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RELATIVES, MOLECULES AND PARTICLES

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CONTENTS

Abstract

The logical nature of kinship terminologies has been argued for from the beginning of kinship studies, starting with Morgan, and more recently, analysts have begun to appreciate the "mathematical beauty" of kin terminological systems. Application of insights from fields such as archaeology, linguistics and molecular genetics is taking kinship studies to levels never before reached. This paper on the kinship system of a Dravidian tribe, the Hill Madia of central India, may be seen as following a similar approach, and the reason being the advantages it gives in understanding this central Dravidian kinship. Most of the ideas and concepts used in the analysis of the Madia data are standard and conventional in the study of human kinship systems, but a few such as complementation, unification and supersymmetry are taken from the natural sciences. Using these concepts as key analytical tools has proven helpful in describing some vital aspects of the Madia kinship.

We propose that the Madia kinship may be best understood using as paradigms two natural structures: the DNA (i.e. the deoxyribonucleic acid) molecule, and the physicists' model of the early supersymmetric universe (known as SUSY). The Madia kinship in its sociocentric view is analogous to the DNA molecule while the same kinship in its egocentric view is configured like the elementary particles in the SUSY model of very early universe. This finding may have implications for social science and perhaps also for natural sciences – for social anthropology because it may have relevance for theories of origins and transformations of human kinship, and for natural sciences because it may imply that the DNA and the SUSY structures share a common mathematical construct.

Since this paper is addressed to a primary audience of anthropologists (kinship scholars in particular), I had to describe in detail the essential features of the biological and cosmological structures for the sake of those who may not be all that familiar with these. However, for the sake of natural scientists who may be reading this, I have been easy on anthropological jargon, and at times explained key assumptions in kinship studies. Also, I have avoided serious theoretical discussions in this paper, hoping to do so in the future when the kinship systems of the other central Dravidian societies, such as Muria, Dhurwa, Bison-horn Madia, Gaitha and the Raj Gond have been studied.

RELATIVES, MOLECULES AND PARTICLES

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INTRODUCTION[1]

The Topic

Dravidian kinship, though the last discovered of kinship typologies, has held the interest of many analysts, and especially of those interested in theorizing about origins and transformations of human kinship systems (Hage 2001, Dziebel 2007, Trautmann 2001, Godelier et al. 1998). The "Dravidian-origin consensus" (cf. Allen 2011:108), which also has some opponents, is a case in point. While the Dravidian kinship may have enjoyed such a privileged position in kinship studies, I, like most of the more than 200 million Dravidian people in India, was unaware of all that fuss. Around here, kinship relationship is like the air we breathe, of which we are oblivious even when our lives depend on it.

My own interest in studying kinship systems was kindled when I was confronted with the intriguing complexity and extensiveness of the Hill Madia[2] kinship system while my family[3] was living among this people and learning to play the game by their rules. The challenge of the central Dravidian eventually became the motivation for a doctoral study which led to finding the key to understanding the Madia kinship system: the patrilateral cross-cousin (FZD) alliance. The current research was taken on with the goal of building a structural framework for the purpose of capturing as much of the system's complexity and uniqueness as possible.

This paper is my third one on the subject, but the two earlier papers foreshadow this. The first one (Vaz 2010) mentioned complementary bonding of relatives as an important aspect of the Madia kinship structure, but the current research uses this as a key analytical concept leading to a comparison of the Madia kinship with the DNA (deoxyribonucleic acid) molecule. Similarly, while the second paper (Vaz 2011a) proposed a Big-Bang-like sequence for the development of

[1] ACKNOWLEDGEMENT: My sincere thanks to Dr. Denham for his very helpful comments on an early draft.

[2] Pronounced as *māṛia*, and alternatively referred to in the literature as Maria or Abujhmaria (meaning 'Marias of the Abujhmar Mountains'). This tribe was referred to as Hill Maria by Grigson (1938:49) in order to distinguish them from their immediate neighbors the Bison-horn Madia (also known as Dandami Madia) who are both "officially classed as Gonds" (Grigson: 1938:36) even though they would call themselves using vernacular names. The Hill Madia, a population of approximately 130,000, live in the Gadchiroli district of Maharashtra State and the Bijapur and Narainpur districts of the neighboring Chhattisgarh state in central India. For the location of Hill Madia habitat in Maharashtra state, where the writer lives, please refer to Appendix I.

[3] My linguist husband and I have managed multiple language development programs for the Madia since 1994.

the Dravidian kinship, the current paper uses certain key concepts from the physical Big Bang theory in the study of kin terms, resulting in a comparison of the kinship with the scientists' model of the supersymmetric (SUSY) early universe, where the constituents are elementary particles. Perhaps in the light of this, the title of this paper would be found justifiable.

Appreciation of the logical nature of kinship terminologies through understanding the "mathematical beauty" of kinship systems (Godelier et al. 1998:5), application of insights from fields such as archaeology and linguistics (Allen et al. 2011) and making use of concepts from molecular genetics for comparative purposes (Allen et al. 2011 , Stone and Lurquin 2007) are recent advances made in the study of human kinship systems. If this paper follows a similar approach, it is because of the advantages it gives in comprehending the Madia kinship. While most of the ideas and concepts used in this analysis are standard and conventional in the study of human kinship systems, a few such as complementation, unification and supersymmetry, which are taken from the natural sciences to be used as key analytical tools, have proven helpful in describing some vital aspects of the Madia kinship.

Overview

Part I focuses on the study of address terms which represent kin categories, and the classification as social categories is studied in order to see the configuration of relatives in the sociocentric view. This is then compared with the DNA molecule. Part II focuses on reference terms which represent kintypes or "types of genealogical connections" (Scheffler and Lounsbury 1971:2) to study the configuration of kin in the egocentric view, which is then compared with the structure of the SUSY model of the early universe. Thus the analysis of data and their description is two-track as shown in Figure 1.

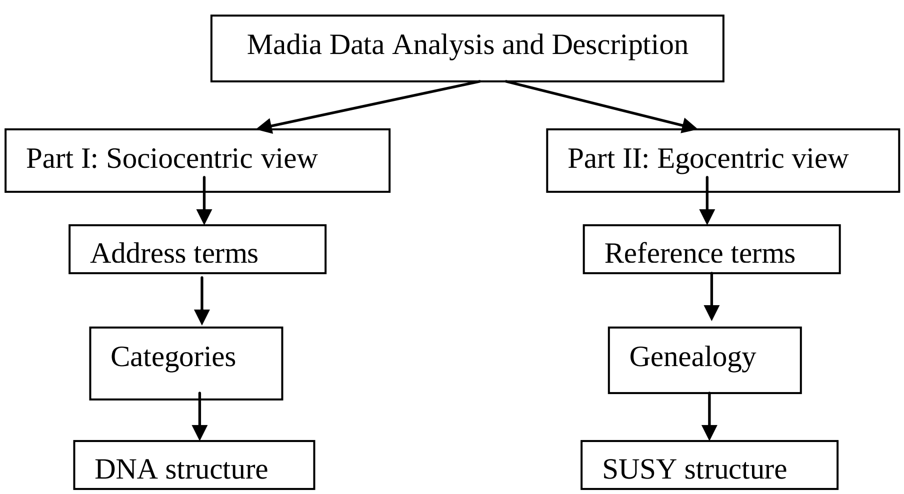

Fig. 1. Overview of the paper

During the course of this analysis were discovered many numerical correspondences at various levels between the kinship and the DNA and between the kinship and the SUSY model which seem to strengthen the comparisons made. Therefore due attention is given to the *number* of categories and kintypes throughout the descriptions of the sociocentric and egocentric views.

In the sociocentric view, where the focuse is on the address terms or categories, the genealogical connections remain in the background. In the egocentric view, the genealogical connections and kintypes come into focus. The recognition of the distinct roles that kin terms play as reference (kintypes) and address (kin categories) is crucial to the whole analysis. The reference terms show the vertical merging of kin through alternate generation equations, and the address terms show the horizontal merging of kin in each generational level to form certain categories. Together, these can show us how the Madia kinship is an extremely compact and highly symmetric system.

Regarding the structure of the paper, it is advantageous to begin with the sociocentric view and then move on to the egocentric view, since the former is a relatively easier analysis considering the fact that the DNA study is an older science and better known than the more recent and speculative theories of particle physics. Besides, for the kinship analysis in Part II, we need to refer occasionally to Part I, but not vice versa. In both Part I and Part II, I present first the analysis of Madia kinship, then a description of the natural science structure (either DNA or SUSY), and finally the comparison between the kinship and the relevant natural science structure. Though the analysis of the Madia kinship data was partly inspired by the natural structures, the presentation of the analysis could not begin with a description of the natural structures lest it indispose my primary audience of social anthropologists.

I hope to revisit this topic in the future with a biologist and a physicist on board which could sharpen the analysis and comaprisons, and until then this paper must be considered a work in progress. Incidently, living in a multi-ethnic environment and having to handle five different languages on a daily basis, of which English is just one, my proficiency in English leaves much to be desired; so I hope my readers would not be distracted by that but rather focus on the substance of this paper.

With this brief introduction to the topic of this paper, let me present the data, i.e. the Madia kinship terminology.

Madia Kin Terminology

The total number of Madia reference terms is exactly 37, and the reference terms presented herein are the same as those listed previously (Vaz 2010:11). With regard to the address terms, I said that there are "*about* twenty" (ibid. 13) because at that time, even though I was aware of the standard and non-standard use of address terms, I had not thoroughly investigated this issue, which this current paper attempts to do.

There is a minor correction in the current data that is worth mentioning. The earlier data showed that the FM *bāpi* and MF *ako* can also alternatively be addressed as '*ango*' (MBD/FZD) and '*sangi*' (MBS/FZS). Now I have come to realize that this is so only when the FM and MF are classificatory kin (i.e. FMyZ, MFyB) who are around the same age as Ego and who are still unmarried. But if these classificatory grandparents are married, and/or older than Ego, then address terms such as *ange* (eBW) and *bāto* (eZH) are used instead of *bāpi* and *ako*. Therefore I have added these two terms as alternative address terms in the current table. Other than this, the current data is the same as reported in earlier papers. While the data is the same, the approach to the analysis is new.

With regard to kinship notations I follow those recommended by Parkin in his 1997 text titled Kinship. The abbreviations F, M, B, Z, S, D, H, W, P, G, E and C are for father, mother, brother, sister, son, daughter, husband, wife, parent, sibling, spouse and child respectively. To these are added "e" for elder, "y" for younger, "ms" for man speaking, "ws" for woman speaking, "os" for opposite sex, and "ss" for same sex. The "e," "y," "os" and "ss" are placed before the symbol to which they relate. When in final position, however, "e" and "y" refer to the whole specification (Parkin 1997:9). Sometimes I have used descriptions such as "e-r to" and "y-r to" meaning "elder to" and "younger to", while specifying whether it is the age of the Ego or that of the linking relative or to some other relative not appearing in the abbreviation.

Though the kinship data are the same as that reported in an earlier paper (Vaz 2010), the formatting of the terminology in Table 1 below is different from the earlier one in the following ways:

1. I have introduced *code numbers* for the 37 reference terms for the sake of easy reference in our discussions, while listing the terms from the highest to the lowest G level. There is no particular reason for the order of the reference terms within each of the four G levels.
2. Another difference is that the current table provides a *complete list of key referents*, which was rather partial in the earlier one.
3. The earlier one listed the kin terms under three headings which are three classes of kin among the Madia: *jīva*, *putul* and *eṛmi* (corresponding roughly to *parallel*, *cross* and *affinal*), listing reference and address together for each of the kin classes. But Table 1 presents the terms under two headings, i.e. reference and address, and I shall explain the reason for doing so. The purpose of the earlier paper was to argue for the FZD alliance as the rationale for the equations and distinctions in Madia kin terminology, and the kin classification served well as a background for that argument. But in the current study, the goal is to understand how the kin classification is made in the first place and how the Madia relatives are configured, for which the separation of address and reference is crucial. How the address and the reference terms function differently is a discussion that follows after Table 1.

Table 1: The Madia kin terms and referents

Reference Terms	Key Referents	Secondary Referents	Address Terms	Gen.
1. *thādho*	FF	MMB, EMF	*dhādha*	G^{+2}
2. *bāpi*	FM	MFZ, EMM	*bāpi, ange, ango*	
3. *ako*	MF	FMB, EFF	*ako, bāto, sangi*	
4. *kāko*	MM	FFZ, EFM	*kāko, akā*	
5. *pēpi*	FeB, MeZH	FFF, EMB, EFZH e-r to F	*pēpi*	G^{+1}
6. *pēri*	MeZ, FeBW	EFZ, EMBW e-r to M	*pēri*	
7. *thape*	F		*bāba*	
8. *thalox*	M		*ava*	
9. *kākal*	FyB, MyZH	EMB, EFZH y-r to F	*kāka*	
10. *kūchi*	MyZ, FyBW	EFZ, EMBW y-r to M	*kūchi*	
11. *māmal*	MB, FZH	EF, EFB, EMZH, MFF	*māma*	
12. *ātho*	FZ, MBW	EM, EMZ, FFFZ, EFBW	*ātho*	
13. *dhādhal*	eB, FBSe, MZSe	FFBSSe, MFBDSe	*dhādha*	G^{0}
14. *ange*	eBW,	FBSeW, MZSeW	*ange*	
15. *akal*	eZ, FBDe, MZDe	FFBSDe, MFBDDe	*aka*	
16. *bāto*	eZH,	FBDeW, MZDeW	*bāto*	
17. *mūryal*	HeB	HFBSe	*dhādha*	
18. *pōraṛ*	EeZ	HFBDe, WMZDe	*aka*	
19. *exayaṛ*	HBW	HFBSW	*aka/ ēlo*	
20. *aglal*	WZH	WMZDH	*dhādha, thamo, agla*	
21. *eṛmthox*	WeB, yZHms	WFBSe, WMZSe	*eṛmthox*	
22. *exundi*	EyB	EFBSy, EMZSy	*pēka*	
23. *kōkaṛ*	EyZ	EFBDy, EMZDy	*pila*	
24. *mujo*	H	----	----	
25. *muthe*	W	----	-----	
26. *maryox*	FZS, MBS	FFBDS, MFBSS	*sangi*	
27. *mandaṛi*	FZD, MBD	FFBDD, MFBSD	*ango*	
28. *pāri*	CEP	BCEPms, ZCEPws	*pāri, dhādha, bāto, ange, aka*	
29. *thamox*	yB, FBSy, MZSy	FFBSSy, MFBDSy	*thamo*	
30. *ēlaṛ*	yZ, FBDy, MZDy	FFBSDy, MFBDDy	*ēlo*	
31. *kōval*	yZHws	FBDyHws, MZDyHws	*ane*	
koyaṛ (see #37)	yBW	FBSyW, MZSyW	*pila*	
32. *max*	S, BSms, ZSws	HBS, WZS	*bāba*	G^{-1}
33. *mayaṛ*	D, BDms, ZDws	HBD, WZD	*ava*	
34. *anemax*	BSws, ZSms	WBS, HZS	*pēka, māma, kāka, bacha*	
35. *anemayaṛ*	BDws, ZDms	WBD, HZD	*pila, pōye, kūchi, bachi*	
36. *ane*	DH, BDHms, ZDHws	HBDH, WZDH	*ane, lāmane*	
37. *koyaṛ*	SW, BSWms, ZSWws	HBSW, WZSW	*pila*	
--------	SS, SD, DS, DD	BDC, BSC, ZDC, ZSC	*wando, ako, kāko, thamo, ēlo, pēka, sangi, ango*	G^{-2}

The distinction of reference and address is not made just for the sake of our analysis, but they actually function differently. The 37 reference terms constitute a sort of registry of who is who, and it is like a list or roll-call of all possible types of relatives. There is only one reference term exclusively for each type of relatives (note that in the first column of reference terms, each row has only one term). Many of the reference terms have more than one key referent, but any given key referent is denoted by only one reference term. Thus the reference terms are fixed, in total number (i.e. 37) as well as in their use. But the case with the address terms is different, as with some of them, neither the number nor the usage is immediately apparent:

(a) Some of the address terms are used for more than one kintype. Note that some address terms reoccur at different G levels and some reoccur many times within one level (e.g. *aka* in G^0); because of this some kintypes have more than one address term. Thus there are options in a few cases.

