2D); date of death of parent (P), spouse (S), or self (OUT)
- date on which the person moved out of the research population (OUT).

There are no known errors in Personal Identification Number, sex, and section (hence, partimoiety, as well). I believe that all information on current marital status is correct, but it is possible that a very few of the people who appear in the data as never having been married may, in fact, have been widowed or permanently separated (i.e., divorced) prior to the beginning of the project.

Because of the distances separating the four camps, I often failed to learn immediately when someone joined or left the population by in- or out-migration; hence, some of the data bearing on these events have an accuracy no better than ± 10 days.

Dates of all births that occurred during the fieldwork are accurate to ±2 days, death dates are correct, and dates of puberty and marriage, both of which mark fairly conspicuous changes in one's residence, probably are accurate to ±10 days.

Determining age, except for those people who were born while I was there, was somewhat more difficult. The Chalmers family, during their half-century at MacDonald
Downs, had compiled and maintained birth records for the Aboriginal people who were born at MacDonald Downs, but their records did not cover everyone in the research population. From these records, which served as the primary source of most age data, I extracted dates of birth - with a probable accuracy of ±10 days for most of the people under twenty years old and ±1 year for older people - and computed the age of each person there (age =1972 - year of birth). Ages of people who did not appear in the Chalmers’ records were determined in the course of checking for errors in the primary age data.

I used four independent procedures to verify the age data. The first and simplest checking method was to age order the people within each sex on the basis of physical appearance in the photographs, and my own knowledge of those people at the end of the project. This told me nothing about absolute age, but it clearly revealed a few obvious (perhaps typographical) errors in the original records or in my transcription of them. I made the second check by identifying all children of each parent, and determining whether those sets of siblings contained pairs of members whose recorded ages were less than nine months apart, or whether anyone was born before the mother was 14 years old or after she was 50 years old, or before the father was 20 years old.

I made the third check by examining the kinship terms used by siblings to determine whether the age order I had established corresponded correctly with the “older-younger” distinction in the terms used reciprocally by siblings. This was especially useful in ordering brother-sister pairs, thereby interlocking the intra-sex age orders based on physical appearance. Finally I checked the age structure of the population as a whole against model life tables (Weiss, 1973) for internal consistency.

Although I am virtually certain that undetected errors remain in the age data, I believe that they are rare enough and small enough that they can be disregarded safely. Where they exist, I believe they are confined to the upper end of the age spectrum.

With the photographs mounted on the cards, the photodeck was a powerful instrument for eliciting additional information for inclusion in the vital statistics data set, for completing the genealogies, and for eliciting all of the kinship data. Specifically, the people learned to sort the cards according to their own criteria and criteria that I proposed, to order the cards on the basis of genealogical relations and to label the cards in accordance with their kinship terminology. Sorting, ordering, and labeling were done on many different occasions by almost everyone in the population, but no one ever became a “key informant” for this or any other purpose.

Their sorting of the cards on the basis of patrilineage membership confirmed the data that I already had on that topic and added much more that I was unable to obtain as I compiled the photodeck. Generally speaking, I am more confident of the accuracy of membership data for large descent groups than for small ones. The single exception to this generalization concerns Yerolja and Adnungarba countries, which may be two descent groups, two groups that are merging to form a single large group, or a single
group that is splitting into two. In the data base, they are coded separately, but they can be re-coded as a single group if it is necessary or desirable to do so for analytical purposes. Because of tight logical connections among moiety, section, and country affiliations, and parent-child and spouse relationships, most errors in these data were detected and corrected in the field.

By having the people sort the cards in the photodeck, I clarified as much as I could the question of linguistic affiliations. During the first month of the fieldwork, I was assured repeatedly that everyone in the population was Alyawarra, but as the work progressed, it became increasingly obvious that such purity was not to be found at MD-DD. Everyone there could understand and speak the Alyawarra dialect, but some had learned it as a second language.

Near the end of the project, I asked four independent groups of people to sort 217 of the photographs, indicating that I was interested in the topic of tribal affiliation, but with the meaning of the concept being unclear to me and unspecified to them. The groups, in the order in which they did the sorting, were composed of five men, five women, three women, and three men. The first two groups sorted the cards on a single afternoon at Gurlanda camp, and the last two sorted them on the following morning at Bendaijerem camp. There was no contact between the two camps, or between members of the two groups in each camp, while these data were being collected. Each sorting group had to reach a consensus before a card was placed in a final category. Each time the cards were sorted, I made an entry on each card to designate the linguistic group to which the photographed person was said to belong. The complete list of dialects named in conjunction with these sortings contained four entries: Alyawarra, Aranda, Anmitjira, and Warramunga.

There was unanimous agreement that 173 of the people in the photographs were Alyawarra and that 13 were Aranda. Three out of four groups concluded that 12 of the remaining 31 people were Alyawarra and that one of them was Aranda. That left 18 people whose linguistic or tribal affiliations were unclear despite vigorous debates that surrounded some of the decisions. Although Anmitjira and Warramunga were mentioned several times each, no one was classified unambiguously as being a member of either group.

By examining the genealogical data for the 45 people whose photographs were not used in this series of sortings, I determined that, of the total population of 264 people, 220 were Alyawarra (100% or 75% agreement), 21 were Aranda (100% or 75% agreement), and 23 were of unclear linguistic or tribal affiliations. This approach to the question of tribal affiliations yielded the data on that topic which appear in the data base.

**Genealogies** I obtained much of the genealogical data simply by recording the identities of parents and spouses at the time each person officially joined the research population, but many people did not have living parents or spouses. Furthermore, the Alyawarra refuse to mention the names of the dead, and they are reluctant even to
acknowledge the prior existence of deceased infants. For this reason, I did not attempt to obtain any information about deceased infants.

It was possible, however, to use the photodeck to reconstruct genealogies upwards through deceased ancestors without violating the injunction against directly mentioning the dead. By arranging photographs of living people to illustrate known parent-child, sibling, and spouse relationships, then extending the process upwards with blank cards representing deceased ancestors, it was possible for me to obtain the information that I wanted without encountering any resistance. To each deceased person who was identified in this way, I assigned a unique personal identification number in a sequence separate from those assigned to living people, and added that person to the vital statistics file. Since there were no restrictions on discussing lineage and section affiliations of those ancestors, I obtained and recorded this information as I constructed the genealogies. Without the photodeck this job would have been virtually impossible; with it, construction of the genealogies for all 264 members of the population was a straightforward though time consuming process.

I checked the genealogical data in conjunction with age data and data on lineage and section membership, and clarified inconsistencies wherever that was possible; however, it is likely that fourth and fifth generation ancestors were identified less accurately than immediate and living ancestors, and it is likely that I failed to detect some adoptive relations.

**Kinship Data**

Finally, I used the photodeck to elicit kinship terms. This is a complex matter that I deal with separately and in detail elsewhere [link]. Here I describe the technique only briefly.

The technique was to select a person whose photograph was in the deck, and to show to that person, one card at a time, all of the photographs in the deck, including his or her own. As each photograph appeared, the informant (EGO) told me a kinship term that he or she used for referring to the person in the photograph (ALTER). I entered a number corresponding to that term on EGO's card in the cell corresponding to the personal identification number assigned to ALTER. The result was a list of 225 terms from each of 104 carefully selected and broadly representative EGOs, yielding a total of 23,400 kinship responses elicited under standardized conditions.

Logically and structurally, the kinship data are an extension of the vital statistics and genealogies. Unlike those sets, however, the kinship data are incomplete. Had I acquired a complete set of kinship data using the technique described here, I would have recorded 69,696 entries (264 EGOs by 264 ALTERs), which would have been far more information than I could have used productively.

