Chapter 4

Theories, Rules, Exceptions and Models

Round about the accredited and orderly facts of every science there ever floats a sort of dust-cloud of exceptional observations, of occurrences minute and irregular and seldom met with, which it always proves easier to ignore than to attend to. . . . Anyone will renovate his science who will steadily look after the irregular phenomena, and when science is renewed, its new formulas often have more of the voice of the exceptions in them than of what were supposed to be the rules. — William James

Recurring Groups, Linking Alliances: A Critique

By the mid twentieth century, an immensely rich and valuable series of ethnographies was in evidence. Many were inspired by Malinowski’s field-intensive approach to participant observation. Conceptual vocabularies emerged that provided a basis for a comparative ethnology. Documentation of different systems of kinship and exchange was a major contribution of anthropology. The year 1949 was momentous for kinship studies, marked by publication of Murdock’s *Social Structure* and Lévi-Strauss’s *Structures Élémentaires de la Parenté*, translated in 1969 but widely read in the original. Both these veritable classics, by masters of the domain of kinship, were logico-deductive in structure and universalizing in scope. They were also mutually contradictory. Each attempted to identify a general pattern from first principles that could guide and explain what could be observed in different ethnographic descriptions. Both could not be right as formulated, however, if each theory contradicted the other. Each had defined a different essentialist notion of social structure. We review here both theories and then proceed to a different approach, one that looks to networks, distributions, and variabilities (with possible invariants at a higher level) rather than to essentialist principles.

Murdock’s book was grounded on the assumption that the nuclear family was a universal building block out of which larger kinship units were constructed, including composite forms of the family, consanguineal groups, clans, lineages, and communities. In its simplest sense, his state-
ment of the universality of the nuclear family meant only that “where there are children, there are two parents, and by and large it is known who they are. Nearly all anthropologists would accept this.”2 Beyond that, however, Murdock also asserted that in every society, important functions are carried by the nuclear family distinct from the other groups in which it is embedded, such as polygynous, extended, compound, or other types of families.

At this level, Murdock’s nuclear family universal is empirically false, as in the matrifocal family where husbands are rarely present if at all. Yet it is from this assumption that he derives a far more wide-ranging conclusion, namely, that all extended relationships of kinship are derived from and modeled upon an extension of relations in the nuclear family. He took the nuclear family as the underlying Platonic form from which other characteristics of kinship could be inferred.3

Lévi-Strauss grounded his theory of kinship, in contrast, on the universality of the incest taboo as a dichotomizing principle that marked the transition from nature to culture. Nature mandates the union of partners to produce children (the “where there are children, there are two parents” observation recognized by Murdock) but leaves open the choice of partners, which is the breach into which a prescriptively dichotomizing Culture creates itself by a universalizing incest taboo. The “formal fact of kinship” was discovered to lie in the injunction to take a partner from another group distinct from one’s own (Lévi-Strauss 1969[1949]:31). Mutually exclusive “wife giving” and “wife taking” groups engaged in exchange or alliance emerge out of this dichotomizing principle along with a distinctively human Society.4 The universality of out-marriage presages Lévi-Strauss’s later model of the “atom of kinship” (1963:72-73, 1976:82-112), in which marriage is again presumed to occur between distinct social groups. This “law,” like Murdock’s claim of the universal distinctiveness and functionality of the nuclear family, is also an overextended claim.5 While most of humanity might search for a spouse outside the nuclear family, this search does not entail the universality of marital exchange or alliance between families as a part of a universal cultural institution.

The opposing perspectives of Murdock and Lévi-Strauss are useful if each is taken in a limited sense, where they are viewed as partial and complementary perspectives. It is not the insights contained in these statements that is the problem. The problem is the value assigned to them when they are posited as universal truths. Grand unification theory and
self-justifying first principles, of course, are no more possible in anthropology than in any other discipline. It is not our intention to detract from the insights or specific findings of Murdock or Lévi-Strauss, or to fail to employ their insights appropriately. Their arguments, however, will need to be extracted from a logic in which there is an underlying universal “form”—from a Platonic world of “timeless and absolute truths that lie beyond the individual, his beliefs, and his perceptions”—that in its universality gives shape to the “shifting and unreliable world of individual beliefs and perceptions.” These are the classical arguments of dualism (Leaf (1979:6): the dichotomy between an unreliable world of surfaces and an unchanging world of forms and essences that give their shapes to the world of surfaces. For Lévi-Strauss, that essential form is the universality of the incest taboo as the badge of humanity creating human order out of nature. For Murdock the universal form of kinship is the nuclear family (a conceit of the bourgeoisie, Marxists would have said), creating an underlying social order out of surface diversity.

Rules for Generating Recurrence in Social Structure

Murdock and Lévi-Strauss, like many of the anthropologists of the two postwar periods, were concerned with constancy: How do patterns of culture and social structure get fixed and how are they reproduced in successive generations? Their theories are concerned with rules that, once in place, generate an eternally recurrent pattern; namely, generative rules that ensure the stability of kinship systems.

For Murdock, the principle of behavioral consistency provided his “main sequence” theory of the development of kinship structure. In this theory, as diagrammed in Figure 4.1, if women are dominant in the division of labor and if polygyny is absent (Korotayev 2001), their cooperative bonds and decisions about where to live after marriage will tend to be consistent with female-centered residential patterns (e.g., matrilocal-ity). Once matrilocal-ity or possibly avunculocal-ity is in place, the fact that co-uterine females live together (or men with their mother’s brother) is likely to result in the formation of named uterine descent groups. The gender principle of descent is likely to express itself in inheritance rules which in turn affect political succession to office. A similar sequence is hypothesized for patriderinant labor, patrilocal-ity, and agnatic descent groups, inheritance, and succession. Equal division of labor predicts similar consequences for bilocal-ity, duolineal descent groups, inheritance, and succession.6
### Figure 4.1 Murdock’s Main Sequence* Rules for Kinship Groups

<table>
<thead>
<tr>
<th>Division of Labor/Marriage Mode Rule: Matridominant or Patridominant</th>
</tr>
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<tbody>
<tr>
<td>Residence Rule: Matrilocal or Patrilocal</td>
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<tr>
<td>Descent Rule: Matrilineal or Patrilineal</td>
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<tr>
<td>Inheritance Rule: Matrilineal or Patrilineal</td>
</tr>
<tr>
<td>Succession: Matrilineal or Patrilineal</td>
</tr>
</tbody>
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* As modified with addition of marriage mode by Korotayev (2001)

For Lévi-Strauss, beyond the dichotomizing principle that requires every marriage to be outside the group, elementary structures of reciprocity in the circulation of women are those marriage rules that, when repeated, regenerate the same structure. Such rules can take two forms (Lévi-Strauss 1949:119), “an automatic procedure (unilineal descent) for sorting out individuals into two categories” such as dual organization, in which distinct intermarrying groups replicate in each generation, or “a discriminatory procedure which applies separately to each individual,” such as preferential marriage. For him, “Cross-cousin marriage is the only type of preferential union which can function normally and exclusively and still give every man and woman the chance to marry a cross-cousin.”

Figure 4.2 shows p-graphs for moiety structures, both patrilineal and matrilineal. The self-replicating feature is that moiety membership (A, B) is assigned by a patri- or matri-line descent rule, and marriages are always with those from the opposite moiety. Moieties of this sort are very common in pre-state societies.

Figure 4.3 shows p-graphs for matrilateral cross-cousin (MBD) marriage as a recurrent marriage rule. Repeated application of the MBD marriage rule repeats the same structure in either patrilines or matrilines. In
either the matrilineal or patrilineal case, the repeated application of the rule entails the movement of women in one direction through a chain (or possibly a cycle) of lineages.

**Figure 4.3: MBD Self-Replication as Elementary Marriage structure**

<table>
<thead>
<tr>
<th>Patrilineal Format:</th>
<th>Repeated in two generations</th>
<th>Multiple Patrilines</th>
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<tbody>
<tr>
<td><img src="image1" alt="Patrilineal Format" /></td>
<td><img src="image2" alt="Repeated in two generations" /></td>
<td><img src="image3" alt="Multiple Patrilines" /></td>
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<thead>
<tr>
<th>Matrilineal Format:</th>
<th>Repeated in two generations</th>
<th>Multiple Matrilines</th>
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<tbody>
<tr>
<td><img src="image4" alt="Matrilineal Format" /></td>
<td><img src="image5" alt="Repeated in two generations" /></td>
<td><img src="image6" alt="Multiple Matrilines" /></td>
</tr>
</tbody>
</table>

Figure 4.4 shows p-graphs for patrilateral cross-cousin (FZD) marriage as a recurrent marriage rule both in repeated generations and with repeated patrilines or matrilines. Repeated application of the FZD marriage rule repeats the same structure in both cases. In both the matrilineal and patrilineal cases, the repeated application of the rule in a way that gives a spouse to everyone entails the movement of women in one direction and then back in the next.⁷
Figure 4.4: FZD Self-Replication as Elementary Marriage Structure

Patrilineal Format:  Repeated in two generations  Multiple Patrilines

Bourdieu: Ethnography Confronts Descent and Alliance Theory

When Lévi-Strauss’s assumptions about the universality of out-marriage confront ethnographic cases like the Aydnli, with preferred FBD marriage, we face another contradiction. It was to this contradiction that Bourdieu (1972) devoted his “case study: parallel-cousin marriage” in
which he examined “the fallacies of the rule” in his major ethnographic work on the Kabyle, *Outline of a Theory of Practice*. The contradiction in Lévi-Strauss’s theory brought to the surface by the Kabyle marriage preference for father’s brother’s daughter, an insider to an extended patrilineal family, was the incompatibility of this type of marriage with the universality of a marital exchange or “atom of kinship” approach that assumes that marriage is invariably with those outside the closest circles of family ties.

The p-graph in Figure 4.5 (equivalent to the conventional genealogical diagram on the left, with the four central marriages numbered in each case), like that in Figure 2.1, is used to represent this type of marriage as one in which a woman’s marriage (dotted line) to her father’s brother’s son (composed of the three males links) closes a cycle of relationships. In the graph, three distinct nuclear families are circled. The men in couples 2 and 3 are brothers, and their children join in marriage couple 4.

**Figure 4.5: FBD—Father’s Brother’s Daughter—Marriage**

In a society like the Kabyle or the Aydınlı Turkish nomad clan, the young men, even after marriage, live with their father. The bold circle in the figure shows the husband and wife in the FBD marriage as coming from the same patrilocal residential group, as well as from the same patrilineage. FBD marriage in local discourse is surely between “insiders” to a patrilineage. After the death of the head of extended family (labeled 1), the Kabyle and Aydınlı sons that head families 2 and 3 will normally set up spatially separated households, so couple 4 will link households rather than continue as “insiders” to a single household.

Preferred FBD marriage is an exemplary case in which Murdock’s principles of elementary units of kinship butt against those of Lévi-
It is easy to grasp that the nuclear families of brothers 3 and 4 in the example in Figure 4.5 are separate, and it is only at the level of the lineage or residential unit that they are merged. What is an exception to Lévi-Strauss’s theory might be assimilated as a rule in Murdock’s theory but only by segregating the different levels of analysis of family and lineage.

British social anthropologists, however, had pushed the assumptions of Murdock’s group-based theory of kinship further to insist on the superordinate status of corporate groups over individuals in all societies. Using this assumption, by analyzing groups such as lineages and their relationships rather than individuals and relationships among them, they could account for the more permanent features of social structure that far outlast the lives of the individuals who comprise a society. By the 1960s, “alliance and descent” became the label used to describe the debate between the two opposing theories, and Bourdieu used the case study of FBD marriage among the Kabyle to prick the balloons of both camps and others as well.

Marriage with a patrilateral parallel cousin [FBD] appears as a sort of scandal . . . only to those who have internalized the categories of thought which it disturbs. In challenging the idea of exogamy, the precondition for the continuation of separate lineages and for the permanence and easy identification of consecutive units, it challenges the whole notion of unilinear descent as well as the theory of marriage as an exchange of one woman against another, which assumes an incest taboo, that is, the absolute necessity of exchange. . . . Is it sufficient to regard this type of marriage as the exception (or the “aberration”) which proves the rule, or to rearrange the categories of thought which make it possible in order to find a place (i.e., a name) for it? Or should we radically question the categories of thought which have produced this “unthinkable” thing? (Bourdieu 1972:30-31).

It is useful for our purposes that Bourdieu did not stop at the limits proposed by Dumont (1971:119) who treated the opposing theories of alliance and descent as simply “regional theories” in the geographic or epistemological sense. Bourdieu went on instead to critique the assumptions about social networks on which these theories are based. We say “useful for our purposes” because our approach, which is diachronic and based on relationships that people themselves report at different times, does not assume that:

- kinship is “essentially” a biological relationship
- kinship constitutes a single determinate “system”
- the “essential” units of kinship are known *a priori*
- “structure” is an *a priori* explanation of other phenomena
- “genealogy” is a fixed and determinate set of relationships
- unilineal descent groups are not necessarily exogamous

Of his observations in the Kabyle case Bourdieu makes an argument about the variability of genealogical relationships over time:

We must find in this exception [of FBD marriage, but expanded to other relationships as well] a reason for questioning not only the very notion of prescription or preference, but also on the one hand, the notion of the genealogically defined group, an entity whose social identity is as invariable and uniform as the criteria for its delimitation and which confers on each of its members a social identity equally distinct and permanently fixed: and on the other hand, the notion of *rules* and *rule-governed behaviour* in the two-fold sense of behaviour conforming objectively to rules and determined by obedience to rules. (Bourdieu 1972:36)

**Diachronics and Diversity**

Our analytic framework is flexible in allowing questions to be posed from ethnographic data about kinship:

- parent-child ties to be defined locally, that is, culturally constructed
- local knowledge and namings to define units
- social relations, knowledge, and appellations to shift over time

We are interested in how (process description) and why (dynamics) kinship networks unfold through time,9 and what the implications of these changes are for social structure, understood as emergent properties of networks. Properties of a network are not considered as immutable but as dynamical variables. What is interesting about a dynamical framework for viewing social phenomena is that change is observed to be a normal process that occurs within certain bounds of variability—as with the anthropological concept of social organization, affected by variability in individual decision making, environmental changes, and demographies. However, there are certain thresholds of change in the ensemble of networked actors and their environment that tip the ensemble into a wholly different range of variability. The shift from one regime of variability to another can be considered a change in social structure. Regimes of variability can change over time but they can also be seen to change if we vary our level of analysis at the same point in time. Hence, what looks like an exception at one level or point in time might become an emergent
rule at another.

Concomitant with our approach, which looks for change as well as constancy, we turn Lévi-Strauss’s modeling strategy on its head in order to consider rules that, far from being fixed, generate diversity. Having examined two master theories, rather than turning their contradictions into a mutual nullification of their theories, we use their complementarity to identify potentially useful elements, models, and insights.

**Rules for Generating Diversity: FBD Marriage**

If we apply Lévi-Strauss modeling strategy of asking whether a given marriage rule has the property of self-replication when applied in successive generations and to multiple groups, what happens in the case of FBD marriage? Repeated application of a FBD marriage rule, as shown in Figure 4.6, has a very different outcome.

**Figure 4.6: FBD and FFBSD Marriage as Replicators of Diversity**
A rule of FBD marriage, applied recursively, generates complex interactions (in Lévi-Strauss’s terms: a complex structure) and not a determinate outcome. This puts us in the realm of the new sciences of complexity in understanding that even simple rules may have complex, nondeterminate outcomes. As shown in Figure 4.6, if we apply a consistent rule of recurrent FBD (patrilineal cousin) marriages, we generate, in succeeding generations, instances of sister exchange, of brothers marrying sisters, and of MZD marriage. If we extend the rule to include FFBSD marriage (an agnatic second cousin), we also get instances of MBD and FZD marriage. In short, the FBD and FFBSD marriage rules (or lineage endogamy generally) generate all the major types of cousin marriages.

Viewed in this perspective, is FBD marriage preference part of a diversity-generating alliance strategy? If so,

- what does this imply for the concepts of alliance or exchange and about Lévi-Strauss’s theory?
- why and under what circumstances might this strategy occur?
- why is marriage with a close cousin the preferential part of an alliance strategy?

We will also ask: What does this say about how we might approach the puzzle of FBD marriage among the Turkish Aydınlı nomads? Because the Aydınlı acquired this marriage pattern as a result of Arabization, it is worth examining the historical background of FBD marriage in the Middle East.

Summary

The argument begun in Chapter 2 about the feasibility and importance of studying network dynamics via longitudinal analysis of long-term ethnographic field data is continued: Anthropology’s grand theories, in focusing on structure as universal and recurrent aspects of kinship—structures that by formulaic regeneration seem to re-create the temporal constancies of human cultures—have tended to be based on a priori assumptions about what constitute the fundamental “systems” on which other regularities are grounded. For Murdock (1949) the nuclear family was a universal building block out of which larger kinship units were constructed, including composite forms of the family, consanguineal groups, clans, lineages, and communities. From this he inferred that all “extended” relationships of kinship are derived from and modeled on an extension of re-
lations in the nuclear family as the underlying Platonic form. Murdock’s innovation, however, was his articulation of praxis theory (Figure 4.1). For him, that began with behavior that creates statistical averages for how people organize their activities in the division of labor, and, in turn, the formation of local residential groups. From these evolve rules for residential membership, leading to descent rules, the emergence of kinship corporations, inheritance rules, and, finally, rules of succession, with changes stopping anywhere along the line.

For Lévi-Strauss, the imperative to marry out as a distinctly human expression of a universal incest taboo that symbolically invokes interdependency between groups exhibits another form of structure capable of creating its own recurrence from generation to generation: the marriage rule. In their elementary form, rules such as MBD or FZD marriage are self-replicating in their consistency across generations in terms of what they imply about intergroup alliances. Further, he argues, the principles that marriage rules reflect, whether in elementary form, such as dual organization or matrimonial moieties, or in more complex form, such as statistical tendencies toward class or occupational endogamy, are closely linked to the principles that structure exchange systems everywhere. The ways in which marriage rules and tendencies serve the circulation of people is systemically linked to how information circulates and to the economic circulation of goods and services.

These two elegant theories, by Murdock and Lévi-Strauss, conflict in their fundamental premises about the generative rules of social systems that infix the stability of kinship systems, and, in doing so, social systems.

To bring home the problem of eternal recurrence as a basis or theme of anthropological theory, we took up Bourdieu’s observations about the inconsistency of FBD marriage in the Middle East with theoretical assumptions about exchange and intergroup alliance as the defining feature of marriage rules. We look at the implications of a rule of FBD marriage practiced recurrently over generations and find a major difference from cross-cousin marriage in the extent to which a continuity principle applies. Consistent application of a cross-cousin marriage rule leads only to more marriages of the cross-cousin type. Consistent application of a FBD marriage rule, however, creates a diversity of forms of other marriages, including cross-cousin marriage. Some marriage rules, then, lead to diversity, others to recurrence. Cannot a diversity-generating rule have advantages, including those for enhancing exchange, much like a rule of
recurrence?

**Further Reading**

Fox (1967, in print) is still the best introduction to kinship and marriage but the real heart of the dialogue between alliance and descent theorists is best captured in Dumont (1971), which also circulates informally in an English translation. Bell (2002), Berrenberg (2003), and White (2005) provide comparative studies of nomadism in the Middle East that inform some of our hypotheses.

**Notes**


2. Leaf (1979:215). Leaf provides an extensive critique of Platonic dualism, containing a fundamental dichotomy, a doctrine of form, and a doctrine of essence that underlay a significant number of anthropological arguments.

3. Leaf (1979) offers a useful critique of anthropology’s various dualistic essentialisms.

4. Again, we have put Society and Culture in capitals to indicate reification which in the case of structuralism is not one of Culture or Society taken as essentialist units but rather taken as universals, with Culture in particular (and it follow, human Society) demarcated from Nature.

5. The concept of reciprocity as foundational to human society is used to justify the universality of “total exchange” in which circulate, now as then, cooked food, manufactured objects, communication, and women, the “most precious object” of all because (by nature again) she is of the sex through which biological continuity passes. As for exceptions to the law of marriage to outsiders, Bourdieu (1972) simply asks us to look carefully at the right to marry the FBD, the prototypical insider, especially as this right occurs within systems of patrilineages, and at the level of the smallest patrilineal segment.

6. These sequences are supported by correlational evidence but the weakest link is the hypothesized connections between sexual division of labor and residence. The correlation between division of labor and residence holds for indigenous North America but not for other regions of the world. Korotayev (2001) shows that once the effects of polygyny are controlled, the correlation appears in all regions.

7. The following application of the FZD marriage rule in successive generations and lineages is not considered because it does not give a spouse to everyone:
8. “The fieldwork in Kabylia which provided the ethnographic basis for this text and the starting point for its reflections was carried out amid the tragic circumstances of the Algerian war, which brought to a head the contradictions inherent in the ethnologist’s position. This was one factor in Bourdieu’s subsequent move into the field of sociology, where the separation which is the hidden condition of all academic activity—most insidiously so in the behavioural sciences—could itself be grasped scientifically in the course of inquiry into the social functions of scholarship and the mechanisms of cultural and social reproduction.”

— Translator’s Preface, *Outline of the Theory of Practice*

9. A process description (kinematics) involves the description of change or motion without examining the forces or interactions that produce the change. Dynamics involves both a description of change or motion and the forces or interactions that produce it. An understanding of kinematics and dynamics is as essential to understanding sociohistorical phenomena as it is to physics, from which these terms are derived.
Chapter 5

Network Models and Complexity:
Measures, Graphs, and Sensitivity to Context

Every society possesses means of aggregating its members into groups for the purposes of cooperation, defense, and integration of its individuals so as to promote broader interaction and exchange. Murdock’s theory of kinship focuses on how groups are agglomerated and organized. Lévi-Strauss’s theory focuses on self-replicating rules of interaction that help to insure the existence of larger structures of exchange. The processes studied in their opposing theoretical approaches require understanding networks of relations: networks involved in building up social groups and in creating the possibilities for exchange. In the one case some network links contribute to local clustering and social group formation. In the other, network links provide routes of connection between distant individuals. When relationships cluster into very tight circles, like friendship groups, our intuition tells us that chains of friendship are unlikely to connect outward at relatively short distances to thousands or millions of others.

Models for Large Networks, Small Worlds

Our intuitions are often wrong about large, clustered networks. The surprise of “It’s a small world” is often heard, for example, when people meet a friend of a friend in some remote spot, or hear over and again a story known from inside some cloistered social circle after gossip has spread it to opposite ends of your world. The paradox that defines a large network as a small world (SW) is local clustering and, on average, short distances between nodes or individuals. The surprise is that networks of tens or hundreds of thousands of people in which most links cluster, but some are constructed at random, can be very sparse but still have the small world property in which the average pair is connected at a relatively short distance. Erdős and Rényi (1960) showed that even a fully
random network (E-R graph, for Erdős-Renyi, more easily thought of as an Edge-Random), where every pair has the same probability of being connected, will achieve, for a fixed number of links, a near minimum average of distances. As soon as the number of links in such a network surpasses the number of persons, for example, a giant connected subnetwork emerges that grows, with additional random links, to include most of the individuals and in which the average distance between pairs rapidly shrinks as more links are added.

In fact, as random links are added to any network, average distance in the network shrinks toward a minimum. Watts and Strogatz (1998) demonstrated that networks with isolated clusters require only a modest random rewiring of links to become a small world with low average distances. What is surprising about their results is that a perfectly clustered network, as it is randomly rewired, retains a significant degree of clustering and continues to have low average distance, thus retaining both its SW properties, until over 80 or 90 percent of the links come to be random. SW networks are thus very robust within a wide range of variation in the randomness of links.