(b) Some address terms are standard ones, some others are generic or merely words of endearment (those used for some of the G^{-1} relatives), and there are still others which are used as self-reciprocals (due to alternate generation mergers).

(c) How a relative is addressed can sometimes be dependent on factors other than the kinship relation itself, and on adulthood and marital status of the addressee.

(d) Address may be different for the same relative when in a joking mode.

(e) Address terms are used for non-relatives too, simply as a mark of politeness, for it is rude to call any adult by name. There is also ritual kinship among Madia which is based on the clan-gods they worship.

Therefore, while the mode of addressing someone is mostly based only on genealogical connection, it is also, in a few cases, negotiated on closeness of age or marital status or on ideas of politeness (which is really an issue of attitude). The point to be made here is that while the reference terms are rather fixed and non-negotiable, there is some flexibility with regard to the use of address terms. While this will become clear in the course of our analysis in Chapters 1 and 4, suffice to mention here that the reference and the address terms operate differently.

As a final note, the list of kin terms in Table 1 includes relatives from four generational levels. Let us also note that there are no unique kin terms for the grandchildren (G^{-2}) - neither reference nor address are unique. The terms for G^{-1} and G^{-2} relatives, (i.e. children and grandchildren) are mostly from the G^{+1} and G^{+2} levels, and are often self-reciprocal. Ego's *own* children and grandchildren are addressed using given names for as long as they are unmarried, and possibly even after their marriage, but the classificatory grandchildren (FBCC, MZCC, etc) who might also be close to Ego in age are addressed using appropriate kin terms. Generally speaking, taking peoples' first names is seen as rude behavior.

PERSPECTIVE I: THE SOCIOCENTRIC VIEW

CHAPTER 1

MADIA KIN CONFIGURATION IN SOCIOCENTRIC VIEW

The study of the sociocentric perspective focuses on the address terms which stand for kin categories. How Madia relatives are categorized is the question we will try to answer through analysis in this chapter. A marriage brings together relatives from the groom's side and the bride's side who are bonded in kinship relationships, becoming one large extended family; and this bonding is fairly universal. Yet, the bonding process occurs following indigenous rules in particular societies. What is typical of Dravidian societies is that the relatives from the bride's and the groom's sides are merged *complementarily*. What is complementation in kinship, how this process occurs among the Madia and forms the basic rationale for the categorization of kin will be discussed in section 1.

Categorization of kin, as of any other thing, is a simplification process. Marriage alliances in an extended family can cause the number of relatives of that family to increase manifold. Complementation and categorization are the processes that help to keep the ever-increasing circles of relations through marriage alliances simple and manageable, preventing the number of kintypes from becoming too large to be useful for daily interactions. We will be discussing the kin categorization process among Madia in section 2 of this chapter.

Our goal for studying the complementation and categorization processes is to get a grip on the logic or mechanism of the Madia kin classification, which is discussed in section 3 of this chapter. We can already know *what* the Madia kin classes are because the Madia informants can tell us about that. These are the *jīva*, *putul* and *eṛmi*, which roughly coincide with what is conventionally known in social anthropology as parallel, cross and affinal kin. Therefore our analysis does not aim to discover the Madia kin classes but rather to investigate *how* this kin classification seems to be worked out among the Madia.

This then is the outline of the study of the sociocentric perspective of the Madia kinship: complementation, categorization and classification. The first two combined is a study of how the Madia kintypes (a majority of these) complement and become kin categories; in a sense this will simply be a study of the relation between the reference and address terms. The third one, i.e. the study of kin classification, will investigate what seems to be the logic behind the distinction of kin into two main social categories: *jīva* and *eṛmi*. We will conclude the analysis in this chapter with a discussion on the relation between Madia kinship, alliance, social organization, and social structure.

1.1. Complementary Bonding of Relatives

What is meant by complementary bonding of relatives? Dravidian societies distinguish between what have been conventionally known as *parallel* and *cross* relatives. Parallel kin are those traced to Ego through same-sex links, i.e. sister to sister, brother to brother, and cross kin are those traced to Ego through opposite-sex links, i.e. sister to brother, brother to sister (Parkin: 1997:60-61). For example, Ego's father's brother's children and mother's sister's children are parallel kin whereas Ego's father's sister's children and mother's brother's children are cross cousins. When a man and a woman marry, the cross and parallel relatives are merged complementarily wherein Ego's cross kin become the spouse's parallel kin and vice versa.

This cross/parallel distinction plays an important role in regulation of kin behavior (such as joking, non-joking and avoidance behaviors) and also in the regulation of marriage alliance. In Dravidian societies, the cross-cousins are potential marriage partners whereas the parallel cousins are equal to one's own siblings (and therefore are non-marriageable). While Dravidian terminologies are generally known to show the crossness distinction in the kin terms of the three medial generations (+1, 0, -1), the Madia terminology shows the cross/parallel distinction in the other G levels too (+2, +3, -2, -3) (which is clearly shown in Appendix II). Of the four dimensions that kin terminologies are distinguished for, age, sex, generation and crossness _ the last one may be a purely cultural construct.

Crossness is a fundamental feature of kinship and social organization in Dravidian societies, where *positive marriage rules* (rules about who one should marry) are known to exist. Cross-cousin marriages are of three types: patrilateral (with a preference for FZD as the bride) or matrilateral (with a preference for MBD as the bride) or bilateral. Cross-cousin alliances are all about the two opposite-sex sibling-pairs (F and FZ make one pair while M and MB make the other pair) engaging in the arrangement of marriage between their children. Therefore we can say that the two opposite-sex sibling pairs form the basis of a cross-cousin alliance system.

With the understanding that the cross/parallel distinction is the basis for the complementation, let us move on to doing a simple exercise that would help us to see just *how many* types of relatives (or kintypes) are being brought together in a marriage alliance to be complementarily merged. It is just as interesting to note *how many* there are as it is to investigate *who* complements with *whom*. Therefore we will begin with a simple head counting. For the purpose of such a head count, I present the Madia kin terms, separating the 37 kintypes as "before" and "after" marriage (Table 2). The many relatives that the groom and the bride can each have while single are referred to as the "before marriage" kintypes to distinguish these from the kintypes that are created through the marriage, which we would refer to as the "after marriage" kintypes. The "before marriage" kintypes are all that an unmarried adult could possibly have, while the "after marriage" kintypes are the ones that only married individuals can have.

Table 2: Total number of kintypes for complementation

Before/After Marriage	Row no.	Kintypes		G. Level
Before Marriage Kintypes	1.	*(1) thādho* (FF)		G^{+2}
	2.	*(2) bāpi* (FM)		
	3.	*(3) ako* (MF)		
	4.	*(4) kāko* (MM)		
	5.	*(5) pēpi* (FeB, MeZH))		G^{+1}
	6.	*(6) pēri* (MeZ, FeBW)		
	7.	*(7) thape* (F)		
	8.	*(8) thalox* (M)		
	9.	*(9) kākal* (FyB, MyZH)		
	10.	*(10 kūchi* (MyZ, FyBW)		
	11.	*(11) māmal* (MB, FZH)		
	12.	*(12) ātho* (FZ, MBW)		
	13.	*(13) dhādhal* (eB)		G^{0} & G^{-1}
	14.	*(15) akal* (eZ)		
	15.	*(29) thamox* (yB)		
	16.	*(30) ēlaɽ* (yZ)		
	17.	*(26) maryox* (MBS, FZS)		
	18.	*(27) mandaɽi* (MBD, FZD)		
	19.	*(37) koyaɽ* (yBW, BSWms, ZSWws)		
	20.	*(14) ange* (eBW)		
	21.	*(16) bāto* (eZH)		
	22.	*(28) pāri* (BCEPms, ZCEPws)		
	23, 24.	*(21) eɽmthox* (yZHms)	*(31) kōval* (yZHws)	
	25.	*(32) max* (BSms, ZSws)		
	26.	*(33) mayaɽ* (BDms, ZDws)		
	27.	*(34) anemax* (ZSms, BSws)		
	28.	*(35) anemayaɽ* (ZDms, BDws)		
	29.	*(36) ane* (BDHms, ZDHws)		
After Marriage Kintypes	1, 2.	*(20) aglal* (WZH)	*(19) exayaɽ* (HBW)	
	3, 4.	*(24) mujo* (H)	*(25) muthe* (W)	
	5.	*eɽmthox* (WeB) *(same as code #21 above)*	*(17) mūryal* (HeB)	
	6.	*(18) pōraɽ* (EeZ)		
	7.	*(22) exundi* (EyB)		
	8.	*(23) kōkaɽ* (EyZ)		

As shown in the Table 2, the *maximum* number of kintypes that a Madia individual can have before his/her marriage (i.e. as a single and unmarried individual) is a total of 28. The "before marriage" kintypes are not just parents and grandparents, but also include those from G^{-1} level, i.e. the "children". This is so because an unmarried Madia person can have "children", who are actually siblings' children (the equivalent of nieces and nephews in English), and children-in-law as well (i.e. BSWms, BDHms, ZSDws, ZDHws). Let us note that among the "before-marriage" kintypes, terms coded #21 and #31 (see row nos. 23 and 24) refer to one and the same referent (i.e. yZH) but which is distinguished by the male and female speaker (yZHms ≠ yZHws).

Thus, when a Madia man and woman marry, each of them brings in a maximum of 28 kintypes from his/her own side, all of whom merge complementarily to make a newly extended family for the couple. In addition, the couple's marriage gives rise to 8 new affinal kintypes, who are the "after marriage" kintypes, 5 of which are unique to each partner (these kin terms for which the notations begin with either H or W) while 3 are common to both (where notations begin with 'E' meaning spouse in general for it does not differentiate between H or W). Therefore the total number of kintypes at the point of marriage, kintypes which are to go through the process of complementation, is as follows:

Before-marriage kintypes (28 x2)	56
After-marriage kintypes	+8
Total number of kintypes	= 64

Now let us move on to discussing how the total of 64 kintypes (which involve more than a hundred key referents from the two sides) merge complementarily to form a much smaller number of kin categories. The complementation process is the *route*, so to speak, that kintypes take to becoming kin categories. However, not all the kintypes complement. Even in the case of those kintypes that do complement, the complementation does not happen uniformly. Rather, how the kintypes from Ego's own generation bond is different from how the kintypes from generations from above or below Ego bond. In the generations above Ego, the process is such that can be described as *direct* complementation, in contrast to that in Ego's own generation where it is an *indirect* process. In the generation below Ego, however, there is and can be no complementary bonding because the G^{-1} relatives are children to *both* Ego and Ego's spouse. For example, Ego's son-in-law (DH or BDHms or ZDHws) will be the same type of kin to his/her spouse too. Therefore in the G^{-1} level, only plain *merging* of kintypes takes place, with no room for complementation.

The sections that follow look at these processes in more in detail.

1.1.1 Direct Complementation and Transcription

In the generations above Ego, there are twelve kintypes and these kintypes bond in a rather straightforward manner. Herein, the complementation rule is simply this: Ego's parallel kin become spouse's cross kin, and Ego's cross kin become spouse's parallel kin. Spouse's parallel kin become Ego's cross kin, and spouse's cross kin become Ego's parallel kin.

This is so, irrespective of whether Ego is male or female. For example: in the level G^{+2}, Ego's *thādho* (FF) becomes spouse's *ako* (MF), and Ego's *ako* (MF) becomes spouse's *thādho* (FF). Table 3 lists the 12 kintypes in the G levels above Ego and shows how complementation works.

Table 3: Direct complementation

G Level	***Kintypes on Ego's side***		***Become on Spouse's side***	***And are Addresed as***
G^{+2}	Parallel	*(1) thādho* (FF)	*(3) ako* (EFF=MF)	*ako*
		(4) kāko (MM)	*(2) bāpi* (EMM=FM)	*bāpi*
	Cross	*(2) bāpi* (FM)	*(4) kāko* (EFM=MM)	*kāko*
		(3) ako (MF)	*(1) thādho* (EMF=FF)	*dhādha*
G^{+1}	Parallel	*(5) pēpi* (FeB) *(7) thape* (F) *(9) kākal* (FyB)	*(11) māmal* (EF = EFB = MB)	*māma*
	Cross	(6) *pēri* (MeZ) (8) *thalox* (M) *(10) kūchi* (MyZ)	*(12) ātho (*EM = EMZ= FZ)	*ātho*
	Parallel	*(12) ātho*[4] (FZ)	*(6) pēri* (EMeZ if er to M = FZ) *(10) kūchi* (EMyZ if yr to M = FZ)	*pēri* *kūchi*
	Cross	*(11) māmal* (MB)	*(5) pēpi* (EFeB if er to F = MB) *(9) kākal* (EFyB if yr to F = MB)	*pēpi* *kāka*

The complementation at the G^{+1} level may look a bit more complicated than at the G^{+2} level because the kintypes in G^{+1} show relative-age distinction whereas the kintypes in G^{+2} do not. However, the relative-age dimension is present evenly on Ego's as well as Ego's spouse's sides. Another thing that may seem problematic is the fact that no kintypes on the spouse's side takes the place of Ego's Father and Mother. However, Ego's F and M are merged on the spouse's side with spouse's MB and FZ and vice versa, and therefore all of these 12 kintypes (in the above Ego levels) are complementarily merged. Such complementation makes it unnecessary to have

[4] *pōye* seems to be an archaic term less commonly used for FZ.

new reference terms created in order to denote the spouse-side kintypes in G^{+1} and G^{+2}, the reason why the kintypes on Ego's side and on spouse's side are the same.[5] Thus the number of kintypes in above Ego generations remains the same "before" and "after" marriage. Such a straightforward complementation can be depicted using a south Indian folk art known as *kōlam*[6].