The kinship vocabulary appears without glosses in Appendix 1, File 22.

In addition to “typographical” errors that occurred in this and all other sets of data, both in the field and at various steps in the final preparation of the data tape, the kinship data
were subject to errors of identification when informants were responding to the photographs. I attempted to handle this problem by giving most of the people a great deal of practice in using the photodeck before kinterm elicitation began, and by allowing or encouraging more than one person to be present when terms were being elicited.

Although the sample card in Figure 8 contains provisions for recording census data, those data are discussed in a separate section farther along in the paper.

**Levels of Resolution in Space and Time**

Together, the three person-based data sets constitute a kind of composite, multidimensional snapshot of the members of the population and a great many kinds of relations among them, but temporal and spatial relations are weakly developed there. Since each person has an age, these data can be analyzed for temporal relations among births; furthermore, the vital statistics include records of the days on which each person joined and left the research population, and the days on which “life crises” occurred, all of which are additional time markers. But these events, significant as they are, might be thought of as “molar” or “macroscopic”. For each person, being born and joining and leaving the population happened only once (temporary visits away from MD-DD did not count as emigration), and for most of the people the other kinds of life crises did not occur at all during the project. Hence, it is not possible to examine these data for recurring temporal patterns. At the same time, many of the ordinary activities of Aboriginal life recur repeatedly during the fieldwork, ranging in their frequencies of occurrence from several times each month for relocating residences, to several times a week for kangaroo hunting, to hundreds of times each day for walking from one residence to another.

To capture data on events that occurred only once per person, and on relationships that were virtually static for the duration of the fieldwork, it was advantageous to use the person-based data structure that characterizes the vital statistics, genealogies, and kinship data.

To capture data on activities that recurred repeatedly during the project, it was necessary to use a time-based data structure.

In vital statistics, genealogies, and kinship data, both the rows and the columns of the data sets are ordered arbitrarily; thus, column and row orders *per se* contain no information. In BEVRECS, group compositions, maps, censuses, and meteorological data sets, the order of the columns remains arbitrary, but the rows are arranged in chronological order; therefore, row order *per se* contains essential information in these sets of data.

In moving from the person-based data in which temporal relations are of minimal importance, to censuses and maps in which time is measured in days or weeks between successive recordings, to meteorological data in which each successive day is
a separate time unit, to the observational behavior stream records (BEVRECS) and the group composition data where time is measured to the nearest minute, the entries become increasingly “molecular” or “microscopic”. From this perspective, the Alyawarra data represent four different time scales, or, to call again on the language of photography: there is a single composite snapshot of vital statistics, genealogies, and kinship data; an intermittent series of snapshots of maps and census data; a time lapse sequence of meteorological data; and a series of motion pictures in the BEVRECS protocols and the group composition data. The “temporal resolution” increases sharply as we move from the single snapshot to the motion picture.

Next there is the matter of spatial resolution. In the person-based data, there are only two spatial components. The first, which is simultaneously basic and trivial, is that a person officially joined the research population only by living in one or more of the camps in the MD-DD area; hence, inclusion in the person-based files indicates residency in that geographical area. The second is that membership in a particular descent group indicates special affinity with an area of land traditionally associated with that group. At the time of the fieldwork, these ties remained extremely important symbolically, but recent changes in subsistence economy and settlement pattern had weakened whatever physical or economic ties the people may have had with their lineage countries in the past, and about which I collected little information.

Within the time-based sets, there are three different levels of spatial resolution: the lowest in the censuses, the intermediate level in the maps, and the highest in the behavior stream protocols. The censuses deal with movements of people among the camps in the MD-DD area, and they contain records of visits and temporary residency elsewhere in the southeastern quarter of the Northern Territory by people who were members of the research population. The maps, on the other hand, show spatial relations among residences and other structures within each camp; hence, their spatial resolution is considerably higher than that of the censuses. The observational behavior stream protocols, all of which were made within Gurlanda camp, use the residences recorded on the maps of that camp as basic spatial reference points, so that it is possible to examine the BEVRECS data in conjunction with the maps of the camp to determine distances involved in the activities appearing in the BEVRECS protocols. At the same time, however, the BEVRECS vocabulary contains a number of distinctions concerning structures and open spaces in and around Gurlanda camp that are finer than the distinctions appearing in the maps. This results in a higher level of spatial resolution in the BEVRECS data than there is in the censuses and maps. Most of the group composition data are at the highest spatial resolution level, but some are at the intermediate level.

**Time-Based Data Sets I: Maps, Censuses and Meteorological Data**

**Day Numbers** In all of the data sets including the person-based ones, dates appear as the number of elapsed days since the beginning of the project. In other words, I arrived at MacDonald Downs on 25 May 1971, spent 7 days in setting up my tent and
getting ready to begin the research, and declared 1 June 1971 to be the first day of the fieldwork. I called it DAY 001. I concluded the research on 23 March 1972, which was DAY 297. The Day Number of the last day of each calendar month of the field session appears in Appendix 1, File 1. Time values, where applicable, are recorded in hours and minutes on the 24-hour clock.

Maps When I began the fieldwork, the Aboriginal people at MD-DD lived in four camps, Gurlanda, Bendaijerem, Liladera, and Angungera. During the field session, part of Gurlanda camp shifted a few hundred meters following the death of an infant, the entire camp shifted about 1.2 km. following the death of a man, and part of the camp shifted another few hundred meters following the death of a woman; Bendaijerem camp shifted a few hundred meters following the man’s death; and Liladera camp was abandoned and its residents moved to other camps following the death of yet another woman. Angungera camp did not relocate during this period.

Soon after my arrival at MD-DD, I made a map of each of the camps, and shortly after the deaths of the three adults, all of which occurred in a period of nine days, I remapped Bendaijerem and Angungera camps. By then, the residents of Liladera camp had moved to other camps and that camp had vanished.

Midway through the fieldwork, I visited the sites of three camps that were abandoned shortly before I arrived at MD-DD. Men who had lived in those camps accompanied me when I mapped them and told me who had lived in each of the residences. Two of the abandoned sites were between 8 and 26 km. from currently occupied sites, but the third was only 1.6 km. from the location of Gurlanda camp at the time of my arrival, and it had been occupied by most of Gurlanda’s residents a short time earlier.

The abandoned Gurlanda site is the first in a series of eleven maps of Gurlanda camp. The second in the Gurlanda series represents the camp as it was at my arrival; the third was made just after the death of the infant mentioned above; the fourth was made on the day when a series of initiations began; the fifth corresponds to the configuration of the camp on the day before the man’s death that resulted in a 1.2 km shift in the camp’s location; the sixth was made five days later, after the camp was established at its new site. On the day after the sixth mapping of Gurlanda camp, a woman died in the camp and most of the residences shifted again; hence, I remapped the camp.

During the next 100 days, I remapped Gurlanda camp five times, not because of general relocations of the camp, but because of movements of families either into or within the camp which thereby altered the number or distribution of the camp’s residences. This frequent re-mapping was essential, since I wanted to be able to link the maps with the observational protocols, all of which were recorded during the last 100 days of the project.

There are no known errors in the map identification data, but the residence location data are approximations rather than precise measurements. This is due in part to a decision to make sketch maps based on paced distances and readings from a hand-
held compass rather than to use more sophisticated mapping techniques. But an equally important problem is that locations of residences are represented as points on the maps, while the residences themselves and the living areas surrounding them covered areas ranging in size from 90 to 460 sq. m. (1000 to 5000 sq. ft.). This makes no difference when examining the maps to see which residences were adjacent to each other, but it can present problems when the maps are examined in conjunction with the BEVRECS data to determine distances covered in inter-residential locomotion.