**Small Worlds with Navigability**

For paths to be useful for the transmission of goods or information, a small world also requires navigability: There must be a means by which one can post messages locally that can reach targets globally (Watts, Dodds, and Newman 2002). Postal services have automated the procedures of search and navigability that are involved but social networks may or may not have a sequential search capability. A SW network that is also structured to handle the problem of search and navigability we will call a complex small world (CSW). One with only the first two small world properties of clustering and short average distances but lacking navigability is an elementary small world (EWS). A random (E-R) network is not an elementary small world because local clustering is lacking.

Kleinberg (2000a) showed, however, that SW networks with random rewiring, like random networks generally, are lacking in the crucial CSW property of navigability: the ability, given a target person or desirable type of person, to find the target quickly by successive links in the network. Search and navigability were investigated in the first small world experiment by Travers and Milgram (1969): Could people randomly se-
lected in Omaha, Nebraska, succeed in sending letters to a target in Boston when asked to direct their letters to single acquaintances who are asked, in turn, to forward the letters through what will become a chain of personal acquaintances? The question is whether the next step in such chains will be any closer to the target than the last. In many cases this task was accomplished in fewer than six steps. Success, however, required that letters were sent to acquaintances that were successively closer, geographically or occupationally, to the target. This will not occur in a network of perfectly random connections!

Kleinberg’s work demonstrated that successful search and navigability is possible when the probabilities of network links scale so that successive jumps traverse the spatial geometry in the fewest steps. Exponential decay of link frequency in relation to geometric distance creates fewer long jumps in the right direction that act as shortcuts over the geometry to allow messages to pass quickly toward the target. Their lower probability reduces the chance of over jumping farther away. When in the right vicinity, honing in on a target is facilitated by the availability of greater numbers of short jumps in the spatial geometry. Barabási and Albert (1999) showed that central hubs (nodes with many links or many outgoing links to authorities) and authorities (nodes with many links incoming links from hubs) also provide a network with navigability. Hubs and authorities are nodes or individuals with hundreds of connections. But they are lacking in social networks with strong constraints limiting how many links an individual may possess. Number of children, for example, has an upper bound that prevents women from becoming hubs of kinship networks on this count alone.

Realistic Social Network Models for Complex Small Worlds

Watts, Dodds, and Newman (2002) identified a family of realistic social network models for complex small worlds with strong upper limits on how many links an individual may possess. They imbued the actors in their network models with social identities. Social distance between pairs of individuals was then defined by differences in the taxonomically organized categories of identity. They found that the ability to search and navigate to specific targets depended on the network having not only short network distances but also links constructed with probabilities that decayed exponentially with social distance. By tuning the exponential parameter for social distance decay of link probability, their family of models generates networks that have navigability as well as short average network distances. This is similar to Kleinberg’s findings. In such a
complex small world (CSW) network, the combination of many short jumps in the social geometry allows messages to hone in on a target once in its network vicinity. At the same time, fewer longer jumps in the right direction (whose lower probability reduces the likelihood of over-jumping farther away from the target) allow targets to be found quickly through short cuts in the network created by jumps to individuals with similar social identities.

Complex small world networks work best, as Watts, Dodds, and Newman have shown, when they possess an additional property that enhances navigability, namely, when the hierarchies of identity are multiple rather than singular, and when the multiple identities cross-cut one another, in the sense of statistical independence. This allows one step in a search to be taken on the basis of one aspect of the target’s identity, while a next step might be on the basis of another aspect. Such cross-cuts move much more quickly toward the target because they move the search out of a cluster of ties in the network that reflects similarities on only one attribute (for which there may be many independent clusters) toward clusters that have all of the target’s attributes, and in which local ties in the cluster are more likely to lead directly to or close to the target.

Models for the Aydnli: Lineage Fractals and Complex Small World Networks

A fractal is a pattern that repeats itself, or is self-similar, at many different scales. Lineages are a good example of a fractal pattern because the core members of a lineage (e.g., males in a patrilineage, females in a matrilineage), in each new generation, reproduce a similar number of new members as did their immediate ancestor. Thus the lineage takes on the structure of a tree, each node in the tree having a roughly equal chance of being a terminus with no descendants, or generating a similar number of new branches.

Because male and female lineages cross-cut one another, if each lineage is imbued with a memorable identity, then the network cross-cuts between lineages provide a way of navigating the genealogical space so as to search for a navigable path from any given node to any other. For the Aydnli, the agnatic lineages are salient social identities, and the female identities that link one patriline as wife-giver, or mother’s lineage, and the other as wife-taker, or father’s lineage, are remembered for a sufficient number of generations to make navigability possible inside the ge-
nealogical networks. Any given ego can find, relatively quickly, one or several paths of genealogical connections that link to any other member of the clan. But even if the clan members did not know one another directly, they could send a message rather easily to a nuclear family member who could send it on to one of their nuclear family members, and so forth, so that the message arrives at a given target. For the navigability criteria to be satisfied formally, this type of indirect message traversal must be possible where each person uses only local information about which nuclear family member (a parent, sibling, or child) is currently residing closer to the presumed location of the target. For this to be possible, the network must also have a certain topology or distribution of links that makes traversal possible. The next hypothesis will be tested in later chapters, while the one that follows is offered as a prediction about results of research that has not yet been done and can be assessed only in very provisional terms.

**Hypothesis 5.1:** The Aydinli genealogical network, which has both living persons and ancestors who are important as links between them, has the structural properties of a navigable CSW (complex small world).

**Aydınli Marriage Networks as Complex Small Worlds**

For a large network to serve as a vehicle for economic exchange relationships, as we hypothesize for the Aydınli network of kinship and marriage ties, it must have navigability and short average distances. Without navigability, optimal partners for diverse exchanges cannot be located. One might object in saying that the Aydınli network is not large, and that everyone in the society will know everyone else at any given point in time. There are three arguments based on ethnographic observations in response to this objection. First, the Aydınli clan is not an isolate but one of many such clans in a larger tribal grouping. The tribe to which the Aydınli belong is one of many that interact within the nomadic environment, and the clan members intermarry with other clans, other tribes, and, of course, with a wide array of villages. Hence, what we are seeing in the network of the clan, including the links of its members to outsiders, is a small part of a much larger network of members of Aydınli clans and lineages, a population numbering in the tens or hundreds of thousands, depending on the historical period and how the boundaries of the network are defined. Inside the larger network, navigability—within the
clan, between clans, between tribes with similar lineage and social organization—is a crucial criterion for finding exchange partners.

Second, even within the clan, numbering only several hundred at any one time, trust is not evenly distributed. The basis of trust is relatively near genealogical relationship and the rules of behavior between near relatives. These are the special conditions of genealogical SWs. The navigability problem also consists of finding exchange partners that one can trust. New partners are often found, in such circumstances, through intermediary chains of prior trustworthy relationships. Hence, a problem of navigability by chains of trust exists even in this relatively small network. The network and the problems of trust and navigability are not reducible to one in which universal acquaintanceship provides an immediate and direct solution. A clan member cannot simply approach just any clan member to strike up a marriage or enter into an exchange relationship of mutual aid, unilateral request for assistance, access to privileged information, or alliance in a conflict.

Third, it is evident that the Aydınlı exchange network derives from Arab-influenced historical archetypes that have been in use for millennia in large and complex networks. These were networks in which widespread exchange relationships—over large distances and populations—were of paramount importance.

Solutions to the navigability problem require either central hubs (Barabási and Albert 1999) or a network geometry that contains local clusters: Kleinberg’s regular lattice geometries or Watts, Dodds, and Newman’s fractal worlds. Networks with hubs, however, require that some nodes have hundreds of ties, or a very high degree of linkage with others. In networks of kinship and marriage, however, there are limits to how many relationships of intimate trust a person can have, or, in more direct terms, the numbers of siblings, wives, and children a person can have. If the network is constructed with lineages as nodes and marriages as the ties between them, an adequate distribution of marriage links that will create a CSW—a complex and navigable small world—is antithetical to a structure of hubs, or hubs and authorities. Neither are regular lattice geometries easily achievable in kinship networks, although such regularities occupied the reveries of many an Australian kinship specialist. In any case, rules for social categories of prescribed marriages are not the evolutionary route taken by Arab or Middle Eastern societies. The social organization typical of the Middle East and found in its historical
devolution among the Aydını is one based on lineages, marriage alliances, and elaborate codes of trust and honor.

Is it possible to construct a fractal world of trust and generalized exchange from kinship and marriage links alone? To begin to visualize such a model, we need to specify a set of social identities that would make such a world navigable. The most obvious hierarchical set of social identities in any kinship system, of course, is that based on unilineal descent, either through the male (patrilineal) or the female (matrilineal). Among nomadic societies there is an insurmountable bias toward hierarchically organized patrilineal segments that specify personal identities of membership (governed, of course, by at least putative genealogical links). Each individual has a place in a hierarchy consisting of nested segments each of which contains the descendants of a real or putative unilineal ancestor. The top of the hierarchy is the set consisting of all the lineages under consideration, for example, those belonging to a clan or interacting society, whether or not they have a common ancestor. The social distance between any two people is the maximum number of levels one has to go up in the hierarchy to reach a common node in the hierarchy. This type of cognitive structuring of groups, which may also take residential or territorial form, is the one most commonly found when considering kinship systems in the manner preferred by Murdock (1949).

If we take a hierarchy of patrilineal segments as our starting point, a second cross-cutting hierarchy of identity is defined by the complementary links in the network, namely, those of marriage, or connections through female lines of descent. If female lines are not traced as far back as male lines, or are de-emphasized in lines of longer length, this hierarchy could be reduced to two rudimentary levels: one, the set of individuals having a mother’s father in common, and the other the set of all individuals. If we wish to build further hierarchy into this classification, we can insert the patrilines above the mother’s father, or we can insert one or more levels of matrilineal segments. The result will be a variety of such models, depending on how far we carry the various types of segmentation in the male and female lines.

Whatever empirical choices we use for models of identity based on lineage segmentation and intermarriage, marriages will always, at one or another level, cross-cut the lineage segments and thus provide the requisite structure for a CSW or fractal world network. Whether or not the network is fractal, however, depends on how marriages are distributed across lineage segments. If the probability of marriage between segments decays exponentially with social distance between segments, then, with
proper tuning of the exponential parameter, we have the possibility of a navigable social world (CSW) that is fractal in its structure.

Why would fractality be a useful property of a kinship network? To recall the earlier discussion, if people can use close kinship to organizing a CSW network, then this CSW is capable of organizing long-range exchange relationships throughout a network of vast or virtually unlimited size. This requires that some close relatives will be found at large spatial distances, for example, a requirement that is easy to satisfy among nomads. This is also a kinship network in which social cohesion through marriage is necessarily clustered around smaller lineage segments, or segments that are more densely intermarried. Such a structure, then, allows people to organize both of the key functions needed for the operation of a society. This is to say that a means of aggregating its members into groups for cooperation and defense is provided as well as a means of providing the navigable linkages needed for individuals to organize interaction and exchange at the broadest possible level. Murdock’s requirements for a theory of kinship based on groups and Lévi-Strauss’s requirements for larger structures of exchange are both satisfied when kinship networks are organized according to a fractal model.

**Hypothesis 5.2**: The specific characteristics that constitute a kin-based CSW for the Aydmnlı are: (1) the basis of trust is relatively near genealogical relationship and the rules of behavior between near relatives, (2) some close relatives will be found at larger spatial distances, (3) marriage frequency correlates with genealogical distance, (4) lineages provide one of the larger identities needed for navigability, (5) reciprocal marriages between lineages that extend the bounds of trust through female or affinal linkages (alliance groups occurring in specific historical periods) provide a second cross-cutting larger identity which is a minimum needed for SW navigability.

**“Arab” Type CSWs with Segmented Lineages**

The following hypothesis has apparent face validity because the five characteristics in Hypothesis 5.2 are ones that are generally found in Arab-type lineage systems.

**Hypothesis 5.3**: The five characteristics of the kin-based CSW network of the Aydmnlı are not unique but are common to Middle
Eastern societies influenced by that form of Arabic social organization that has segmented patrilineages and a right to marry FBD.

Our examination of the Aydınlı will show whether, in addition, they have the topological network properties required for a CSW. For Arab-type segmented lineages generally, we simply note that the small world properties of high clustering and relatively short average distances are also likely to be satisfied because they come about with marriage among close relatives, including lineage endogamy, and networks of alliances among lineages.

Simulation Models

Simulations can be extremely useful tools for network analysis because they provide baselines by which to evaluate actual networks and control for demographic and other factors that alter the contexts of behavior by affecting the availability of different types of resources and of possible avenues of choice. Cohort size, for example, has been shown to have major effects on a host of socioeconomic variables (Easterlin 1987). Similarly, the sizes of sibling sets in successive generations have major effects on the types of relatives available for endogamic marriage.

In general, demography alters opportunities that affect choice in fundamental ways. As a function of migration, reproduction, and survivorship, for example, smaller age cohorts enjoy relative advantages in competition for resources, while larger cohorts augment competition. Size and compositions of sibling sets as affected by fertility and emigration will affect the types of relatives available for marriage.

We examine here three types of simulation models:

- a design for an agent-based model in which the actors and their interactions are completely virtual
- Feynman simulation, in which the actors and their interactions are real, and the comparison between actual data and actual data with one element randomized allows us to test specific hypotheses about network structure and behavioral choices made in a specified context
- Hammel’s simulation findings on the effects of demographic biases on marriage choice in kinship networks.

Investigating Fractal Marriage Networks through Simulations: Agent-Based Models
Imagine a society based on agnatic lineage organization that evolves over many centuries, beginning from independent communities, each of which is a relatively small-scale network where everyone knows everyone else on a face-to-face basis. Nearby communities are linked by some amount of trade and mutual visiting or intermarriage, with no specialized traders. Now imagine that the frequency and amount of trade grows, and that many families or lineages begin to have members who are specialized traders, and who begin to go farther and farther on trading expeditions along routes that carry them greater and greater distances. We are now in the imaginary space of agent-based modeling or simulation. As networks grow larger, relationships within lineages and marriages between lineages are still the basis of trust for organizing trading expeditions as well as managing local community affairs. Small world navigability is at a premium because it makes exchange-at-a-distance relationships possible through relationships of trust.

How does such a society evolve through trial-and-error agent-based experimentation? As trade expands, how does it evolve a network topology that is navigable? One way would be to make lineages larger, spanning more people, and enabling segments of the lineage involved in trade to spread out, in clusters, over various nodes along the trade routes. If the lineages are exogamous, however, their internal network distances become ever more tenuous as common ancestors recede into the past. The sublineages within a lineage may grow closer by having affines in common. This, however, may also lead to more segmentation into cohesive clusters without solving the more global navigability problem.

Some agents in our simulation, however, break the lineage-exogamy and begin to marry, at least occasionally, within their lineage. Not many such marriages, and even those occurring occasionally and at somewhat random distances inside the lineage, solve the navigability problem. Over time, growing sets of agents who marry probabilistically, roughly proportional not only to spatial distance (in which some long distance occurs because of the expeditionary trading groups) but, more importantly, proportionally to genealogical distance, evolve because they tend to solve, in the most optimal way for economic and trading benefits, the small world navigability problem.

The plausibility of this type of social-evolutionary scenario could presumably be checked by agent-based simulation. Of more immediate concern, however, is whether it is possible to check a genealogical network to see whether it has, for example, a probabilistic distribution of mar-
riages that match a particular model, or whether a given probabilistic bias for distributing marriages matches that of an actual population, in this case, that of the Aydınlı.

Hammel’s Principle of Demographic Network Biases:
The Example of Status Bias

Hammel (1976, Gilbert and Hammel 1966), Coult and Randolph (1965), and others have shown through simulations that inequality of age or status at marriage markedly decreases the likelihood that FZD cousins will be of an appropriate age to take as a spouse. Such inequalities between spouses will thereby increase the relative likelihood of marriage with MBD cousins, other things being equal. Thus relative rates of cousin marriages are unreliable as an indicator of marriage preferences.

Hammel’s principle can be illustrated by a geometric p-graph emphasizing status or age differences. Figure 5.1 redraws two versions of the example of a cousin marriage in Figure 4.5, once for a FZD marriage (the exact replica of 1a on the right) and once for a MBD marriage. The drawing of MBD marriage on the left includes a status bar in which average status or age of males and females is indicated. The four lines labeled a-d in each p-graph are those that connect the marriage between cousins to their common ancestor. The vertical height of each of these lines (as measured by an implicit status bar) is the measure of the status s(m) of males or the status s(f) of females. For example, s(m)=45 and s(f)=15 might represent markedly unequal average ages of marriage of males and females, respectively, in a gerontocratic society where older men monopolize younger women through polygynous marriages. Tjon Sie Fat (1983) analyzes the effects of such age disparities on marriage rules, and White and Jorion (1992) review the utility of p-graphs for the analysis of marriage systems with different age or status skewing between husband and wife.

Hammel defines status or age difference between males and females at marriage as a quantitative variable, d = |s(m)-s(f)|. Assuming that these differences are roughly constant over generations, Hammel’s rule for consanguineal marriages is that the sums of status or age measures in the husband’s lines (a, c) to the common ancestor must on average equal the sum of status or age measures on the wife’s lines (b, d) to the common ancestor, s(a) + s(c) = s(b) + s(d). This applies to cousin marriages in general, where each edge a through d is either an f (female) or an m (male), and contrastive types of cousin marriage differ in which of the lines a through d are male and which are female. For MBD marriage this
represents no particular constraint because this equality is satisfied for any values of \( s(f) \) and \( s(m) \) by the fact that in every case \( s(f) + s(m) = s(m) + s(f) \).

**Figure 5.1: Hammel’s Principle Applied to Cross-Cousin Marriages**

MBD marriage can accommodate any extreme of status difference between husband and wife. For FZD marriage, however, the requirement that \( s(f) + s(f) = s(m) + s(m) \) requires that the age or status of husband and wife at marriage be equal. Further, when there are large status differences between husband and wife, such as age differences, then many more MBD than FBD relatives will be available to marry. This is likely to affect their relative frequencies if both marriages are allowed. This model, however, applies only to average differences. By simulating variations around the average of status or age differences for husbands and wives, Hammel (1976) showed that, in general, the greater the average status differences between husband and wife, the more likely MBD will be of the right age for marriage as opposed to FZD cousins. Hammel’s principle applies as well to any relinking relationship in terms of
the symmetries or asymmetries in distribution of male and female links on the husband’s and wife’s side in connecting to common ancestors.

Thus, regarding status differences between wife-givers and wife-takers, Hammel’s principle boils down to the greater the difference, regardless of which side has higher status, the more likely is MBD marriage compared to FZD marriage. This derives from the assumption of “random choice” from the set of potential status mates. In more general terms, however, Hammel’s principle reflects a more general phenomenon, namely, that the demographic characteristics of a population and the basic demography of its marriage practices may have major effects on types of marriage quite independently of marriage preferences.

Hammel’s status inequality hypothesis does not have any special consequences for our analysis of the Turkish case because there is age and status equality between the families of a wife and a husband. Hence, there is no demographic bias operating against the likelihood of FZD marriage. The greater frequency of MBD over FZD marriage, for example, must be explained by other factors.

In understanding marriage practices, however, the demography of kinship networks is one of the key factors to examine in order to control for the problems of demographic constraints. Networks are significant, however, for a more important reason: Networks are the basic constituents of kinship at the most fundamental level. The kinship network needs to be studied both as an outcome of kinship practices at the more abstract level of roles, rules, and preferences, and as an existing structure that sets contexts, constraints, and opportunities for further behavior.

**Feynman Simulation**

White (1999) published a simulation method that is suited to the second question that we posed in ending the discussion on agent-based simulation: Does a given set of marriage rules or a probabilistic bias for distributing marriages match what is observed in an actual population, in this case, that of the Aydnml? White called his method controlled simulation because the simulation of possible marriages controlled for the actual demographics of a population for which we already have a genealogical network. In renaming this method Feynman simulation we were inspired by the fact that Richard Feynman introduced the analysis of thousands of individual diagrams similar to ours. In his case, each was intended to visualize and describe a particular quantum electrodynamical interaction for a particular set of elementary particles, and his goal was to find solutions to their interactions in many-body, electromagnetic, and other
probabilistic field problems. Further, in the Feynman diagram all particles are represented by lines, just as individual males and females in the \( p \)-graph are represented by lines. In each case the lines represent temporal trajectories of the interacting persons or particles. In the case of life-cycle trajectories of people, their temporal trajectories are inflected by interactions such as sexual union, marriage, parentage, and so forth. These few cited, including those of the networks formed by kinship and marriages, may well have some regularities of their own.

In a Feynman diagram the lines for particles are affected by their interaction. Two electrons interact, for example, by exchange of a virtual photon, and then repel each other. A \( p \)-graph node represents two people who interact (including sexual union) to produce children as continuations of their genetic lines. Other forms of reproduction will have other interactions. In terms of social interaction, the ceremony, rights, and obligations of a marriage will alter the relations among family members. New in-laws, for example, may acquire new rights and obligations, or behaviors may change for some members, say, to joking or avoidance relationships. The interactions of family members may be much more extensive than just a man, woman, and children. When relinking occurs through marriage, family lines are involved that are longer than single individuals. Cousin marriages, for example, involve the generations of the grandparents and parents of the couple, as well as potential children. Marriages may pull together different family lines and their absence may allow them to drift apart.

A \( p \)-graph network of a population in which genealogical links have been traced and graphed contains an inventory of the frequencies and relationships (e.g., correlation, transmission) of different types of relinkings, each considered as an individual Feynman diagram. How do all these individual diagrams fit into the ensemble? What rules, types, preferences, and probabilities of marriage behaviors produce this ensemble?

As in White’s (1999) use of Feynman simulation, we use this method to addresses questions of what rules, types, preferences, and probabilities of marriage behaviors produce a \( p \)-graph ensemble for a population. The idea is simple. For complete control over contextual and demographic factors influencing marriage behaviors as compared with rules, preferences, or preferential selection biases in the choice of mates, the network itself is used as a control. A \( p \)-graph network typically possesses a reliable classification of marriages by relative generation, so that random baseline models can be used to compare, for each generation, random
mating with actual choices. For each generation, then, the network used for simulation makes only one change from the actual network: actual spouses are separated, and the simulation reassigns spouses based on the investigator’s choice of a biased probabilistic random assignment of marriages. Various models are used for such comparisons.

What if investigators want to evaluate the effect of prohibitions against marriages with specified classes of relatives (known from the ethnography), and to test whether the non-prohibited marriages are distributed randomly? The simulation will, for example, reassign marriages with equal probability for all possible choices that duplicate the actual generation in which each marriage occurred. If the actual and randomized marriages have statistically indistinguishable distributions across types of marriages—different blood marriages, different types of affinal relinkings, genealogical distances as measured by various criteria, size of structurally endogamous groups, and so forth—then we can conclude than none of these types of marriage models investigated represent departures from randomness that conform to actual marriage rules or preferences. If, however, one of the types-of-marriage models fits the actual data better than the simulated data and passes statistical tests for multiple-model data mining, then we have evidence for a pattern of marriage rules or preferences. That is, because we test multiple models, and one or more may happen to fit the actual data due to chance variation of the actual data, we have to control for the number of models tested.

White (1999) demonstrated how this type of modeling rejected the hypothesis of class differences in marriage preferences for an Islamic Javanese village, accepted the hypothesis of preferential affinal relinking in an Austrian village, and identified a two-sided model of marriage alliances in a Dravidian Sri Lankan community. Each example showed a high fit to the identified model and high level of statistical significance in rejecting the null hypothesis. We will use this approach with our Aydinli marriage data, although we anticipate very different results from those in the other ethnographic cases in which Feynman simulation has been employed.