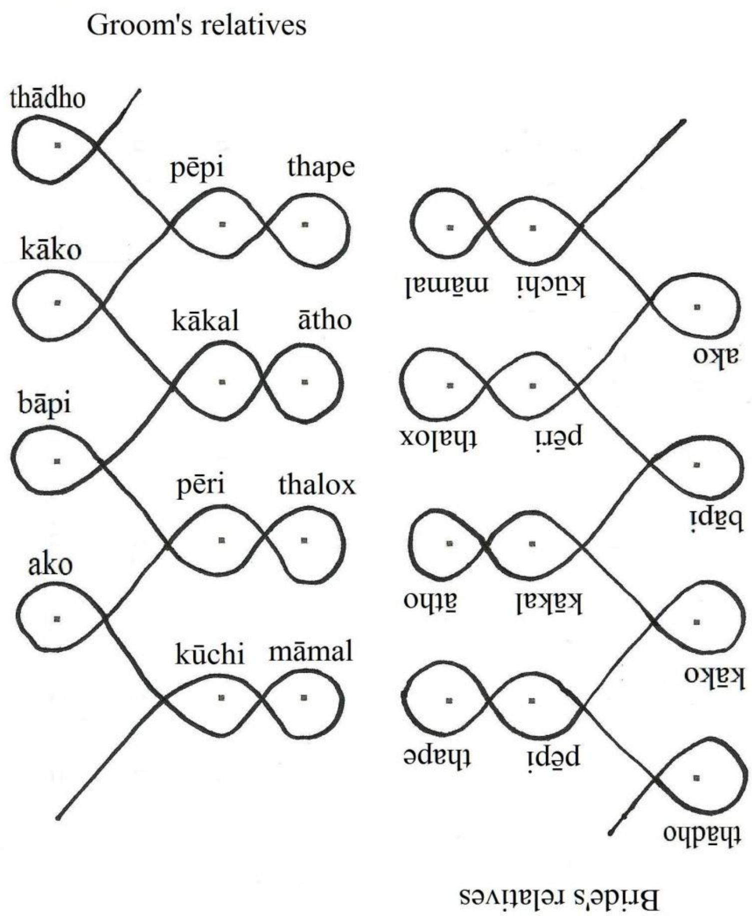

Fig. 2. Direct complementation of Madia kintypes

[5] This is unlike in the English language, in which following his/her marriage, Ego will have two new kintypes in the G^{+1} level, i.e. father-in-law (EF) and mother-in-law (EM). There is no need in the Madia language for new kintypes in the parental level because terms for EF and EM already exist as terms for MB and FZ.

[6] A *kōlam* is an art made with dots and lines, where lines go around the dots to connect them and where the dots function like a grid to guide the drawing. A given set of dots can be connected in many ways. Women draw *kōlam* before dawn at the entrance to a house in order to welcome the blessings of a new day into one's house. Since *kōlam* "expresses mathematical ideas", it is drawing attention from scientists (Ascher 2002).

The two "strands" in this illustration represent the groom's and bride's sides (or simply, Ego's side and Spouse's side). It would be inconsequential which is on the right and which is on left. The important thing to note is that the two strands run in opposite directions to show that these are complementarily bonded. This would be so irrespective of whether Ego is male or female, or whose side is shown as going up or going down. One half of each side represents the Father's (*thape*) side kin (six kintypes that include FF, FFZ, F, FZ, FeB, FyB), while the other half on each side represents the Mother's (*thalox*) side kin (six kintypes that include MF, MFZ, M, MB, MeZ, MyZ). The grandparents are shown a step elevated from the parents' level to indicate the G level distinction (or the gap of a generation). This diagram is useful to show that the complementation in G^{+1} and G^{+2} levels is total and uncomplicated. It is also meant to show that Ego's parents and parents' opposite-sex siblings (the four kintypes or the four dots on each of the two sides that make up the vertical middle section of this diagram) are the leading components in the complementation process, which is an important point that we will take up for discussion later on in Chapter 3.

The end result of the complementation of kintypes is the formation of kin categories. Note that the address terms (see the last column in Table 3) are mostly the same as the reference terms. This means that all kintypes are retained as kin categories, except for one of them *thādho* (FF = EMF) which becomes a category in Ego's generation *dhādha* (eB). For all the remaining kintypes, the reference terms are simply copied as address terms. We will call this process *transcription* in order to distinguish it from the more complex process that terms in the Ego generation seem to go through for complementation, which is discussed below.

1.1.2 Indirect Complementation and Translation

The complementation in Ego's G level works rather complexly. In the complementation discussed above for the above Ego generations, Ego's parallel kin become spouse's cross kin (and vice versa), and Ego's cross kin become spouse's parallel kin (and vice versa). That is why we described it as straightforward complementation and labeled it as "direct complementation". But the same is not the case with the kin terms of Ego's own generation. At the G^0 level, there are three kinds of kin: parallel, cross and affinal, as shown in column 1 of Table 4. Looking at Table 4, it might seem as though complementation may not be occurring after all, because we see that the kin terms on Ego's side and spouse's side do not match. Moreover, three kintypes that are found on Ego's side are missing complementation partners on the spouse's side. These issues call for our attention.

Though all but two (#21 and #28) of the kintypes on Ego's side (in column 1) are not found among the spouse's side kintypes (column 2), looking at the terms in column 3 we see that all the affinal kintypes are complementarily merged, one way or another. Among the six affinal kintypes in column 1, all except two (#37 and #31) *reappear* as address terms in column 3, and so do all of the parallel kintypes.

In the previous section on direct complementation we saw how the parallel-cross complementation rule works. It works in a similar fashion here too: Ego's affine's affines are Ego's parallel kin and Ego's parallel's affines are Ego's affines too. This simply means that Ego's *spouse's siblings spouses* are Ego's parallel kin and Ego's *sibling's spouses* are Ego's affinal kin. Thus complementation definitely occurs at G^0 level too, but it works somewhat different from how it works at the G levels above Ego.

Table 4: Indirect complementation

Complementation in G^0			
Kintypes on Ego's side		***Becomes Kintypes on Ego' Spouse's side***	***And are addressed[7] as***
Parallel	*(13) dhādhal* (eB)	*(17) mūryal* (HeB), *(21) eɽmthox* (WeB)[8]	*dhādha* *eɽmthox*
	(15) akal (eZ)	*(18) pōraɽ* (EeZ)	*aka*
	(29) thamox (yB)	*(22) exundi* (EyB)	*pēka*
	(30) ēlaɽ (yZ)	*(23) kōkaɽ* (EyZ)	*pila*
Cross	*(26) maryox* (MBS/ FZS)	-------(EMBS/EFZS)	--------
	(27) mandaɽi (MBD/ FZD)	-------(EMBD/EFZD)	-------
Affinal	*(37) koyaɽ* (yBW)	*(19) exayaɽ* (HBW)[9]	*aka or ēlo*
	(14) ange (eBW)	*(19) exayaɽ* (HBW)	*aka or ēlo*
	(16) bāto (eZH)	*(20) aglal* (WZH)	*dhādha, or thamo, or agla?* [10]
	(28) pāri (CEP)[11]	*(28) pāri* (CEP)	*pāri* (CEPy) or *dhādha* or *bāto* (CEFe) *aka* or *ange* (CEMe)
	(21) eɽmthox (yZHms)	--------- (HZH)	*thamo*
	(31) kōval (yZHws)	*(20) aglal* (WZH)	*thamo*

[7] The reference terms for siblings go through minor changes in becoming address terms; the vocative words (address) are usually derived from the corresponding referential words by dropping the word-final consonant.

[8] The WeB *eɽmthox* is a namesake of yZHms, a kintype listed on Ego's side.

[9] There are no reference terms in Madia for WBW and HZH. The WBW is addressed as either *aka* (eZ) or *ēlo* (yZ) and the HZH is addressed as either *dhādha* (eB) or *thamo* (yB) based on whether the addressee is elder or younger.

[10] While WeZH is invariably addressed as *dhādha* (eB), there is the option for addressing WyZH either as *agla* or as *thamo* (yB). Incidentally, among the six kintypes on Ego's spouse's side (which are *mūryal, pōraɽ, exundi, kōkaɽ, exayaɽ, and aglal*) only the term *aglal* seems to have this option for also being used as address, which seems odd and may need further inquiry. Moreover, it is reported that it is a show of affection to address the WeZHy as the yB whereas men who may not be as loving as to do so may simply address them as *agla*. Thus it seems as an issue of attitude. For these two reasons, I do not include *agla* among the standard address terms in Table 5.

[11] The CEP here actually refers to BCEPms, ZCEPws as mentioned in Table 2.

Two things are to be noted from Table 4.

Firstly, all the kintypes on Ego's spouse's side (column 2) are *reinterpreted* so as to be made identical to (or, merged with) the kintypes on Ego's side. Ego's marriage creates new kintypes (such as spouse's siblings and spouse's siblings' spouses), which are converted into kintypes that are already existing from before Ego's marriage. This process of conversion which occurs in Ego's G level may be described as *translation,* as opposed to the simple copying or *transcription* that occurs in G levels above Ego.

Secondly, we also note that there are *alternative ways to translate* some of the G^0 kintypes. See in column three that a few of the address terms are found in multiple places, with some of them even having the option of being addressed in more than one way depending on the relative age criterion. For example, the EeZ and CEM can both be addressed as *aka* (as shown by its multiple occurrences), and the HBW can be either *aka* or *ēlo* (i.e. alternative translation) depending on the relative age.

Let us now consider the three kintypes that go missing on the spouse's side (i.e. column 2). Two of these kintypes, *maryox* and *mandaṛi* (#26 and #27), are not mentioned on the spouse's side because EMBC and EFZC are considered too distant to be designated as any specific kintypes. How so? Generally speaking, Ego's spouse's cross-cousins are to be like Ego's siblings (and vice versa). But this is contingent on Ego's spouse's cross-cousins not being already related to Ego in any other way prior to the marriage. In case of such prior relation, the former relation is likely to be continued as it is. Thus, we may say that the two terms for cross-cousins are not amenable to the complementation process. The third one, # 21 *eṛmthox* (yZHms), does not carry over as a kintype on the spouse's side because HZH (as is the WBW) is not a kintype in Madia. As a non-existing kintype, it is not available for complementation. However, the HZH and WBW do exist in real life (though not in the kin terminology) and these relatives are seen as sibling categories: HZH = B and WBW = Z, which means that these too fall within the complementation rules.

Finally, why are the H and W not listed among the affinal kintypes in the Table 4 above? These two stand for the bride and the groom, the individuals who are marrying and whose marriage makes necessary the complementation of kintypes from the two sides but these two are not amenable for complementation. (These are described as non-categories in a latter section).

1.1.3 Non-complementary Bonding

What about the kintypes from the G^{-1} level? There are six kintypes in G^{-1} level (#32 to #36, and #37 *koyaṛ* which is SW but is also a namesake of yBW). As children, these are the same type of kin to both the bride and the groom, and thus are merged non-complementarily. Relatives of the G^{-1} level are addressed either with terms of endearment which are not 'proper' kin terms, or with terms of the G^{+1} level, which is to say *self-reciprocally*.

As is seen in the table of kin categories (Table 5 in the next section), the G^{-1} kintypes do not make it to the set of categories, except for *ane* (DH). And if the DH is the only one to appear from the G^{-1} among kin categories, it is because DH is a namesake of yZHws, which is a kin category from G^{0}.

1.1.4. Summary and Conclusion

We have seen that out of the total of 64 kintypes comprising of relatives from the two sides engaged in a marriage alliance, most bond complementarily. The kintypes in Ego's own and above Ego's G levels become kin categories following two kinds of processes: transcription (that stands for direct complementation) or translation (that stands for indirect complementation). The kintypes in G^{-1} are non-complementary. So are the kintypes H and W. The kin statuses of spouse's cross cousins are contingent. With this understanding of the complementation process, we can now move on to studying the kin categories.

But before we do so, a few general comments about complementation in the south Dravidian kinship systems seems in order. As mentioned earlier, complementation is not a unique feature of the Madia kinship (which is central Dravidian), but is also found in south Dravidian kinship systems, though in varying degrees.

In the bilateral cross-cousin marriage alliance systems of south India (e.g. Tamil non-Brahmin kinship terminology as presented in Table 18 in Chapter 4), complementary bonding does occur among kintypes in G^{+1} and G^{0}, but not among the kintypes of the polar generations (+2, +3, -2, -3). It is because the kintypes of these G levels are not distinguished as parallel and cross kin. For example the term *thāthā* refers to the grandfathers on both sides, the MF and the FF. The same is true of the female kintypes in G^{+2}.

In the matrilateral alliance system though, such complementation is found to be even less than in the bilateral kinship system. Not only is complementation impossible in the polar G levels, even in the G^{0} it is only partial, because in the matrilateral kinship system the wife *addresses* all of her husband's relatives the same way as does her husband, which means his parallel relatives are same kind for her too, and his cross relatives are the same kind for her as well. However, the husband addresses the wife's relatives using affinal terms. The example of the Tamil Brahmin kinship terminology presented in Table 19 in Chapter 4 does not include the address terminology, but all my informants from this group agree that a wife is required to address her husband's side's relatives just as he does.

But with regard to the Madia kinship, because the crossness distinction is found even in the polar G levels, complementary bonding is possible in these levels too, a feature that marks the Madia terminology as unique among the Dravidian systems.

1.2. Kin Categories

As mentioned in the introductory chapter, the 37 reference terms are like a registry of all the different types of relatives in Madia, while the 20 or so address terms show how most of these 37 kintypes fall into a more limited number of categories. The following analysis is not for discovering the kin categories, for these already exist as address terms in Madia. Rather, this section is a study of the address terms in order to differentiate among these, based on their usage as well as certain behaviours or features.

The Madia address terms can be distinguished as *standard* and *non-standard*. The standard ones are "proper" kin terms which are used widely and regularly, and these stand for standard kin categories. The non-standard address terms are either generic terms, or have very limited use or are merely terms of endearment, and these stand for non-standard kin categories. The distinction as standard and non-standard kin categories and the study of these is a necessary step before we discuss the dual kin classification because it is the standard kin categories that are part of the two major social categories (or kin classes) known as *jīva* and *eṛmi* (section 1.3).

There are twenty standard address terms and a few non-standard ones. Since our focus here is on the address terms, I have rearranged the kin terms in Table 1 to create the Table 5. The difference between Tables 1 and 5 is that the latter lists the address terms first and then the reference terms as this arrangement would make it easier for the readers to observe how the kintypes are organized into categories. In Table 5 I have assigned category number to each of the categories in addition to the code numbers I assigned to the 37 kintypes in Table 1. The *total numbers*, whether of referents or kintypes or categories, are also given at the bottom of the Table 5, because these have relevance for the comparative study we do of the Madia kinship and the DNA in Chapter 3.