I converted the maps from analog to digital format for computer analysis along with all of the other data.

Censuses In order to keep track of the people as they moved from camp to camp, I performed complete censuses of the MD-DD camps sixteen times. Each time, I noted the camp and the residence in which each person spent the night preceding the census.

There never were more than 238 people at MD-DD on a census day, and the number dropped as low as 151 on one occasion. When a member of the population was absent on a census day, I asked people to tell me where the person was at that time, and recorded that information as if I had observed the person at the reported location. This less-than-ideal procedure was necessary because of the large distances over which the people traveled. In addition to the semi-permanent camps at MD-DD, the locations at which people in the research population lived or visited on census days included temporary stock camps both within and outside the MD-DD boundaries, semi-permanent camps at eleven cattle stations other than MacDonald Downs and Derry Downs, and camps at Warrabri Settlement, Alice Springs, and Santa Theresa Mission.

The residence number of the place where a person spent the night before the census was recorded when the person was in one of the MD-DD camps, but in many cases it was impossible to make a reliable inference in this regard when a person was away from the MD-DD camps. Here, as elsewhere throughout the data base, I entered “unknown” whenever I could not arrive at a more informative entry.

When a person entered the population by birth or in-migration after the first census was performed, or left the population by death or out-migration before the last census, I noted these facts appropriately in the census data as well as in the vital statistics.

Meteorological Data At Gurlanda camp, I set up a small weather station that was provided by the Commonwealth Scientific and Industrial Research Organization of the Australian Government. The equipment included a continuously recording seven-day thermohydrograph, a cumulatively recording anemometer, and a manual rain gauge. Meteorological data on the computer tape include high and low temperature, high and low humidity, average wind speed, and total rainfall for each of the last 146 days of the project.
**Time-Based Data Sets II: BEVRECS Data**

Maps and censuses contain data with higher spatial and temporal resolution than the person-based files, but they show very little “behavioral” resolution; i.e., they deal exclusively with gross changes in the locations of people and residences, but distinctions between different kinds of movements - to say nothing of distinctions among and within other classes of behavior - are absent from those files.

My decision to record data with much higher levels of spatial, temporal, and behavioral resolution made it necessary for me to use a methodology designed specifically for that purpose. The BEVRECS data, which contain the finest distinctions in space, time, and behavior, constitute by far the most complex set in the data base. The brief description of BEVRECS that appears below deals specifically with the nature and operation of the recording system as it was used in the Alyawarra study. Comprehensive and detailed descriptions of the observational behavior stream recording system appear in Denham (1973, 1975a), and its roots can be found in Bobbit, Jensen, and Gordon (1964).

**Structure and Vocabulary** Unless otherwise indicated, “behavior” here means “activity or change relative to the environment”. Behavior can occur only when there is something that can change in some way, and we must be able to identify that thing if we are to study its behavior. That which behaves necessarily occupies space, and we can refer to its location in space. Changes necessarily occur in time, which means that they occur at particular calendar-and-clock times, that they occur relative to other events in time, and that they have durations. Behavior, defined as change relative to the environment, can occur only if there exists something other than that which is behaving, and those other things must be identifiable. We may discuss behavior as an abstract unitary concept, but in performing empirical research, we must study specific kinds of behaviors. Since there are unlimited numbers of ways in which to categorize behaviors,

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTOR</td>
<td>A person or thing whose behavior is recorded in a row of the data matrix</td>
</tr>
<tr>
<td>LOCATION 1</td>
<td>The place where an activity occurs, or, when an activity such as “walking” begins at one place and ends at another, the place where the activity begins</td>
</tr>
<tr>
<td>LOCATION 2</td>
<td>The place where an activity such as “walking” terminates, when that place is different from the place where it begins</td>
</tr>
<tr>
<td>BEHAVIOR UNIT</td>
<td>An activity in which an ACTOR engages</td>
</tr>
<tr>
<td>ORIENTATION</td>
<td>Another person or thing toward which an ACTOR behaves</td>
</tr>
<tr>
<td>OBJECT</td>
<td>A thing that an ACTOR uses in interacting with an ORIENTATION (e.g., a tool or item of exchange)</td>
</tr>
<tr>
<td>DAY</td>
<td>The day on which an activity occurs</td>
</tr>
<tr>
<td>TIME</td>
<td>The hour and minute when an activity begins</td>
</tr>
<tr>
<td>CONTINUATION</td>
<td>A flag used to mark an entry that is not complete in a single row of the data matrix, as when an ACTOR does two or more things simultaneously, or when two or more ACTORS do the same or different things simultaneously as members of a group.</td>
</tr>
</tbody>
</table>

**Table 5.** Variables used in the BEVRECS protocols in the Alyawarra project.
selecting a particular categorizational scheme depends upon the purposes for which we will use it, and the categories selected will necessarily be somewhat arbitrary. Behaviors, then, are more or less arbitrary categories of changes in more or less discrete entities. The changes occur relative to the environment in which the entities exist in time and space. In the behavior stream recording system used in the Alyawarra project, these principles are embodied in a set of variables that are the columns (or features) in the BEVRECS protocols, as described in Table 5.

The nine variables in the BEVRECS file can be grouped as follows:

- **BEHAVIOR UNIT** pertains to categories of change
- **ACTOR, ORIENTATION, and OBJECT** pertain to discrete components of the arbitrarily circumscribed system under investigation, with ACTOR being the person or thing whose behavior we record, and ORIENTATION and OBJECT being primary and secondary components of the environment in which the ACTOR behaves
- **LOCATION 1 and LOCATION 2** pertain to spatial relations
- **DAY and TIME** pertain to temporal relations
- **CONTINUATION** pertains to the social or behavioral complexity of an entry in the matrix.

Each valid entry in a BEVRECS protocol contains one and only one value for ACTOR, BEHAVIOR UNIT, LOCATION1, DAY and TIME. The other four variables are used as needed, but values in those columns are not essential. A valid entry, then, is a kind of sentence that states, at a minimum, who does what, where and when. Such a sentence is called a BEHAVIORAL EVENT, or simply an EVENT.

The BEVRECS data set contains 41,809 EVENTS as described above. The EVENTS appear in their exact chronological order, and the columns appear in the order shown in Appendix 1, Files 28-78. Each of the variables can assume two or more values, and the values for each of the variables are mutually exclusive and jointly exhaustive of the universe to which they pertain (with one exception noted below). The labeled values for the BEVRECS variables appear in Appendix 1, Files 28-78.

The temporal resolution of the BEVRECS file is one minute; i.e., the TIME value in each EVENT corresponds to the minute on the 24-hour clock during which the EVENT occurred. The number of the day on which the EVENT occurred appears in the DAY column. The values for both TIME and DAY NUMBER are clear intuitively. The values for CONTINUATION are equally clear:

- “1” means the EVENT is continued in the immediately succeeding row
- BLANK means the EVENT is not continued in the next row.

Value lists for the other variables are more complex. The human and nonhuman components of the system under investigation are ACTORS, ORIENTATIONS, and OBJECTS, all of which fit into a continuous numerical sequence that is segmented as follows:

- 001-300 are living members of the Aboriginal population
301-499 are deceased Aboriginal ancestors
500-599 are non-Aboriginal people
600-699 are nonhuman components of the system
990-999 are unidentified or partially identified Aboriginal people.