Part of the beauty of Feynman simulation is that because it controls for the demography of a population by holding demography constant (i.e., under given constraints of size and gender composition of sibling sets, lineage structure, age, and status differences as they are composed into generations in which marriages occur, etc.), the control for Hammel’s principle of demographic constraints allows a much more sharply honed set of base comparisons by which to test hypotheses about the processes that underlie actual marriage choice, preference, or rules.
Deepening the Foundations for a Network Theory of Kinship

Marriage and sexual behavior in nearly any society exhibits certain preferences, such as marriage with a particular type of relative or sex with a particular type of person, as well as avoidances such as incest taboos or prohibitions against certain types of marriage, for example, with close or distant cousins. Quantitative data on cousin marriages typically come in the form of raw and relative frequencies. The latter might be expressed, for example, in terms as the percentage of FBD marriages, out of the total number of cousin marriages, or as a percentage of all marriages.

How do we know that, even if informants say they avoid or prefer marriage with a certain type of relative, they actually do so? How do we compare verbally stated ideas to actual behavior? Do we use the raw frequency, the relative frequencies of different types of marriage, or the rates per total number of marriages? More fundamentally, is there any advantage in having relatively complete data on marriage networks, which gives us the opportunity to compare actual marriage frequencies to baseline rates based on the availability of each type of relative? Does it make a difference which types of measures we use?

In addressing such questions, there are major advantages to having network data. By having accurate network baselines we can make better inferences about actual preferences and avoidances and, potentially, their consequences elsewhere in the network. One example, that of the network implications of FBD marriages, is shown in Figure 4.6. One of the significant impacts of having network data may be to alter the very conclusions, and types of conclusions, that we reach in kinship studies.

The Axiom of Choice

Observed behavior has two components. One component is the result of constraints that can be further broken down into opportunities or existing possibilities reflecting internal and/or social pressures to seek alternatives within an opportunity set. The other component of observed behavior is the result of either preference or avoidance of choices among a set of alternatives. Viewed in its simplest form, where the subtraction sign means limited by, we have:
Behavior = Choice (by preference or avoidance) – Constraint

Alternatively: choice = behavior, factoring out constraints, bearing in mind that behavior may be either random or biased by preferences or avoidances. Can we take as an axiom that there is a language of behavior that can be read and understood when appropriate forms of network analysis are combined with an ethnographic understanding of indigenous knowledge systems? Can preferences and social rules be inferred from actual choices made in a network context, given knowledge of the network background of possible choices as a system of constraints?

Inferences about preferences, avoidances, and choice raise the problem of agency (Emirbayer and Goodwin 1994). We must be careful in how we ascribe preferences, for example, with respect to actors in an event such as FBD marriage, given that actors other than bride and groom are involved in the transaction. For the Aydnli nomads the agency of other relatives is involved because most marriages are arranged. Application of an axiom of choice would require appropriate ethnographic embedding.

Attributing agency involves careful ethnographic observations as well as statistical estimates of the effects of context on possible choice, and whether there is evidence of preferential choice. Thus, we turn to an evaluation of some of the principles of measurement that are involved in the statistical side of such questions.

Baselines of Measurement for Particular Types of Marriage

For particular types of marriage in a population and time period, we can compare the raw frequency of an observed behavior, for example, marriage with FBD, with rates for this behavior that control for various effects of context. We begin with raw frequency of a behavior as a rate in a population, and then work through the other measures.

Prevalence

Prevalence is a standardized rate of occurrence per (100) marriages (or persons). Prevalence creates conditions, contexts or structures that affect others in the population. Prevalence is important for the consequences of marriage choices. Comparisons of prevalence with other types of rates and analyses of distributions are shown in Table 5.1.
Table 5.1: Measures of Behavior for Types of Marriage

<table>
<thead>
<tr>
<th>Type of Measure</th>
<th>Unit of Measure</th>
<th>Method of Measurement</th>
<th>Used for the study of</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rates for Single Types of Marriage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Prevalence</td>
<td>Rate per 100 marriages (or persons)</td>
<td>Raw Frequency</td>
<td>Consequences for population demography</td>
</tr>
<tr>
<td>2 Selective Rate</td>
<td>Rate per 100 available</td>
<td>Controlled</td>
<td>Comparisons and change in statistical norms</td>
</tr>
<tr>
<td>3 Interactive Rate</td>
<td>Excess/deficit versus random</td>
<td>Compared to simulated</td>
<td>Preferences/avoidances that influence behavioral outcomes</td>
</tr>
<tr>
<td>4 Relative Rate</td>
<td>Percent over the set of alternatives</td>
<td>e.g., FBD over all cousins</td>
<td>Cousin marriages compared without appropriate controls</td>
</tr>
<tr>
<td>Measures for Rank-Frequency Distributions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Ranked Distribution</td>
<td>Marriage type frequency plotted by rank</td>
<td>Frequency by rank frequency (Zipf)</td>
<td>Equiprobable versus preferentially biased models of behavior</td>
</tr>
<tr>
<td>6 Binned Distribution</td>
<td>Same as above, rank-plotted by binned freqcy.</td>
<td>Bin frequency by rank frequency bins (5) or (6) as cumulative distributions</td>
<td>Same as above, with distribution parameter estimates</td>
</tr>
<tr>
<td>7 Cumulative Rank</td>
<td>Same as above, cumulative distributions</td>
<td></td>
<td>Same as above, with more accurate assessment of tails</td>
</tr>
<tr>
<td>Measures for Temporal Distributions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 Tick Rates</td>
<td>Events, ticked up or down in time sequence</td>
<td>Occurrence in timeline</td>
<td>Temporal sequences, e.g., for giving, getting</td>
</tr>
</tbody>
</table>

*Selective rate*

Selective rate is the percentage of available possibilities utilized of a
given type, such as how many men who have FBD relatives actually marry them. It is a baseline comparison of actual marriages with a given type of relative compared with the number of available relatives of this type for each ego. It is sensitive to the contexts in which behavior occurs, and it filters out extraneous demographic factors that differentially affect raw occurrence. Selective rate is a descriptive measure that accurately describes statistical norms for a behavior as opposed to preferential (or avoidance) norms. Although sensitive to context in terms of relatives available for marriage, higher selective rates are not necessarily indicative of stronger preferences. As Hammel’s principle has shown, type of relative is only one factor that affects the context for choice. What about relative age, status, and other factors?

The selective rate does control for a multitude of demographic constraints that affect the availability of a spouse in a certain category defined by kinship ties or kinship terminology. For example, 15% of the married men with a FBD available for marriage might actually marry a FBD. Rates of change in this percentage from one generation to another, or different rates in different societies, would be more meaningful than simply recording that certain percentages of men married a FBD. If it is very rare to have cousins in the first place, both of these percentage rates may be low. However, a preference for FBD marriage may still be indicated. If the society in question had uniformly very low fertility and mortality, for example, then a low rate of FBD marriage (by either method of measurement) may still reflect a preferential marriage. Such rates, however, contain no intrinsic ratios or cutoffs to indicate whether the choice is preferred or avoided, given Hammel’s principle of demographic bias.

**Interactive rate**

Interactive rate is a baseline measure of actual marriage frequency compared with random marriages (Feynman simulation) under existing demographic constraints. The Feynman simulation operates as a control for Hammel’s principle of demographic bias because the baseline of (randomized) marriages already provides a generational control group in which men and women are marrying, which already implies that they are of an age to marry. Status considerations, however, need to be modeled separately. Because interactive rate compares frequencies of actual marriages with frequencies of random marriages given the existing demographic constraints of a given society (such as gender distribution and sizes of sibling sets in each successive generation, which are controlled by Feynman simulation), it is potentially capable of taking a whole ensemble of demographic constraints into account to determine whether an
observed marriage frequency, using FBD again as an example, indicates a preference, an avoidance, or a frequency that is expected from marginal constraints.

When individual agents or groups selectively and voluntarily influence behavioral outcomes away from what is expected by chance (equivalent to the marginal constraints in statistical interaction tables), they cause the interactive rate to deviate from the rate expected by chance. That is, the excess/deficit of observed behavioral frequencies versus random or expected frequencies (under the assumption of statistical independence of contextual factors) is close to zero. An indicator of behavioral preferences influencing outcomes is signaled as a significant excess, while avoidances are signaled as significant shortfalls in frequency of actual behavior compared to what is expected by change. To repeat: a preference is indicated statistically by a significantly higher frequency than expected by marginal constraints. Avoidance is marked by a significantly lower such frequency.

**Relative rate**

Relative rate, the final baseline measure shown in Table 5.1, is determined in relation to an arbitrary standard of comparison, such as the percentage of cousin marriages that fall into a particular type, such as FBD marriage. Although it is commonly employed, relative rate is not recommended because of the possibility that it can be strongly influenced by demographic biases. Relative rates of a certain type of cousin marriages relative to all cousin marriages, for example, are likely to suffer from such biases.

The top four rows of Table 5.1 provide a summary comparison of the raw frequency measure (prevalence) to baseline measures. It should be noted that the basic measures of marriage behavior—raw frequency, frequency relative to availability, and interactive rate compared to simulated random behavior—will differ among themselves. These differences are useful for comparing prevalence, selectivity, and choice (preferential or avoidance). The fourth measure listed in the table, relative rate, provides the least control for the effect of Hammel’s principle and is the least useful of the measures.

**Distributional Measures for Marriage Types**
The next three rows of Table 5.1 are measures for rank-frequency distributions that are standard ways to measure the overall distributions of frequencies of different types of events, such as marriage behaviors classified by type (FBD, MBD, etc.). While the type of marriages considered here are the same as those for which rates 1-4 may be calculated (prevalence, selective, interactive, and relative rates), what is different is that all various types are now considered as single frequency distributions. What this accomplishes is to put each type of marriage, by frequency, in the context of all other types of marriage. Typically, such distributions tend toward regularities of the next three types: exponential, power law, and, in combination with the other two, truncated.

**Exponential distribution**

The bulk of the distribution may follow an exponential distribution, which is typical of many types of random processes. One may wait a long time, for example, for radioactive particle to be emitted from an isotope. The process is a random one, where, if $p$ is the probability of an emission in a fixed time period, the probability $p_e$ of waiting $T$ time periods is an exponential decay, $p(1-p)^T$. This probability translates to a frequency $F = Np_e$ for a number of trials $N$. A distribution of such frequencies is called exponential because the exponent $T$ is variable. In exponential rank-frequency distributions, the high-frequency tails, such as waiting a long time in a queue, can be merely the outliers of random processes. These outliers are always more extreme or heavy-tailed in power-law distributions than in exponential ones. A wealth generating process where the rich get richer, for example, will generate a wealth distribution that is power-law, with a heavy or fat tail extending far beyond what would be expected if wealth were exponentially distributed.

A **binned** distribution is one that separates intervals along some scale (such as time or frequency) and then plots the frequency of observations for each interval against the binned scale values. The function of binning data into intervals is to get a more accurate estimate of the exponent, which corresponds to the slope of the straight line that best fits the scatterplot relationship of $\log(F)$ and the binned intervals.

**Power curve distribution (Power law)**

The bulk of the distribution may follow a power law, where
log(F=frequency) varies linearly with log(R=rank), and thus F = R^p, where p is a power-law exponent that typically varies between 1 and 3. For example, the probability of two persons encountering one another in a flat unobstructed space if each is doing a random walk is inverse to the square of the initial distance between them. Such a distribution is called *power law* because the exponent p is fixed. Because power-law distributions show an amplification of high-frequency behaviors beyond what is expected from random fluctuations of frequencies, they may indicate a probabilistic bias that randomizes behavior choices but follows a strong set of preferential biases. Again, data may be binned into intervals to get a more accurate estimate of the power coefficient, which corresponds to the slope of the straight line that best fits the scatterplot relationship of log(F) and the log of the binned intervals.

**Truncation and Testing Distributions**

The testing of statistical distribution models for exponential versus the power-law relationships among the frequencies of marriage types, number of children, number of descendants, and other phenomena is an important method for the study of social structure and will be used later in this study. Some care is needed in interpreting power-law distributions, however, because they may result from summing exponential frequency distributions that differ in shape over heterogeneous subpopulations.

Frequency distributions that have regular shapes, such as a power law or an exponential shape for the bulk of a distribution, are often truncated at the extremes of the distributions. The may be irregular because of extreme outliers that given the tendency of the distribution are the ones that are low frequency and more susceptible to random error. Frequencies at the lower end of a distribution, toward zero, may also be under- or over-estimated because of sampling problems. Thus the reporting of empirical distributions of a given shape usually needs to be bracketed by the range or scale at which the distribution applies. This is particularly evident when one or both axis is a log scale, as is the case with the exponential and power-law distributions, respectively.

**Temporal distributions**

The last row in Table 5.1 gives one of the methods for studying temporal
Network Models and Complexity

distributions and could be used here to study the occurrence of wife-taking and wife-giving between lineages over time, with time varying by generation. Because we have only eight generations, with considerable missing data in early generations, this method will not be used. The basic idea, however, is to set up a timeline, with labeled events occurring at different times for particular pairs of actors (e.g., lineages), with events between each ordered pair recorded as upward ticks for giving and downward for getting. Thus, one could study the synchronies in the exchange of women between lineages, for example. Eckmann, Moses, and Sergi (2003) apply this methodology to e-mail exchanges which may be taken as a model for the study of temporal distributions in exchange networks.

Using Graph Theory in the Study of Kinship Networks

The anthropological study of kinship is often based on an approach which, when taken to the extreme, begs certain basic questions: Can one discover (or describe, if one posits the authority to do so) how other peoples define their kinship systems? Who are “they” (for whom does one speak?), and what defines a “kinship system”? That is, how does anthropology, in the challenge of its problem of cultural translation, determine what kinship is in the first place without being ethnocentric or basing one’s account on a claim to authority? Without justification for such claims, much of the “discipline” of kinship studies has fallen into disrepute, and perhaps justly so, despite the contributions to this field of study. Without common conceptual ground it is difficult if not impossible, as Geertz once claimed, to make comparisons.

One can hardly have a theory of meaning, or a meaningful description of anything, unless one can say what is the relation among its elements—words, concepts, observed behaviors—that gives it meaning. Meaningful descriptions are built from related elements, so an obvious place to start would be from what can be observed—individuals, behaviors, utterances building up to more complex entities and relations such as communications and how they are related, in what kinds of ways, in a given field of study, including kinship. It is in specifying, in communicable ways, what it is we are talking about when we say “things are related in an X way” that the theory of graphs is useful, or more generally, the theory of relations.

Substantive ideas in the domain of genealogy and kinship networks, which begin from observable and utterable relations among specified in-
individuals, for example, starting from a common observed tendency among human societies to talk about and to identify parent/child relations even if culturally rather than biologically defined, may be given useful counterparts in graph theory. In this way we can build up a common conceptual vocabulary for the cross-cultural study of kinship networks. Table 5.2 lists some definitions and theorems that will prove useful. Because these are very detailed definitions, they are not listed in the Glossary, and were not introduced as elementary concepts in Chapter 2.

Theorems are significant linking constructs between mathematical theory (e.g., of graphs) and substantive theory (e.g., of social networks) because, whenever a formal definition applies to a substantive case, all of the consequences established by the theorem transfer also. This is one of the fundamental ways in which substantive theories and hypotheses spawned by them grow into scientific theories. If the application of a formal concept is valid, then all of its formal consequences, established by theorems, are available for empirical testing as well. The list also contains hybrid concepts, such as p-graphs and structural endogamy that because they have been found sufficiently novel and useful when imported from a formal theoretical framework have been added to our substantive vocabulary.

This list offers some initial pointers to what we are undertaking in this study by providing an analytical grounding for the study of kinship networks that coordinates with ethnographic descriptions of kinship. For the society that Johansen has studied so intensely over decades, it is a model that incorporates the ethnographer’s skill at capturing the subtle nuances of how behaviors and social relations are meaningfully interpreted in local discourse.
Table 5.2: Key Definitions and Useful Theorems

<table>
<thead>
<tr>
<th>Substantive Idea from Chapter 1</th>
<th>Graph Theoretic Concept</th>
</tr>
</thead>
<tbody>
<tr>
<td>Egocentric genealogy</td>
<td>Rooted tree</td>
</tr>
<tr>
<td>(Cycles Theorem)</td>
<td></td>
</tr>
<tr>
<td>A set of relatives</td>
<td>Reachable set:</td>
</tr>
<tr>
<td>(Transitivity)</td>
<td>Connectivity 1</td>
</tr>
<tr>
<td>A cohesive set of kin</td>
<td>Multiconnected:</td>
</tr>
<tr>
<td>(Connectivity Theorem)</td>
<td>Connectivity 2</td>
</tr>
<tr>
<td>Multiply connected relatives</td>
<td>Node-independent paths</td>
</tr>
<tr>
<td>(Connectivity Theorem: Pairwise)</td>
<td>(Pairwise cohesion)</td>
</tr>
<tr>
<td>Structurally cohesive set of kin</td>
<td>Bicomponent</td>
</tr>
<tr>
<td>(Connectivity Theorem: Maximal Sets)</td>
<td>(Structural Endogamy)</td>
</tr>
<tr>
<td>Kinship network showing structural endogamy</td>
<td>P-graph</td>
</tr>
<tr>
<td>(P-graph theorems)</td>
<td></td>
</tr>
<tr>
<td>Density of endogamy</td>
<td>Index of relinking</td>
</tr>
</tbody>
</table>

To see where we are heading, it is useful to take a brief excursion through each of the pairs of substantive concepts introduced here, as in Chapter 1, with the intent of clarifying general concepts useful for the analysis of kinship networks and corresponding relational concepts in graph theory. Under each of the pairs of concepts in Table 5.2 there is also a mediating term that derives from the theory of graphs. These mediating terms provide some additional theoretical purchase and help to explain, for example, how concepts that are identical—or one entailing the other logically—must also be so in the empirical world if the concepts are correctly applied. The mapping of logical equivalents and entailments and their relation to empirical observations is, in principle, the role of theory.

We are not trying to minimize the importance of studying meaning within the culturally constructed contexts of peoples’ lives, far from it. We are attempting to develop an analytical ground against which one can detect how meaning is constructed and how behaviors in their cultural...
contexts are meaningfully organized; and which is also able to connect the observers’ (“etic”) views and indigenous (“emic”) meanings, some of which may be shared widely and others less so.

Egocentric genealogy  Rooted tree
(Cycles Theorem)

We all have some conception of our parental background, no matter how shallow our genealogical knowledge, and we humans all understand the metaphor of a branching tree in recognizing that we have a father and a mother, as do they in turn, recursively. Graph theory models this egocentric conception as a rooted tree as a particular type of graph, beginning with the idea of an edge (here a relation between two individuals), a path composed of successive edges (linking successive individuals), and the possibility of a cycle (in which we return to the origin of the path). The graph theoretic definition of a tree is that of a graph that contains no cycles. A useful theorem is that if you have a connected graph and ask how many independent cycles it contains, where every cycle contains at least one distinct edge, you take a tree that spans every node in the graph, and the answer to the question is that the number of edges left over is the number of independent cycles. This theorem solves problems that befuddled kinship studies dealing with cycles of exchange (e.g., matrimonial exchange) in the 1960s, such as: How many cycles are there? What if the cycles are not independent of one another? At this basic level, graph theory is capable of resolving what might otherwise generate analytical quandaries.

A set of relatives; \hspace{0.5cm} \text{Reachable set;}
\hspace{0.5cm} A maximal set
\hspace{0.5cm} \text{Component, Connectivity 1}
(Transitivity)

What do we mean by a set of people who are related by kinship links? If we draw a graph of the people and add parent/child and marriage links between them, then graph theory defines such a set as people who are reachable from one another by the links we have put on the graph.
A useful property of a mutually reachable set of persons or of nodes in a graph is that of transitivity. If A is reachable from B and C from B, then A is reachable from C. There will exist, then, a single largest set in which all members and no others are mutually reachable. In graph theory this is the idea of a reachability component. Usually, two relatives have a single path by which they recognize how they are related.

Next we consider types of structural possibilities that occur when there are two or more paths between relatives, or between nodes in a graph.

**Multiply connected relatives:**

**Relinking**

**Node-independent paths**

(Pairwise cohesion)

In some cases, relatives are related by two or more independent paths, in which case their relation is more cohesive in proportion to the number of independent paths of connection that they have.

**A cohesive set of kin**

(Connectivity Theorem)

The **connectivity theorem** shows by means of proof how the connectivity k of a graph equals the least number of node-independent paths for any pair of its nodes.

A **reachable set** in a graph is a set of nodes that are connected by paths of edges. A reachable set has **connectivity 1**.

A relation r is **transitive** for every three nodes in a graph if ArB and BrC entails ArC.

A **component** of a graph is a reachable set that is as large as possible (maximal).

The **pairwise cohesion** between two relatives is the number of completely independent paths that connect them.

**Node-independent paths** between two nodes in a graph are paths that do not pass through any of the same intermediate nodes.

The **connectivity** of a graph is the minimum number k of nodes whose removal would disconnect the graph.

A **cohesive set of kin** is one in which the removal of a single individual and all of this person’s links would not disconnect the group. A cohesive set of kin has connectivity 1.
A structurally cohesive set of kin—or structural endogamy, as discussed in Chapter 2 but now given a more formal definition—corresponds in graph theory to a bicomponent. A bicomponent is a set of nodes, as large as possible, in which no pair can be disconnected by a single node and each pair has at least two completely distinct paths.

Group boundaries may change in relation to particular families or social categories as a function of new relinkings in subsequent generations. In this sense, structural endogamy has a feature of self-organization that is lacking in the conventional concept of endogamy.

A p-graph representation, in which senior nodes represent marriages and junior nodes children (possibly married), as noted in Chapter 1, can clearly differentiate the hypothetical case of a network with very little relinking from the structurally endogamous case where families are married in extended circles and marriages continually relink families.

In the first case, there will be few or no cycles in the p-graph of the community and what endogamy might exist is purely on the basis of attributes or social categories. In the second case, the cycles in the p-graph will define the boundaries of the endogamous community, and within that community the relative densities of relinking will further delineate a network structure of kinship that is partly a function of marriage alliances.
Structural endogamy may provide social cohesion to a kinship or ethnic group, social class, political stratum, occupational subgroup, and so forth. The density of endogamy in a structurally endogamous group is measured by the relinking index (see box). A relinking index of 100 percent, given a common set of independent ancestors who are themselves relinked, indicates that every known link traces back to the ancestors of the common set.8,9

The index of relinking of a p-graph or kinship network (White, Batagelj and Mrvar 1999) measures the extent to which endogamous marriages take place among descendents of a limited set of ancestors, compared to the maximum possible.

Summary

Sensitivity to context is crucial to interpreting field observations and dialogue in the absence of experimentation. Because ethnography does not involve experiments with human subjects, ethnographers must be sensitive to context in making interpretations. However, because of sensitivity to context, today’s ethnographers often conclude that comparison is next to nearly impossible, not unlike Lévi-Strauss and anthropological theorists before him who concluded that it was next to impossible to study kinship by taking the complexity of social networks into account. What occurs inside the social networks that the ethnographer observes is crucial to the contexts of interpretation. Just as network analysis has developed enormously over the past eighty or so years (tracing back to Jacob Moreno’s sociometric studies, for example), so have practitioners in the natural sciences realized that, in spite of the possibility of experimentation, networks of interaction were crucial for understanding complex phenomena—defined as dynamical processes in the interaction among entities that lead to emergent phenomena. Complex phenomena are also those in which the entities that are interacting have their own internal dynamics, internal structures, and reaction times that differ, with time delay, from the time scales of interaction. All scientists are beginning to acknowledge that the phenomena they study, considered at the level of networks, are not reducible to a mechanical model of interaction among the interacting parts.

This chapter, then, has dealt at one and the same time with social networks, and with models of complexity and how the two are related. Networks, at a very concrete level of detail regarding entities, actors, and
relationships, provide a model of context and make provision for sensi-
tivity to context in the analysis of social behavior.