Before we move on, let me add here a few general notes on Madia address terms. The use of kin terms is mandatory for addressing relatives who are older than self. It is normal to address one's own younger siblings and children (including siblings' children) using their first names. Younger people outside of one's extended family, and all other distant and classificatory relatives are generally addressed using their second names or using appropriate kin terms rather than taking their personal names, as the latter would mean disrespect. People can address married adults, if younger, by referring to the addressee's firstborn child's name, but this is generally seen as a less loving way of relating, and so using appropriate kin terms is always the most preferred way. As mentioned in the introductory chapter, address terminology has certain flexibility in comparison to the reference terminology.

Table 5: Standard kin categories

G Level	Category Code No.	Categories (Address)	Kintypes (Reference terms)	Number of Key Referents
G^{+2}	1	*bāpi / ange*	*(2) bāpi* (FM, EMM)	2
	2	*ako / bāto*	*(3) ako* (MF, EFF)	2
	3	*kāko / aka*	*(4) kāko* (MM, EFM)	2
G^{+1}	4	*pēpi*	*(5) pēpi* (FeB, MeZH, EMB (e-r to F)	3
	5	*pēri*	*(6) pēri* (MeZ, FeBW, EFZ (e-r to M)	3
	6	*bāba*	*(7) thape* (F)	1
	7	*ava*	*(8) thalox* (M)	1
	8	*kāka*	*(9) kākal* (FyB, MyZH, EMB (y-r to F)	3
	9	*kūchi*	*(10) kūchi* (MyZ, FyBW, EFZ (y-r to M)	3
	10	*māma*	*(11) māmal* (MB, FZH, EF, EFB)	4
	11	*ātho*	*(12) ātho* (FZ, MBW, EM, EMZ)	4
G^{0}	12	*dhādha*	*(13) dhādhal* (eB, FBSe, MZSe) *(1) thādho* (FF, EMF) *(17) mūryal* (HeB) *(20) aglal* (WeZH) *(28) pāri* CEFe ws (see # 24 below)	8
	13	*aka*	*(15) akal* (eZ, FBDe, MZDe) *(18) pōraɽ* (EeZ) *(19) exayaɽ* (HeBW) *(28) pāri* (CEMe ms)	6
	14	*thamo*	*(29) thamox* (yB, FBSy, MZSy) *(20) aglal* (WyZHy) (same as # *20* above)	4
	15	*ēlo*	*(30) ēlaɽ* (yZ, FBDy, MZDy) *(19) exayaɽ* (HyBWy) (same as # *19* above)	4
	16	*ange*	*(14) ange* (eBW) *(28) pāri* (CEMe ws)	2
	17	*bāto*	*(16) bāto* (eZH) *(28) pāri* (CEFe ms)	2
	18	*eɽmthox*	*(21) eɽmthox* (yZHms, WeB)	2
	19	*pāri*	*(28) pāri* (CEFy ms)	1
	20	*ane*	*(31) kōval* (yZHws) *(36) ane* (DH, BDHms, ZDHws)	4
Total Kin Categories: 20			**Total Kintypes: 26**	**Total Key Referents: 61**

1.2.1 Standard Kin Categories

In this section we will discuss the twenty standard categories: their different characteristics and their usage. While this study is aimed at understanding the Madia kin categorization, some of the observations made here are also helpful in the later comparisons of the Madia kinship with the DNA (Chapter 3) and with the SUSY model of the early universe (Chapter 6).

1.2.1.1 Solitary and Sociable Categories

What is most obvious from the Table 5 is that the first eleven categories (all from generations above Ego) are solitary allowing only one kintype in each of them, while on the other hand, most of the remaining ones tend to be 'sociable', that is, having more than one member each in their congregations. The only exceptions among these seem to be the categories that are #18 and #19. The category #18 *eṛmthox* is a solitary kintype but it has two referents. The category #19 *pāri* seems like a solitary one with only one referent, but however the term reappears along with other kintypes in categories #12, 13, 16, and 17, and therefore can actually be described a sociable one.

It is also interesting to note that all of the directly complemented and transcribed kintypes (except the FF - *thādho*) are solitary categories. Similarly, all of the indirectly complemented and translated kintypes (except the yZHms/WeB - *eṛmthox*) are sociable ones.

1.2.1.2 Ambiguous Categories

The first three categories, all from the G^{+2} level, can be addressed in two ways and so can be described as ambiguous.

Table 6: Ambiguous kin categories

Standard address term	***Alternatively addressed as***
bāpi (FM)	*ange* (FMyZ = eBW)
ako (MF)	*bāto* (MFyB = eZH)
kāko (MM)	*aka* (MMyZ = eZ)

Why do these kintypes have alternative address terms? Let me explain. It is not uncommon for an extended family to have the youngest of grandparents be close in age to the oldest of the grandchildren. For an example, the MFyB and the eBDC can be close in age, in which case the two would relate as though they belong in the same generation. When the classificatory MF and FM (for example MFyB, FMyZ, etc) are same age as Ego and are unmarried, they are addressed as cross-cousins (*sangi* and *ango* respectively) and if they are older than Ego and/or married, they are addressed as *bāto* (eZH) and *ange* (eBW) respectively.

When a middle-aged woman is addressed by someone as *ange*, it is not immediately clear to the observer whether the addressee is the speaker's own eBW or a classificatory *bāpi* (FMyZ, FFyBW). Thus, when close in age, Ego addresses the G^{+2} relative using terms from his own level G^0, and of course doing so following the rules of cross/parallel distinction as is evident in the cases cited in Table 6. The case of addressing the MM is slightly different from that of FM and MF because the MM is mostly addressed as *aka* (eZ), whether own or classificatory, and the address term *kāko* is less commonly used. Therefore, if the MM is a middle-aged woman then it is not readily obvious to the observer whether she is the speaker's MM or a classificatory eZ. It is for this reason that these kin categories are described as ambiguous.

What then about the fourth kintype in this G level, i.e. the FF *thādho*? The case of *thādho* is entirely different because there is only one way to address *thādho*, and that is *dhādha* (the same address term as for the eB; see category #12 in Table 5). The *thādho* is *never* addressed as such. Thus he is indistinguishably merged with another male category from another G level, the eB.

1.2.1.3 Root or Essential Categories

There are nine kin categories that Ego owes his existence to, i.e. parents and grandparents (and also the great grandparents in G^{+3} who are merged with some of those in G^{+1}):

G^{+3}: *pēpi* (FFF = FeB), *pēri* (FFM = MeZ), *māma* (MFF = MB), *ātho* (MFM = FZ)

G^{+2}: *bāpi* (FM), *ako* (MF), *kāko* (MM)

G^{+1}: *bāba* (F) and *ava* (M)

These 9 categories are the "essential" ones in the production of an individual; without them Ego could not come to be. (If FF is missing from this list it is again because FF is categorized along with the eB in G^0.)

While it is true of all human beings to have parents and grandparents, not all cultures and kinship systems in the world see these 9 relatives as 9 distinct kintypes or categories. As far as my knowledge of Dravidian kinship systems goes, the Madia (an example of central Dravidian) is the only system that has 9 essential categories. The south Dravidian systems have at least 12 such categories or address terms (and many more kintypes or reference terms) for relatives in the G levels above Ego.

1.2.1.4 Single Referent Categories

The Father and Mother are unique among the standard categories as each has only a single referent. What about step-parents? The Madia step-father is addressed either as *pēpi* FeB or *kāka* FyB, and similarly the Madia step-mother is either *pēri* MeZ or *kūchi* MyZ.

Let us also note that the category #19 (CEP) looks like having only a single referent, but it is not so because, unlike the F and M, the CEP actually has different referents such as CEF and CEM which are then further distinguished as elder or younger, and also by "ms" or "ws".

1.2.1.5 Joking and Avoidance Categories

The observations made so far in this section are quite obvious from Table 5 (of kin categories). But there is a feature that is not as obvious from the address terminology, and is observed only in kinship usage, i.e. the behavior of the relatives as manifest in the interactions among them.

The two affinal kintypes, *mūryal* HeB and *pōraɽ* WeZ, which are spouse's elder siblings, are placed, quite strangely, along with the sibling categories as is shown in the address terms of these two kintypes. Behaviorally, these two kintypes must adhere to avoidance rules prescribed by social norms; daily interaction with these two relatives is to be minimal. Breaking of this avoidance taboo subjects violators to penalties. These categories are opposite to those that can be described as the joking categories – *ange* (eBW) and *bāto* (eZH). Among the Madia, the joking interaction between HyB and eBW, and between eZH and WyZ, can be carried on to the point of insulting or seduction. Everyone here has funny stories to tell about their joking relation with these kintypes.

1.2.1.6 An Anomalous Category and an Anomalous Kintype

Nineteen out of the twenty standard categories include kintypes which are from either Ego's own G level or from the above Ego G levels. The *ane* (DH/yZHws) is the only category that includes a kintype from the G^{-1} level (i.e. the DH). This is so because the term *ane* is an address term also for another kintype, i.e. *kōval* (yZHws), which is a member of the G^0 level. It is also strange that *ane*[12] refers to two kintypes in adjacent G levels. Therefore it can be described as an anomalous kin category.

There is a kintype that is conspicuous by its absence in this list of kin categories: *koyaɽ* (yBW). This term does not make it to being one of the standard kin categories, even though its kin counterparts, *eɽmthox* yZHms and *kōval* yZHws, both do. We can explain that it is missing because it is also a namesake of the SW in G^{-1}.

It does seem strange that while the DH from G^{-1} seems to have made it to being part of the standard categories, the yBW from G^0 is relegated to being a non-standard one (see Table 7). The male kintype *ane* (yZHws = DH) seems to enjoy a privilege that the female kintype *koyaɽ* (yBW = SW) is not allowed to. We may see this as a principle of balance at work – a kintype

[12] The *ane* (DH) is also addressed as *lāmane* in case the DH was someone who did *lām* 'bride-service' before marrying his bride. Young men who cannot afford to pay a bride-price can offer their labor for a few years in the potential father-in-laws' farms, and these men are referred to/addressed as *lāmane*, a term that might linger even after he has married the girl and become *ane* (DH).

from the G^{-1} level is moved up while a kintype from G^0 is moved down. Nevertheless the point to be made here is that this kintype *koyaṛ* (yBW = SW) is an anomalous one, in the same sense as is the kin category *ane*.

1.2.1.7 Defining Characteristics of Standard Categories

The twenty standard categories include only 26 of the total 37 kintypes. The question arises as to why certain kintypes are standard categories while others are not. What may be the basic criteria for standard categories? We can try to answer this question by identifying certain common characteristics shared by the twenty standard address terms. The following seem to be the defining characteristics of a standard kin category.

1. *Complementation*: Only those kintypes that are amenable to the complementation process become standard kin categories.

2. *Marital* status: Every one of the twenty standard categories either denotes a married adult or has at least one married kintype in its group of key referents. This is probably the reason why the terms *exundi* (EyB) and *kōkaṛ* (EyZ) are not address terms (and why these kintypes are not included anywhere in the list of key referents for the 20 standard categories in Table 5).

3. Kin *distance*: Notice that all key referents in Table 5 (as well as Tables 7, 8, 9) are maximum of three letters long (e.g., MBD, FZS) and none of the key referents is four-lettered (e.g., HMBD, WFZS). We can infer that a four-lettered referent is not close enough to be a "key" referent, neither can it be a category. This partly explains why the address terms for cross cousins *sangi* and *ango* are not standard kin categories. When becoming kintypes on the spouse's side, the cross-cousin kintypes would be denoted by four letters (e.g. HMBD, WFZS etc.), and thus become too distant to be proper kin categories. How Ego's cross-cousins would be related to Ego after their marriages would be contingent on who these (Ego as well as cross-cousins) would be married to.

4. *Generations*: The twenty kin categories are from either Ego's or above Ego's G levels. No kintype from G^{-1} makes it to being kin categories (on its own merit) and this can be related to point 1 above to say that it is so because there is no complementation in G^{-1}.

1.2.2 Non-standard Kin Categories

Non-standard categories are those kintypes that are not addressed using proper kin terms but with terms that are meaning-based or descriptive, or terms of endearment. Besides, we can see that such terms also do not meet the basic criteria we discussed above for standard categories. The non-standard categories can be further distinguished as follows:

1.2.2.1 Universal Categories

Two of the non-standard categories are known and used in a specific sense throughout the Madia society and hence described as universal. Generally, the terms *pēka* 'boy' and *pila* 'girl' can be used to address any unmarried youngster. The following sentences are examples: "Who is that *pila* standing over there?" "Is the newborn a *pēkal* or *pila*?" You may address a young boy or girl who is not related to you and whose name is not known to you as *pēka* or *pila*. These terms are also used to mean 'son' and 'daughter' as in "this is my *pēkal*" or "I would like to meet your *pila*". However, these two terms are used specifically to address the kintypes *exundi* (EyB), *kōkaṛ* (EyZ) and *koyaṛ* (yBW) as listed in Table 7 below. The social context leaves no doubt as to whether the terms *pēka* and *pila* are used as generic nouns or in reference to the three specific kintypes.

Table 7: Non-standard universal categories

G Level	Category Code.	Categories (Address Terms)	Kintypes (Reference terms) and Key Referents
G^0	21	*pēka* - 'boy'	*(22) exundi* (EyB)
	22	*pila* - 'girl'	*(23) kōkaṛ* (EyZ) *(37) koyaṛ* (yBW, also SW from G^{-1})
Total	**Kin Categories: 2**		**Kintypes: 3**

Note that the kintype *koyaṛ* (yBW) meets all the four criteria discussed above and yet it is not one of the 20 standard categories; rather it is addressed as *pila* and is included along with *kōkaṛ* (EyZ). In this sense it is an anomalous occupant here (see also section 1.2.1.6).

By being assigned the terms *pēka* 'boy' and *pila* 'girl' the three kintypes listed here have the same kin status as the unmarried youngsters, even when they may actually be married. It is interesting to note here that two of these three relatives (WyZ and HyB) are potential spouses for male/female Ego in case of Ego being widowed and the WyZ/HyB still being single and available. In contrast to these two, the third one, yBW is an avoidance type (i.e. non-joking and non-marriageable) and she is terminologically equated with the SW, who a kintype from the G^{-1} level.

It seems that the non-standardization of the first two kintypes (spouse's younger siblings) relates to the potentiality for future marriages with Ego, whereas the non-standardization of the third one (younger sibling's spouse) is related to avoidance or non-marriageability. This may be a significant issue in Madia kin categorization for we must revisit this issue in Chapter 3 (section 3.1.2) as well as later on in chapter 4 (section 4.2.1.1) on widow inheritance.