Likewise, the values for LOCATIONs constitute a continuous numerical sequence that is segmented as follows:
- 01-10 are miscellaneous structures in Gurlanda camp
- 11-19 are men’s residences (ungundyas) and associated structures in all MD-DD camps
- 20-29 are women’s residences (alugeras)
- 30-79 are single-family residences (anoardegans)
- 80-89 are codes that appear in the census data but not in the BEVRECS data
- 90-99 are nonstructural locations in or near Gurlanda camp.

The ACTOR, ORIENTATION, OBJECT and LOCATION codes are used in all files in which they are appropriate entries, as indicated by the extensive cross-referencing of value labels among various file descriptions in Appendix 1.

There are fifty-four different values in the BEHAVIOR UNIT vocabulary in use here. Twenty-four of them pertain to locomotor behavior, seventeen to manipulatory behavior, three to body maintenance behaviors, and ten to highly complex activities that include components from two or more behavioral dimensions, and which thereby violate the principle that all values should be mutually exclusive of each other. The items in the BEHAVIOR UNIT vocabulary are used exclusively in the BEVRECS file.

Although the real world may be comprised of continuous variables “in fact”, we must deal with it in a language of discrete variables, and the conversion from continuous to discrete is necessarily somewhat arbitrary. This, of course, demands solutions to the so-called splitter-lumper problem, which is yet another aspect of the broader question of resolution levels. It was handled in the Alyawarra project, as it is in any research, by taking into consideration both the aims of the research and the observable regularities in structure and behavior within the system under investigation. The best way to comprehend the categorizational scheme that was used in the project is to look at the BEHAVIOR list that appears in Appendix 1, Files 28-78. Items in the BEVRECS vocabulary that have definitions that are not intuitively clear to anyone who is fluent in the English language are defined briefly in Appendix 2.

Vocalizations, facial expressions, and changes in posture are major behavioral dimensions that do not appear in the Alyawarra BEVRECS protocols. The reasons for their absence appear below (p. 74).

Table 6 is an excerpt from a BEVRECS protocol that I made in Gurlanda camp between 1130 and 1145 on the morning of 10 March 1972.
- It contains fifty EVENTS, all of the recordable activities that I observed during the period of sixteen minutes.
<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>NUMBER</th>
</tr>
</thead>
<tbody>
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<td>232</td>
<td>201</td>
<td>24</td>
<td>1</td>
<td>1130</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>235</td>
<td>201</td>
<td>24</td>
<td>1</td>
<td>1130</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>169</td>
<td>201</td>
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<td>1</td>
<td>1130</td>
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<tr>
<td>21</td>
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**Table 6 BEVRECS Protocol**
Twenty different people (ACTORS, col. 2) were active during that time, and they engaged in recordable activities at sixteen different LOCATIONS (col. 1).

When an activity led to a change in an ACTOR's LOCATION, I entered his initial LOCATION in column 1 and his final LOCATION in column 6.

Sometimes an activity involved only one person as in EVENT 19, where ACTOR 086 ran (BEHAVIOR UNIT 202) from one residence (LOCATION 51) to another (LOCATION 40);

Sometimes an activity involved two people as in EVENT 4, where ACTOR 169 carried (BEHAVIOR UNIT 222) another person (ORIENTATION 105, her own son);

Sometimes an activity involved a person and one or more nonhuman components of the environment as in EVENT 29, where ACTOR 189 made (BEHAVIOR UNIT 322) a fire (ORIENTATION 631) using small sticks (OBJECT 617).

Two or more people sometimes acted together as in EVENTS 1 and 2, where ACTOR 232 and ACTOR 235 walked (BEHAVIOR UNIT 201) together from LOCATION 40 to LOCATION 24. I indicated that the two EVENTS occurred together with the “1” in column 7 of EVENT 1.

The reader can decode each EVENT in its entirety by referring to Appendix 1 and matching each numerical entry in the protocol with the corresponding value in the appropriate value list in the Appendix. This sample is included here simply to give the reader a general idea of the appearance of the protocols.

Operation of BEVRECS  The 41,809 EVENTS in the BEVRECS data set were recorded during 193.4 hours of observation during 51 days in the interval beginning with DAY 199 (16 December 1971) and ending with DAY 284 (10 March 1972). The mean data acquisition rate was approximately 217 EVENTS per observation hour.

I made all observations from a single fixed location, a seat atop my Landrover parked beside my tent. Because of the contour of the land, the distribution and sizes of the structures in the camp, and the absence of trees and other potential obstructions to visibility, I could see from that point every residence in the camp, all except two paths between adjacent residences, and all of the unoccupied space in and around the camp to distances of 100 to 500 meters. I made all observations between dawn and dusk while I was fully visible to anyone who chose to look in my direction, and made none with the assistance of binoculars or other magnifying devices. Records were made initially with pen and paper in a shorthand form, and within twenty-four hours a field research assistant converted them to the form shown in Figure 13.

Because I decided to make all observations from a fixed location beside my tent, my inability to reliably distinguish subtle behaviors at distances as great as several hundred meters set the upper limits of spatial and behavioral resolution. I chose to record only those activities in behavioral dimensions in which I could make reliable distinctions, which led me to disregard all facial expressions and vocalizations. However, within those behavioral dimensions in which I could make reliable distinctions from the observation point, I recorded every activity that I observed at the selected resolution.
level during each observational session. Since I recorded an activity if and only if I observed it, since the BEVRECS vocabulary requires very little evaluative effort by an observer, and since I disregarded those behavioral dimensions in which I could not make reliable recordings, I believe that the BEVRECS files contain data that are both valid and reliable at the resolution level selected for this part of the project.

A wide-ranging introduction to the analysis of BEVRECS data appears in Denham (1973), and a sharply focused analysis of a single substantive topic, infant transport, appears in Denham (1974a).

**BEVRECS Data Quality Control** Errors of omission are likely to have occurred when brief activities happened simultaneously with, but at LOCATIONS different from, more lengthy and complex activities. While recording lengthy and complex activities, I may have failed to notice fleeting activities happening elsewhere in the camp.

An especially insidious kind of systematic error occurred when, as observation time accumulated, my perceptions and codes “drifted”; i.e., I am certain that I was not infallible in using the codes, even though I intentionally omitted behavioral dimensions requiring difficult evaluative judgments.

At a few points during the observational work, I decided that previously established codes were not sufficiently refined for some potential uses of the data, so I made revisions in the code lists. For example, in the break between DAY 218 and DAY 228, I decided to redefine BEHAVIOR UNIT code 210 (“carry”) as “carry nonhuman object”, and to introduce a new series of codes, 221-225, to distinguish among the five different styles of infant transport. But that meant that the definition of 210 was not the same at the end of the observational work as it was at the beginning. In order to eliminate this problem, I re-coded all of the 210’s that were used to represent early observations of infant transport, converting them to 220 (“infant carry of unknown style”) and leaving 210 to represent “carry nonhuman object” wherever it appears in the protocols. This means that BEHAVIOR UNIT 220 represents all cases of infant transport that were recorded from DAY 199 through DAY 218, and that 220 does not appear at all in the protocols from DAY 228 through DAY 284. This and similar re-coding was done as the computer tape was being compiled, but this is the only case in which any detectable evidence of the re-coding remains in the protocols.

Among the most common errors of commission are incorrect codes that occurred as a result of inaccurate identifications of people, places, and activities, or as typographical errors during coding or keypunching. In order to detect and correct these errors, considerable effort went into preparing error detection programs that were used in compiling the data tape. These programs were designed both to detect illegal entries in the protocols, and to detect legal entries that were used incorrectly.