In spite of the detail that can be provided by network data about so-
cial interactions, the larger contexts of networks as open ended and large
scale in their outreach is a useful place to begin. Small world models
provide a useful place to begin characterizing networks in natural and
social settings. Generally they are (1) large, involving many entities, ac-
tors, and relationships; (2) clustered and yet (3) the distribution of rela-
tionships tends to allow the average distances between any link pair of
entities or actors to be relatively short. This characterization of small
worlds allows us to begin an inquiry about social networks at a theoreti-
cal level by asking whether such networks allow for the possibility of
self-organization and emergent phenomena.

For exchanges to occur freely in a network, small world properties
(1)-(3) are useful but they are not sufficient. Agents, actors looking for
the possibility of exchange with others, require a means of finding oth-
ers, or different kinds of targets, in the larger network. Centralized or-
ganization is one possibility, as, for example, the phone book.
Decentralized or distributed organization is another possibility. Self-
organization is often said to occur in agent-based models of networks
when agents have only local information, and yet on the basis of local in-
formation can navigate through a set of tasks or through links in a net-
work. For decentralized processes of self-organization that occur through
networks, it is useful to ask: What are the additional properties of small
world networks that make them navigable? This turns out to conform to
properties of (1) the topology of the network and (2) the cognitive maps
or local information possessed by agents. Navigability requires local
clusters in the network for honing in on targets. The usefulness of local
clusters, however, is relative to certain proportions or probabilities of
more randomlike ties that span longer-distances in the network. Cogni-
tive navigability, which relies on locating people by their social identi-
ties, not only requires a general sense of which local ties lead in the
general direction of a target but also requires that information be avail-
able regarding the best distance-spanning links in the direction of the tar-
get. Small world experiments in message forwarding through a network,
for example, tend to be successful when the distance-spanning locatabil-
ity of ties involves cross-cutting ways of classifying links, for example,
occupation in combination with geographic location.

For the Aydınlı nomads, navigable small world social networks might
exist through knowledge of geographic location and kinship categories such as lineage, marital ally, and/or close relative. Because honor and trust are prime elements of relationships used to accomplish tasks among the Aydnlı, the theoretical concepts of strong ties of trust and the navigability of strong ties in the small world of kinship or genealogical relationships are among the concepts and models that we will explore empirically (White and Houseman 2003). We will be looking at network models that are realistic in terms of how social behavior operates, and whether the elements of the model’s use are supported by empirical evidence.

Having proposed the possibility of a theoretical investigation of models of complexity in social interaction that are sensitive to the network context of social relations, we explored the model of fractality in Aydnlı kinship organization. Fractality is immediately evident in lineage organization. It is a structural element that has often been used in describing a property of many Middle Eastern societies in terms of segmentary lineages, in which there are multiple levels of potential oppositions between lineage, and possibly geographic, segments. We offered the provisional hypotheses that not only does the genealogical network of Aydnlı nomads have properties of a navigable or complex small world (CSW) but that many of these properties are shared with other Arabized societies of the Middle East. We were careful to describe this provisional model, however, as one of segmented lineages so as not to confuse it with the particular characteristics of the Nuer or Tiv often used to define segmentary lineages such as predatory expansion or territorial lineage segments.

We then explored the model of segmented lineage structure further, with reference to both the Aydnlı and to other Middle Eastern societies, and noted how selected parameters of navigability might be specified and tested.

Social structure and its relation to dynamism can be investigated not only by careful empirical investigation but also by various types of simulation. We characterize and explore three types of simulation. The first, an agent-based model, we illustrate by a thought experiment: How might a society, through agent-based behavior (local optimization using local information in interaction with others) evolve a set of marriage strategies that distribute or diversify into a whole range of variant behaviors that exhibit self-organizing or emergent properties?

The second type of simulation explores the effect of altering the demographics of a population and looking at the effects on marriage behavior. In demographic simulation there are no autonomous agents, simply varying demographic regimes in which a population reproduces
itself, and different rules of marriage. Hammel and others used such simulations to make the point very effectively that differences in population demography can radically alter the probabilities of different types of marriage, regardless of preferential choice.

The third type of simulation we describe is one we use to compare what would happen if an existing social network structure were retained, in every detail, and only one element of how people choose their spouses in their own generation were allowed to vary. This type, the Feynman simulation, can be used to compare alternative models of random marriage, probabilistic marriage choice, or marriage rules (for both avoidances and preferences or prescriptions), in comparison with actual behavior. It is a powerful means of using simulation methods to test hypotheses and answer questions about actual behavior, controlling for the contextual effects of demography in order to test hypotheses about agent-based preferential choice.

Baselines of measurement for particular types of marriage, and the usefulness of examining the full range of types of marriage as statistical rank-frequency distributions, are examined next. The two measures of marriage types in current use are prevalence per units of population, which is important as a social context variable in its own right, and relative rate, for example, of a particular type of cousin marriage as a percentage of all cousin marriages. While the use of the latter rate is very common in anthropology, it does not take the appropriate controls into account to infer anything about actual marriage preferences.

We introduce two new and highly meaningful measures for assessing the rates of different types of marriages. The selective rate is the number of relatives of a particular type that are married, per number available in the population, and may be computed generation by generation as well. Because this rate is affected by and adjusted for demographic changes, it is very useful for comparisons through time and for assessment of the statistical norms of marriage. The interactive rate is one computed against the background of a Feynman simulation, and relative to a given model such as known prohibitions against incest or avoidances, which can assess the excess of a given marriage frequency against a controlled random baseline. This is perhaps the best of the available measures for assessing actual marriage preferences. Both these new measures make use of the information provided by the actual network of genealogical relationships, whereas the two measures in current use in anthropology (prevalence and relative rates) do not. We will use each of these four
measures, and often compare them, in our analysis of Aydınlı marriages. We will also use, in our analysis, the measures of rank-frequency distributions discussed in the chapter. These have proven to be extremely important to kinship studies because they put every type of marriage that occurs in a given population in the context of the frequency distribution of all other marriages. This approach is capable of characterizing, with a single parameter, an exponential or power-law coefficient, the entire ensemble of marriages extant in a society. If a distribution can be validly characterized by such a parameter, and that parameter has both a theoretical and an empirical and context-relevant explanation, then a probability-based explanation may apply to a whole population. This can be very useful if it also ties in with a theory of emergent complex phenomena applied specifically in the context of the case study, or to broader classes of cases.

Having completed the discussion of the general types of models and theories that can inform a network analysis and empirical investigation of this sort, we turn in the final section of this chapter to the use of graph theory for the study of kinship and kinship networks. Here we are not talking, like many anthropologists do, about networks as a metaphor but come full circle to using network analysis to provide a means of measuring specific kinds of interaction and effects of interaction, in ways that are sensitive to social context. We urge that network data be used in conjunction with ethnographic observations and narratives: crucial contextual elements for interpreting social behavior. The concepts we develop in this section demonstrate that sensitivity to context can make meaningful comparison possible, and that it is possible to study kinship while taking the complexity of social networks into account. What we can observe to occur in systematically studied social networks may provide many of the contexts, if connected to other knowledge and observations obtained by the ethnographer, crucial both to interpretation and to comparison across cases. Formulation and testing of more general theories will be found to have very concrete applications to particular case studies.

Some of the key definitions, particularly those related to the emergent boundaries of cohesive groups, are useful for interpretive and comparative work on social networks in testing hypotheses about kinship. They are summarized in Table 5.2 and explicated in the paragraphs that follow. The use of these concepts, and the measures they provide, can be coupled to the understanding of complex phenomena, defined as dynamical processes in the interaction among entities that lead to emergent phenomena, not reducible to some mechanical model of interaction among interacting parts. Hopefully, that will be amply illustrated in the chapters that follow.
In this chapter, then, we have attempted to deepen the terms introduced in Chapter 2—relinking, structural endogamy, network cohesion, and p-graph—as a means of tying together the dynamical as well as the egocentrically rooted aspects of kinship networks in order to demonstrate the connection between these concepts and the key concepts and measures from graph theory that permit an analysis of network dynamics. The terms discussed (Table 5.2) are paired concepts, one from the kinship domain, the other a graph theoretic concept that serves to identify or measure one of the properties of a kinship network or its elements. The critical concepts here are those that build up to the measurement of cohesion in kinship networks—tree and cycle, reachability, connectivity, node-independent paths, and biconnectivity—that when coupled with the idea of structural endogamy as represented in p-graphs allow us to study the dynamical process of how cohesive groups are formed in kinship networks over successive generations and in terms of embedded hierarchies of cohesive groups. The idea here is a simple one: relinking tightens the web of kinship, much like knotting the weave of a fishnet.

In the Middle East, for example, there are often very dense marital re-linkings among families, and entire villages or larger regions may be integrated by relinking. Kinship cannot be easily conceived in this case as genealogical trees in which the branching of ancestors or descendants is forever distinct. Where relinking is common, any given pair of relatives may have multiple paths of connection.

Further Reading

Because of the density of relinking marriages and their importance to the social organization of the Aydenli nomads, this study illustrates the use of the p-graph formats for diagrammatic representation of kinship networks, some of which are also of specialized use in programs for kinship analysis (White and Jorion 1992, White and Skyhorse 1998). P-graphs (White 1997) entail the most compact sociologically and structurally informative representation for the analysis of marriages and their re-linkings, including blood marriages. The study by White (1999) is concerned with the use of Feynman simulation for evaluating marriage preferences or avoidances (and the general topic of marriage norms and specialized rules) by providing a means for comparing actual to simulated “random” marriage behavior.
Notes

1. Mark Newman suggests using inverses to accommodate unconnected nodes when computing distances.

2. Hubs and authorities in networks are defined as complementary roles in which a hub points to many authorities and an authority is pointed to by many hubs. The algorithm for finding hubs and authorities applies this concept interactively to try to find the set of best instances of both types. For www pages, for example:

   the most prominent sources of primary content are the authorities on the topic; other pages, equally intrinsic to the structure, assemble high-quality guides and resource lists that act as focused hubs, directing users to recommended authorities. The nature of the linkage in this framework is highly asymmetric. Hubs link heavily to authorities but hubs may themselves have very few incoming links, and authorities may well not link to other authorities. This, as we suggested above, is completely natural; many good hubs on the Web are being created by relatively anonymous individuals, and the main authorities on a topic are often in competition with one another, either explicitly or implicitly. (Jon Kleinberg, 2000b, italics in the original)

3. It is conceivable that some generalized form of “Arab” lineage-segmented social organization that includes the tendency toward marriage with the FBD as well as the diversity of marriage types (as in Figure 4.6) that recurrent FBD marriages engender could fit Watts, Dodds, and Newman’s requirements for a realistic model of social networks having the CSW or fractal small world property.

4. Barry (2000), for example, studies how the type of marriage of the parents affects the type of marriage of the children. If the same type is replicated from generation to generation we may speak of transmission of a marriage rule; if complementary types occur we speak of a correlated pattern, for example, sister exchange followed by bilateral cross-cousin marriage.

5. The study of prohibitions in societies with “Arab” type FBD marriage has been done by Barry (2000).

6. A common example is the rank frequency of events that occurs randomly in time. For example, for each uniform time period there is a fixed probability \( p \) of an event occurring and \( q = (1-p) \) of not occurring. The frequency \( F \) of intervals of length \( R \) is then \( F = pqR^{-1} \). A rank-frequency distribution of binned intervals from data with a normal bell curve statistical distribution, for example, is also exponential.

7. In circumstances in which relinking is very infrequent, it is easiest to represent kinship relations by the conventional egocentric network diagram, in which individuals are nodes and kinship or marriage links are shown as links between individuals as nodes. If we choose to indicate parent/child, marriage, and sibling links on such a graph, cliques or clusters of links on this graph will usually cor-
respond to nuclear families. All full siblings are connected to the same two parents and to each other, and the parents are connected by marriage. There are, of course, overlaps between these cliques in that any given person will belong to a family of birth but may also belong to one or more families of marriage or procreation.

8. A structurally endogamous group defined by a single cycle of marital relinking (e.g., ten families married in a circle) is assigned a density of 0% to indicate that it is not cohesive if not reinforced by additional cycles (e.g., the same ten families but with three additional links between them). This may occur when the relinking index among members of a structurally endogamous group reaches a sufficient density (White and Harary 2001).

9. A full comparative treatment remains to be made of the cohesive densities relevant to recognized kinship and marriage ties but Houseman and White (1998b) began to do so for Amazonian societies with network-structure dual organization. For nomad clan genealogies the index of relinking is 75%, which is extremely high by world standards, and well above a level critical for the emergence of social cohesiveness in kinship and marriage networks.
Chapter 6

Clan Structures and Dynamics

The Oral Tradition: Reconstructing the Past

“Here on the yayla (=summer pasture), we are all relatives, all from one kök (=root),” the elderly men declared firmly. Johansen accepted this statement in 1957 but in 1964 she began to write down their genealogies and continued this during her visits in 1970 and 1982. She discovered, however, that the members of the clan were indeed all related by the many relinkings which had taken place through marriage but they were not “all from one root.” They had no less than ten “roots”—male ancestors going back as far as about the mid-eighteenth century—to whom the best informed old men could trace back their offspring in their mostly agnatically organized society. The memory of these men, the root ancestors, their descendants, and their respective lâgap (=nickname) was preserved from generation to generation by the men; women, who stand in a different relation to genealogies, did not show any interest in them until I began to question them on the subject. Because in Turkey no official surnames existed before 1932, except those of some families of nobility, and the usual Islamic first names gave only a small choice, many Ahmets, Alis, Mehments, Isaas, and so forth existed in every clan. Boys and young people with the same name were distinguished by their fathers’ names. They acquired nicknames in addition to their given names as soon as their personalities or their development of distinctive qualities as adults began to stand out. In many cases the nicknames of ancestors were transmitted over generations, during which time they became simply names without pejorative characteristics. Nobody believed that a whole lineage was, for example, “quarrelsome” or “rovers.” Neither were the names taken as attributes of their founders, who might have been given nicknames in youth as, for instance, “crazy” for a fiery youngster, hardly reflective of one in old age.
The ten root ancestors, the first seven of whom were lineage founders, are listed below, together with lineage nicknames and some of the expressions of the nomads that add context and color to the place of genealogies in nomad culture. The ethnographer likes most of her nomad friends and she drew their ethnographic portrait with warm feelings of thankfulness for their kindness and willingness to give her the many kinds of information she asked for. Yet, it is considered very impolite to use decrying nicknames of lineages or persons if the members representing these persons or members of their families are present, although everybody knew them. We could change the names but we would never find such humorous ones and, nevertheless, everyone in southeast-Anatolia knows where Johansen lived and conducted her interviews. After she had stayed for years the group was proud to have a German member and many have said they would not like to be anonymous. Johansen’s early informants are nearly all dead now and the picture of traditional life is historical. After the year 1982, the nomads of today have changed considerably. Hence, the inclusion of historical lineage nicknames is more informative than damaging to contemporary reputations. We will use quotes around lineage names when they are derogatory and not self-identified, however, so that there is no carryover of mistaking sometimes humorous or derogatory nicknames as if they were names that lineage members ascribed to themselves.

Taking the Genealogies

To get information about their descent from the patriarchs was an easy task. Sometimes Johansen also tried to ask younger men also but they at once told her to ask their fathers or father’s brothers. Women, even elderly ones, laughed in embarrassment when she put the same question to them. They told her they did not know anything of the older times, neither of the families they had married into nor the families of their descent, which they had left usually of age between fifteen and twenty years. But when Johansen asked people the names of those in their own generation and especially those of the children and perhaps the children’s children, the elderly women were better informed than the men. They could tell her the exact sequence of children, inclusive of those who died as infants. In this way they could estimate even the age of the children and young people by counting a regular distance of two years between
each birth of a woman. Johansen observed these birth intervals too, which had to do with the fact that babies were more or less exclusively breast fed for about one year and only thereafter slowly began to take part in the meals of the women and elder children. Mothers never let a baby from another mother suckle, even when their mothers did not have enough milk to satisfy them, because this would make her children brothers and sisters of those of the other woman which would serve as an absolute obstacle to marriage when the children became adults.

When Johansen asked men how many children they had, they named their sons and she had to repeatedly ask how many daughters they had before they named their daughters too. At least before 1982 this was the case. Thus in the older generations the genealogy gives in some cases an impression that sons were born before the daughters. Johansen could not elicit exact sequences of births and the number of those daughters who died in early childhood in the eighteenth and nineteenth centuries. It was simply not the concern of men to show officially an interest in children, especially not in girls if they were not an object of marriage negotiations.

Johansen first asked the most prominent patriarchs to give her their genealogy and she entered the information into her large book in the manner anthropologists do (see Figures 2.2 to 2.5). The old men usually were not willing to change the subject of their talk and when, as a young woman, she wanted simply to ask a question, she had to wait for a good opportunity for special interviews. This is to say, when their own supply of themes was exhausted for the moment. By contrast, they reacted eagerly to her requests to tell her their genealogies because quite obviously this gave them the opportunity to make known once more the long history of their families and the influential position of their ancestors. They did not become tired of her requests to give the dates of every relative, not only the most prominent or the male ones, although they had sometimes to work for hours. Of course she encouraged them by telling them how impressed she was by their comprehensive knowledge. As soon as the man just talking named relatives whom he had in common with the other men present in the tent, the latter began to supply or correct his namings. They immediately understood Johansen’s genealogical drawings and wished to correct them by having her reread them.

It soon happened that when she came into tents of the clan’s summer-pasture for the first time in this season and the inevitable greetings and drinking of tea were made, the host told her in the presence of as many men as possible: “Haydi, kökümü çıkart, bakalım!” (=Go to it, draw out my root, and let us see!). She had to do this, even when it seemed unnecessary for her, because she had already written down his genealogy in the
tents of his cousins in his presence. But she understood that this was a question of reputation for him. Sometimes, when she did not want to waste too much time, she showed the genealogy already written to her host and asked him to correct the data. She then recited his full genealogy in a loud voice waiting for his corrections. The men always laughed in amazement that a woman knew their genealogy and, as her data grew, knew it even better than some of them. By the constant repetitions she had good control and could eliminate incorrect data (see Johansen and White 2002:86-88).

**Oral Traditions of the Lineage Founders**

In this way Johansen traced back the ancestral lines of the informants to ten “roots” and their offspring, whose identifying numbers appear in our genealogies in Figures 2.2 to 2.5. To reference the place-names in the narratives, Map 6.1 shows the general locations of the earliest “Aydınlı” near Aydın on the Aegean Sea, where there were quarrels with the local chiefs over the pressure to become sedentary. Those who left in order to remain nomadic migrated to pastures north of Antalya on the Gulf of Antalya and later to the pastures north of Adana on the Gulf of Iskendurun. We don’t know the exact route but only the general direction taken.

In the narratives that follow, the relinking genealogies of Figure 2.2 to 2.5 may be used to locate particular individuals in the lineage and marriage network. Throughout the book, the numbers shown on these figures are used to identify individuals. When someone is discussed whose lack of marital relinking has excluded him or her from these figures, their relation to someone on the graph will also be mentioned.

#1. Dolaşıkçı [=Rovers, or People who Rove, a maximal lineage (L1) with a segmented sublineage (L1b) “Hımlı”="Quarrelsome”]: In the latter part of the eighteenth century lived a man (id 1927) and wife who were not fully sedentary but had their camps or winter house on the territory of Kurşun or Kurşunlu village, ca. 30km northwest of the coastal town of Antalya (de Planhol, 1958). They gave Zembirciler¹ as their tribal name but there is no corroborating evidence of this as a tribal name. They had two sons, Ismail (1381, Figure 2.4) and Yusuf (1926, Figure 2.2 and 2.5), probably born between 1780 and 1810.

**Map 6.1: Pasturelands near Aydın (early), Antalya and Adana (late)**
*(arrow indicates successive migrations from Aydın)*
These two are looked at as the founders of two lineages, with Hacı Doğanlı (28) the son of Ismail (1381) the founder of the main lineage, while members of Yusuf’s line separated and moved away. The sons,
mainly the elder one, Ismail, were dragged into bloody quarrels with the derebey, the local ruler in the Antalya region. This circumstance forced them to flee before punishment into the higher mountains to the northwest and live there poorly endowed from small herds and troubled by occasional robbery. They could not obtain regular summer and winter pastures there because they would have been easily discovered. They moved around irregularly from one place to the other as Deli Ahmet (=Crazy Ahmet; 165) had heard from his father. After 1865 they were using some of the summer pastures left by the settling of the Afsar in 1865 but they also retained ties to the population still living around Kursun, that is, in a 400km range. His stories about their robberies provided fascinating entertainment for the other old men, some of them not without experience in this field too. Thus the family and the whole offspring were given the name Dolaşıklı (=People who Rove).

#1b. The offspring of Yusuf had segmented from the main lineage in the generation of his grandson “Hınalı” Mustafa (=“Quarrelsone” Mustafa, 630, see Derleme Sözlüğü 1963-82:2363). “Hınalı” himself, however, was one of the few to rejoin the clan after retreating to the high mountains for many years to avoid the tax collectors. He returned to the clan to marry Mustan’s daughter from #2 (a MBSD?), and left descendants who are recognized as a separate lineage (#1b). This lineage is called not only the “Quarrelsome,” but is still subsumed with the other “Rovers” (#1, or #1a) segment. These are, as mentioned above, merely names; nobody thinks that the whole lineage is quarrelsome or are rovers to this very day. These were attributes only of the founders, or in this case, a designation that also connotes the split between sublineages later reunited through circular migration. One man of this lineage (32, from #1a) was among the applicants for the valley of the current clan in 1933 (located north of Adana, Map 6.1) as one of the representatives for fifty-five officially recognized nomad households.

#2. Ecevitli A-B.2 In the time between 1780 and 1810 also in Kursun village as a winter camp grew up a man with the name Abbas (659). He was a member of the well-known and numerous Karahacılı (=Black Pilgrims people) tribe, who generally had its winter camps in the lowland around Antalya (Map 6.1). He had two sons, Mustan (716), founder of the Efe sublineage (a name now outdated and often called
Karabulut=Black Cloud), and Hacı Ketr Mehmet (=Stony Lands-Mehmet, 661, the Pilgrim, see Derlem Sözlüğü 1963-82:2774).

Mustan and Hacı Ketr Mehmet arranged exchange marriages of their daughters with the Dolaşıklı “Rovers” lineage (#1),\(^3\) which in this generation obviously had greater peace than before. Soon both lineages became richer and acquired some political influence by their numerous offspring and the migration when the children were older to better pastures about 500km farther east from Kurşun, around the Armenian villages in the mountains of the Antitaurus. They did not go there voluntarily: After 1893, Mustan and his brother and their families fled to the Antitaurus because they did not want to hand over their sons for military service, which could last more than seven years at this time, with many incidental dangers. The control of the local government institutions in the new area seemed to be less tight or less strict in the summer pastures with Turks in contrast to Armenians. Moreover, an abundance of pasture in the Çukurova basin (Adana-Ceyhan), the marshy and malaria infested lowland of Adana Province, where full settlement was then widely impossible, could be used in winter. The tribes that occupied them up to then (e.g., Afşar) had been forced to settle after 1865.

In 1957, the most influential person of the whole clan was from Ecevitli A-B segment. No name was heard as to what they call themselves. Also from this lineage one man was representative of the land claim in 1933 (Efe Halil, 880, not shown on the relinking genealogy but lineage grandson of the founder 716 and brother of Efe Hasan, 882, who gave a daughter to the new “influential personality” (818) of lineage #2 in the next generation).

#3. Ecevitli C [segmented from #2]:\(^4\) Abbas’ [#2] son Mustan married a young woman (1151) at Kurşun village in Antalya near Kurşun whose brother (1152) had the nickname Ecevitli, a common lineage name from Aydın. He is the known ancestor of the lineage but further reconstruction supports the facts that he descended from an unknown patrilineal ancestor in common with #2, and is thus of Karahacılı tribal descent.