1.2.2.2 Transient Kin Categories

The address terms for male and female cross cousins (*sangi* and *ango*) are also universal but are limited in use and have partial existence, and hence can be described as transient, which is the reason why I have not assigned these category code numbers.

Table 8: Transient categories

G Level	Categories (Address terms)	Kintypes (Reference terms) and Key Referents
G^0	*sangi*	*(26) maryox* (FZS, MBS)
	ango	*(27) mandaṟi* (FZD, MBD)

As unmarried youth, cross-cousins address each other as *sangi* (male) and *ango* (female). But once married, these would be addressed using kin terms other than the ones for cross-cousins. A male cross-cousin who is married is addressed as either *bāto* (eZH) or *eṟmthox* (WeB, yZHms) or *pēka* (HyB) or *dhādha* (HeB) or *ane* (yZHws) depending on who Ego or the male cross-cousin has married. Similarly, a female cross-cousin who is married is addressed as either *ange* (eBW) or *aka* (WeZ) or *pila* (yBW). Married adults are never addressed using the terms *sangi* and *ango.* However, while such a taboo applies strictly with regard to the female cross-cousin, it is only partially applied to the male cross-cousin. I shall explain this.

Among men, the term *sangi* may be used even after the men have gotten married, but certain conditions apply. The *sangi* must be close in age or younger to the speaker in order for him to be addressed as such. Furthermore he should not be married to any of Ego's relatives, which would give him a new kin status that would overrule the earlier relation as cross-cousin. But on the other hand, a woman can never address her male cross-cousin as *sangi* when he is a married adult. Since the use of the term *sangi* is limited to unmarried youth and used only among married men, we may say this is a *partially existing category*.

Thus, while the term for the male cross-cousin *sangi* could continue to exist, even if only partially, the term for the female cross-cousin *ango* ceases to exist once the addressee is married. A married woman is never addressed as *ango* either by male or female speakers, and she is addressed as either *ange* (eBW), or *pila* (yBW) or even using sibling kin terms such as *aka* (eZ) or *ēlo* (yZ) which is done as recognition of her marital status and as a mark of respect for that status.

1.2.2.3 Non-universal Categories

The address terms used for children (S, D, GC, EGC) are optional ones as the kintypes in this level are commonly addressed using their given names. As we see in Table 1, the kin in descending G levels are often addressed with "proper" kin terms from the ascending G levels, due to the self-reciprocal quality inherent in this kinship system (refer to Appendix II). Besides the self-reciprocal terms, there are a few other address terms that are used for children and one term used for grandchildren which are really terms of endearment expressing fondness or affection. Moreover, these optional address terms are non-universal, which can vary from family to family, or from region to region in the Madia country.

Table 9 presents the data differently than the other tables in this section. Though there are only seven address terms for children given here, there can always be other optional terms to address children which are less common and therefore not in the knowledge of my informants. The total number of address terms for children do not seem all that important anyway to the arguments in this paper about kin categories because, as we shall see later, children are not kin categories, and therefore calculating the number of such non-universal categories is not necessary.

Table 9: Non-universal categories

G	**Non-Standard and Non-universal Categories (Address Terms)**	**Kintypes (Reference terms) and Key Referents**
G^{-1}	*pēdu* (yZSws, HyBS, SSSws) *pēda* (BSms, SSSms)	*(32) max* (S)
	pēdi (BDms, HBD, SSD)	*(33) mayaŗ* (D)
	bacha (WBS)	*(34) anemax* (BSws, ZSms)
	bachi (WBD) *pōye* (BDws)	*(35) anemayaŗ* (BDws, ZDms)
G^{-2}	*wāndo*[13] (SSws, SDws, DSms, DDms)	-------

We can make three observations from Table 9. Firstly, the total number of kintypes from G^{-1} is actually six, but only four of them are listed in the table above. The two remaining ones are the two children-in-law; one of them, the *ane* (DH), is listed among the standard categories and another, the *koyaŗ* (SW) is a non-standard category. Secondly, there are no kintypes (or reference terms) in G^{-2} level. Thirdly, though the optional address terms may be just terms of endearment, these do seem to follow rules of appropriateness (such as male/female and parallel/cross distinctions) as is shown by the fact that these have specific key referents. For this reason, these cannot be dismissed as mere expressions of fondness, but must be considered as kinship relationship terms.

[13] Informants say that the term *wāndo* is less common these days than it was in previous generations. It may be noteworthy that the list in Grigson (1938) list mentions this term.

1.2.3 Non-categories

The twenty standard categories, two non-standard ones, two transient ones and seven (or an indeterminate number of) non-universal ones which we have discussed so far cover 35 of the total 37 Madia kintypes. The only two remaining ones are the *mujo* (H) and the *muthe* (W). The H and W are non-categories because there are no address terms for spouses. Needless to say, the spouses (H and W) are the reason why the other kintypes that merge complementarily do so. How the couple's marriage causes the complementary bonding of relatives from the two sides is what we have been studying all this while in section 1 and 2 of this chapter. As the central reference points for the complementation process, the spouses bond complementarily as two *individuals* but there is no opportunity for them to complement as *kintypes*.

Besides the H and W, there are also the four kintypes (# 32 to #35) from G^{-1} (Table 9) that are non-standard and non-universal, which can also be described as non-categories because these do not meet three of the four criteria mentioned in section 1.2.1.7. And so are the two transient ones. Thus, counting all these together, the total number of kintypes that are excluded from being kin categories are eight.

1.2.4 Summary and Conclusion

The conclusion we draw here is that the key concept that forms the fundamental logic for the Madia kin categorization is complementation. Complementation is based on crossness. Crossness has to do with regulating marriage alliance. Marital status, which is synonymous with adulthood, is a defining factor in categorization of relatives.

We have seen that the 37 Madia kintypes fall into twokinds of kin categories:

(i) Standard and universal kin categories (which are 20)
(ii) Non-standard but universal kin categories (which are 2).

Kintypes that are neither standard or non-standard categories are described as non-categories. Let us note that the total number of kintypes included in kin categories (standard and nonstandard) are 29, and the kintypes that are not included in categories are 8.

1.3 Social Categories

The twenty standard kin categories fall into two major groups, which we call social categories. The Madia terms for these are *jīva* and *eṛmi*. Each and every relative is either a *jīva* or an *eṛmi*. The word *jīva* literally means 'life' as well as 'love', and in the context of kinship it stands for 'siblingship' because *jīva* refers to 'those who share in the same life'. In contrast, the term *eṛmi* refers to 'those who are and can be partners in marriage exchange', i.e. those who are the actual and potential *bride-givers* and *bride-takers*. These are mutually exclusive entities that stand for twin opposing ideas: siblingship and marriageability. Behaviorally, the *jīva* is generally a non-joking social category wherein the relationship is marked by mutual affection and respect for one another. On the other hand, the interaction with the *eṛmi* can be done in a joking mode, where "joking" can range from playful teasing to ceremonial insulting and shaming.

The *jīva* and *eṛmi* are alternatively known as *dhādha-thamox* and *ako-māma*, terms which are rather explanatory (Grigson 1938:236, von Fürer-Haimendorf 1979:356). Note that these two alternate expressions use four kin terms (the first one *dhādha-thamox* are the terms for eB & yB and the second one *ako-māma* are the terms for MF-MB), and that all of these are male categories. Madia is a patrilineal and patriarchal society, and the alternative descriptive terms for the two social categories using all male kintypes only illustrate the "domination" of male membership in the social organization. The male relatives such as F, FF, FB, B and S are members of the kin class *jīva*, and others such as MB, MF, FZH, ZH, WB and DH are members of the kin class *eṛmi*. Thus the male relatives are either *jīva* or *eṛmi*, and unambiguously so. In comparison, the membership of the married women in these two social categories seems somewhat ambiguous, and thus calling for an investigation.

1.3.1 Issue of the Female Kin Categories

The question here is this: who are *jīva* and who are *eṛmi* among the female relatives, i.e. the MM, FM, M, MZ, FZ, MBW, Z, SW and D? Does the dichotomous principle of siblingship and of alliance-partnership even apply to women relatives? What follows is the summary of the explanation I received from some of my Madia informants.

The Madia do distinguish their women relatives as *jīva* and *eṛmi*, but they also acknowledge that it may seem ambiguous due to the fact that married women are where the two principles, *jīva* and *eṛmi*, "mingle". The mingling refers to the marriage alliance and it means that a Madia woman, i.e. the bride, who becomes first the W and later the Mother for children on her husband's side, is originally the *jīva* of the side that is opposite to her husband's group (i.e. his *eṛmi*). As objects of exchange between two groups, women may seem as belonging in both places. However, a woman is the *jīva* of the group where she is born. This issue becomes more clear when we consider couples that are separated. In disputes such as this, the "divorced" woman is returned to her *jīva*, which is her father's and brother's people, whereas the children born to her must remain with their father because the children are considered as the *jīva* of their father but not of their mother.

However, since such explanations did not seem totally satisfactory to me, I further investigated this issue by doing, once again, an analysis of the address terminology (which, as always, I carried out with the help of Madia informants). For this analysis of the female kin categories we will consider two things as follows:

1) The address terms (including the reciprocals) used by certain key female categories.
2) Joking and non-joking behavior of such key female categories.

The two female categories in G^{+2} (*bāpi* FM) and *kāko* MM) and two of the four female categories from G^{+1} (*ātho* FZ and *kūchi* MyZ) are chosen as the key ones for our investigation. The reference or address terms *used for* these women categories may not give us much of a clue as to their classification, but the reciprocal terms *used by* these women do. Now, reciprocal terms are address terms too, but it is helpful for our analysis here if we view these as separate.

1.3.1.1 The Categories bāpi (FM) and kāko (MM)

The fact that *bāpi* (FM) can also be addressed as *ange* (eBW) when close in age with Ego can itself suggest that the FM is not a *jīva* but rather an *eṛmi*. But what can show this more clearly are the reciprocal terms. Reciprocally, the FM can sometimes address her SS and SD as *sangi* and *ango*, mostly doing so while in a joking mode. Recall that *sangi* and *ango* are terms for cross-cousins, who are not considered as *jīva*. With regard to kin behavior, it is quite acceptable for the FM to joke with her young and unmarried SS calling him her future husband and asking him to marry her, even though she normally (i.e. in non-joking situations) addresses her grandson using the non-standard address term for boys *pekā*.

Contrary to how the *bāpi* (FM) reciprocates, the *kāko* (MM) is addressed as *aka* (which is same as the address term for eZ), and the MM does not ever engage her daughter's children in joking as does the FM routinely. Being addressed with a term for elder sister and being a non-joking category, the MM clearly belongs with the kin class *jīva*.

Another important observation is the equation of MM with FFZ (both referred as *kāko*). The address term for these two referents is either *kāko* or *aka* (eZ). The eZ is unambiguously a *jīva* category. We have already noted that the FF is addressed as *dhādha* (eB) and is unambiguously a *jīva*. Even as the eB and eZ are both *jīva*, the FFZ is as much a *jīva* as is her brother the FF. The main point to be made here is that the siblings in G^{+1}, i.e. FF and FFZ, are categories that belong together in the same kin class *jīva*.

Let us now consider the equation FM = MFZ (both referred to as *bāpi*). The MF is unambiguously *eṛmi* just as the FF is *jīva.* In the same way that the FF and FFZ belong in the same social category, the MF and MFZ too, as siblings, belong together in the same class as *eṛmi*.

The conclusion we make is that male and female siblings in G^{+2} level are the same kind of kin. We shall investigate below if the same is true of the female categories in the G^{+1} level.

1.3.1.2 The Categories āthо (FZ) and kūchi (MyZ)

The term FZ uses for her nephew[14] (BSws) is *kāka* which is also the term for FyB who is a *jīva*. Besides, just as the FZ does, the FyB too addresses his nephew as *kāka*. (FyB = eBSms = *kāka* is a case of self-reciprocity, examples of which abound in the Madia kinship system.) On the other hand, both the MB and the MyZ use the term '*māma*' for their ZS. The Madia *ātho* FZ is generally a non-joking category (which is, by the way, unlike the Tamil kinship where the FZ is indeed a joking kintype.)

Let us consider the fact that *kāka* (FyB) is a term for parallel kin (i.e. *jīva*), whereas the *māma* (MB), as a cross kin and which is also terminologically equal to FZH and WF/HF, is an affinal category belonging in the class of '*eṛmi*'. (Similar to the above mentioned FyB = eBSms = *kāka,* the equations *māma* = MB = ZSms is also a case of self-reciprocity.)

Through such comparisons we can see that the female category MyZ is similar category as is her brother (MB), and therefore can be seen as belonging in the same class as does her brother, i.e. the *eṛmi*.

In the above analysis, we have attempted to resolve the seeming ambiguity about the female kin categories, as to which ones are *jīva* and which ones are *eṛmi*. The ambiguity exists because female categories, cannot be the *eṛmi*, practically speaking, because the term *eṛmi* refers to the "wife-givers" and "wife-takers", but women are neither givers not takers but the entity that is given and taken. However, we can see from the analysis of the reciprocal terminology and behavior whose *jīva* 'sibling' a female category is. A woman is a *jīva* of her B and her F, and it goes without saying that she *cannot* be a *jīva* of her MB or her H, to whom she becomes, respectively, the SW or W.

The above analysis shows, once again, that male and female siblings are similar kin categories and fall under same social category. Here are two reasons why it might sound reasonable that sibling categories belong in the same social categories: (1) Male and female siblings, as young children, refer to and address all their elders (i.e. the 'above Ego' generation relatives) using the same kin terms and, needless to say, the siblings continue to do so even after they are married and for the rest of their lives. The terms that the siblings use for their relatives in G^0 are always different from those that are used by their cross-cousins. (2) On the contrary, the two spouses, the H and W, do not use the same terms for relatives either in their own

[14] Here I am not considering the address term for a "niece" (BDws) because the term used by FZ for her BD is *pōye* and this term is used only for that single referent (i.e. BDws) and not for anyone else. This means it is not as useful an example for our discussion here as is the term for her "nephew".

generation or the generations above. Therefore, the H and W cannot belong in the same social category.[15]

The conclusion, in this case too, is that the Madia married women belong in the same social category as their male siblings, which will be the group that is opposite of their husbands. Thus, the FZ belongs in the same social category as F (*jīva*) which is the opposite of the group the FZH belongs in (i.e. *eɽmi*). Similarly, the MyZ belongs in the same social category as her brother, i.e. the MB (*eɽmi*) which is the opposite of the group where the FB belongs.

What applies to MyZ easily applies to MeZ too, because the MeZ too uses the term *māma* for her yZS (otherwise using *pēdu*). What then about the Mother?

1.3.1.3 The Mother (M)

The mother usually does not use the address term *māma* for her son as her brother and sisters do. She does not really need to use any kin term at all because she can use his personal name all through his life, even after he is married. But sometimes when she is in a joking mode, which is only rarely, she can address him as *māma*.