For example, an ACTOR value of 562 was an illegal entry because there was no ACTOR with that identification number. Detecting and correcting such errors was a straightforward process.
Then there were TIME errors. If, for example, EVENT 31 in Figure 13 had a TIME value different from 1137, it was incorrect. In this context, 1127 or 1139 would be a legal entry that was used incorrectly.

Then there were cases in which ACTOR 207, for example, was incorrectly coded or keypunched as ACTOR 209. If this was a coding error, I could detect it only if I could determine by independent means that one of the people represented by the two legal ACTOR codes was not in the camp on the day when the EVENT was recorded.

Similarly, if a legal residence number appeared as a LOCATION code when the residence that it represented was not located in Gurlanda camp, the error could be detected and corrected. The BEVRECS support files, described next, were valuable aids in dealing with errors of this kind.

From all that I have said with regard to data quality control in both person-based and time-based data sets, it is clear that I consider the very high degree of redundancy that characterizes the data base to be an extremely valuable asset. Although I could have used a less redundant system in the field, it would have been much more difficult, and in many cases impossible, to rid a less redundant data base of its many errors. And a great many errors are certain to be made while recording a million numeric characters, regardless of the skill of the recorder or the setting in which the work is done.

**BEVRECS Support Files**

The exigencies of life in the field made it impossible for me to establish and follow a rigid schedule for performing BEVRECS observation sessions, and the size and composition of the population of Gurlanda camp were unstable through time. Hence, some kinds of summaries of data in the BEVRECS protocols are not meaningful unless one adjusts the data to prevent the appearance of spurious behavioral patterns that derive from imperfect scheduling of observations or unstable population parameters.

For example, it is possible to examine the temporal distribution of activities by cross-tabulating BEHAVIOR UNITS by TIME. But the results of performing this operation on unadjusted data would be misleading because there are differences in the amount of time that I spent in making BEVRECS protocols at each clock hour. If a tabulation shows that I recorded a BEHAVIOR UNIT twice as frequently between 0800 and 0900 as between 0900 and 1000, one must know the amount of observation time accumulated during each of those hours in order to know whether this is a genuine difference in Aboriginal behavior, or simply an artifact of observational time distribution.
Table 7 Time distribution of BEVRECS observations
Table 7 shows the exact number of minutes during which I recorded BEVRECS protocols on each of the 51 days in which I conducted observational sessions. It includes the total number of observation minutes on each observation day, and the total number of observation minutes accumulated during each clock hour throughout the 51 observation days. Clearly the 11,485 observation minutes were scattered rather haphazardly, except insofar as I attempted to accumulate roughly the same total amount of observation time at each clock hour from 0600 to 1900 hours. The fact that the attempt was moderately successful does not reduce the importance of adjusting the data for greater accuracy. This operation is most important when we wish to compare behavior on hot and cold days, or wet and dry days, or whenever we wish to examine only a portion of the BEVRECS data. In order to make these adjustments easier, I have included the contents of Figure 14 as a separate file on the data tape.

Instability in the size and composition of the camp’s population produced a different but related set of problems that often necessitates further adjustment of the data. For example, we can cross-tabulate BEHAVIOR UNIT by sex of ACTOR. If we discover that a specific BEHAVIOR UNIT appears twice as frequently in EVENTS with female ACTORS as it does in EVENTS with male ACTORS, we must know the proportion of males and females whose behavior I observed and recorded in order to know whether this represents a genuine behavioral difference between the sexes, or is simply an artifact of unequal numbers of males and females. Basically the same problem occurs when we examine the behavior of two or more age groups or sex-age classes.

In order to facilitate adjusting the data to correct for instability in camp population, the camp population on BEVRECS observation days appears as a separate file on the data tape. The file is a rectangular matrix with the rows representing the people who were present in Gurlanda camp on one or more of the BEVRECS observation days, and the columns representing the 51 observation days for which time distributions appear in Figure 14. Each cell contains a “1” or a “0”, depending upon whether the person in question was present or absent on a particular observation day.

In addition to their uses in conjunction with the BEVRECS data, the BEVRECS support files can be analyzed as independent data sets. The observational time distributions say a great deal about my behavior, and the camp population file can be used as a detailed supplement to the census data for Gurlanda camp.

*Time-Based Data Sets III: Group Composition Data*

The person-based data sets, which have the lowest levels of resolution, deal with the composition of a single group, the research population as a whole. Censuses and maps break that group into subgroups based on the presence of people or residences in various camps at various times, and yield increases in spatial and temporal resolution with regard to group compositions. In all of these data, however, there is no distinction among behaviors; i.e., these data concern where a person is, rather than what a person does.
BEVRECS data contain a great deal of information about the behavior of people in groups, but the resolution of the BEVRECS data is higher than is necessary for some purposes. For example, if I saw a group of three women, four teenage girls, and three children arrive at an alugera carrying buckets of water from the bore, the BEVRECS protocol corresponding to that observation would contain perhaps eighteen EVENTS which together would show all pertinent information in detail. However, for some purposes I can meaningfully summarize the entire happening with the simple label of “water hauling group”. This is the rationale underlying the compilation of the group composition data.

Each case that appears in the group composition data contains the DAY and TIME at which I observed a group, the general ACTIVITY in which its members were engaged, and the LOCATION at which the ACTIVITY occurred. The values for these four variables are followed by a list of the identification numbers of all the members of the group.

The first and by far the largest set of group composition data was derived directly from the BEVRECS data for DAY 199 through DAY 266. Here I define a group as two or more people who were outside of structures and cleared areas immediately surrounding structures, who were closer to each other than they were to anyone else, and all of whom were moving in the same direction if they were in motion. By using these criteria for including cases in the Group Composition (BEVRECS) data, I was sure that I could see all members of a group, and that the people were acting together rather than simply acting simultaneously.

In the other two sets of group composition data to be described below, a group could consist of only one person, but in the Group Composition (BEVRECS) data, the minimum group size was two. This difference was introduced in order to eliminate a great deal of unnecessary writing in the field, but the difference can be removed, either temporarily or permanently, now that the BEVRECS protocols are on magnetic tape. As a result of my using the stated criteria for defining a group, almost all of the groups in the BEVRECS-derived group composition data consist of people moving from one LOCATION to another. Therefore, one can extract from the BEVRECS protocols all of the single-person groups that meet the selection criteria by using a computer program that selects only those BEVRECS EVENTS in which one person walks alone from one place to another. DAY, TIME, and LOCATION can be read directly from the protocols, and the ACTIVITY can be derived from the EVENT following the locomotor EVENT if, for example, the person is carrying water or firewood. Otherwise, the ACTIVITY can be coded simply as “walk to”.

I compiled the second set of group composition data as I made multiple visits to each residence and gathering place in and near Gurlanda camp, and noted the identification number of each person present at the time of my visits. In effect, these data comprise a series of intra-camp censuses characterized by very high levels of spatial and temporal resolution. I refer to these data below as the Group Composition (Residential) data.
The third set of group composition data is a specialized version of the Group Composition (Residential) data. As the first person awake in the camp on eleven mornings, I sat atop my Landrover and recorded the residence at which each person in the camp first appeared on those days. Although the behavioral resolution of these data is low (i.e., the records show where a person is rather than what he does), this was the only effective means that I devised for systematically obtaining observational data that are even indirectly related to behavior that occurred during the hours of darkness. These are the Group Composition (Sleeping) data.