#4. Kırbaşı oğulları: In the last decades of the eighteenth century another ancestor had his winter camp in the lowlands around Antalya as a fully nomadic member of the Karahacılı tribe. His nickname was Kırbaşı (=Greyhead; 507), his son was Koca Oğlan (=Old One’s Boy; 509), and the lineage afterward was called Kırbaşı oğulları
(sons of Kırbaşı, the greyhead). Koca Öğlan’s son Ali (514), still in the Antalya region, had a son, Erkek Mustafa (=Manly Mustafa; 517) who was the most famous of them, and moved to the eastern pastures north of Adana (Map 2.2) after 1865. Only after the move, at the same time as the Dolaşıklı and Ecevitli A-B (see #1,#2) did the offspring of Kırbaşı—wealthier keepers of sheep—agree to marriages with these two lineages. Kırbaşı’s offspring, because they had intermarried especially with the Honamlı tribe, were represented by a genuine Honamlı in the application for land in 1933. But being sheep breeders until 1947, they were not interested in 1933 in summer pasture fit only for goats in the hottest months.

#5. Koca bey oğulları: Another ancestor living at the end of the eighteenth century was Koca bey (=Old Master; 224), also a nomad from the Karahacılı tribe or, at any rate, firmly bound to this tribe by intermarriages. His lineage also had connections with the Cırıklı tribe. He had three sons. The eldest was Hacı Ali Bey (=Master Ali, the Pilgrim; 226), of whose offspring nothing is known but probably they became sedentary. The youngest was İsmail Kara Molla (=İsmail, the Black Religious Student; 430), whose offspring settled in a village only two generations later, and the second was Veli Kahya (=Veli the Headman; 228). Veli Kahya had three sons but nevertheless engaged a shepherd Deveci Ali (=Ali, #8, the Camel breeder; 409), to help care for his flocks. The reason why his son, Hasan bey (=Master Hasan; 343) went to the eastern pastures soon after 1865 (the 1880s?) was to help his most gifted son Hafız Ali (=Ali, Hafız=who knows the Qur’an by heart; 345) to escape from military services. A member of this lineage, Ramazan (344, although not shown on the relinking genealogy but son of the “influential personality” 343) was the fourth signer of the land claim in 1933.

#6. Dazkırı kabile: At the beginning of the nineteenth century there was another couple of the Karahacılı tribe who had two sons, Yusuf (436) and Mehmet (437). They had their camps at least in some winters in the Antalya lowlands south of Kürşun village. They went in summer to the mountains about 150km north-northwest near Dazkırı, a large village and trading center, and therefore acquired the name Dazkırı lineage. Already in 1933 they were in the state of segmenting from the rest of the clan and did not take part in the application for land in 1933. In 1957 they switched to the pasturing of sheep rather than
goats. In the twentieth century they had the closest connections to lineage #4, sheep breeders until 1947.

#7. “Ahrazlar”: In about 1800 in the winter camp at Kurşun village also lived a man called Koca Mustafa (=Old or Great Mustafa; 1228), who obtained for his son Deli Abdurrahman (=Crazy Abdurrahman; 1230) another daughter (866) of Mustan (716, see #2). Two of the latter couple’s sons did not talk much (hence they were called speechless or dumb) or had an impediment of speech. Thus they got the derogatory nicknames Kara “Ahraz” Ali (=Black “Speechless” Ali; 1231) and “Ahraz” Mustafa (=“Speechless” Mustafa; 1304) and the whole lineage was called thereafter “Ahrazlar” (=the “Speechless”).

#8. Deveci Ali [assimilated to Koca bey lineage #5]: As already mentioned, Veli Kahya (#5, 228) was obviously rich enough, as the most influential man of the clan in his generation, to adopt into his lineage a smart but poor boy, younger than his own sons, from a village: Deveci Ali (=Ali the Camel breeder; 409). Deveci Ali was fully integrated into the clan by marrying the granddaughter (912, generation e) of Mustan of the Ecevitli A-B lineage (#2) and by relinkings of his offspring with the other lineages in the next generations. His agnatic descendants are still looked at today mainly as members of Koca bey’s lineage [#5].

#9. Öksüz Yusuf [assimilated to Dolaşıklı families #1]: Another poor boy, Öksüz Yusuf (=Orphan Yusuf; 14), who may have earned enough for a bride payment and a modest living by doing shepherd’s work for many years, married a Dolaşıklı girl (164, generation d) and nomadized thereafter together with some Dolaşıklı families [#1]. Shepherds are usually paid in kind and thus bring together a herd of their own as time goes by and if no epidemics occur. His sons emigrated, however, vacating future generations of this lineage as nomad members of the clan.

#10. Kel Ahmet [assimilated to Dolaşıklı families #1]: In the 1920s a third orphan boy joined the Dolaşıklı lineage [#1] as a shepherd and made the same career as Orphan Yusuf. This was Kel Ahmet (=Scrubby Headed Ahmet; 100), who married a daughter of Horzum tribe but married his children to other members of the clan.

Ancestral trees were collected for every member of the clan, back to the
point were root ancestors were encountered (ancestors whose parents were not remembered), or where someone from outside the clan was a parent. Genealogies were also traced downward to all known descendants but not beyond those who had emigrated from the clan. The depth of the actual genealogical ties that are remembered and shared among informants does not go reliably beyond five generations before those persons living. Beyond that only paternal ancestors are counted but because there is much lineage endogamy, there are likely to be many members of a patrilineage who are maternal relatives as well. Intralineage marriage was frequent. Because of this, while informants agree on genealogies that establish factual lineages up to five generations above living residents, some of these ties may have been inadvertently fictionalized, in some cases along lines where lineage segmentation is said to have occurred. Named nomad lineages were found to be subgroups with a factual common ancestor in the last three to five generations.

The Genealogy and Relinking Marriage

The historical narratives provided by the women and patriarchs, together with the total genealogies of the clan shown in part in Figures 2.2 to 2.5, along with written sources, allow us to put together the migratory history of component lineages and their amalgamation into a clan and evaluate the rankings and relations between lineages and the relations to sedentary groups.

Written Historical Data about the Development of the Clan

Seen from the older men’s accounts, the nomad clan consists basically of members of the well-known and widely scattered Karahaci (=Black Pilgrim’s people) tribe (lineages #2, #4, #5, #6, and probably #3 and #7 as well) and shepherds (founders #8, #9, #10) adopted by them. Only the lineages of the numerous Rovers #1 and the “Speechless” #7 may not be of Karahaci origin, although the early marriage linkings seem to indicate it. Sapuk Halil (=Enthusiastic Halil; 954) from the Ecevitli B lineage #2 and Hamit Haci (=Pilgrim Hamit; 346) from Koca bey’s lineage #5 even advised Johansen in 1964 to look at the Karaevli simply as Karahaci.

Some Turkish and Western sources supply information about the his-
tory of this tribe in the last four centuries. Karahacılı are mentioned in historical sources already in the seventeenth century (Sümer 1980:181; see De Planhol 1958:117). Langlois (1861:21), crossing the lowlands near Adana, met in 1852 some 500 tents of Karahacılı, who owned about 12,000 animals. Yalgın (V:46), who undertook wide travels in the Taurus and Antitaurus between 1928 and 1937 (some of them with the young Béla Bartok) recorded that Karahacılı had moved from their winter camps in the Antalya region to winter pastures in the Çukurova in the year 1862-63 (1279-after-the-Hejira), and many of them were forced by the military to settle down only two years later. Güngör (1941:41) states that at least 150 tents of the Karahacılı did not move eastward but stayed in the Antalya region (De Planhol 1970:28). Even among the Turkomans of Iran there was a Karahacılı tribe (Sümer 1980:149) but they may be the offspring of another Black Hacı.

Thus the information—gathered during Johansen’s first stays—from the oldest informants, born between 1875 and 1905, proved to be true. They told her that their fathers, who might have been born between 1845 and 1875, were still born in the Antalya region and migrated eastward during their youth. But some of the lineages’ joint families stayed in the Antalya region and the connections to them became weaker during the lifetime of these old men. In the next generation the offspring of these lineage members who stayed near Antalya were not personally known any more. The long distance migration about 500 to 700km eastward took place slowly, over a period of a decade or more. Thus Deli Ali (=Crazy Ali; 306), one of the few old men who owned a document with the more or less exact year of his birth, was born in 1874 still in the Antalya region but as a youngster he lived in the Antitaurus Mountains and spent the winter in the Çukurova.

In 1928, when Yalgin (III:24) visited the Antitaurus and the Çukurova, the Karahacılı were widely scattered over this area but they had a central summer pasture at the large and high Üçkaplı yayla (Three Gates summer pasture), only about 150km west from our valley. In the neighborhood he met joint families of the Honamlı. They all told him that they were fed up with nomad life and wished to get land for settlement. Because Yalgin stayed with them only two days he could not know whether this was an honest wish or only an effort to get documents for pasture grounds as their property. Nor do we know that these were not Karahacılı using the Honamlı identity to claim land. Nevertheless Yalgin’s reports prove again the reliability of the information of the old men of our clan.
Clan Amalgamation

It is clear from the histories and genealogical figures that clan amalgamation, leadership, and segmentation are deeply correlated with the historical periodization of differential access to grazing rights and wealth, and how these interact with alliance formation through marriage. Lineages may wane and emigrate if their resource base disappears, segment if it changes, or wax to greater importance by absorbing other segments if their personnel and resources expand.

The amalgamation of the lineage groups is fairly clear. Lineages #1, 2, 3, and 7 were together in the nineteenth century in the same winter village of Kurşun, although they may have summered separately. Mustan (#2) and his wife both had parents from Kurşun, and his generation had moved east, on both sides of the Kilikian gate. Lineages #4, 5, and 6 also wintered in the same region of lowland Antalya near Kurşun. All were likely members of the same Karahacılı tribe, with some question about #1 and lack of certainty about #7. The Ecevitli C (#3) and Ecevitli A-B (#2) founders were brothers-in-law as well as patrilineal relatives whose lineages later segmented (see Figures 2.3 and 2.6).

Although Karahacılı were in the lowlands near Adana by 1852 (Langois 1861:21) and Yalgu (V:46) recorded some of them as moving from their winter camps in the Antalya region to winter pastures in the Çukurova in the year 1862-63, just before the Ottoman military defeated the large and militant Aşar tribe in Adana Province in 1865 and forced members of both tribes to settle. Yet this battle freed the Aşar pastures in the Antitaurus and opened them other nomadic groups. This allowed other Antalya nomads to move, lineage by lineage, either to seek better pastures due to poverty or to escape military service by moving to the new “frontier” in the east. Later, after the Armenian catastrophe in 1915 there was even more free space. Still, after 1865, clan ancestors were on both sides of the Kilikian Gate, the valley between the Taurus and Antitaurus. Mustan and his brother (from #2), with all of their children, were apparently among the later groups to pass into the Çukurova and Antitaurus region around Adana in 1893. Their children began the first extensive intermarriages between the lineages of the clan. Thus amalgamation of the clan appears to occur after 1893 as they arrived lineage by lineage.

Detailed analysis of the intermarriages from the nineteenth century, in fact, radically changed our impression of how the clan amalgamated. The
lineages had come one at a time, each with its own account of its history. The amalgamation by intermarriage between lineages, all having arrived on the Antitaurus side of the Kilikian Gate, however, occurred nearly all at once through relinking marriages in a single generation, with Mustan’s lineage as the attractor.

Social Ranking of the Lineages

The factors promoting social rank of men and their lineages were not only wealth and many relations to influential persons in the small towns but also high intelligence, eloquence, and ambition. But the most important factor contributing to social rank was the backing by a large group of related families. Charismatic leadership may also have played a role. The religious title hacı signifies those who have made the pilgrimage to Mecca. It is an honorific title that is achieved near the end of one’s life by men who could raise the considerable money necessary. One became hacı only after retirement from active political life whereupon a man was expected to live piously and not interfere in daily business. Only peace-making is left as an important task for such men.

The Koca bey lineage (#5) was originally the highest in social ranking. This lineage was among the first to leave the Antalya region in about 1870 to escape a long period of military service for one of their sons and to migrate toward the Antitaurus Mountains in the east. They supplied the headmen of the clan in the second half of the nineteenth century beginning with Veli Kahya (228). They had even closer ties to the Cırıkli tribe than their marriage allies in lineage #2. Some segments of this lineage emigrated so that their early constituency was by no means identical with the one Johansen met between 1956 and 1995. A lineage member was one of the four elected signers—each representing a different lineage—of the land claim in 1933 along with #1, #2, and #4 (represented by a member of the Honamlı tribe).

The Rovers (#1) and the Ecevitli A-B (#2) were originally poor and without great influence but old Mustan (716, #2) and his brother were clever men with large numbers of offspring who constructed fine relinkings. Mustan’s great-granddaughter in the male line (723) married Kozan Mehmet (32, #1), the known-person or tanıdık kişiler leader of the time just before Johansen came. Lineages #1 and #2, heavily intermarried, take the political lead from #4 after 1930 and 1957, respectively, with lineage #4 returning to the leadership role after 1980.
The Ecevitli C (#3) were too small to play a leading role. They were tightly linked with Ecevitli A-B (#2).

The Kıraş oğulları (#4) were originally higher in informal ranking than the Rovers and Ecevitli A-B. They had intermarried heavily with the outside tribe of Honamlı, established leadership between 1900 and 1930, and were represented by the Honamlı in the land application of 1933. Although initially not very interested in the additional pasturing rights mainly for goats that this settlement allotted (because goats eat mainly leaves from bushes rather than grass), they gave up sheep herding in 1947, and they integrated their pasturing schedules with their earlier marriage allies in lineages #1 and #2, who had become richer and were pasturing goats. Between 1950 and 1970 their herds had been depleted by epidemics and bride-monies. Moreover, the most able man of the cohort born in the 1920s, Emin (534, #4), died relatively early. Afterward Mustafa (597, Johansen’s “brother”), although poor at the beginning of his life, became very rich and influential, earned through his high intelligence and entrepreneurship. He had two wives and thirteen surviving children, which made him all the more influential.

The Dazkırlı lineage (#6) participated only partly in the social life of the clan. From the most distinctive Antalya origin (Dazkırlı village), ever politically marginal, they were also the first to be prone to segmentation in the 1920s and 1930s. Only some of them participated in the pasture-deal as “Honamlı” in the 1930s, and they adopted shepherding in the late 1950s, which took them to different pastures and also to a higher level of wealth. Because of their 1957 decision engage in for sheep instead of goat breeding, their most prominent members went regularly to other pastures. Therefore they had to go higher up the mountains in summer because sheep can bear even less summer heat than can goats. Thus the Dazkırlı were only marginal, forming many other relations with their neighbors. This shows the importance of the common landownership of a summer pasture for the cohesion of the clan.

Of Mustafa’s (1228) lineage, the “Speechless” (#7), too many of the generation born from 1935 to 1965 had become sedentary for them to pretend to play a leading role in the clan.

The three shepherd-lineages (#8, #9, and #10) were all lower in social ranking than the large ones. But no one knows whether they will attain
high influence later.

**Interrmarriage and Descent as Bases of Clan Cohesion**

At the analytical level, the clan is at least for a season a mainly co-residential unit in a territorial sense, whose primary internal bonds are those of dense intermarriages. It has at least the fiction of five or more generations of common ancestry. While common descent is the case for the core members of the nomad clan, there are two factors that promote fictional clanship. One is the notion that, after dense intermarriages among a distinct set of ancestors, the perception develops that “we all come from one root.” Because lineage (and by extension: clan) members often intermarry, intermarriage itself becomes proof of “common” descent. This fiction may also be useful in integrating groups of outsiders, initially as subclans, on something wider than a lineage-by-lineage basis. This assumption, which establishes a fictive basis for agnatic clanship stemming from marriage alliance, is not uncommon in the Middle East. Accordingly, Johansen’s visits to clans of other tribes—Sarıkçeili, Hayta, Horzum, Tekeli—and from the reports of Bates (1973, 1974; see Yalcin-Heckmann 1991:98ff for the same situation at the East Anatolian Kurds), gave the impression that the rules and preferences regarding marriages were much the same at least among the Turkish nomads everywhere in Southeast Anatolia.

**Sedentarization and Genealogical Memory**

In 1957, many persons told Johansen that a man from the Aydınlı could marry a village girl, especially when the young woman became his second wife but that village girls did not have the high moral standards of nomadic ones. Except for nomads who had recently become farmers and still behaved like Aydınlı, they would never let one of their young women marry a farmer.

But the knowledge about the personal fate of families that had become fully sedentary, and who never again met the other members of their clans at weddings, funerals, and the memory-meals forty days after death or local terms of juridical character was not continued for a very long time. The children of such people were still known but the interest in the marriages and offspring of these children faded. In this way the extraordinarily high number of seemingly unmarried persons named in the genealogy are to be explained, despite the fact that unmarried people are
very rare. In 1995 pride in nomadism and aggressive feelings against sedentary population which Johansen noticed in 1957 had vanished and intermarriages with farmers occurred more often. Already in 1982 Johansen could observe this change in attitudes.

Social Terminology and Social Change

While the word *kabile* is usually reserved for clan, it is also used for lineages, especially for the larger ones and sometimes at a higher level, for political units such as tribes (=*aširet*). Lineage is often distinguished from clan by “the sons of” x, whereby x is the name of a famous male member of the lineage, often the founder. The polysemy of the term *kabile* reflects the fact that clan and lineage are analogous units in a hierarchical system whose lower (lineage) and higher and more inclusive groups (clans) are organized according to similar principles: informal leadership based on kinship following, feuding as a matter of honor and an expression of power, endogamy as a basis of internal cohesion, and exogamy as a means of political alliance. The nomads defined the term as a group of people “from one root.” The clan mediates locality with lineage identities at a lower level and tribal identities at a higher level. It develops the sense of single-rootedness through marital relinking within a few generations. Arranged marriages by clan fathers were preferentially within the clan.

As mentioned above, in terms of people responsible at the tribal level, tribal organization ceased to exist after World War II (Chapter 2). But endogamous marriage preferences within the clans remained in place until about 1982, when changes were also observed in the decline of arranged marriages, feuding, and traditional costume. Tribal descent also became less important in the last two decades. When telling Johansen their genealogies in 1982 the nomads mentioned it only if the father-in-law of a young nomad was a villager but did not name his tribal offspring as they did with nomadic fathers-in-law from outside their own clan. Obviously the village community was looked at as his main social unit, not the tribe or clan his ancestors had been members of. Yet, although most of the descendants of the nomad clans had settled in villages between 1970 and 1995, the “one son” in many of these families who had stayed a nomad still preferred endogamy within the core of families remaining nomadic.
Introduction to the Computer Analyses, 1-20

The capacity of computer programs to produce finely detailed and annotated genealogies for very large numbers of people is especially useful in ethnography and social history. Individuals, both prominent and of ordinary walks of life, in all their diversity, can be placed in the context of their genealogical reticulation, which in the case of the nomad clan includes memberships of lineage, both tribal and village, migration histories, occupational specializations, leadership, and officeholding. The social demographics of the society are embedded within the network. Aspects of social life can be contextualized, and patterns of relationship extracted. Ethnographic patterns and the details that support or refute ethnographic interpretations can be discovered or checked against the patterns embedded in the richness of these network data. How rich the data are for purposes of learning about patterns of social life depends on the quality of the ethnography that produced them, and how well we are able to connect the ethnographers data and knowledge with the construction and analysis of the network itself. Recall (from the Glossary) that a network is not just a graph or series of graphs, with nodes and lines, that is, a way of showing relationships but contains as much additional information on its nodes or lines as we can provide.

A Note on Software

The Pgraph programs that we used for Figures 2.2 to 2.5 and elsewhere in this book are not the only routes to a network analysis of genealogies. Standard genealogical programs—such as Family Origins or Brother’s Keeper—are also extremely useful for data entry. These programs, like Pgraph, also check for consistency of data, and construct a kinship network. The drawback of commercial genealogical software programs is that they do not provide suitable means for network or statistical analysis of kinship and marriage patterns. Furthermore, the larger the number of people in the genealogy, the less compact and readable are genealogical diagrams. Without a network representation in the form of a p-graph, with marriages as nodes, they can neither show nor analyze patterns of marital relinking.

An alternate route for kinship analysis than the one taken here is to use standard genealogical programs—some of which are free and some
commercial—for data entry, and then output a text file such as Table 2.2 to proceed with the types of network and statistical analyses that begin below. One could also use a simple spreadsheet to calculate initial statistics on marriages, such as those we see later in Table 6.2 but as the analysis proceeds to greater complexity, it is easier to shift to the programs that specialize in network analysis—Pajek and UCINET being of special importance—and to statistical analyses designed specifically for kinship, such as the Pgraph package (e.g., programs Ego2Cpl, Ego2All, Pgraph, Par-Plot, Par-Calc, discussed earlier). These programs are designed to be used together, and provide automatic transformations or output formats to move from one to another. Pajek (Batagelj and Mrvar 1998; White, Batagelj, and Mrvar 1999) is the program of choice for network, structural, and dynamical analyses, and it is especially useful in showing and analyzing the overall structural characteristics of the network. In the course of this book, each of these programs or program options is discussed when used in the analysis.

**Analysis 1: Finding Generations, Counting Marriages**

Social network analysis allows us to model precisely how sets of people are embedded in the contexts in which they interact with others. For genealogical as well as other types of networks, generation is an important context, and marriages are one of the primary contexts through which many other relations and social units are formed.

The recounting of family histories was one of the favorite subjects of the Aydmli, and even simple questions about relationships within the family could soon blossom into a full listing, recounting, and discussion of ancestors and links to other families. It was not possible to separate the tasks of taking genealogies and that of recording the details of family histories. Once Johansen began to take genealogies systematically, in the second field session, even more data on family histories and personalities began to pour out of the interviews. In this second year, she began to transcribe the genealogical relationships to a genealogical scroll consisting of taped pieces of graph paper so that successive generations could be kept on different lines. Agnatic lineages were kept together. Marriages were tracked by colored lines which descended from the symbol for a wife to the bottom half of the page, then traversed horizontally and re-connected upward to the symbol for the daughter of the other lineage.
who was taken as wife. When lineages became too large to fit to a page, two pages would be separated and another added in between, and the colored lines would be filled in across the new page. This system proved effective but had reached its limits by the last field session. We could have transcribed all the data directly into a genealogical program but that would have involved innumerable traversals of the scroll marriage by marriage without any diacriticals to connect the genealogy to the genealogical file to check validity. Instead, we assigned individual ID numbers to individuals, entered these numbers into a spreadsheet, and then efficiently scrolled through the genealogy to record the agnatic links and the easily visible uterine links to parents. We then went through to identify the remaining uterine links that spanned larger distances on the scroll.

Our spreadsheet, constructed in the coded format of Table 2.1, transcribed kinship links along with data on residence and lineage written on the scroll and data on individuals from the accompanying narratives (see Appendix 1). Each name was entered only once, along with the numbers of father, mother, and spouse. If there were multiple spouses, a line for that individual containing all the other data would be copied below the first line, and only the number of the spouse would be different in the second line. Three or more lines could thus handle any number of spouses. The procedure of assigning a unique number to each individual in the scroll saved an enormous amount of time because they were entered only once although they might appear several times in the scroll (e.g., as daughter, as wife). The resultant numerical data from the spreadsheet were run through the Ego2Cpl program that checks the data for internal consistency, and that creates GEDCOM and other files used in kinship analysis.

Ego2Cpl assigns a unique identifying number to each marriage, much like the family numbers automatically assigned in programs that use the standard genealogical data formats know as GEDCOM. The Ego2Cpl program also provides various files for the programs used in those analyses exemplified in this book, as will be explained with subsequent figures (2.2-2.5). One of those programs is called Pgraph (White 1997) in contrast to the term “p-graph,” which stands for the type of graph that it draws. The program displays, edits, and analyzes kinship graphs in which marriages rather than individuals are the nodes, and it automatically produces a set of unique numbers for each distinct marriage.

