Appendix. Conditions for sided systems to converge to section systems.

This is the more general case for Read’s (2010) demonstration in a particular case where a Dravidian kinship terminology converges to Kariera.

Definitions

P-graph. Following Weil (1949), but for concrete marriages rather than marriage-types, "let the number of types of marriages be \( n \)", and let each marriage be numbered from 1-\( n \), as in Fig. 1 (\( n = 13 \)), where ♂ links (agnatic descent lines) are shown in black and ♀ links in red. A P-graph has vertices that represent unmarried children or couples (with or without children) and P-links between vertices directed from child-to-parent(s). The inverse links, parent(s) to offspring, are given by p=P^1. Vertices represent single individuals in the case of unmarried children, whose type of P link (♂ male, ♀ female) depends on their gender. All other vertices represent either a single parent (partner unknown) or a parental couple. Their P links to parents again depend on gender: husband to parents, wife to parents. A sub-P-graph \( Q \) consists of a set \( Q \) of vertices and all the P links between vertices in \( Q \times Q \). Although one may have more than one marriage, P-graphs normally represent (1) real or fictive genealogy wherein no-one is their own ancestry, (2) two-parent opposite-sex marriages, (3) only one set of parents for a child, and thus (4) no vertex will have more than two parental links, one to a male’s parent(s) (for a couple: husband's), the other to a female’s (for a couple: wife's) parent(s). Other variants of P-graphs may be defined.

P-graph generations. The P-graph defined by 1-4 above is a directed asymmetric graph (DAG) with \( 1 \leq gen \leq g \) generations, \( g \) equal to the length of the longest directed path (e.g., \( g = 3 \) in Fig. 1), which insures that every generation will have at least one parent in the preceding generation. Program Pajek (Batagelj and Mrvar 1992) computes \( g \) generations for P-graphs.

Sides and sidedness. These are implicit moiety structures in the marriage network, wherein a P-graph can be uniquely partitioned into two, within each the vertices are connected by the links of one gender and between which they are uniquely connected by the links of other gender.

V= Viri-sides. Here, a P-graph or sub-P-graph \( Q \) is split into two halves, uniquely determined, within which vertices are connected by ♂ son/parent links and between which they are uniquely connected by ♀ daughter/parent links.

U= Uxori-sides. This a P-graph or sub-P-graph \( Q \) that is split into two halves, uniquely determined, within which vertices are connected by ♀ daughter/parent links and between which they are uniquely connected by ♂ son/parent links.

S= Same-generation marriage. In general, siblings do not all have to marry spouses of the same generation, nor does “same generation marriage” imply that generations partition by time
periods, nor that men and women share the same temporality of generations (when women marry on average at a younger age than males, their generational time is faster than males, for example). Nonetheless, a P-graph component (connected graph) connected only by P\*p (sibling or parent’s child) links among marriages constitutes a pure generation iff it contains no connecting parents P-connected to other connecting parents within it (i.e., no grandparents). If the pure generations of the P-graph are partially ordered by the g generations in the P-graph, then the P-graph has property S, same generation marriage. A sub-P-graph Q may also have property S.

A= Implicit alternate generational moieties exist when a sub-P-graph Q is same-generation but a larger subset R ⊆ Q has some marriages with both same-generation marriages and ones between individuals +2 and -2 apart but none at +1 and -1 apart.

B= Bicomponent. A bicomponent of a marriage network P-graph containing marriages x and y is a maximal sub-P-graph B containing x and y in which for any node z there are two or more disjoint paths between very pair of nodes in B. (All links between nodes in B that occur in the main graph are by definition also in the P-graph)

Ck= A sub-P-graph Q is one of consanguineal marriages iff every marriage within Q for which there are two parent links is between a male and female who have a common consanguineal ancestor less than k generations back.

**Theorems**

The presence of both viri-sides (condition V) and uxori-sides (condition U), for a sub-P-graph marriage network Q of Ck consanguineal marriages, in a bicomponent B of a marriage network, logically entails alternate generational moieties (conditions S and A) in B. This includes the possibility of an ego at generation i, 1 ≤ i ≤ g, marrying someone at generation j, 1 ≤ j ≤ g, where the absolute difference |i - j| is an even number, e.g., +2 or -2 generations (condition A). Further, the presence of S, same-generation marriage, and either viri-sides V or uxori-sides U logically entails the complementary type of sidedness.

**Theorem 1.** U, V, and Ck, consanguineal marriages => S and A: implicit alternate-generational moieties.

**Theorem 2.** U and S => V

**Theorem 3.** V and S => U

**Proofs**

**Proof of 1.**

Suppose U and V and consanguineal marriages. For a sub-P-graph Q in which every marriage is between consanguines (Ck, consanguineal marriages), then marriages in which all husband and wife marriage cycles are with ancestors that are both U and V, and each
such cycle will have even number of female links, an even number of male links, and adding the two, an even number of total links. Thus, if the ancestral graph for each such cycle is drawn, from parent to child in adjacent generations, then either husband and wife will be of the same generation or one is an even number of generations above the other. This will apply to all such marriages, and conditions S and A will be satisfied: implicit alternate-generational moieties. Q.E.D. This proof will generalize to Australian section systems.

Counterexample to 1, lacking consanguineal marriage, S and A are not entailed.

Suppose U and V and a network without $C_k$, consanguineal marriages, in which a man marries a BDHBD or BDHSD, implying two nonconsanguineal marriages (they are linked by two distinct ancestors, not a common ancestor). Then the number of males is even (4) as is the number of females (2), qualifying for U and V but S and A are violated.

Lemma 1.

Suppose A (Implicit alternate generational moieties). This may apply so that the generation number of each marriage is the required minimum of one below the generation number of the parents of the husband and that of the wife, the other alternative being an odd number below. This entails that any marriage cycle will have an even number of links because for any distance $d$ (odd) from one spouse to the common ancestor, the distance is a $d'$ (odd) for the other spouse, for a sum of two odd numbers, which is an even number of total links in every such cycle.

Proof of 2.

Suppose U and A. By Lemma 1, A requires that every marriage cycle will have an even number of links $e_c$, while U entails an even number of male links $e_m$, so the remaining female links $e_f = e_c - e_m$ must be even, and the network is V. Q.E.D.

Proof of 3.

Suppose V and A. Exchanging U and V above: then V and A entail U. Q.E.D.

References