**The Numerical Data Archive**

All of the data described above have been placed on magnetic tape for computer analysis (now available on CD-ROM and becoming available on the World Wide Web). The Data Documentation File appears at the head of the data files and has been upgraded to apply to the CD-ROM and Internet versions of the database. It contains a detailed technical description of the organization and contents of the numerical data as a whole and of each data file individually; however, the structure of the files as described in the Data Documentation File is somewhat different from the conceptual structure of the data base as I have described it above.

The basic difference between the conceptual structure of the data base and the organization of the data on the tape is that two of the data sets described separately above have been integrated to form a single file on the tape, while three other sets have been divided into subsets and placed on the tape as multiple files. Furthermore, the order of the files on the tape is different from the order in which I introduced the data sets. These differences exist solely to improve data processing efficiency and economy, and they do not invalidate any substantive comments appearing above.

The Data Documentation File is File 0. It is followed by the first data file, File 1, containing both vital statistics and genealogical data, and then by the census data on File 2. Next come the seventeen maps, each appearing on a separate file in the series from File 3 through File 20. File 21 contains meteorological data, and File 22 the kinship data. Next come the three sets of group composition data, each appearing as a separate file in the series from File 23 through File 25. They are followed by the two BEVRECS support files, the time distribution of BEVRECS observations appearing on File 26, and the camp population on BEVRECS observation days on File 27. Finally, the BEVRECS data appear on Files 28 through 78, with the protocols for each observation day entered on a separate file.

Each of the 51 BEVRECS files contains all of the EVENTS recorded during the day in question. Although there were two or more observational sessions on almost all of the days, the individual sessions do not appear as subfiles. Rather, the EVENTS appear in exact chronological order with no subfile structure and with no other entries representing periods of time during which I suspended observations. For most
purposes, this file structure should be most convenient to use, but if subfiles ever are necessary (e.g., when analyzing behavior sequences in which uninterrupted series of EVENTS are the units of study), subfiles can be obtained by segmenting each BEVRECS file at each point where there is a period of five or more consecutive minutes during which no EVENTS were recorded. There were no sessions during which I observed less than one recordable EVENT in five or more consecutive minutes, and there were no occasions when I terminated one session and began another with five minutes or less between sessions.

When the database was published on tape by HRAF Press in 1978, the data records and files were highly compressed. As the technology had developed since then, they have been unpacked and reformatted. Further details concerning the structure and contents of the tape may be obtained by examining the Data Documentation File. (This link displays the most recent version of the Data Documentation File. The version that was included in the AEDB Manual when it was published in 1978 no longer applies.)

**Conclusion**

Each set of data described here can be rated relative to the other sets according to the fineness of the distinctions made in time, space, and behavioral diversity. The person-based data make no distinctions in time, space, and behavior; maps and censuses make minor distinctions in time and space, but make no meaningful distinctions in behavior; group composition data make finer distinctions in time and space, and they make some distinctions in behavior; finally, the BEVRECS data make relatively fine distinctions in all three dimensions.

It is reasonable, then, to think of these sets of data and their associated data acquisition techniques as a single entity. The three person-based sets constitute a matrix in which people are items and characteristics of those people are features; the time-based sets constitute a matrix in which time units are items and characteristics of those time units are features; and, the census data are located conceptually at the intersection of the person-based and time-based sets. A uniform coding scheme, used consistently throughout the data base, integrates the contents of the sets just as the matrix formats integrate their structures. Underlying the codes and the structural arrangements is the multifaceted concept of the resolution level which provides continuity and insures compatibility among all data in the three dimensions of time, space, and behavioral diversity.

The kinds of questions that can be asked of the data are defined largely by the nature and organization of the data themselves; at the same time, the nature and organization of the data were determined initially by the kinds of questions that I wanted to ask and the kinds of analytical procedures that I wanted to use to answer them. My decision to use the approach described here to generate a preliminary, comprehensive, and general description of life among a small, relatively isolated, previously unstudied
Australian Aboriginal population directly affected the choice of topics that served as the empirical foci of the project, the choice of resolution levels within and among data sets, the design of data acquisition techniques and coding schemes, and my solutions to various conceptual and practical problems related to file linkage and the structure of the data base as a whole. The result is as intended; namely, a data base that one can use to generate a multifaceted description of life among the Alyawarra, a quantitative description that delineates the context in which one may productively conduct sharply-focused investigations of topics of specialized interest. In its own right, the description generates many questions that could not have emerged had I used a less rigorous and systematic means for obtaining and organizing the data.

The contents and structure of the data base facilitate some kinds of analyses and preclude others; furthermore, the methods introduced some kinds of biases into the data while avoiding others. Since these problems inhere in all field research, their presence here does not distinguish this methodology from any other. But it is important to note the significant differences between limits and biases that are essentially unknowable and uncontrollable on the one hand, and limits and biases that are explicitly described and directly controllable on the other. The approach used here represents a determined effort to avoid making implicit assumptions and to avoid operating on the basis of preconceived notions that so often bias fieldwork in anthropology. To the best of my ability, I have stated all of my assumptions explicitly, and I have made provisions for controlling biases wherever I have known them to occur. In this regard, the data collection procedures and the data base organization described here are distinctly superior to traditional participant observation and other informal data collection methods.

Clearly the system as a whole is quite primitive at this time. The field study in Australia was an experiment designed to develop and test the system under realistic but simple conditions. Much was accomplished, but the system still contains many gaping holes that can be filled only by much additional research along several lines of inquiry. The lacunae include, but certainly are not limited to, the following:

- certain kinds of behavior, including verbal behavior, facial expressions, and postural changes, were not incorporated into the BEVRECS files, and no data were recorded at resolution levels as high as those that might be attained by observing and recording from distances of ten meters or less; hence, the data yield an incomplete and somewhat distorted picture of life among the Alyawarra.

- there was no systematic attempt to link the observational records to Alyawarra cognitive systems except in the kinship data and to a very limited extent in the vital statistics data

- the methods used for obtaining genealogical and kinship data would be awkward to use with populations significantly larger than the one with which this project was conducted
• maps and censuses are technically defective

• there was a failure to obtain dietary data of the proper quality and in sufficient quantity to justify including those data as another time-based data matrix

• there was no ongoing, in-the-field, computerized checking of the data for scheduling and sampling defects, omissions of information, and incorrect entries.

Despite these obvious deficiencies, none of which presents insurmountable difficulties for future research, the project yielded an extremely large and richly interconnected body of data that is amenable to mathematical analysis concerning a multitude of topics and using a broad array of analytical procedures.
Chapter 3. Using the Data Base

The remainder of the paper demonstrates a few of the ways in which the data base can be used. Some of the work is simple to do, requires only one data file, and is nothing more than straightforward ethnographic description. Other examples are considerably more complex, require simultaneous access to two, three, or more files, and illustrate the kinds of hypotheses that can be tested with the data. The simpler exercises suggest the range of topics that students might investigate in research methods courses where they could develop skills in formulating and answering precise ethnographic questions, learn both the strengths and weaknesses of data structures such as the ones used here, and develop mathematical and programming skills while using real, rather than fictitious, data. The more complex examples suggest lines or research that independent investigators could pursue with the data base.

In recent years, demographers, geneticists, and anthropologists have become increasingly interested in small, semi-isolated human populations, because it seems likely that almost all of human evolution occurred in populations of that kind (Ward and Weiss 1976). Computer simulation models are powerful tools for studying such populations, but they need to be checked against real-world data in order to determine the credibility of the assumptions built into them (Dyke and MacCluer 1973). The following examples suggest ways in which the Alyawarra data may be used for this purpose.