Figures 2.2 to 2.5 (Chapter 2) are p-graphs created with the suite of Pgraph programs (White and Skyhorse 1998) that includes Par-Plot, which assumes control of laser printing of the graphics. For a closer analysis of lineages and marriage patterns, the overall p-graph was edited
so as to divide the nomad genealogies segments organized by patrilineages. The Pgraph program uses the numbering system for marriages’ and the output files produced by Ego2Cpl to edit and save a series of data file for “slides” used in making genealogical p-graphs. Once the graphic co-
ordinates are saved for each slide that has been edited on-screen, another program, called Par-Plot, is used to print the slides on any printer that understands HPGL, which is the acronym for Hewlett-Packard’s Graphics Language. The four slides shown in Figures 2.2-2.5 keep one or more patrilineages together in the same slide. The vertices in these graphs represent marriages, or else individuals who are still single. As a legend, five numbers are shown alongside each vertex: that of the husband, the wife, the wife’s lineage, the wife’s father, and the wife’s mother. Given this information, one can locate the parents of the wife even if they are not on the same figure. Where they are located in the same figure, the wife’s marriage and her parents’ marriage are connected by a dotted line. In Figure 2.2, three couples deep into lineage #4, for example, we can read that male 517’s wife 1444 is the daughter of 1438 and 1442 in the same lineage. Further, the diagram itself shows that she is married to her father’s brother’s son (517: a FBS) in what is for him a FBD marriage.

The solid lines in a p-graph connect a husband’s marriage to that of his parents and a series of solid lines indicates a patriline. Hence, we can see in Figure 2.2 that 1444’s husband, 517, is a child of 514, who is also her uncle (she has married her FBS). Most often, the units connected by solid lines are patrilineages whose names are well known but there are also segmentations of patriline into distinct lineages, as mentioned above. In the large “Dolaşıklı” patriline, for example, Hacı Dolaşıklı’s descendants constitute the main lineage (#1, Figure 2.5). Hacı Dolaşıklı’s cousin (FBS) “Hıncalı” Mustafa founded the second segment of “Dolaşıklı” lineage (L1b, Figure 2.4, segment of maximal lineage #1 whose main lineage is #1). “Hıncalı” Mustafa was the son of Yusuf, who earlier had left the clan, and the son only returned as a mature man. Only a few people now remember the fact (possibly by now a supposition) that Yusuf was the father’s brother of Hacı Dolaşıklı in lineage #1.

The graphs in Figures 2.2 to 2.5—as opposed to others which use a newer technology—are also simplified by not showing the entire genealogy but only those marriages that re-link. They list all of the 241 marriages that re-link by connecting to other marriages through two or more independent paths. Note that single children, by definition, cannot re-link because they have only one set of parents and have neither children nor a
spouse to provide another path for relinkings. Hence, there are no single children in these figures. Close examination of the figures shows concretely how each marriage relinks by connecting to two or more other relinking marriages. Some of the marriages, however, show no number for the wife. These are either ancestral couples or couples who relink through their parents and their children but not through the wife’s kin.

Figure 2.2 shows the relinking marriages in lineages L6, L4, and L1b (part of lineage #1; lineages also designated #6, #4, and #1b), and two marriages that are not part of a patriline. Of the 56 marriages, 45 (80%) are relinked within this graph, and the other 20% relink through one of the three other figures. For these four figures, the percentage of internal relinking is 20%, 28%, 25%, and 20% (conversely, external links are 80%, 72%, 75%, and 80% respectively). The ratio of internal to external marriages is approximately 1:3, roughly the random expectation for division of the genealogy into four parts. There is no particular significance to which lineages are shown on which figures but the figures give an indication of the types of alliances between lineages.

Because these figures show only the relinking marriages, some of the founders are missing. In Figure 2.2, for example, 441 Sari Veli (left center) is the son of 437 Mehmet and nephew of 436 Yusuf (#6), who do not otherwise relink to other couples. Missing in Figure 2.3, for example, is the presumed common root ancestry that links Ecevitli A-B (#2) and Ecevitli C, #3. In Figure 2.4, 1230 is shown as the son of Koca Mustafa, founder #7, who is not shown and for whom we do not know the ancestry although he was a Karahacci of Kursun village and possibly related to Abbas of #2 lineage, who was also a Kursun native founder. In the upper right of Figure 2.4 is shown an unnamed founder (#1) who is father of Yusuf in the “Speechless” segment of lineage #1 (designated lineage L1b), and also of the father of 1381 Ismail in the upper left of Figure 2.4.

The genealogies in Figures 2.2 to 2.5, with the additional notes above on apical ancestors, take us back to the founding ancestors of each of the lineages of the larger nomad clan. Most of the founding ancestors separated from other nomad groups (mostly of the Karahacci tribe) to form the nucleus of the present clan around their interactions in the Kursunlu winter pasture. In addition, clan members were recruited from pastures of nearby villages.

To summarize our discussion of the ten lineages or sublineages established by the clan “founders,” each of the following nomad lineages (with derogatory nicknames in quotes) can be identified in the genealogi-
cal charts under their numbers of their lineage or sublineage founders:

#1 (L1, L1b) Dolaşıklı (Rovers). Encompassing the Rovers proper and the “Quarrelsome” lineage segment.

#2 (L2) Ecevitli A-B (=descendants of the ancestor nicknamed Ecevit, and a common lineage name outside the clan)—a large lineage.

#3 (L3) Ecevitli C—a smaller branch lineage.

#4 (L4) Kırbacı oğulları (=Sons of Greyhead 407). This is the lineage of the extended family with which Johansen lived for most of the time during her seven half-year or summer visits.

#5 (L5) Koca bey oğulları (Sons of the Old Master) with connections to the Çırıklı tribe, and absorbing the adopted lineage #8.

#6 (L6) Dazkırı kabile (=from Dazkırı village and trading center, 150km northwest of Antalya).

#7 (L7) “Ahrazlar” (=Speechless”)

#8 (L8) Offspring of a shepherd (409) working for L5 and adopted by that lineage.

#9 (L9) Offspring of a shepherd (14) working for L1 and adopted by that lineage.

#10 (L10) Offspring of a shepherd (100) working for L1 and adopted by this lineage.

To understand the development of the clan through time as evidenced by the genealogical data, we can ask first: What individuals are remembered in each time period, and what is the difference in remembering males versus females? We then report on types of marriages and some basic historical demography.

There is considerably more extensive memory data for males in the early generations, for example, than for females (Table 6.2). To illustrate, Figures 6.1 and 6.2 show the male and female lineages, respectively, for the 253 marriages in the structurally endogamous core of the clan. Because of clan endogamy there are female lineages but they are considerably thinner than those for males.
Figure 6.1: Male Lineages among the 253 Structurally Endogamous Marriages (Number of arcs: 234)

Figure 6.2: Female Lineages among the 253 Structurally Endogamous Marriages (Number of arcs: 187)

The making of these graphs uses Pajek options Net> Transform> Remove> lines with value> lower than [2] or > higher than [1], where the values 1 or 2 are those usually assigned to male or female lines, respectively. Color coded versions of these figures are found at http://eclectic.ss.uci.edu/images/TurkishNomads/.

Tabulation by Generations

While Johansen assigned rough generational birth-intervals to individuals on the scroll (letters a-h, using the coding key in Table 2.1), the Pgraph and Pajek programs use depth algorithms to determine the relative generations of marriages. Because individuals may have several
marriages, and a second marriage will not necessarily have the same generational depth as a first marriage, the assignment of birth date generations to individuals does not always correspond to the assignment of generations of marriages.

**Computing Generational Depth.**

The Pajek> Net> Partitions> Depth> Genealogy option computes generational depths for a p-graph kinship network by calculating the minimum number of generations needed to distinguish parents from children in every line of descendants, and then assigning generational depth to couples or p-graph nodes so as to minimize the overall sum of generational differences between parental nodes and their children. The Pgraph programs use a similar algorithm to determine generational depth. To the extent that there is a high degree of relinking within a population, the generational depth assigned to marriages will correspond to successive historical periods, and will not be influenced by differences in time-to-marriage along different ancestral paths in a p-graph.

**Keying the Dates**

Our first task of basic demography, lacking actual birthdates, is to key together our two estimates of time depth, the birth cohort generation estimates by Johansen, and the genealogical generations computed by Pajek. Table 6.1.1 lists the nine Pajek generations for men across the top, with the first two generations (1-2) combined, and the nine ethnographer generations for men in the rows, with the first (a-b) and last (h-i) pairs combined. Because the ethnographer generations have estimated dates, across the bottom we average these dates to get approximations of historical dates for the Pajek generations. Pajek generations have larger intervals between generations 3-6 and shorter intervals between generations 6-9. Table 6.1.2 gives the similar data, this time for women. The idea in these two tables is to see how the two estimates of historical generations correlate, and to see how we can use both estimates together to come up with somewhat more reliable estimates of birth cohorts when needed. Overall, of course, we note there is high reliability between them in that they cluster tightly on the diagonals of the tables.
Table 6.1.1: Keying the Two Estimates of Birth Cohorts for Men

<table>
<thead>
<tr>
<th>Pajek:1-2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>Johansen:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a-b</td>
<td>4</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>b. &gt; 1815</td>
</tr>
<tr>
<td>c</td>
<td>7</td>
<td>13</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>b. &gt; 1845</td>
</tr>
<tr>
<td>d</td>
<td>19</td>
<td>22</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>b. &gt; 1875</td>
</tr>
<tr>
<td>e</td>
<td>40</td>
<td>53</td>
<td>28</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>b. &gt; 1905</td>
</tr>
<tr>
<td>f</td>
<td>81</td>
<td>115</td>
<td>48</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>b. &gt; 1935</td>
</tr>
<tr>
<td>g</td>
<td></td>
<td>115</td>
<td>54</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>b. &gt; 1965</td>
</tr>
<tr>
<td>h-i</td>
<td></td>
<td>36</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>b. &gt; 1980</td>
</tr>
<tr>
<td>&gt;1800</td>
<td></td>
<td>&gt;20</td>
<td>&gt;60</td>
<td>&gt;00</td>
<td>&gt;30</td>
<td>&gt;45</td>
<td>&gt;60</td>
<td>&gt;75</td>
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<td></td>
<td>~60</td>
<td></td>
<td>~30</td>
<td>~60</td>
<td>~70</td>
<td></td>
</tr>
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</table>

Table 6.1.2: Keying the Two Estimates of Birth Cohorts for Women

<table>
<thead>
<tr>
<th>Pajek:1-2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>Johansen:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a-b</td>
<td>6</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>b. &gt; 1815</td>
</tr>
<tr>
<td>c</td>
<td>8</td>
<td>11</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>b. &gt; 1845</td>
</tr>
<tr>
<td>d</td>
<td>17</td>
<td>23</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>b. &gt; 1875</td>
</tr>
<tr>
<td>e</td>
<td>38</td>
<td>48</td>
<td>24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>b. &gt; 1905</td>
</tr>
<tr>
<td>f</td>
<td>103</td>
<td>89</td>
<td>37</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>b. &gt; 1935</td>
</tr>
<tr>
<td>g</td>
<td>2</td>
<td>114</td>
<td>49</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>b. &gt; 1965</td>
</tr>
<tr>
<td>h-i</td>
<td>23</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>b. &gt; 1980</td>
</tr>
<tr>
<td>&gt;1800</td>
<td></td>
<td>&gt;20</td>
<td>&gt;60</td>
<td>&gt;00</td>
<td>&gt;30</td>
<td>&gt;45</td>
<td>&gt;60</td>
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<td></td>
<td>~30</td>
<td>~60</td>
<td>~70</td>
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</tr>
</tbody>
</table>

Generational Statistics

Of the total of 1499 individuals (707 male, 601 female, 191 gender unknown), 55 date back before the 1870s, when clan ancestors migrated from the Antalya region to their present territories in the east. Approximate generations were estimated by Johansen in thirty-year intervals, beginning from the earliest estimated birth dates of 1785. All the remembered ancestors, then, had their adulthood in the nineteenth or twentieth century. Statistics for generations are shown in Table 6.2.
Table 6.2: Statistics for Generations

<table>
<thead>
<tr>
<th>Parental links for marriages:</th>
<th>All Marriages</th>
<th>Relinking Marriages</th>
<th>Migrants’ Marriages</th>
<th>p-graph</th>
<th>generation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generation of males, born</td>
<td>M  F</td>
<td>M  F</td>
<td>M  F</td>
<td>generation</td>
<td></td>
</tr>
<tr>
<td>GEN a 1785—2 marriages</td>
<td>2  0</td>
<td>2  0</td>
<td>0  0</td>
<td>1-2</td>
<td></td>
</tr>
<tr>
<td>GEN b 1815—9 &quot;</td>
<td>8  4</td>
<td>5  1</td>
<td>0  0</td>
<td>2-3</td>
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<tr>
<td>GEN c 1845—15 &quot;</td>
<td>18  4</td>
<td>8  4</td>
<td>0  0</td>
<td>3-4</td>
<td></td>
</tr>
<tr>
<td>Pre-1875 totals:</td>
<td></td>
<td></td>
<td>55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GEN d 1875—41 &quot;</td>
<td>37  17</td>
<td>26  14</td>
<td>3  2</td>
<td>4-5</td>
<td></td>
</tr>
<tr>
<td>GEN e 1905—113 &quot;</td>
<td>97  67</td>
<td>65  47</td>
<td>12  12</td>
<td>5-6(7)</td>
<td></td>
</tr>
<tr>
<td>GEN f 1935—139 &quot;</td>
<td>235 165</td>
<td>82  71</td>
<td>51  22</td>
<td>6-8</td>
<td></td>
</tr>
<tr>
<td>GEN g 1965—82 &quot;</td>
<td>194 161</td>
<td>41  41</td>
<td>66  16</td>
<td>7-8</td>
<td></td>
</tr>
<tr>
<td>Post-1875 totals:</td>
<td></td>
<td></td>
<td>591 418</td>
<td></td>
<td>229 178</td>
</tr>
<tr>
<td></td>
<td></td>
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<td>132 32</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>59% 41%</td>
<td></td>
<td>56% 44%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>72% 28%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The historical birth date generations designated by the letters a-h in Table 6.2 are Johansen’s estimates of historical birth date intervals for husbands in the nomad genealogies. The columns of the table show the number of links remembered for the parents of males versus parents of females, first for all persons remembered, second for only those whose marriages relink to other couples by connections through two or more separate types of kinship relations, and third for those who emigrated from the clan. The fourth column shows the generations computed for each marriage by the Pajek program for comparison with the birth dates of individuals as estimated by the ethnographer. The generational depth estimates for marriage dates and those for birth dates of individuals (done by the ethnographer) are, of course, closely related.

Given the importance of patrilines as named local groups (and the relatively high rates of FBD marriage), there is a bias toward remembering more male genealogical links than female ones. The bias is greatest in the pre-1875 generations. In keeping with the agnatic structure and the patrilocal bias in residence, the males also tend to provide more of the generational continuity in the relinked marriages. The excess of the 591 male parental links over the 418 female links remembered is 41.4% but if those couples are removed who are not connected by two or more (“re-linked”) types of kinship tie, there remain 229 male links and 178 female links, and the excess is only 28.6%. (It is almost necessarily the case—except for plural marriages—that the numbers of males and females in
relinking marriages reach parity in the most recent generation.). Yet, only 36% of the remembered males have made a relinking marriage, however, compared to 45% of the remembered females. Women’s role in relinking marriages is of importance in remembering kinship links, and bilaterality is of importance as well.

It became obvious during the fieldwork that females generally had much less interest in genealogy and the past of their families than did men. Thus the informants were males. That the parents of males are more often remembered in relinking marriages than the parents of females may be also a reflection of the importance of exchanges involved in marriages between lineages or outside the clan, such as the payment or receipt of bride payment.

**Tabulation of Marriages**

Of the 1282 individuals included in the genealogies, as shown in Table 6.3, plus 191 of sex unknown not included in the network analysis, those married included 361 men and 387 women, or 53% of the males and 65% of the females. Forty-seven percent (324) of the males and 36% (210) of the females were single, consistent with polygyny and an earlier age of marriage for women but also somewhat biased in that more men were recalled than women in the genealogies. The 413 marriages plus the single individuals (413+324+210) constitute the 957 nodes of the kinship network constituted as a p-graph.

The story of the one woman with three marriages shows the responsibilities that extended patrilocal families have toward married daughters but also just how difficult it is for a woman to choose a husband openly. Of lineage #1, she ran away as a newly married wife from her first and quite agreeable husband (497, #6), whom the families had chosen because she was in love with 198, her handsome FBS. The new marriage was unwelcome with both her former and the new parents-in-law. Because the former had given bride payment for her, her own family was obligated in terms of their responsibility for her, and arranged for her first husband 497 to marry her sister. This also restored the balance of wealth and rights exchanged between lineage #6, having given a daughter in one generation, and #1, giving back a daughter in the next. She then continued to show her love for 198 openly but this was considered scandalous and the new parents-in-law had 198 divorce her, basically expelling her from her own lineage because of the lapse of honor her behavior had created. Still a young woman, she had no chance other than to
marry an older man who had been unable for reasons of appearance to attract a wife. With 1157 she had three children.

Table 6.3: Distribution of Successive Marriages for Those Married

<table>
<thead>
<tr>
<th>Freq.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>191</td>
<td>Children of unknown sex</td>
</tr>
</tbody>
</table>

Of 685 males and 597 females (1282 individuals), there are:

- 210 Single females (35% of females; some of these children)
- 387 Married females (65% of females; some of these children)
- 324 Single males (47% of males)
- 361 Married males (53% of males)

They are married once, sequentially, or polygynously as follows:

- 1 marriage: 316 (87.7%) males and 362 (93.5%) females
- 2 marriages: 38 (10.5%) males and 24 (6.5%) females (including 5 widow inheritance marriages)
- 3 marriages: 7 (1.9%) males and 1 (~0%) female

Six leviratic marriages: id numbers 340, 652, 885, 915, and 1336

413/387 married females = 1.07 marriages per female (1.05 non-levirate)
413/361 married males = 1.14 marriages per female

Table 6.3 also shows the frequency distribution for different numbers of successive or polygynous spouses, as compiled from the genealogical data using Ego2cpl. Of the married men, 11% were married more than once, compared to 6% of the married women (1.14 marriages per male; 1.07 marriages per female). Five of these remarriages among women (340, 652, 885, 915 and 1336) were widow inheritances by a brother of a deceased husband. There were no sororal marriages. The nineteen other women who remarried were either predeceased or divorced by their first husband.

**Tabulation of Children**

Lacking birth dates and censuses, it is hard to get accurate demographic estimates such as numbers of children from the nomad data. Some members of the network self-selected by staying in the clan rather than migrating out, and further selection occurred from the remembering of certain ancestors and forgetting others. Taking the network as an outcome of social selection processes, however, Figure 6.3 shows the number of children remembered, measured as the outdegree of nodes for all but the highest ancestors. This distribution is modeled as a power-law
curve—the dotted line—in which the number of children (x) in the x axis and the number of couples with this number of children (y) in the y axis are related by the equation $y=\frac{707}{(x+1)^2}$, a power coefficient of 2. Zero children has the highest frequency (707) for those remembered and the distribution declines from there. What a power curve of this sort shows is simple a tendency for a long-tailed distribution toward having large families. The arrow calls attention to the region of overestimation, which may be due to the bias for fewer children to be remembered for earlier ancestors. Those who at maturity will have no children are far fewer, however, so 707 is an overestimate also. The actual coefficient of the power law is not so important as that the tail of distribution is elongated as it moves toward fifteen children, without a dominant modal peak which is typical of societies with preferences for smaller nuclear families. Elongation of the tail of the distribution, regardless of the power-law coefficient—a second distribution is shown with a coefficient of 1.01 rather than 2 to exemplify this point—indicates an augmentation process, in this case a preference for having very large families. This matches the ethnographic fact that nomad women do not stop having children after a certain family size is reached but they continue to have children, if possible, leading to large families. Hence, we obtain a qualitative demographic result, even though precise demographic estimates have not been made.

**Figure 6.3: Remembered Children (x-axis; frequency on y-axis)**

![Graph showing remembered children and power law distributions.](image)

**Analysis 2: The Structural Endogamy Hypothesis**

The members of the nomad clan, as in every human society, reinforce their affiliations and identities through marital relinking. Here we look at how the clan itself persists through the reproduction of offspring of such
marriages. Relinking usually entails both spouses coming from the same group. It tends to guarantee that, for these marriages, the spouse will be already suited to nomadic life and possess the requisite skills and knowledge. While the clan is clearly demarcated by relinking, however, the nomad clan is far from closed to marriages from the outside. Indeed, there are numerous women who come from the outside, sometimes from other nomadic tribes, and there are outside men who are absorbed as well. Apart from the two initial Karahacılı founders (#2 and #4), there are four distinct founders in generations 1-3 who appear as dispersed ancestors and contribute descent lines from the outside. The clan itself is maintained or replenished through these marriage alliances. Outside alliances are often reinforced by marital relinking, that is, two or more marriages cement the linkage of these outside ancestral lines into the clan.

When a set of couples relinks through marriage they can be said to form a marriage circle. A set of couples constitutes a marriage circle if one can trace, upward or downward through the generations, a circle of parental ties that connect them. FBD marriage, for example, constitutes a marriage circle among four couples: an ancestral couple and two sons with their wives whose respective son and daughter marry. Sister exchange also constitutes a marriage circle consisting of four couples: two ancestral couples each with a son and daughter, where the two sets of siblings intermarry. Other marriage circles might have three or more ancestral couples. The minimum number of bilateral kinship groups that are relinked through marriage is said to be the order of the marriage circle. Some relinkings, like FBD, are consanguineal marriages, while others, like sister exchange, are marriage exchanges between kin groups, or circles of various orders of affinal relationships. FBD marriage, like all consanguineal marriages, is of order 1, sister exchange (like all exchanges between two families) is of order two, ZHZHZ marriage is of order three, and so forth. Figure 6.4 shows examples of p-graphs for relinkings of three different orders: consanguineal marriages (a and b: order 1), relinkings between two families (c and d: order 2), and relinkings among three families (e: order 3).

Structural endogamy, as noted above, results from the fact that relinked marriages form maximal cohesive subsets in which everyone is multiply connected through genealogical relationships. Each maximal subset of marriages resulting from structural endogamy defines a delimited or bounded social group.
Clan Structures and Dynamics

Figure 6.4: P-graphs of Selected Types of 1- to 3- Family Relinking

(a) FBD Marriage  (b) MBD Marriage  (c) Two brothers marry  (d) Sister Exchange  (e) MBWZHZ Marriage

The order of each graph is the number of independent ancestors doubly connected through the relinking marriage(s). Nodes in the p-graphs are couples, solid lines represent males connecting parents above to their wives below, and dotted lines represent females connecting parents above to their husbands below.

In a FBD marriage, such as in the figure (6.5), the wife is also a FBD, wife’s father a FB, and wife’s father’s brother a father’s father. In sister exchange, a wife is also a ZHZ, and a wife’s brother also a ZH.

In any population for which we have genealogical data, one of the first structural questions we want to ask is: how many structurally endogamous groups are there, and how are these cohesive subsets of marriages distributed in the population? Of the 414 nomad marriages, 241 (60%) relink with other marriages, and there is only one large structurally endogamous group composed of all these relinked marriages. Consistent with hypotheses 4.2.1 to 4.2.6:

**Hypothesis 6.1**: Relinking marriages knit together the entire nomad clan as a cohesive alliance network.

**Hypothesis 6.1.1**: Marriages that do not relink are the couples that leave the group to settle into village life; or, alternately:

**Hypothesis 6.1.2**: Marriages that do not relink are those of affines or ancestors originating outside the clan.

These hypotheses involve our first use of a classification of marriages
that relink and those that do not. Here it is merely the existence of relinking that is important, not the type of relinking. We are interested here in the idea that social cohesion occurs through relinking marriages, and the relinking need not be through consanguineal marriages.