I was not quite convinced about the M's classification as *eɽmi* until a team (or focus group) of people headed by Sainu Wadde of Halver village explained this issue to me. The following is a rough translation of his explanation: "Two things. Firstly, my mother addresses my FF as *māma*. Now who is my FF? Isn't he my eB? Therefore, whatever my FF is to my mother, I am the same to her too. And secondly, my wife calls my mother *ātho*, and my mother addresses my wife self-reciprocally as *ātho* too. If my wife is my mother's *ātho*, then who am I to my mother? As the husband of my mother's *ātho*, am I not my mother's *māma*?" Thus, when this issue was explained to me using the self-reciprocal nature of this kinship system, it became clear that the M belongs in the *eɽmi* category.

The reason why the issue of the M seem confusing is this: As a couple, the H and W refer to and address their "children" using the same kin terms. There are six kintypes in G^{-1} and they are all the same in relation to the married couple. But we must note that it is only the children and the children-in-law (i.e. relatives in G^{-1} level) that a couple, the H and W, could refer to using the same kin terms. However, the grandchildren and great grandchildren are addressed differently by the couple. For example: SSms is *thamo* (yB), whereas SSws is either *pēka* (HyB)

[15] Although the two reasons given here will apply to the Tamil kinship (i.e. a bilateral system), the Tamil terminology does not work like the Madia terminology. In Tamil, the classification as two social categories (known as *pangali* and *uravumurai* in Tamil) is not as distinct. For an example, the address term *thambi* for yB is one that can be used by all types of female relatives, eBW, WeZ, FZ, MZ, FM and MM and therefore these female relatives cannot be distinguished on the basis of reciprocal terms. Besides, in Tamil *athai* (FZ) is a joking category. Therefore, it does not seem possible to say about the Tamil kinship that the male and female siblings belong in the same social category.

or jokingly *sangi* (MBS/FZS). Thus, while the kin terms from all other levels show that the H and W belong in opposite social categories, the G^{-1} level alone make it seem ambiguous. But then, let us recall here that the relatives of G^{-1} level are not even among the standard kin categories. Therefore, if we consider the broad societal view, and take into account all the G levels together and the overall pattern of classification, then the female categories fall into the same group as their male siblings.

The seeming ambiguity about the mother may also be due to the fact that when seen a *kintype*, where the emphasis is on *genealogical connection*, she belongs in one's own patrilineage because she is the FW. But when seen as a *social category*, she clearly falls in the MB's group as a cross kin.

1.3.2 Two Major Social Categories

Following the understanding gained from the above analysis about the status of female kin categories in the social organization, the twenty standard kin categories can be listed in the two groups: *jīva* 'siblings' and *eɽmi* 'alliance-partners'. There is also a subgroup within the *eɽmi*, which the Madia call the *putulthor*, or simply *putul*[16] to refer to the MB's group distinguishing these from the rest of the *eɽmi*. While the main basis for the distinction between the two kin classes is marriageability, these are also characterized by non-joking (i.e. for the *jīva*) and joking (i.e. for the *eɽmi*) behaviors which need some mention here. Behaviorally, the *jīva* relate affectionately, and the elders among the *jīva* with patriarchal authority. The *putulthor* show affection and fondness to their *putuli* (ZCms) but can indulge in mild joking that amounts to simple teasing. The *eɽmi* generally are aggressive jokers, indulging in jokes that are meant to humiliate and insult one's *eɽmi*; the joking between opposite sexes belonging in *eɽmi* groups can be loaded with sexual overtones. Some examples for the different kinds of joking follow.

The distinction between aggressive and affectionate joking is made based on the content of the joking. The eBW-HyB duo can engage in obscene jokes, often in front of a watching crowd at occasions such as weddings when they can get drunk, or during festival times when the atmosphere is rather permissive. The eBW-HyZ duo exchange insults as jokes; and so do the eZH-WyB. The eZH and WyZ engage in practical jokes, aimed at making life difficult for one another and in ways that would entertain observers. These are examples of aggressive joking.

Affectionate joking is between MF and DD, as well as between FM and SS. The MF proposes to marry his DD promising her infinite bliss, and so does the FM to her SS. The MB and even the M and MZ make jokes with the C and ZC about their father's lineage or clan, for

[16] *putul* literally means 'birthplace' or 'place of origin'; the word *puttor* means 'were born' and *putikiyina* is 'to make' or 'create' or 'to give birth'. In both these examples, the root word is *put*. In the kinship system, the word *putul* is used in reference to one's mother's womb which is understood to be one's 'birthplace' and one which belong to one's MB's family and clan. This is the how the FZD is called *putul-pila* (whereas the MBD is not) because the FZD belongs to her MB's clan to which she must go as the bride of her MBS.

example, about how weak or poor they are. The FZ jokes with her brother's children asking about their prospects for marrying her own children, like asking her BS how much bride price he would give which amounts to nothing more than teasing. The content of jokes made by FZ is never obscene or intense.

The following then is the Madia kin classification which is presented with only one primary referent for each category (except for the MM and FM where it helps to mention whose siblings these two female categories are).

The *jīva* (Non-Joking) (9)

G^{+2} level: *kāko* (MM = FFZ)
G^{+1} level: *pēpi* (FeB), *kāka* (FyB), *bāba* (F), *ātho* (FZ)
G^{0} level: *dhādha* (eB), *thamo* (yB), *aka* (eZ), *ēlo* (yZ)

***The eɽmi* (Joking) (11)**

putulthor (Affectionate Joking) (6)
G^{+2} level: *ako* (MF), *bāpi* (FM = MFZ)
G^{+1} level: *māma* (MB), *ava* (M), *pēri* (MeZ), *kūchi* (MyZ)

eɽmi (Aggressive Joking) (5)
G^{0} level: *ange* (eBW), *bāto* (eZH), *eɽmthox* (WeB/yZHms), *ane* (yZHws), *pāri* (CEP)

The 9 kin categories in the *jīva* group are relatives from the father's side. The *eɽmi* group has 6 kin categories that are relatives from the mother's side, and 5 that are relatives only through alliance. Among the sub-group that is *eɽmi*, the majority, actually four out of the five, are the spouses of Ego's siblings where *pāri* is the only odd one. In the sub-group of *eɽmi*, all are from G^{0} level, which means that the distinction as *putulthor* and *eɽmi* is relevant only in the G^{0} level whereas, on the whole, there are only two: *jīva* and *eɽmi*.

The Madia kin terminology published in an earlier paper (Vaz 2010) had the three social categories labelled as *parallel*, *cross* and *affinal*. But this was not done exactly in line with the conventional use of these labels. The tradition is to classify the kintypes F, FB and M as parallel kin and the FZ and MB as cross kin. While such labeling reflects accurately the south Dravidian kinship (which I share by birth), it is not true of the Madia kinship (which may indicate a pattern common to central Dravidian).

The analysis of the Madia female categories has shown that the MZ falls along with the cross and the FZ with the parallel. However, if glossing the indigenous terms *jīva*, *putul* and *eɽmi* as 'parallel', 'cross' and 'affinal' would be a source of confusion to my readers, then it may be better to gloss these terms in a rather simple manner as father's side, mother's side kin and spouse's-side respectively. While the first two consist of relatives on the *sides* of the mother and the father, the last one consists of spouses themselves (of Ego and of Ego's siblings) and does not refer to the relatives on the spouses' side, i.e. the spouse's siblings or the spouse's siblings' spouses where the only exception is *pāri* (CEP) for CEP is not a spouse-kintype.

From the perspective of alliance, the mother's side categories and the spouse categories would both fall in the "exchange-partners". Thus there are only two main social categories: *jīva* and *eṛmi*. This then is the grand scheme of Madia kin classification, a dual organization (refer Appendix II). *Marriageability* is the fundamental principle of distinction in this dual organization. Madia kin classification is all about who one can marry and who one must avoid marrying.[17] (The *jīva* as siblings and the *eṛmi* as exchange-partners can be seen as having to do with the two fundamental social interactions: production[18] and reproduction, both of which are essential for the Madia's survival, not just as a family but as a clan and as a society as well.)

Let me also point here to a certain flexibility that exists among the social categories with regard to another aspect of kinship, i.e. the kin behavior. Though I have glossed *jīva* as non-joking and *eṛmi* as joking, there is some overlap here. The FZ who is *jīva* can sometimes make jokes with her BC (as mentioned above in our discussion on affectionate joking) even though she is generally a non-joking category. Similarly, *ane* (yZHws) falls along with the *eṛmi* group but it is actually an avoidance category, and its namesake the DH, though not avoided, is a non-joking category. This means that while the distinction as *jīva* and *eṛmi* as broad social categories is accurate, the distinction based on the dimension of their behaviour as "non-joking" and "joking" shows some overlap.

1.3.3 A Three-Way Kinship Connection

It is interesting how the Madia perceive the connection to the relatives on the three sides. The word *jīva* means 'life' and life is believed to be in blood. Thus it is only the Father's side kin that are related through blood. But the Mother's side kin are related through the mother's milk. The womb that bears children is a property of the MB's clan. This is the reason why the question *where were you born?* is actually meant to ask *who is your mother's brother?*'[19] Like the womb, the mother's milk also belongs to the MB and his clan. The debt of the womb and the milk are paid back only by sending the woman's daughter back to marry the MB's son, and in case of unavailability, at least one of the MB's classificatory (or distant) sons. The third one, the

[17] One recalls Dumont's description of the Dravidian kinship as an expression of affinity (Dumont 1983).

[18] Madia patrilineage known as *thexa* usually lives patrilocally and own lands for doing subsistence farming.

[19] During the initial stage of my Doctoral research, I collected the genealogies of half of the households in the Ithapadi village of Bhamragarh tehsil before a kind old lady pointed out to me that I seemed to be confusing the Madia "place of birth" with the Father's clan while 'place of birth' actually referred to the Mother's brother's clan.

eɽmi side, is perhaps seen as related through semen, although that too is referred, euphemistically, as the blood. Blood, milk and semen seem to be the three "fluids of identity"[20].

There are three questions that the Madia would ask in order to fix the complete identity of a new acquaintance: *What is your father's clan? Whose milk did you drink? Who did you marry?* As with the first one, the second and third questions also refer to lineages and clans, and not to individuals. Every member of Madia society has the threefold identity: Father's clan, Mother's Brother's clan and Spouse's clan. Thus we may say that the social identity of a married adult is a triplet code. Recall that every married person in Ego's and above Ego's generation levels, except for H, W and yBW for reasons mentioned earlier, falls into one of the twenty standard categories. Therefore, we can say that a standard kin category is a triplet code.

What then about unmarried adults? The question usually does not arise because none among the Madia remain unmarried. The lame, the blind, the lepers are all taken in marriage[21]. Besides, one is not really an adult until one is married[22]. Recall that having at least one married kintype was a criterion for kin categories (section 1.2.1.7).

The Madia words for bride and groom are *marmi-pēkal* and *marmi-pila*, meaning the 'boy' and 'girl' who are to be married. Boys and girls marry and then they become *ānchaɽi* 'woman' and *kōythox* 'man'. This is an indication of the worldview that marriage makes adults out of boys and girls who then become grown members of the Madia society.

1.4 Madia Alliance, Social Organization and Structure

What has gone on so far in this chapter is all about kinship relationship and categorization of kin among Madia. In this section we will consider its relation to the Madia marriage rule, its social organization and structure. Linkage between these phenomena has long been argued for. That "kinship terminologies do not exist in a vacuum but are influenced by the marriage rules of the societies in which they are found" has been recognized as one of the fundamental ideas about the nature of kin terminologies (Godlier 1998:5).

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[20] Balachandran (2010) mentions the first two as fluids of identity in her study of the Kolami (also a Gond) tribe.

[21] There are many kinds of marriages: by bride-capturing (often ceremonial), by offering a year or two of bridal-service in her father's rice fields, or by living together based on mutual consent. A woman could go and live in the house of a young man she likes, and work to win the hearts of his family. This type of marriage is called *oɽiy vāyna* 'coming under the roof' (of a potential husband). These do not have the prestige of an arranged marriage; but arranged marriages often involve a proper wedding ceremony with feasts which not everyone can afford.

[22] In a sharp contrast to the south Dravidian societies where families sometimes celebrate the attainment of female puberty like a wedding, the Madia do not have any ritual to mark either female or male maturity. In the absence of such rites of passage, marriage is the one to mark an individual's coming of age and attainment of adulthood.

1.4.1 Madia alliance and social organization

The father's sister's daughter (FZD) is the preferred bride among the central Dravidian tribes as has been noted by ethnographers such as Grigson (1938) and Thusu (1965). To my question "how do you normally go about arranging for your children's marriage?", all the male informants said that the first people they would approach to ask for brides for their sons are their sisters, either their own sisters (born of their mother and/or father) or the classificatory sisters who are their FBD (but not their MZD, unless of course the MZ is married to a FB). Informants have also said that while they have to go around villages looking for brides for sons in case there are no FZDs available, they normally do not have to look for grooms for their daughters but rather wait for suitors to line up with the offer of bride-price[23] of bridal service[24].

Underlying the practice of the FZD marriage is the cultural idea of the debt of milk or womb, as already mentioned in the preceding section (1.3.3). This debt in a previous generation carries over to the next generation and is paid back in the FZD marriage, which would involve minimally 2 but could also involve more than 2 generations. There is also the religious belief that when a baby boy is born, his father's clan-gods (or souls of their ancestors in the underworld) rejoice over the birth of a male child, a future member of their clan. But if the baby is a girl, it is the clan-gods of the baby's MB that celebrate her birth because this girl child would eventually return to her MB's clan to marry her MBS and to produce future male members for the MB's clan.

It seems relevant to point out here how the Madia describe the alliance exchange as they distinguish between the "old" and "new" alliances. The Madia term for marriage alliance is *eɽmi-kaxsna* and the *kaxsna* 'play' or 'game' refers to the interaction between the two *eɽmi* groups or "exchange partners". Since the FZD alliance is all about returning a bride taken in the previous generation (the "paying off the debt of mother's milk"), it is a mere continuation of a-generation-old exchange interaction.[25] While any cross-cousin alliance, whether MBD or FZD, is an "old" alliance, the FZD marriage alone is like the scene 2 of an older "play" or the second half of a sports "game". Madia understand a 'new alliance' (that occurring between previously unrelated people) as the first half of the game and the FZD alliance as the second half of one and the same game. When a girl baby is born, the baby's MB rejoices that a "future wife" for his

[23] This practice is very different from the general practice in India, whether north or south, which is for the girls' parents to offer huge dowries in gold, cash and kind while looking for grooms for daughters.

[24] Bridal service is when a young man who cannot afford to pay the bride price to offers his labor in her father's fields and gardens. While the regular kin term for DH is *ane*, there is also the alternative term *lāmane*, from the root word '*lām'* which means 'to serve', and this term is used for DH who serve or served for a bride.