Population statistics that one can obtain readily from the data base include, but are not limited to, age distributions for each sex; mean and median ages; sex ratios of several kinds; child-woman and dependency ratios; marital status and incidence of polygyny for males and females by age; mean age differences between spouses, siblings, and parent-child pairs; and sizes of sibships (Denham 1975b). Since the vital statistics file holds the day numbers when each person officially joined or left the population, it is possible to calculate rates and ratios on the basis of person-days rather than person-years, and thereby to increase the accuracy of the computations. One could generate a life table with the data, but because of the small size of the population, it would have to be interpreted cautiously. Census data can be used to determine household sizes and compositions through time, and to obtain a comprehensive picture of Aboriginal mobility among the camps at MD-DD and throughout the southeastern quarter of Australia’s Northern Territory; data on tribal affiliations provide information on migration and intertribal marriage; and genealogical data can be used to compute inbreeding coefficients.

The data can be used to examine the Alyawarra life cycle from a great many different perspectives. Consider the carrying of infants and children, a social activity that is basic to the survival of humans and nonhuman primates. Despite the long-standing anthropological interest in child-rearing, the literature contains virtually no quantitative data on infant transport. What are the styles in which infants are carried? Do styles vary systematically with the sex and age of the infant, or the sex and age of the carrier? Are
boys and girls carried equally often, or is there a sex-related bias in the frequency of infant transport? Are males and females equally likely to carry infants, and if not, at what age does the difference begin to appear? Do people other than their mothers carry infants, and if so, who are the other carriers? What are the stages in the transition from being a person who others carry to being a person who carries others? Where are infants and children taken when they are carried? Answers to the questions are in the data base.

The BEVBECS files contain 1200 cases of infant and child transport, each of which has the identification numbers of the carrier and the person being carried, the style in which the person was carried, the geographical locations where the carry began and ended, and the day and time when it occurred. The BEVRECS data can be analyzed alone, linked with vital statistics, genealogical and kinship data to determine various kinds of relations between carriers and infants, linked with the maps to investigate spatial aspects of infant transport, and linked with the meteorological data to search for weather related variations in any of the behavioral dimensions. Hence, we may generate a quantitative, multidimensional description of Alyawarra infant transport that we can compare across cultures and across species (Denham 1974a).

Together, the data on demography and infant transport raise serious questions about recent hypotheses concerning the role of infanticide as a birth spacing mechanism. Birdsell (1968) and others have suggested that preferential female infanticide was used regularly in Aboriginal Australia and elsewhere not only to control population growth, but also to improve the food gathering performance of mothers who could carry only one infant at a time while foraging. This hypothesis seems to be based on the assumption that mothers perform most or all infant transport. Although the Alyawarra did not forage for most of their vegetable foods in 1972, they did so as recently as 1958. Hence, inferences about infant transport among foraging groups may be more meaningful if they are based on Alyawarra data than if they are based on data from people with long histories of sedentary life. What do the Alyawarra data show?

They are ambiguous on the question of preferential female infanticide. On the one hand, the overall sex ratio is 103, which is normal for a small population that does not practice preferential female infanticide, and the mean age difference between adjacent siblings under four years old is only 2.3 years. On the other hand, the sex ratio for people under 15 years is 120, which suggests that infanticide may have been both present and preferentially female. Regardless of the answer to this question, the BEVRECS and genealogical data show that mothers perform only 52 percent of Alyawarra infant transport, and elder sisters and mothers’ sisters perform the remaining 48 percent. Since almost half of Alyawarra infant transport was performed by people other than infants’ mothers, and since there were, in fact, 1.7 females between the ages of 10 and 54 years who were available to carry each person under the age of five years, the Alyawarra data suggest that Birdsell’s hypothesis is based on an unjustified assumption, and that his hypothesis should be rejected (Denham 1974b).
Infant transport is only one aspect of the life cycle and the lifelong socialization process that we can examine in the data base. Another is spatial mobility. Preliminary analysis of the BEVRECS and group composition data show the following pattern:

- During the first year of life, infants stay near their mothers.
- During the next few years, they go places and do things with their older siblings and mothers.
- At five or six years of age, they begin to form play groups with peers in parts of the camp well away from older people.
- At or soon after puberty, women become wives and go to live with their husbands in new households, while boys are initiated at puberty.
- The census data show that, at that time, males begin to move from camp to camp so frequently that it becomes meaningless to think of them as residents of single camps or households.
- From the time that men acquire their first wives more than a decade after initiation, until they are about 40 years old, they and their families remain quite mobile, but far less so than the men were before they married.
- Above 40 years, there is much less mobility, and it is these older families that constitute the core members of each camp's population.

The fact that males marry more than a decade later than females ramifies throughout Alyawarra social organization. There is a mean difference of 14 years in the ages of husbands and wives, 48 percent of the 40 - 50 year old men have two or three wives, and there is a mean difference of about 42 years in the ages of fathers and their children in contrast with a mean difference of about 28 years in the ages of mothers and their children. In other words, a male generation is about 1.5 times longer than a female generation.

One hypothesis that has been offered repeatedly to explain the late marriage of Aboriginal men in many parts of Australia is that older and more powerful men exclude younger men from sexual access to women and thereby reserve all of the women for themselves. A second hypothesis is that polygyny may be most advantageous to women of childbearing age, who have access to needed assistance from co-wives to improve the chances that their offspring will survive to reproduce. A third hypothesis is that late marriage may be most advantageous to young men, who are free to move about independently for many years, have sexual access to more women than they might if they were married, and thereby increase the probability of their impregnating several women and leaving more genetically diverse descendants in succeeding generations.

The hypothesis that attributes late marriage of males to the dominance of older males leads us to predict competition and perhaps conflict between married and unmarried men, and large numbers of wives for the most powerful men and few or no wives for the others. The other two hypotheses complement each other, since together they allow both young men and young women to increase their chances of leaving descendants who can reproduce in the next generation. In this case it appears that the older men are helping both the young women who gain from having co-wives, and the young men who
gain from being mobile. This pair of hypotheses leads us to predict evenly distributed polygyny, no objection by older men if a young man acquires a wife, and perhaps no hostility from older men if their young wives have sexual relations with young men. We may test these hypotheses with the Alyawarra data.

The evidence includes the following items. Of 40 living married men, 28 had one wife each, 11 had two wives each, one had three wives, and no one had more than three; i.e., there was no concentration of women in one or a few households. In the peak childbearing years from ages 15 to 30, 68 percent of the married women had co-wives; conversely, 96 percent of the women who had co-wives were of childbearing age. Although there were no married men under 26 years of age, age differences between fathers and their children show that, in 6.6 percent of 166 father-child pairs, the father was under 26 years old when the child was born. This may be due to inaccurate age estimates, or it may be a valid indicator that young men sometimes marry. Finally, I never observed any overt hostility or aggression between men, nor any occurrences of sexual intercourse; hence, the data base contains no records of these kinds of behavior. Although these bits of evidence are incompatible with the first hypothesis and support the second and third, it might be best to leave this as an unresolved matter among the Alyawarra.

One can use the genealogical data to generate conventional genealogical diagrams for visual examination and to identify all known consanguineal and affinal links between each pair of people in the population, as well as to compute inbreeding coefficients and to support life cycle analyses. Beyond this, however, one can use the genealogies in conjunction with kinship and age data to test competing hypotheses concerning Central Australian marriage, descent, and kinship. I shall explore these topics in some detail, because they demonstrate the utility of the data base for investigating multifaceted problems that I did not formulate as precise questions before or during the fieldwork.