What, then, is relinking if not marriage between blood relatives? In the general case of relinking marriage, couples previously linked become doubly linked through marriage, along with the set of other couples through whom they are previously linked. Every such relinking marriage is embedded within a unique largest set of doubly linked couples. We compute relinking through the Pajek option Net> Partition> Components> Bicomponents. Recall that a bicomponent, or two-connected component of a graph or social network, is a maximal set of nodes (the largest possible such set) in which every node is connected to every other node in the set by two or more independent pathways. Hence, in a p-graph it is the largest effective unit of relinking or structural endogamy.

**Bicomponents of Kinship Graphs**

Relinking defines cohesive blocks of couples that in the p-graph representation have the graph theoretic property of two-connectedness: they have at least two independent kinship connections to everyone in their cohesive block. To generalize the concept of biconnectivity, in which the largest set of biconnected nodes in a graph is a bicomponent, the multi-connectedness of a graph is defined by a general parameter k for the minimum number of independent pathways between every pair of nodes and k may take values beyond two. Because p-graphs are based on representing a succession of generations by graphs with edges oriented from children to parents they will always include recently married couples connected only to their parents (i.e., with only two edges) or to unmarried children who do not relink, so that there can never be a p-graph that is more than biconnected. Hence, the cohesion of kinship networks will occur within bicomponents and not in multi-connected components of higher order.
Giant Bicomponent

A graph with one or more bicomponents has a giant bicomponent if one of the bicomponents is many times larger than any other or if there is a unique bicomponent that includes a substantial proportion of the nodes in the graph. In a cohesive kinship community there is typically only one bicomponent, a giant bicomponent to which the great majority of all the people in the network are connected.

The Pajek program (Batagelj and Mrvar 1998) can be used to study relinking patterns in networks of any size (up to one million nodes),\textsuperscript{10} using the option Net> Components> Bicomponents. (As noted, Pajek reads kinship data in GEDCOM format and automatically represents the genealogical relationships in p-graph representation.\textsuperscript{11}) The Pajek Bicomponents option computes all of the bicomponents of the p-graph genealogical networks. If there is one giant bicomponent—with a greater number of couples than any other—this can be extracted as a cluster of nodes. In theory, however, pairs of bicomponents may have up to one node in common.

Figure 6.5 shows the result of extracting large bicomponents in the last few generations of the clan genealogies. Here there is no giant bicomponent, only two large bicomponents sharing a central node in common (enclosed in overlapping rectangles of the figure). The other nodes in each of the two bicomponent are shown as darker and lighter nodes, respectively. In each of the two bicomponents, every pair of marriages is connected by multiple paths. All paths between the two bicomponents can pass through only the (enlarged) central node, and there are no multiple paths between them so they do not form a common bicomponent. In sociological terms, two socially cohesive kinship groups are depicted. The index of relinking for this graph is 84\%, a very high level of structural endogamy, Still, there is a cleavage in the network in terms of social cohesion. The leader of the clan in the latest time period is Mustafa or “Dede” (597, circled), is not the central node in the graph but only a member of the leftmost bicomponent. Using the lineage numbers used to describe the Lineage Founders, the row of numbers at the top of the graph are the lineages of the corresponding couples (and their descendants in the male line), so we can see that “Dede” (lineage #4) here is cohesively allied with lineages #1, #5, #6, and #9 but not with those in lineages #2 (except for the central node), #3, #7, and a villager (V). Members of lineages #2 and #4, however, span the two bicomponents. The pairs of numbers just above each node correspond to the ID numbers of each husband and wife.
Distance

The p-graph or parental *distance* between couples is the length of shortest parental-link pathway that connects them in the p-graph. The *kinship distance* between couples on a p-graph is the length of shortest pathway of parental that connects them, plus one for every time the path has to pass from one member of a couple to another. The sibling distance between couples on a p-graph is the length of shortest pathway of parental or sibling links that connects them. The reduced distance between couples on a p-graph is the length of shortest pathway of parental or sibling links that connects them, plus one for every time the path has to pass from one member of a couple to another. Parental and sibling distance assumes unity of the couple in reckoning. Some of these measures correspond to various culturally defined systems of kinship reckoning.

“Dede” is connected to everyone in his bicomponent at a distance of 7 or less, including the red node but the distances to the yellow nodes in the other bicomponent is 8 or more. If we examine lineage memberships (senior node labels 1-5-6-4-9-2-4-2-7-2-3 in Figure 6.5, along with V for villager) that depend on genealogical connections in earlier generations,
both “Dede” and his cousin (521: distance 4) in the opposite bicomponent are in lineage 4. This reduces the sibling distances between opposing bicomponents.

An egocentric view of the bicomponents in Figure 6.5 is shown in Figure 6.6, this time from the perspective of distances to the leader “Dede.” Here the labels are sequential numbers (1-44) for nodes rather than ID numbers of husband and wife (e.g., 597 and 364 for “Dede” and his wife), and sibling links have been added. Larger sizes of nodes reflect longer sibling distances to “Dede,” which are between 1-4 in his bicomponent and between 4-7 in the opposing bicomponent. The Pajek options to color and scale the size of nodes according to the vector of distances from “Dede” (the smallest node) are Net> k-Neighbors> All> [number or vertex label] (=node 23 for “Dede”), Partition> Make vector and Draw> Draw-Partition-Vector. “Dede’s” support base for leadership is through both personal ties and lineage mates. Hence, the distances from “Dede” to nodes in the opposing bicomponent are mediated by the fact that he and the husband in node 26 are cousins belonging to lineage #4 (reducing their distance from 5 to 4).

Figure 6.6: Egocentric Distances from the Clan Leader (597 “Dede,” node 23) in the Bicomponents of the Most Recent Generation

Pajek can also make partitions such as distinct colorings of nodes that are relinked in a giant bicomponent (or a pair of large components, as in
Figure 6.5), and those that are not. White, Batagelj, and Mrvar (1999) give further instructions for using Pajek for the analysis of relinking. For the analysis of social cohesion, we are interested in extracting the giant bicomponent of a social network as the largest unit of structural endogamy. Such partitions define the variables (depending on the time period) that we use to test hypotheses such as 6.1, 6.1.1, or 6.1.2. For example, “the relinking marriages knit together the entire nomad clan as a cohesive alliance network” (Hypothesis 6.1) is tested by extracting the giant bicomponent (if one exists) for the entire nomad clan genealogy, calculating the proportion of persons in the bicomponent (26%), its index of relinking (a measure of its social cohesion over the maximum possible for a given number of ancestors, nodes, and connecting links), which is 74%, and the proportion of clan members connected to it even by a single path (99.3%). The latter figure (99.3%) confirms that the clan is almost totally connected by kinship links and the index of relinking of 74% in the giant bicomponent indicates a high level of cohesion within the clan. Those who are not in the bicomponent are connected to those in the bicomponent by a single path. They may be unmarried children or married persons whose spouses come from outside the clan or bicomponent. Other aspects of Hypothesis 6.3 may account for the difference between those married persons who do or do not belong to the bicomponent.

The different aspects of Hypothesis 6.1, 6.4.1, and 6.4.2 are tested in Table 6.4 for those marriages in which we know the premarital and postmarital residence of each of the spouses. Each marriage is classified as to whether or not it is part of the giant bicomponent of relinked marriages, and then by clan or various types of nonclan membership of the couple. Cells in which the relinked versus non-relinked marriages are predicted are shown in bold, and are segregated by the four larger cells in the table. The correlation (Pearson’s coefficient) between couples in relinked marriages and residence with the clan is .95.

What is striking about the results, supporting the hypothesis that the relinking marriages knit together the entire nomad clan as an alliance network, is that of those couples for whom both are resident members of the clan, 100% are relinked marriages, that is, members of the bicomponent. There is also a very high rate of relinking with the Hayta, Honamli, and Sarıkçeşili nomad tribes. Our hypothesis is strongly supported in another way: Not only do relinking marriages knit together the entire nomad clan (and, we may add: those who marry into neighboring nomad
tribes with whom there is reciprocal exchange) as an alliance network but the marriages (of clan members or others) that do not relink are the couples who leave the group to settle into village life (36 cases, of which 23 fit the hypothesis) or another tribe (8 cases, all fitting the hypothesis), who marry villagers (35 cases, of whom 24 fit the hypothesis) or distant clans or tribes (5 plus 9 cases, of whom 12 fit the hypothesis) or those of affines or ancestors originating outside the clan (4 cases, 3 fitting the hypothesis).

Table 6.4: Test of Hypothesis 6.1—Relinking and Cohesion

<table>
<thead>
<tr>
<th></th>
<th>Relinked Marriages</th>
<th>Non-Relinking Marriages</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>villagers who became clan members</td>
<td>2**</td>
<td>1**</td>
<td>3</td>
</tr>
<tr>
<td>clan member and:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>clan wife</td>
<td>148</td>
<td>0</td>
<td>148</td>
</tr>
<tr>
<td>Hayta*, Honamlı*, Sarıkeçili wife</td>
<td>12</td>
<td>14</td>
<td>26</td>
</tr>
<tr>
<td>left for village life</td>
<td>13</td>
<td>23</td>
<td>36</td>
</tr>
<tr>
<td>village wife (34) or husband (1)</td>
<td>11</td>
<td>24</td>
<td>35</td>
</tr>
<tr>
<td>Çırmılı*, Tırtar wife</td>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Horzum*, Karakolunlu*, Tekeli* wife</td>
<td>0</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>left for another tribe</td>
<td>0</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>villagers not joined to clan</td>
<td>1</td>
<td>3**</td>
<td>4</td>
</tr>
<tr>
<td>Totals</td>
<td>189</td>
<td>85</td>
<td>274</td>
</tr>
</tbody>
</table>

* tribes **non-clan by origin

Only 7% (13 of 174) of the couples in relinked marriages in the clan eventually depart and take up village life. An interesting side-note on this table is that when all the place-names for origins of those married from outside the clan are tallied, they trace out the migration routes of the clan.

Analysis 3: Structural Endogamy with Outside Tribes

Cohesion in social groups is hierarchically nested: groups with more cohesion are nested within those with less. Structural endogamy in genealogical networks is a special type of cohesion. Genealogical networks are like many others in that people worldwide are related in a single net-
work. Where you draw boundaries and how you sample, however, makes a difference. Cohesion through kinship—structural endogamy among those with common ancestries—is often spatially organized. Denser relinkings are found in smaller groups, like the lineage, and becomes successively less dense as we move to larger groups: the clan, other Aydınlı clans, and relations among nomadic tribes, for example.

In the 50 cases in which daughters were given to other tribes, the factors that made a relationship desirable were neighborhoods in winter or summer pastures and/or economic negotiations. This happened, for instance, with the Honamlı, with whom 12 matches were arranged—two early ones in the second half of the nineteenth century and not less than 6 during the joint efforts to get a summer pasture of their own in the 1920s and 1930s, followed by 4 relinkings in the next generation. With the traditional tribes Sarıkeçili and Horzum there were also a few intertribal marriages in the nineteenth century. However, an increasing number of these were arranged between 1920 and 1960 when nomadism was still going strong but was already suffering from pasture shortage due to the accelerating growth of the Turkish population that led young farmers to occupy the remaining free lots. The nomad’s extended families were scattered then, especially in winter pastures, and they had to establish unions of interest with neighboring families of different tribes. In this period five marriages also took place with Kurds.

As mentioned earlier (Chapter 1, p. 10), the tribes (aşiret) are historical alliances of nomads with well-known names. But tribes in the sense of Kressler’s (1996:129) definition of having common ancestors, common leaders, and a unifying social organization have not existed in Anatolia for a century. Although nearly all nomad tribes were without importance in the twentieth century, every nomad knows the tribal name of the group. The narrative about Karahacı members taking Honamlı identities for purposes of land claims, using tribal names of well-known groups that had not made claims before, was only a reaction to the demands of the administration.

The tribes and their identities as found in the genealogies are mostly those of the Taurus region; some are better known and others less so. We group them into three categories: those of the clan, those whose marriages with the clan formed marriage circles or relinkings, and those whom clan members married without relinking.

Those belonging to the clan include:
1. Karahacı, a dispersed tribe, originally from Aydınlı, who migrated
over many generations through Antalya and whose members have coalesced in the present case to form the core of the nomad clan.

2. Zembirciler, given as a tribal identity of the clan founder of the Dolaşıklı “Rovers” lineage (#1), was not corroborated as a tribal name. Given an anomalous history of leaving Kurşun village long before the others because of their conflicts with the local rulers of Antalya, and that other lineages of Kurşun had a Karahaciği identity, the same tribal origin cannot be rejected for the Dolaşıklı.

Those that formed relinking marriages with the clan include:

A. Honamlı (a local non-Aydınlı tribal name known to the Turkish administration, which gave out cadastre or land register documents). Eight Honamlı men and six women figure in the genealogies, as spouses and their parents in generations d-e-f for the women, and f-g for the men. Ecevitli A-B lineage (#2) took two wives in generations d and f and gave three from generations f and g, and later gave three wives, one from generation f and two from generation g. Kırbaşi lineage (#4) took three wives, two born from generation e (i.e., marriages after 1905) and one from generation f. Koca bey lineage (#5) also took a woman from generation e. We have seen how this identity was “borrowed” by the Karahaciği when it was useful for land claims. It is not quite clear why the Karahaciği clan hid their identity under this name. It may be that other Karahaciği clans had already made claims to indicate willingness to settle.

B. Sarkeçili (=Those with Yellow Goats, mentioned in the first half of the nineteenth century near Aydın; Süm er 1980:632)—8 women from generations e, f, and g.

C. Çirkli (Johansen heard this name from many informants but there is no written evidence. It is the name of a clan or lineage that stayed in the West near Antalya or moved only half distance to the east from Aydın)—three men and two women, 3 from generation e, 2 from d. The Karahaciği founders and early descendants of lineage #5, prominent in the early generations, intermarried with the Çirkli, as did the Rovers (#1) as they rose in status in later generations.

D. Hayta (=Rebels; the name occurs already at the beginning of the nineteenth century in Western Anatolia; De Planhol 1970:22)—4 men and 5 women, 1 from generation e, 5 from f and 2 from g. The Hayta Kelebekli (=Butterflies) were a clan of the Hayta tribe who intermarried heavily with our nomads. Clan members named the Tırtar as another clan of the Hayta. Today Tırtar has become the name of a
village in the Çukurova—1 woman from generation e and 2 women from generation f.

E. Afşar (a very large and famous tribe that occupied wide parts of inner Anatolia. They were at war with the central government of Turkey in the nineteenth century. After their defeat in 1865 they became sedentary—no nomadic Afşars are left (Eberhard 1953a:41) and the nomadic newcomers from the West could obtain their pasture grounds. But in many villages there were those who kept the consciousness of belonging to the Afşar-tribe)—1 woman from generation e.

Those marrying with the clan but not through relinking marriages (not including one man, generation g, from an “unknown” tribe:

F. Horzum (mentioned near Aydın and West from Antalya since the sixteenth century; Sümer 1980:181,318,357,629f.) — 5 men, 4 generation f, one from g, and 3 women from generations d, e, and f.

G. Tekeli (=People from Teke, the old name of Antalya, and first documented as a tribal name in the seventeenth century; Sümer 1980:181) — 4 women, from generations e, f, and g.

H. Karakoyunlu (=People with Black Sheep, known already since the thirteenth century; Sümer 1967a) — 2 women, from generation g (one also listed as Tekeli).

I. Keşifli (a far-off tribe)—1 female of generation e.

Most members of the clan identify themselves as Karahacı in tribal identity, although we have also seen that claims of tribal membership can sometimes shift for purposes of land claims (e.g., the claims of Honamlı identity in the 1920s and 1930s, reinforced by subsequent alliances through intermarriage with Honamlı). Unlike the situations of shifting identities described by Barth (1960), however, clan members were well aware of a true identity as Karahacı.

**Hypothesis 6.2**: The clan is not the largest unit of structural endogamy: structural endogamy extends to the level of maritally allied nomadic tribes as well. Probable correlates of the ambiguous meaning of kabile—for clan, lineage and sometimes tribe or larger unit—are the units of structural endogamy that occur at maximal levels of social cohesion.
Our study of relinking shows that the clan is not the largest unit of structural endogamy. Wife-takers usually have higher status than wife-givers. Table 6.5 shows in more detail the marriages between lineages #1-#10 and tribes A-F (those with relinking marriages) and G-H (those without), with the various residential outcomes (with clan, in town, with the other tribe). Three of the five larger lineages 1, 3, and 5, plus the wealthy sheep-keeping lineage #6 are only involved with one exception in high-prestige taking of wives, and never in giving of wives to other tribes. Only lineages #2 and #4 that attained clan leadership in the twentieth century (changing from #4 to #2 in the early 1900s) through marriage exchanges, are involved in both taking and giving wives (reciprocal marriages) with other tribes in the category A-F (those with relinking marriages). Lineage #2 has fifteen reciprocal marriages (four nonreciprocal) and lineage #4 has four (two nonreciprocal).

Where women from other tribes come to live with the clan through marriage into the leading lineages with which their lineage has reciprocal exchange, most of their marriages (5 out of 7) relink. Most lineages, or tribes (except [B]), are often involved in relinking marriages (six out of twelve) but only for unreciprocated taking of wives.
## Table 6.5: Intertribal Marriages

<table>
<thead>
<tr>
<th>Clans</th>
<th>Tribe</th>
<th>Lineages giving wives-low status</th>
<th>Lineages taking wives-high status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>#1 #2 #3 #4 #5 #6 #7 #8 #9 #10</td>
<td>#1 #2 #3 #4 #5 #6 #7 #8 #9 #10</td>
</tr>
<tr>
<td></td>
<td>[A]</td>
<td>0 2 0 3 0 0 0 0 0 0 0</td>
<td>0 2 1 3 1 1 0 0 0 0</td>
</tr>
<tr>
<td></td>
<td>[B]</td>
<td>0 0 0 0 0 0 0 0 0 0 0</td>
<td>0 2 0 0 0 1 0 0 0 0</td>
</tr>
<tr>
<td></td>
<td>[C]</td>
<td>0 0 0 1 1 0 0 0 0 0 0</td>
<td>0 4 0 0 2 0 0 0 1 0</td>
</tr>
<tr>
<td></td>
<td>[D]</td>
<td>0 3 0 0 0 0 0 0 0 1 0</td>
<td>0 1 0 1 0 0 0 0 0 0</td>
</tr>
<tr>
<td></td>
<td>[E]</td>
<td>0 2 0 1 0 1 0 0 0 0 0</td>
<td>0 2 1 0 0 0 0 0 0 0</td>
</tr>
<tr>
<td></td>
<td>[F]</td>
<td>0 0 0 1 0 0 0 0 0 0 0</td>
<td>1 0 0 1 0 0 0 0 0 0</td>
</tr>
<tr>
<td></td>
<td>[G]</td>
<td>0 3 1 2 0 0 0 0 0 0 0</td>
<td>1 0 0 1 0 0 0 0 0 0 1</td>
</tr>
<tr>
<td></td>
<td>[H]</td>
<td>1 2 0 0 0 0 1 0 0 0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>[I]</td>
<td>0 0 0 0 0 0 1 0 0 0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kurds</td>
<td>2 1 0 0 0 0 0 0 0 0 0</td>
<td>0 3 0 0 0 0 0 0 0 0</td>
</tr>
<tr>
<td>Reciprocated</td>
<td>0 8 0 6 1 0 0 0 0 0</td>
<td>0 8 0 4 2 0 0 0 0 0</td>
<td></td>
</tr>
<tr>
<td>Nonreciprocated</td>
<td>2 3 1 1 0 1 1 0 1 0</td>
<td>3 8 2 1 2 2 1 0 1 1</td>
<td></td>
</tr>
</tbody>
</table>

Numbers in bold are reciprocal as between givers/takers.

The Sarıkçecli tribe [B] are an exception to the overall pattern, in that lineage #5 took three wives from them, one in the generation born after 1870 and one of only a few years ago (g-generation) that was an elopement without the consent of the father of the groom. The giving of the young woman of g-generation was the reason for years of quarrel even in the 1980s, when most of the clan members had settled down. Lineage #2 also avoids reciprocity with them. They were said to be brave but not always honest and less bound to Islam than other tribes. Their men and women even danced together in 1957 and they did not fast during Ramadan. Thus the distinguished families of the clan looked down on the Sarıkçecli. Sarıkçecli women marry into the clan but the exchange is not reciprocal, and their marriages do not re-link. The originally lower ranking lineage #2, however, did take wives from them.
A Single Tribal Origin

No men from clearly distinct tribes other than Karahacılı have married into and resided with the clan, although the leading lineages (2, 4, and 5) in the twentieth and twenty-first centuries are involved in a larger unit of structural endogamy with reciprocal and relinking marriages with other tribes. The clan is dominated by a central tribal identity, Karahacılı. The diagrammatic listing shown in Figure 6.7, of tribal and lineage designations in the order in which the clan assembles in the eastern pasturelands, is meant to emphasize the central tribal identity of the clan components but also that the various lineages are integrated through marriage. Migrating from a common homeland the lineages seem to arrive separately but their integration occurs by marriage, although not on a one by one basis. Rather, they are amalgamated into a single cohesive group by the relinking marriages of the Ecevitli A-B children following the fairly late arrival of the large extended family of Ecevitli A (two brothers and a score of children). They were preceded a generation earlier in the eastward migration, however, by Ecevitli lineage B.

Figure 6.7: Clan Structure in Terms of Temporal Amalgamation of Tribal Identities and Lineage Assimilation

- Dolaşkı Rovers #1 (probably Karahacılı)
- Ecevitli C #3 (Karahacılı)
- Greyhead #4 (Karahacılı)
- Koca bey #5 (Karahacılı)
- Ecevitli A-B #2 (Karahacılı)
- Koca bey #5 (Karahacılı)
- Dazkırılı #6 (Karahacılı)
- Ahrazlar #7 (Karahacılı ?)
- Cross the Kilikian Gate separately after 1850 but do not intermarry until after the crossing
- #8 Shepherd to #5 >1850
- #9 Shepherd to #1 >1870
- #10 Shepherd to #1 >1920
Intratribal marriages between local groups would seem to be central to establishing the stability of nomadic life. Intertribal marriages, on the other hand, involving males retaining their patrilocal residence and women moving to other groups, entails strategic alliances not just for replenishing membership of a local group but also for gaining access to pastures and resources, settling disputes between neighboring tribes, and redistributing population.

The clan is a group with a we-feeling, an identity. The core of the clan ancestors seems to have formed through intermarriage in the two formative generations, after which no new lineages were integrated, possibly because the group attained sufficient size for a viable nomadic unit, and beyond that size there has been little room for new lineages. Further, there is population regulation through a sliding of membership of lineages within the nomad clan in which new members are absorbed in earlier generations by alliances (marriage ties within the same tribe) and in later generations by adoption of shepherds. By a process of lineage segmentation, members vanish by becoming sedentary (see lineage #5: Koca beyoğlu).

While there is a significant amount of relinking between the Karahacı and the neighboring Honamlı, Hayta, Sarikecili, Tırtar, and Cırıkli tribes, through repeated intermarriages, there is no apparent absorption of entire lineages from other tribes. The possibility exists that underlying the dense intermarriage among clan founders there may have been a common agnatic ancestry. Whether this disguises some absorption of lineages from other tribes is an open question.

**Analysis 4: Clan Roots—Singularity and Multiplicity**

With high rates of endogamy and relinking, where the descendants of founding ancestors remarry, we should expect over time that each such ancestor will have an increasing proportion of the whole group who will be descendants and common consanguinity will increase. The sense of common ancestry, and how this works out in fact, is clearly of importance in group cohesion. In a relatively small group with a high degree of structural endogamy this source of cohesion will be of major importance. In fact, with random marriage in a steady-state population of 20,000 people, in fifteen generations, about 80% of the founders appear in the genealogical tree of every individual (Derrida et al. 1999:1990). The
20% that do not appear are those who have left no descendants so that most pairs of adults have nearly all their root ancestors in common: Such is the power of randomness! Common single ancestors appear much earlier for pairs of descendants. The distribution of the number of common ancestors up to nine generations back for pairs of people follows an exponential distribution that is skewed as expected from randomness toward fewer and fewer common ancestors for more and more people. That is what we expect for a society with five to nine known generations such as the nomads.