[25] What forms the rationale for the kin terminology is not the marriage in the G^{+1} generation, the scene 1, but rather Ego's own wedding, i.e. scene 2. The terminology seems to show that the key affines are not the F and FZH, but the WeB and the yZHms who are both *eɽmithox* 'alliance-partner' (and who are both from G^{0}.)

clan has been born, and this shows that the stage for scene 2 of the exchange is all set even before the bride and groom are born.

The question about how many exchange units are required comes up. The new alliance, or the scene 1, requires four exchange units. One is the groom's clan, another is the bride's, and the third and fourth are the two MBs of the groom and the bride. The MB of the groom and the MB of the bride must be in two different groups, for if the couple had their mothers' brothers in one and the same clan, then their marriage exchange could not be arranged because the bride and groom would be "siblings through the mothers" (i.e. mother's classificatory sister's child, like the MZS or MZD, who are parallel kin as a parent's same sex sibling's children). Most of the few hundred cases (couples) that I have known attest to the fact that new marriage alliances would normally involve four different clans[26]. However, a new alliance can work just between two clans in which case it must be four unrelated lineages from the two clans, for otherwise it would not be a "new" alliance but one involving distant cross-cousins. Thus, any new alliance among the Madia is a quadrilateral exchange for it requires a minimum of four exchange units, where the units are either four clans, which is the case generally, or four unrelated lineages.

The FZD alliance works in the following way. In one generation, a woman goes from family A where she is a daughter to a family B where she will be a wife, and in the very next generation that woman's daughter returns from family B where she is a daughter to family A where she will be a wife. Thus the wife-giver in one generation becomes the wife-taker in the next generation. Similarly the wife-taker in one generation becomes the wife-giver in the next generation. In the male Ego's perspective, his Father was a wife-giver who gave his sister (Ego's FZ) away in marriage and in his own generation Ego is a wife-taker marrying his FZD, and Ego's Son could again be the wife-giver, as was his own FF. For this reason, it may look like that the FZD alliance involves only two exchange groups. But, since there can be no scene 2 without the scene 1, we can generalize and say that FZD requires 4 exchange groups to work.

While the above is the essence of the FZD exchange, the same interaction *at the societal level* can be illustrated as a double helix as in the figure below. If we were to picture a single chain of FZD exchanges between just two families (i.e. Ego's and Ego's spouse's), a single helix would do the job. And a picture representing two lineages (including many extended families) engaging in FZD exchange, would have a few lines to show the many FZD marriages occurring simultaneously. A quantitative study of FZD marriages involving lineages and spread over a span of few generations can be expected to yield a diagram with multiple helices. On the other hand, if we diagrammatically illustrate the FZD alliance in the sociocentric perspective, it can be done with a simple double helix as in Figure 3.

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[26] For an example, the most recent wedding I attended last June (2013) was not between cross-cousins but a new alliance in which the groom (Lālsu Pūsu of Arewada village) belongs to the Pallo clan, his MB belongs in the Pūsali clan, while the bride Mani's father is a man from the Pungati clan and her MB belongs in the Wadde clan. This new alliance involves four clans: Pallo, Pūsali, Pungati and Wadde.

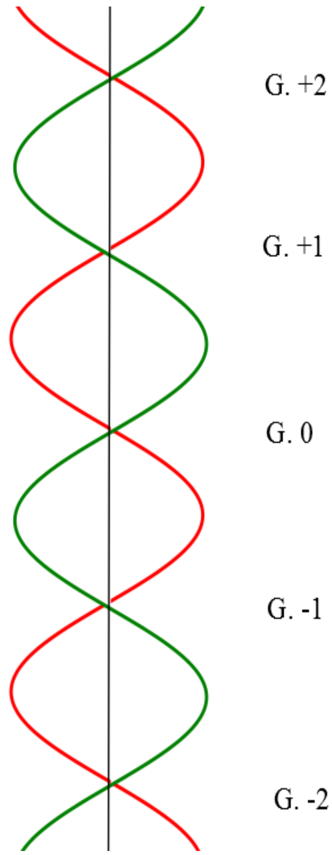

Fig. 3. The FZD exchange in sociocentric view

Figure 3 is an idealistic picture of the phenomenon of FZD alliance where the two lines represent the two social categories *jīva* and *eṛmi*, and illustrate the interplay of the two. In a FZD marriage, the exchange is unilateral and the flow of the bride is unidirectional. But when we think of the same as a social phenomenon and depict it as the interplay of two social categories, which the diagram is meant to depict, then it looks as though the exchange is bidirectional and bilateral. The FZD marriage is asymmetric, but it is symmetric when seen on the whole, i.e. in the sociocentric view.

The systematic reversal of direction of the movement of the bride after a gap of a single generation is fundamental to the FZD marriage exchange, and this type of exchange links adjacent generations in a way that the two other cross-cousin alliances do not seem to. Since the generation provides the skeleton or frame for the FZD exchange I have used that as the central axis in this depiction.

This model of the FZD alliance shows two interactions: (1) that between the two social categories which continually engage in giving and receiving brides and (2) that between the twin categories and the generation level. The first is about *how* the interaction takes place and the second is about *when*. The "when" and the "how" cross-cut to create the double helix[27]. The 'how' is based on the idea of crossness which is a human creative construct whereas the 'when' is based on biology. This leads to the question about the generation intervals among Madia. The generation interval, i.e. "the average span of time between the birth of parents and that of their offspring"[28] will be crucial in the construction of a mathematically accurate double helix structure for Madia kinship and social organization.

My own observation during nearly the last two decades of our life here is that girls reach puberty at around 12 years of age and are often married off within a year or two after that, unless the girls are being schooled. However, it is the unschooled that have been the majority. Therefore we could say that the average age for girls to get married is 14. Women usually have children within a year of marriage and so let us say that a woman attains motherhood at 15. The same could go for boys too, since the grooms are usually more or less same age as their brides (showing the neutral age bias for marriage, whether cross-cousin or otherwise). The average generation span can be put conservatively at 15 and liberally at 20. A mathematical construction of a double helix with a specific number of years as the average generation span is not attempted here because, while it may help to enhance the description of the Madia kinship, it is doubtful that it would provide any radically new information about the Madia kinship structure and social organization.

Let us move on to considering how the kinship, alliance and dual social organization is related to the Madia society's four-section structure. Let us recall here the description of the FZD alliance as scene 2 of a play or the second half of the game of exchange. If a FZD marriage is essentially a follow-up of an alliance in the previous generation, how was the original alliance arranged in the first place? Or, in other words, how does a man who does not have an FZD to marry, is expected to go about finding a wife? The answer to this question is provided in the next section.

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[27] Helical models have been proposed for tetradic terminology (Allen 1989) and also for asymmetric alliances among Australian Aborigines (Denham 2012). What I am proposing here for FZD alliance may be similar in some ways to, but also different from that of Allen's double-helical model.

[28]This definition is taken from Merriam-Webster, I. 1993. *Merriam-Webster's collegiate dictionary*. (10th ed.). Springfield, Mass.,:Meriam-Webster

1.4.2 Madia Social Structure

Among the Madia, new marriage alliances (that between people who are previously unrelated) are made on the basis of *god-number*[29]. There are about a hundred *jama* 'clans' in the Madia society (Vaz 2011b) and each has a specific number of clan-gods, ranging from 4 to 7. Thus there are clans with either 4 or 5 or 6 or 7 gods; but none with 3 gods or less, nor 8 gods or more[30]. Since there are only four specific god-numbers, we know that the Madia society is divided into four sections which are known as *pēn mul*, literally 'god group'. The god-group system prevalent among some of the Gond tribes is noted by several ethnographers such as Grigson (1938), von Fürer-Haimendorf (1979), and Naik (1973).

The god-groups are generally exogamous groups[31]. Though these sections are not known by distinct names, every section has a specific number of gods by which the sections are identified. When I was collecting the *names* of the clan-gods, I noticed that most people, even the older folks, are not knowledgeable about the names of their clan-gods. Only the religious specialists (shamans, priests) and those who are key leaders in village communities are well-informed about the clan-gods and the origin of the god-group system among the Madia. However, every grown man knows *how many* gods he has, or in other words, what his/her clan's god-number is. Thus it is the number of gods that is more important than the names of the gods[32].

The god-number is same as the primary membership in these four sections. The 7 gods group has only 7 primary clans, the 6 gods group has only six primary membership clans, and the four gods group has only four mail members. (This is probably the reason why Fürer-Haimendorf (1979) refers to the god-groups as the "five-brother" phratry, "six-brother" phratry and so on.) The five-gods group alone is an exception here because there are too many clans in this god-group, and there is no clarity as to which the five primary ones are. Since there are many who would say that they themselves are the originally primary five clans, I have presented them all as one group without identifying which five are the main ones. It may be that such a

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[29] It is only some of the Gond group of tribal societies that have the god-number system. Many of the Hill Madia's Dravidian neighbors in central India, such as the Dhurwa or the Bison Horn Madia or the Muria (made famous as the *ghotul* Muria by Verrier Elwin (1947), do not have the god-number system and therefore the clan organization of these societies cannot be compared with the chromosomal organization.

[30]Incidentally, the Madia language has only seven numbers: 1 to 7. Words for the numbers 8 to 20 are borrowed from Hindi/ Marathi language. After 20, they use "two twenties," "three twenties," and so forth.

[31] Intermarrying groups called *marriage sections* are known to exist among Australian Aboriginal societies.

[32] The god-numbers seem to be used like the way animal *totems* are known to be used among some other central Indian tribal societies. One example of such a totemic society is the Hill Madia's own neighbor, the Bison Horn Madia, who are described as such because they use bisons' horns as head-dress in their ritual dances while the Hill Madia use buttock-bells instead, which they tie around their waist and let the bells hang behind. Grigson has reported Goat (and Cobra), Cuckoo, Tiger, and Tortoise as the Bison Horn Madia phratry totems, and he had also observed that the Hill Maia tribe had the *god-numbers* instead of totems (1938:238-239).

division does not even apply to the 5 gods group. The primary members in any god-group are known as *modul* "main" clans for these are the *core members*. The several "secondary" members in each god-group are described by the Madia as "late-comers" into the god-group system because these were supposed to have been admitted into the system through recruitment by ritual means.

We already noted that the Madia practice god-group exogamy. The clans that have the same god-number are *jīva* 'brothers' to one another, whereas clans that have different god-numbers are *eṛmi* 'alliance-partners'. For example, a clan that has 4 gods can give and take brides from the clans that have 5 or 6 or 7 gods, but cannot do so with another clan that have the same number of gods, that is 4 gods. God-group exogamy is a stringent rule with social sanctions for violators. However, the god-group exogamy is a bit more complicated than it may seem. Once again, the five-gods group is an exception to the general rule of god-group exogamy because this rule works differently for the five-gods group. The five-gods group is the largest of the four sections, with a total of 48 clans as members. This may be the reason why there is certain flexibility about the rule of god-group exogamy within this section alone. The vast number of clans within the five-gods group form sub-groups, each subgroup having five clans in it where some clans are found in more than one subgroup) and this formation of subgroups allows for a clan within one sub-group to marry from another subgroup. Here, since the god-number of all the sub-groups are also only 5, it is not the god-number but rather the set of gods (or otherwise the main god's name) which is considered the basis for deciding marriageability. For example, Pūsu Pallo of Arewada village and his wife Bandi who is a daughter in the Pūsali clan are both from the five-gods group. But the Pallo clan and the Pūsali clan are reported to have different sets of gods and therefore fall into different sub-groups within the five gods-group. This difference makes a marriage possible between Pallo and Pūsali in spite of their god-number being the same, that is, 5. There are innumerable examples of this kind of marriages happening within the five-gods group, and it happens only in this section and not in the other three sections. (Thus it must be noted that the five-gods group is unique among the four sections because its membership as well as marriage exchange works somewhat differently).

The question may arise as to why the marriage sections are strictly only four (because all the so called late-comer clans have been recruited to be in one of these four god-groups, and the few rare cases of breakaway factions are not allowed to form a new god-group). Why not either more or less than four sections? It has already been mentioned that a new marriage alliance would require at least four exchange units. Therefore the four section system may simply be a reflection or a symbolic institutionalization of the quadrilateral exchange with the god-numbers as the symbols. However, functionally-speaking, the four section system seems to help maximize the balancing of the two 'social fields'[33] of *jīva* and *eṛmi* to the optimal level (for

[33] Jay (1970) has used the term "social fields" in reference to the *jīva* and *eṛmi* dual organization.

marriage and reproduction), which is an issue taking an entire chapter in my doctoral dissertation to discuss (Vaz 2011b).

Another important observation here is that, according to the most recent data I have (see Appendix III), the five-gods group has a total number of clans which is equal to all the rest of sections put together. In the order of size of membership in each god-group, the largest is the 5 gods group, followed by the 7 gods-group and then the 6 gods group. The smallest is the 4 gods group, smallest both in its god-number as well as the membership in it.

The god-group system provides for "ritual kinship"[34] (Parkin 1997:124) that encompasses the entire Madia populace. The god-number system is useful to connect the four sections of the society whereby all the clans that are *not* related by either genealogical or affinal ties (which is kinship in the more usual or normal sense), can be related on the basis of relationships assumed between their *pēnk* 'gods'. Thus, its serves the function of social integration.

The general rule that those clans with the same number of gods are *jīva* and those with a different number of gods (or in the case of the five gods groups, a different set of gods) is a potential *eɽmi* brings the entire society under the dual or double helical social organization. In this way everyone is related to everyone else. Even those who are not related through the three-way kinship connections are still kin, i.e. the *ritual-kin*. Kinship is so very fundamental in the Madia thinking or worldview that the god-group system is used in addition to the usual or normal kinship so that the entire population may be held in a single web of kin relations. The god-groups system binds this society as a single entity, a kinship universe.

1.5. Summary

Section 1 analyzed how most of the kintypes from the groom's and the bride's sides are complementarily merged, either directly or indirectly, to form kin categories. Where direct, the kin terms are copied or transcribed as address terms, and where complementation is indirect, the

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[34] The god-groups act like cult or religious groups. The different god-groups come together once every year or two to celebrate an annual festival of their gods known as *pēn kaxsadi* 'gods-play'. During this festival, the male members of a particular clan or god-group gather to make animal sacrifices to their clan-gods and share a fellowship meal. The main event of this festival is the partaking of the *lākan*. The *lākan* refers to the vital organs (heart and liver) of the sacrificial animals (such as pigs, goats, oxen) which are roasted on fire and shared among all of the male members of the god-group present at the festival. Thousands gather from distant regions of the Madia land to be present at the festival, but only the male members (married adults) of the particular clan whose clan-god is being celebrated can partake in the *lākan.* A man may get to eat only a wee bit of the *lākan* but it is important to partake in it in order for him to renew his membership if he is an old member, or to establish new membership if he is a late-comer to the god-group system. A recent admission into the god-group requires a payment of cash and many cattle towards a feast for the whole gathering at the festival. People from other god-groups are invited to join in the festivities and the feast but are forbidden from partaking in the *lākan*. *Lākan* rituals are for the strengthening of god-group solidarity and is a mark of the ritual kinship through the the god-number.

terms are converted or translated (with a few of them being translated alternatively) into one of the already existing address terms. A few kintypes that do not complement do not have proper address terms but only words of endearment as optional address.