The study of Aboriginal society in general, and Central Australian social organization in particular, has relied very heavily on Spencer and Gillen’s reports (1899, 1927) which stated that the Alyawarra were very similar to the Aranda (Arunta) with whom Spencer and Gillen spent a great deal of time. Radcliffe-Brown (1930) used their classic description of the Aranda in his equally classic work on the social organization of tribes throughout the continent. Levi-Strauss (1969) used Radcliffe-Brown’s models of Kariera and Aranda four-section and eight-subsection systems, with bilateral first and second cross-cousin marriage, sister exchange, and unambiguously reciprocal kinship terms in his classic work on the elementary structures of kinship.

On the basis of his research with an Aboriginal group on Groote Eylandt, adjacent to Australia’s north coast, Rose (1960) challenged much of this anthropological tradition. He demonstrated that bilateral cross-cousin marriage and sister exchange are virtually impossible on purely logical grounds in a population where the mean ages of husbands and wives are not equal to each other. Furthermore, he demonstrated that, at least among the Groote Eylandt Aborigines, there was nothing approaching the mathematical precision in mate selection that had been attributed to other societies where eight-
subsection systems were found. He hypothesized that Central Australian social organization, characterized by a large mean difference in the ages of husbands and wives, actually had an asymmetrical structure in practice, that those groups maintained a fictitious symmetry only in the kinship terminology, and that it was this fiction upon which Radcliffe-Brown based his models. Hence, Radcliffe-Brown’s symmetrical model and Rose’s asymmetrical model contradict each other. Which is the better predictor of Alyawarra behavior?

A superficial examination of the Alyawarra data reveals that Alyawarra social organization has a great deal in common with that of the Aranda. Without the quantitative data in the data base, it would appear to be nothing more than a minor variant of the Southern Aranda four-section (implicit eight-subsection) system that Spencer and Gillen described. But a detailed analysis of the Alyawarra data makes it very clear that the symmetrical model is grossly deficient, and that the asymmetrical model resembles Alyawarra practices much more closely.

The Radcliffe-Brownian model predicts frequent sibling exchange, but in 114 known marriages among living and deceased people, I have been unable to confirm a single instance of real sibling exchange, and only twelve percent of the marriages are between close classificatory siblings. It predicts that MBD and FZD will be terminologically equivalent, but in fact there are two significant terminological differences between MED and FZD. In the first place, real MBD are terminologically equated with M in 24 percent of 173 cases, but real FZD is never equated with M. In the second place, the term which, according to informants’ statements concerning kinship ideology, should be applied to both MBD and FZD is, in fact, applied to FZD in 77 percent of 119 cases and to MED in only 30 percent of 173 cases. The model predicts that MBD and FZD will be genealogically as well as terminologically equivalent, but in 292 cases in which one person is another’s MBD or FZD, there is not a single instance in which a person is simultaneously MBD and FZD. Finally, the Radcliffe-Brownian model predicts that men will marry women who are bilateral second cross-cousins, but in fact, 84 percent of the marriages are between men and their first cross-cousins, and 89.5 percent are between men and their matrilateral cross-cousins.

Although the Alyawarra have a twenty-two term kinship nomenclature that is virtually identical with that of the Aranda, and a section system nomenclature whose terms are cognate with those of the Southern Aranda to whom Spencer and Gillen attributed implicit subsections, Alyawarra marriage practices and kinship term applications do not agree with predictions from the Radcliffe-Brownian model.

But the observed deviations from that model can be explained in terms of the large mean age difference between husbands and wives. The age difference between spouses introduces a systematic matrilateral bias into Alyawarra marriage practices. Consequently, the Alyawarra engage in a kind of indirect, rather than direct, exchange (Levi-Strauss, 1969), despite their having a descent, marriage and kinship ideology that superficially resembles the Radcliffe-Brownian model of the Aranda system. Indeed, the most adequate way to represent both the ideology and the practice of Alyawarra
descent, marriage, and kinship is to use an age-biased Kariera model that can be conceptualized and visualized most effectively as a three-dimensional structure in the shape of a double helix. A detailed presentation of the kinship study is forthcoming (Denham, McDaniel, and Atkins 1978).

To conclude this section of the paper, let’s consider the composition and organization of Aboriginal local groups, a topic about which there has been long-standing and frequently acrimonious debate. People such as Radcliffe-Brown (1930), Stanner (1965), and Birdsell (1970) argue that traditional Aboriginal local groups were patrilineal, patrilocal “hordes”. Others, including Elkin (1953), Meggitt (1962), and Hiatt (1962, 1966), argue that membership in Aboriginal local groups is and always was unstable, and that the concept of the patrilocal horde is, at best, a misleading abstraction. Stated more generally, there is no consensus concerning the “patrilocal” or “composite” (Steward 1955; Service 1971) nature of traditional Australian Aboriginal bands.

There are at least three problems that are central to the debate on Aboriginal local groups. First, the logical distinction between land owning groups and land using groups has not always been maintained; second, the distinction between ideology and practice often has been disregarded; and finally, definitions of terms that are used to categorize postmarital residence (e.g., patrilocal, matrilocal) have not been operationalized sufficiently to enable anyone to measure the extent to which practice accords with ideology (Helm 1965, 1969).

The Alyawarra data will be especially useful for developing and refining complex operational definitions of postmarital residence terms, and for investigating processes rather than typologies of local group composition and organization. Since the Alyawarra no longer lived as nomadic hunter-gatherers when I worked with them, there is only an indirect connection between my observations in 1971-72 and their settlement pattern and community organization before European contact. However, the Alyawarra data base contains a large quantity and variety of data that bear on these topics, and I think it is feasible to distinguish that which is traditional from that which resulted from European contact with regard to settlement patterns and community organization.

Since the Alyawarra remained highly mobile in 1971-72, the eighteen maps and sixteen complete censuses of the population make it possible for us to determine, in this highly fluid situation, which people lived in each camp on a great many occasions, and which people lived adjacent to each other in those camps. The BEVRECS files contain a great deal of information about who interacted with whom, and the relative frequencies of those interactions, and about which residences were linked with each other through visiting, food and water sharing, and so on. The group composition files contain information concerning the composition of task groups, residential groups, and sleeping groups. And all of the maps, censuses, group compositions, and BEVRECS data can be linked with vital statistics, kinship data, and genealogies. The results can be a multifaceted analysis of Alyawarra group composition and organization.
Major objectives of local group analysis will be to determine which families lived as neighbors always, sometimes, and never, to isolate distinguishing features of those three kinds of relationships, and to identify and account for patterns of movements and social interactions among and within camps. Taken together, these analyses should describe both the structure and the dynamics of Alyawarra local groups in 1971-72, and provide insights into traditional group composition and organization.

With the single exception of the work involving Alyawarra kinship terms, everything described in this section of the paper has close parallels or analogues in the study of nonhuman primates and other social animals. I have not attempted to draw those parallels here, but readers who wish to pursue this matter might consult, for example, Altman and Altman (1970), Kummer (1968), Poirier (1972), Cohen (1971), and Wilson (1975) for directly comparable work on primate demography, social organization, and life cycles.

The analytical possibilities mentioned here are examples of the kinds of topics that can be investigated and the kinds of approaches that can be used with the Alyawarra data base and with other data bases constructed along similar lines. Appendix 1 should suggest even more possibilities.
Appendices

Appendix 1  Data Documentation File

This link displays the most recent version of the Data Documentation File. The version that was included in the AEDB Manual when it was published in 1978 no longer applies.

Appendix 2  Selected BEVRECS Code Definitions

The following are brief definitions of BEVRECS values whose meanings are not intuitively clear. See the Data Documentation File for complete details.

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