**Hypothesis 6.3**: In a small closely knit society—specifically, with a high degree of endogamy through relinking and high rates of consanguineal-kin marriages—there will tend to emerge over six to eight generations both the actuality and the perception that most members of the society are descended from a common ancestor or ancestral root.

Nomad elders, consistent with this hypothesis, assert that clan members of the seven major lineages have a common root. But are we to understand by the statement of “common root” that a single dominant common ancestor has emerged? Or is it that there are multiple common or root ancestors whose offspring have intermingled? Or is the idea of a common root merely that of a common history, place of origin, or descent from members of a common tribe?

How many times are the same common ancestors involved over and over again in intraclan blood marriages? To answer this question, statistics were computed in the relinking analysis as to the number of relinking marriages with a single common ancestor (hence: multiple cousin marriages, for example, from the same ancestor). These statistics motivated a search for the ancestors whose descendants relink most often. In a pre-2003 analysis (see Figure 2.6), the ancestral couple whose descendants most often intermarried was also the couple with the maximum number of descendants: Koca Mustan (716), of lineage #2 (Ecevitli A), and his wife (1151), of lineage #3 (Ecevitli C). The grandchildren of Mustan and his brother had many cousin marriages and their great-grandchild and great-great grandchildren many more distant cousin marriages. The nodes that are circled in Figure 6.8 are the result of our 2003 reanalysis (Figure 2.6) and show the sons who were wrongly identified by some informants as sons of Mustan, whereas in fact they were sons of his brother, Haci Ketir Mehmet. While Figure 6.8 thus confuses some offspring of Mustan and his brother, it is intended to show their many relinked descendants not only in the grandchild generation but also in later
generations where relatives are relinked also through blood marriages.
Figure 6.8 was drawn using vintage Pgraph software. Figure 6.9 is drawn using newer Pajek software (but still the pre-2003 data), with the p-graph representation it adopted as a default for showing kinship networks. It requires some explanation of the method of automatic drawing used to construct the figure because it is three-dimensional (and can be rotated on a computer screen).

Figure 6.9: The Apical Ancestor of the 90% of Those Down to Contemporary Nomad Clan Members, drawn with Pajek

Minimum Energy Drawings

Minimum energy drawing or “spring embedding” is an automated technique for graph drawing produced by Pajek options Draw> Draw Partition and Energy> Fruchterman-Reingold> 2D or 3D. It keeps closely connected nodes together and distantly connected nodes apart. It is useful and appropriate for displaying tendencies toward cohesion in networks.

Koca Mustan is one of the five Karahacılı founders, descendant of both Ecevitli branches (A-B and C, #2 and #3). He is the man we desig-
nated from the pre-2003 data as the closest approximation to a “common root” for the clan. From the 2003 data we can push this “common root” back to the ancestor that Ecevitli A-B and C have in common. It is through the intermarriages of his and his brother’s descendants (and his cousins in branch B) that the core of conical structure of the clan is constructed. Of the cousin relinkings in pre-2003 data, 63% are among the grandchildren of a common ancestor, as in Figure 6.9. Independent of such consanguineal relinking, the percentages of different types of cousin relinking rarely rise above 4% for any generation and have a maximum of 8%.

Analysis 5: Relinking as an Attractor for Further Marriage and Migration Affecting Size of Groups

An attractor is a conceptual fixed point around which move the possible trajectories of different states in a dynamical system. Different types of attractors and patterns involving attractors are used to describe some of the differences among dynamical systems governed by deterministic equations. Social relations are not governed by deterministic equations (although approximate models of them might be so) but the idea of an attractor is a useful analogy because it does not describe a body or material that has a force of attraction. Rather, it is a property of the structure of a dynamical system. In social lives similar orbits repeat, much like typical days might resemble one another but variations in their structure have to do with the changing availability of paths that are themselves affected by the interactions of other social lives. A cohesive set of elements, or a cohesive social group, offers to its members a variety of different paths between every pair of nodes. They need not have a single individual or nodes as a center of attraction, yet they act like the attractors that we see in a deterministic system: activities tend to revolve around them but these orbits themselves may change from one attractor to another.

From the family histories and their intermarriages we can piece together the movements of the clan from region to region in their search for a freer life and better pastures, each of the lineages that make up clan moving from winter villages around Kürşunlu to the mountainous areas still west of the Kilikian Gate, and at last to the Antitaurus. Lineage #1 was first to leave to the winter area around Kürşun about 1850 but others followed after the battles of 1865 between the government and the Aşar
Clan Structures and Dynamics

tribe, and then went farther east past the Kilikian Gate into the Çukurova. In 1893 Mustan and his brothers moved their entire families to the mountains east of the Kilikian Gate, and the relinking marriages they arranged for their children (#2 with #1, #3, #4, #5, and #7) came to operate as the attractor that kept members of the clan together in their current pasturage areas.

Hypothesis 6.3, then, is supported. It helps to resolve the apparent contradiction between informant statements of having the same ancestral root and the historical documentation of separate patrilineal ancestors for distinct lineages. The Aydınlı patriarchs certainly had no intention of asserting they come from the same patriline. Were they asserting more than a common historical background from the same tribe (Karahacı) and from a common winter village or region of origin (near Kurşunlu north of Aydı)? Because cognatic descent is acknowledged, that is, uterine as well as agnatic ties, and they share a common historical root in the relinking marriages of Mustan’s and his brother’s children that knit together the clan even while they lived west of the Kilikian Gate, it is not only possible but likely that they are asserting something more than mere territorial commonality, given the importance of kinship links to the constitution of the clan.

If we think about how the lineages are integrated, the predominance of common ancestry from Koca Mustan’s lineage #2 has as a corollary that members of his lineage will have the most consanguines in other lineages. This may have further consequences, such as the following:

**Hypothesis 6.4**: The position of a lineage such as #2 that has more blood kin in other lineages due to a dominant common ancestor ought to be an attractor to continued residence in the clan and an attractor to further consanguineal marriages with lineage #2.

If lineage #2 is more attractive as a marriage ally because of its descent from Mustan and his brother, then it ought to (1) grow relative to other lineages, and (2) have less emigration. Figure 6.10 shows the numbers of males and females in each generation. Lineage #1, #2, #4 and #5 are the major players in terms of numbers, and signers of the 1933 land agreement.
Figure 6.10: Percent Membership of Men (upper chart) and Women (lower chart) in Lineages 1-10 over 8 Generations, Showing also Turntaking in Clan Leadership

Key: Circles show clan leadership by lineage on both charts (dated, with IDs of leaders). The diamond shows a rival aspirant to lineage #2 in the 1960s. No women were remembered for lineage 5 in generation 3.

Data on male emigration shows a marked exodus of men from lineages #1, 3, 4, and especially 5 and 7, as opposed to #2 (6 and 10) in generation 6 (p=.05; an evaluation of comparable data on females shows no
significant emigration tendencies by lineage.). This was the generation at which the leader from #1 settled in town, and lineage #2 gains the leadership position in the clan. A total of eight men and six women from lineage #1 settled in villages at about this time.

These findings begin elucidate the complex relationships among lineage size, wealth, leadership, and emigration. Size is an advantage within the clan in terms of potential leadership but for some the wealth that is partly associated with leadership also induces emigration and decisions in favor of the comforts of settlement in town. As concerns lineages, marriages do not follow regular rules but rather operate as strategies. Lineage #2, for example, is exogamous in the early generation (4) where relinking integrates the clan but endogamous in the later generation (6) where their size and degree of integration with other lineages helps to consolidate their lineage leader’s claims to clan leadership. There are also micro-patterns in the marriage alliances: while men of lineage #5 emigrate along with those of #1 in generation 6 when #2 comes into leadership, #5 is not a rival of #2 but they have been intermarrying since generation 4, and this intensifies in generations 6 and 7, as if, while half their number are settling in villages, the other half are amalgamating through marriage with the newly politically dominant lineage, #2.

Analysis 6: Dispersal of Marriages in Clan Integration and Exponential Ancestral Distribution

The dispersal of marriages in a population has unexpected effects on how common ancestry is distributed. Even a randomly mating population, if endogamous, will produce an uneven distribution of the sizes of groups that have common ancestors. We will use the Aydınlı data to illustrate.

Among the relinking marriages in Figures 2.2 to 2.5, there is also little evidence for preferential marriages between specific lineages, and there is only a slight tendency toward higher endogamy for the larger lineages. Overall, alliances are fairly randomly distributed between lineages. The rate of relinking within lineages #1-#8, as shown in Table 6.6, roughly decreases with size, which is what is also predicted from a random distribution.
Table 6.6: Relinking and Relinking within Lineages (Consanguineal Marriage) as a Function of Lineage Size

<table>
<thead>
<tr>
<th>Lineage Number</th>
<th>Number of Relinking Marriages</th>
<th>Number with Unknown Spouse</th>
<th>Relinking within Lineage</th>
<th>Expected Percent</th>
<th>Marginals*</th>
</tr>
</thead>
<tbody>
<tr>
<td>#2</td>
<td>81</td>
<td>16</td>
<td>24</td>
<td>30%</td>
<td>35%</td>
</tr>
<tr>
<td>#1</td>
<td>37</td>
<td>5</td>
<td>9</td>
<td>24%</td>
<td>19%</td>
</tr>
<tr>
<td>#5</td>
<td>38</td>
<td>10</td>
<td>4</td>
<td>10%</td>
<td>19%</td>
</tr>
<tr>
<td>#4</td>
<td>14</td>
<td>4</td>
<td>4</td>
<td>29%</td>
<td>9%</td>
</tr>
<tr>
<td>#3</td>
<td>14</td>
<td>4</td>
<td>1</td>
<td>7%</td>
<td>5%</td>
</tr>
<tr>
<td>#7</td>
<td>14</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>6%</td>
</tr>
<tr>
<td>#6</td>
<td>6</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2%</td>
</tr>
<tr>
<td>#8</td>
<td>5</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1%</td>
</tr>
<tr>
<td>Total</td>
<td>209</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Expected values for within-lineage relinking are computed by squaring the number in the first column (the marginals) and dividing by the column total.

Other than differences by size, and differences for the assimilation of new allies, the implications of the general absence of marriage preferences between lineages is clear: lineages are endogamous by virtue of their membership in the larger unit, the clan, and perhaps not as separate phenomena of interlineage marriage preferences. The nearly random distribution of marriages across lineages with exceptions noted serves as a continuing basis for the integration of the lineage and other segments of the clan, both externally and internally, through intermarriage. Intermarriage is the glue that holds the clan together, just as within its lineage subunits. Nevertheless the lineage has an agnatic charter. The ideal model for the clan is a set of lineages that have segmented from a common patriline. At both levels endogamy is conflated with descent. The clan itself is the unit of structural endogamy, not the lineage. Thus computer analysis has proved our initial theories, developed from intuitive fieldwork impressions, to be correct.

**Hypothesis 6.5:** Our theory of clan integration through relinking, if correct, would predict a high dispersion of marriages between different lineages. We would further expect claims for clan leadership to be more concentrated in the larger lineages and consequently predict (1) a tendency for larger lineages to reinforce their
claims to leadership by somewhat higher proportions of intra-lineage endogamy, and (2) a tendency for smaller lineages to concentrate their marriage alliances with the larger lineages, proportionally more than the size of the larger lineage would predict.

Table 6.7 bears out these expectations. Here the frequencies of marriages between lineages are shown, with the rate marked in bold if higher than predicted from the lineage sizes alone and in italics if lower. The inter-lineage marriage data show a slight tendency for disproportionately higher lineage endogamy in all of the larger lineages but not in two of the three smaller lineages, in which the men married into the leading lineage #2 or lineages linked to #1. Endogamy declines with marginality, with the exception of the sheep-herding lineage #6.

### Table 6.7: Lineage Intermarriages and Leadership Roles

<table>
<thead>
<tr>
<th>Hu’s Lin.</th>
<th>Wi’s Lineage</th>
<th>Endogamy</th>
<th>Leadership</th>
</tr>
</thead>
<tbody>
<tr>
<td>#2</td>
<td>#5** #4 #3 #7</td>
<td>46%</td>
<td>after 1957 (818)</td>
</tr>
<tr>
<td>#1*</td>
<td>#1* #3 #4 #3 #7</td>
<td>32%</td>
<td>after 1930s (32)</td>
</tr>
<tr>
<td>#5**</td>
<td>#2 #4 #3 #7</td>
<td>33%</td>
<td>ca.1850-1900 (228+343)</td>
</tr>
<tr>
<td>#4</td>
<td>#5** #3 #6 #7</td>
<td>38%</td>
<td>bef.1930+aft.1982 (517+597)</td>
</tr>
<tr>
<td>#3</td>
<td>#5** #3 #7</td>
<td>11%</td>
<td>Political and patriarchal links to #2</td>
</tr>
<tr>
<td>#7</td>
<td>#5** #3 #7</td>
<td>12%</td>
<td>Marginal, settled villagers</td>
</tr>
<tr>
<td>#6</td>
<td>#5** #3 #7</td>
<td>40%</td>
<td>Marginal</td>
</tr>
<tr>
<td>Sum</td>
<td>#1* #3 #6 #7 #7</td>
<td>157</td>
<td></td>
</tr>
</tbody>
</table>

Actual values in bold if greater than expected, in italics if less than expected.

* includes affiliated lineages 9,10
** includes affiliated lineage 8

Smaller lineages sometimes have slightly higher rates of marriage with specific larger lineages (e.g., women of 6 with men of 4, men of 7 with women of 1) but only marginally more than proportionally expected. The higher proportion of marriages of lineage #3 men with #2 women, all taking place before 1930 (see Figure 2.2) reflects the political alliance of these men with lineage #2. Conversely, those pairs of lineages that were in competition for leadership in the twentieth century (lineages #1, #2, and #4) and in the second half of the nineteenth century (#5 and #4) have slightly less intermarriage than expected from a random distribution.

To see the unevenness of common ancestries that results from dispersed marriages as a means of clan integration we can plot the overall
distribution of the ranked ancestors (y axis) having different numbers of descendents (x axis) shown in Figure 6.11. This illustrates the match between Derrida’s simulation results and empirical populations. The distributions are for Aydını and a farming village in Austria (Brudner and White 1997), and both have the number of ancestors with a given number of descendents on the y axis, with ancestral couples ranked from those having highest number of descendents (low on the y axis in rank 1, with over 900) to those having the fewest (rank 300-700 having only one descendant. The lower but more left-peaked curve is for the Aydını ancestors. Its fit to an exponential curve is not perfect: it is even more peaked at the upper left extreme with Mustan, his father, brother, and two of his sons having nearly 700 descendents. The upper curve for the village of Feistritz has a better fit to the exponential. The general point, however, is that these distributions, with peaks of “root ancestors,” are to be expected in any endogamous population, even if intermarrying randomly.

Figure 6.11: Descendants of Aydını and Austrian Village Ancestors

As the fraction of common ancestries grows in a population, so does the likelihood of marriages between consanguines. Lack of prohibitions on the marriage of relatives shortens the number of generations to common root ancestors and bends the distribution curves we see in Figure 6.11 away from the Feistritz pattern (no cousin marriages allowed within the third degree) toward the Aydını pattern (more extreme outliers). When members of the nomad group prefer to marry endogamously rather than bring in spouses from outside, the likelihood of common ancestry increases further. Hence, the appearance that “we all have a single root in
common” is easily imputed: The clan is thus constituted by affinity as well as putative descent.

To visualize unevenness of common ancestries in another way, Mustan’s (#2) and the other lineages are drawn in Figure 6.12 with the sizes of nodes in proportion to the betweenness centrality, that is, the extent to which each node occupies a shortest path between other marriage nodes in the network. Mustan’s lineage has the most central (largest) nodes. The numbers of the early lineages (#1-#7) are labeled but late lineages of #8-#10 are lost among the lower generations and in general their nodes have little centrality.

**Figure 6.12: Mustan’s Lineage (black nodes), Sizes Show Centralities (with 2003 data, the centrality of his brother Haci Ketir increases)**

<table>
<thead>
<tr>
<th>#1</th>
<th>#2</th>
<th>Mustan</th>
<th>#3</th>
<th>#4</th>
</tr>
</thead>
<tbody>
<tr>
<td>#7</td>
<td>#6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>#5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>#</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>#</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Key:** Solid lines with # designations are the ancestors of agnatic lines, size of nodes is proportional to betweenness centrality in the network.

The nodes in Figure 6.12 increase in number exponentially as centrality decreases. This uneven distribution of the centralities of the nodes is shown in the graph by the distribution of node sizes.

**Summary**

The narratives and genealogical recountings of the patriarchs, amplified
by group discussions among the older men and by interviews with women, provide a means of tracing the histories of the clan and its membership over the last 200 years. With these data the analysis amplified and annotated the computerized data from Johansen’s scroll of the genealogical network. Thus began our inquiry into how the clan was amalgamated, how leadership operated, how men were ranked, how the clan integrated by intermarriage, and how lineage segmentation and sedentarization of segments affected genealogical memory. Such topics are always supplemented by the ethnographer’s assessment of statements and sources (see Chapter 11, starting with “Ethnogenesis” for a summary).

Some of the older men insisted that members of the clan are derived from a common root. Ten distinct couples ancestral to the major and a few minor and dependent lineages were identified. The dependent lineages were adoptions of shepherds from neighboring villages. We began the computer analysis with preliminary tabulations by generation (Analysis 1), keying the generations noted by Johansen to those calculated by computer, and we began to ask and analyze the first of our deeper structural questions (Analysis 4): Was there, as informants asserted, an apical ancestor, a single “root” to a clan formed by a conjoining of migrants and founders of different patrilineal? Intensity of intermarriage certainly played a role in creating that impression. To our surprise, one ancestral couple in particular counted nearly 80% of all clan members as direct descendants. The strategies employed by this family in the marriages of their fourteen children were clearly catalytic in the formation and consolidation of the clan as an entity. This is evidence of cohesive action on the part of Mustan and his brother Haci Ketir Mehmet because all his offspring migrated together (separate from patrilineal cousin Ecevit, lineage #3): a clear instance of networked migration. We also examined hypotheses about how the clan was integrated through marriage (Analysis 2) and arrived at one of our major findings: structural endogamy operated as a bifurcation for the inclusionary principle of continuity in nomadism as well as the exclusionary principle in sedentization (Table 6.4).

Given the hypothesis that the cohesion created by marital relinking is integral to group formation or dissolution at every level in the clan, the analysis (Figure 6.5) illustrated an anomalous case of the immediate network of siblings and their offspring in the generation of the most recent clan leader. The analysis revealed that his network was critically segmented by a cutpoint so as to form two separate bicomponents rather
than one, which had been the case for the generational sibling sets of every previous leader. The analysis demonstrated how distances in the kinship network grow large only in the presence of such cutpoints. It is only the continual relinking within bicomponents that creates new links that shortcut and reduce the distances that separate kin. We also showed how relinked components served to integrate certain of the other tribes that were intermarried with clan members, and how structural endogamy at different hierarchical levels mapped onto Aydınlı terms for potentially hierarchical social units (Analysis 3). Figure 6.7 showed how unified were the actual tribal identities of the founding ancestors as they were assimilated into the new territories to the east following the migration gives further support to the hypothesis of networked migration at a more general level of tribal identities as part of the formative events in clan ethnogenesis.

Further Reading

Emirbayer and Goodwin (1994) discuss the problem of agency in social networks. Key references for understanding the concept of structural endogamy and its ethnographic applications, along with the methodology of controlled simulation that is fundamental for making inferences about agency (as opposed to randomness under constraint) from network data, include White (1999), Brudner and White (1997), and White, Batagelj and Mrvar (1999).

Notes

1. An unknown word in Turkish, possibly Zembiciler=basket makers, or Zembureciler=crossbow men, but these are not tribal names.
2. This is the lineage we thought prior to 2003 was nicknamed “Donsuz” (=Pantless) but as shown in Chapter 2, Figure 2.6, was a segment of Ecevitli. The name “Donsuz,” used by some members of competing lineages and in a somewhat derogatory sense, turned out to be not only appropriate but historically associated with another lineage altogether than Ecevitli.
3. Dolaşıklı girls 222 and 223 married Mustan’s sons 1013 and 1061 as against Mustan’s daughters 867 Aysa and 1147 Durdu marrying 630 “Hınalı” Mustafa and 98 Ismail, Hacı Dolaşıklı's son.
4. As noted in Chapter 2 lineages #3 and #2 are related in a way we now understand, given the 2003 data of Koçali (826), to involve missing ancestors who were the common root to both lineages. Prior to 2003 Johansen could not elicit
whether there was an agnatic relationship between the families of Mustan (716) and his wife in the generation before, that is, if there had been a lineage segmentation beginning with the generation of Abbas and Ecevitli’s father but we thought that very likely and we felt that hypothesis to be confirmed in 2003.

5. Except for part of lineage #5.

6. Using Ego2Cpl and the type of text file shown in Table 1 as a starting point for kinship analysis also has the advantage that these “family numbers” corresponding to marriages will remain constant throughout the analysis because both GEDCOM and other files are created with the same family indices.

7. Starting with individual numbers as in Table 1, the transformation program Ego2Cpl assigns unique numbers to marriages for analysis of kinship network structure.

8. Recall that single individuals, by definition, cannot relink, and they cannot be relinked by another couple’s marriage unless they have children (i.e., unless they have been one of a parental couple).


10. For smaller networks, up to 8,000 nodes, relinking analysis can also be done by the Pgraph programs (White and Skyhorse 1999).

11. There is a more cumbersome standard format where individuals are nodes, arcs go from each child to each individual parent (thus with a plethora of kinship links and cycles within nuclear families), and married couples are connected by edges.

12. Bates (1973:40,51f), who does not know all the books of Yalçın (1931-1939, 1977) that help to distinguish tribal from other names, lists Karahacılı, Sarıkeçili, Hayta, Horzum, and Tekeli as descent groups, but he explains that he is not distinguishing these grouping by level, and he does designate Sarıkeçili as a tribal name, if not each of the others. Several hundred people in his area of study held Sarıkeçili and Hayta identities.

13. The only lineage for whom we cannot document this is #1, the Dolaşıklı Rovers, who are probably Karahacılı as well.

14. Of the few marriages in which such a couple settled in a village or town, one woman from lineage #2 took a husband from tribe A, and three women from tribes C, H, and I married clan men from lineages #2, #7, and #7, respectively.

15. Number of descendants would also correlate with the network measure of radial centrality proposed by Valente and Foreman (1998).

16. Spring embedding is useful to show cohesive groupings but cannot be interpreted in terms of covariation and is not a substitute for multivariate analyses that do so. It does not give a unique and repeatable result. See the Glossary, net-
work vocabulary: Eigenvalues and Eigenvectors.

17. The Pajek options for a drawing like that of Figure 6.9 are Net> Partitions> Depth> Genealogy and Draw> Draw Partition, which is an instruction for including generational depth in the drawing of the kinship network. Options Layers> Type of Layout> 3D and Layers> in z dimension fix generations as the third or z dimension of a 3D graph of the network. Once this is done, options Draw> Draw Partition and Energy> Fruchterman-Reingold> 2D scale the x and y coordinates using the minimum energy (Fruchterman-Reingold) algorithm. The x, y and z keys on the keyboard can be used to rotate the energy drawing into the perspective desired. In Figure 6.9 the z-axis is nearly in the vertical position to differentiate the generations.

18. Because these are proportions, this is not simply a result of the greater range of choice within the larger lineages.