In section 2 we saw that there are two types of kin categories: standard and non-standard, described the characteristics of certain kin categories, and what seemed to be the defining criteria. Some were neither standard nor non-standard, and therefore were labeled as non-categories.

In section 3 we saw how the standard kin categories fall into two major social categories, i.e. *jīva* and *eṛmi*, and also discussed how the male kin are unambiguously categorized either as one or the other, whereas certain female kin categories needed some investigation which led to the conclusion that they belong in the same kin class as their male siblings. Here we also discussed how a married adult's identity is defined through a three way kinship connections.

In section 4, we discussed Madia alliance and the distinction between old and new alliances, about how alliance relates to the dual social organization and how the social organization can be depicted as a double-helix. Here we also discussed the four exogamous god-groups, which symbolize the quadrilateral alliance exchange, and the god-group cult which extends ritual kinship to encompass the entire Madia society.

CHAPTER 2

THE DNA MOLECULE

It is now fairly common knowledge that genes are units of heredity and that they determine many of the properties of living organisms. Genes carry biological information and each time a cell divides to form two daughter cells, the biological information in genes must be copied accurately for transmitting it to the next generation. Two important biological questions arise from these requirements; one is about how the information for specifying an organism can be carried in chemical form, and the other is about how it can be accurately copied (Alberts et al. 2002). The study of DNA's structure and function has provided answers to both questions as we shall see in this chapter[35] which also covers the basics of the organization of DNA in chromosomes and the process of replication of DNA during cell division.

2.1 Structure and Function of the DNA Molecule

The DNA contains the instructions for producing proteins, and a *gene* is a part of a DNA molecule which codes for just one protein. All living organisms are made of protein. The properties of a protein, which are responsible for its biological function, are determined by its structure. A protein molecule is composed of strings of *amino acids,* and the exact sequence of these amino acids determines the structure and behavior of a protein molecule. The amino acid sequence is in turn determined by the sequence of *bases* or *nucleotides* in a DNA molecule.

Since nucleotides are the smaller molecules that make up the macromolecule, i.e. the DNA, we will begin the description of DNA with the nucleotides.

2.1.1 Nucleotides and Base Pairing

A nucleotide is made of three components: (1) a phosphate group (P), (2) a pentose sugar (S), and (3) a nitrogen-containing base. (See inset in Fig. 4 that shows the structure of a nucleotide). There are only four bases in the DNA, which are often referred to by their first letter: adenine (A), thymine (T), guanine (G) and cytosine (C). This is why the genome is sometimes described as a book written entirely in three-letter words and using only four letters: A, C, G and T. The four different nucleotides are like the steps in the long ladder-like structure of the DNA molecule and the famous double-helix shape is its usual state.

[35]The DNA's structure, function, replication and organization are extremely complex, and this chapter is a simple description, covering only its essential features that are relevant for our comparison of DNA and Madia kinship. The content of this chapter draws from many sources, including the A-Level textbook for the Cambridge International Examinations (Jones et al. 2003) as the major source; sometimes the textbook is directly quoted but often the content is paraphrased. Illustrations from several sources are used and appropriately cited in order to facilitate comprehension.

The DNA molecules are made of two strands (or *polynucleotides*) lying side by side, and running in opposite directions. The two strands are held together by *hydrogen bonds* (bonds formed between positively and negatively charged molecules) between the bases. The sugar (S) and phosphate (P) are lined up alternately forming the backbone of the strand held together by what is known as *covalent bonds* (bonds formed between atoms by sharing of electrons).

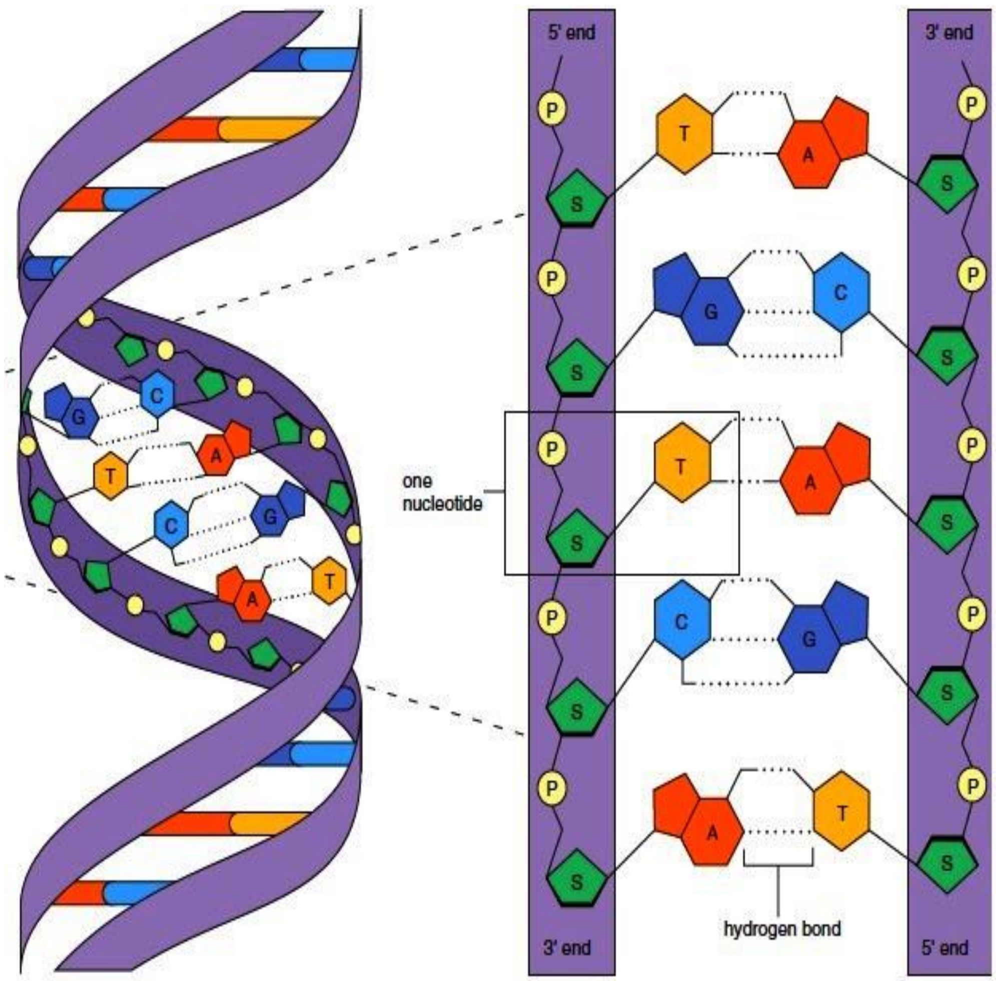

Fig. 4. Complementary base-pairing in DNA[36]

[36] http://encyclopedia.lubopitko-bg.com/Nucleic_Acids.html

The four bases, A, C, G and T can be *purines* or *pyrimidines*. As illustrated in Fig. 4, the purine bases (A and G) are larger than the pyrimidine bases (T and C). Between the two sugar-phosphate backbones on either side, there is just enough room for one purine and one pyrimidine molecule; that is, pairing one big one and one small one, but never pairing two big ones, or two small ones. Therefore, a purine in one strand must always be opposite a pyrimidine in the other. The base pairing is even more precise than this.

Adenine always pairs with Thymine: A with T

Guanine always pairs with Cytosine: G with C.

Why not A with C and T with G? It is not possible because of the nature of the hydrogen bonds between these. Note that A and T are held together by two hydrogen bonds while G and C are held together by three. But the AC and GT pairing would not work for these would be mismatches because these do not correspond.

Thus the complementary base pairing follows base-pairing rules (known as Watson-Crick base-pairing, named after the two scientists who discovered their structural basis).

We already noted that the two strands in DNA run in opposite directions. How? The sugars are joined together by phosphate groups that form bonds between the third and fifth carbon atoms, known as the 5′ (five prime) and the 3′ (three prime) ends, of adjacent sugar rings. This asymmetric bond means a strand of DNA has a direction. Complementary base pairing is possible only because the strands run in anti-parallel direction.

The helical shape of the DNA is usually ascribed to the hydrophobicity37 of the four bases which must remain hidden in the inside of the helix and covered by the hydrophilic sugar and phosphates on the outside.

2.1.2 Codons

The gene encodes the sequence of protein and thus controls the manufacturing of protein in all living organisms. Each sequence of three bases stands for one amino acid. A contiguous block of three bases is called a *codon*, for it is a code for making a *single* amino acid.

There are 64 ways to arrange the four bases in blocks of three (4 x 4 x 4 = 64). The following Table shows the complete set of the 64 codons.

[37] The classification of amino acids as hydrophobic and hydrophilic is based on their tendency to either interact in an aqueous environment or their preference to reside mostly inside the protein.

first base in codon	second base in codon: T	C	A	G	third base in codon
T	TTT Phe	TCT Ser	TAT Tyr	TGT Cys	T
	TTC Phe	TCC Ser	TAC Tyr	TGC Cys	C
	TTA Leu	TCA Ser	TAA stop	TGA stop	A
	TTG Leu	TCG Ser	TAG stop	TGG Trp	G
C	CTT Leu	CCT Pro	CAT His	CGT Arg	T
	CTC Leu	CCC Pro	CAC His	CGC Arg	C
	CTA Leu	CCA Pro	CAA Gln	CGA Arg	A
	CTG Leu	CCG Pro	CAG Gln	CGG Arg	G
A	ATT Ile	ACT Thr	AAT Asn	AGT Ser	T
	ATC Ile	ACC Thr	AAC Asn	AGC Ser	C
	ATA Ile	ACA Thr	AAA Lys	AGA Arg	A
	ATG Met	ACG Thr	AAG Lys	AGG Arg	G
G	GTT Val	GCT Ala	GAT Asp	GGT Gly	T
	GTC Val	GCC Ala	GAC Asp	GGC Gly	C
	GTA Val	GCA Ala	GAA Glu	GGA Gly	A
	GTG Val	GCG Ala	GAG Glu	GGG Gly	G

Fig. 5. Table of codons[38]

The following are a few quick observations from the Table of codons:

1. The 64 codons code for only 20 amino acids, which means that most of the amino acids are coded for by multiple codons. This has been experimentally proven to be so, and is described as degeneracy or *redundancy*. Redundancy helps because it means there are back-ups when a gene gets damaged and it reduces the harmful effects that incorrect nucleotides can have on the protein synthesis (Smith 2008). The total number of codons for each amino acid ranges from two to six codons. In the Table of codons, the 20 main amino acids are listed as three-letter abbreviations, which are, in most cases, the first three letters of their full name. (These 20 main amino acids are listed in section 2.4.1.1 that follows, where the classification of these is also shown.)

[38] http://www.chemguide.co.uk/organicprops/aminoacids/dna6.html

2. Among the 64 codons, only 61 code for amino acids whereas three are STOP codons. These codons function as STOP signs in the process of protein synthesis (which is discussed in section 2.2.2). Not coding for any amino acids, when transcribed into the messenger RNA, these serve as STOP codons, signalling it is time to stop. We can think of the STOP codons as a perforated line in a sheet of paper saying "tear here".

3. While most amino acids are represented by multiple codons, the amino acids Tryptophan (Trp) and Methionine (Met) are the only ones coded for by single codons.

Now let us see how exactly the coding works in the production of amino acids. (Fig. 6 below, as well as the description of the coding, is taken from the A-Level textbook for the Cambridge International Examinations (Jones et al. 2003).

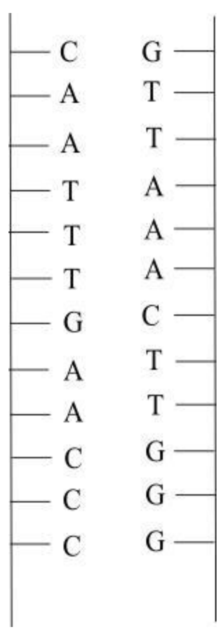

Fig. 6 illustrates a length of DNA coding for four amino acids.

The sequence of bases is read in only one of the strands and is always read in one particular direction.
Reading from the top of the left-handed strand, the code is for the following amino acids:

C-A-A which stands for valine

T-T-T which stands for lysine

G-A-A which stands for leucine

C-C-C which stands for glycine

Fig. 6. A length of DNA coding for four amino acids

So, the short piece of DNA shown in the figure above carries the instruction to the cell: "Make a chain of amino acids in the sequence valine, lysine, leucine and glycine".

2.1.3 Exons and Introns

Introns and *exons* are parts of eukaryotic[39] genes. Exons code for proteins whereas introns do not. These exist as alternating segments in the genes. If introns are like the *in*tervening sequences, the exons are the *ex*pressed sequences.

Gene expression refers to the process by which information from a gene is used in the synthesis of a functional gene product. Introns are present in the initial RNA transcript (or pre-mRNA) which undergoes *splicing* when introns are "spliced" out or removed to create a mature mRNA, which is then ready to be translated into protein compositions. (These processes are described in section 2.2 that follows).

2.1.4 Non-coding DNA

Not all of the DNA code for proteins. Sequences of DNA that do not code are popularly known as the *junk DNA*. However both the proportion of the so-called "junk DNA" as well as its function is hotly debated. Estimates of the proportion range from 80% to 97% of the genome. The ENCODE project has asserted that these genes are not junk, but have definite biochemical functions such as "organization and regulation of our genes and genome" (Consortium 2012). Others, such as Siegfried (2013) contest this view. There are also studies which say that a major fraction of junk DNA consists of introns.[40]

2.2 Processes in the Protein Synthesis

The production of protein is a twin process involving the DNA: *transcription* and *translation*. (The DNA also functions as a unit of heredity, its unique structure helping to preserve the genetic information and allowing for accurate copying, avoiding mistakes, in a process called *replication* which we describe in section 2.4). This section describes the twin process of protein synthesis.

2.2.1 Transcription

Though the DNA encodes protein molecules, the information in DNA is not directly converted into proteins, but is first copied into RNA. This copying process involves transcribing genetic information from DNA to RNA. The RNA molecule that is produced as a result of transcription is called *messenger RNA* or mRNA. The mRNA is a transcript and each gene present in the DNA is copied separately. Transcription ensures that the information contained within the DNA does not become tainted. The mRNA is a complementary copy of the code from

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[39] There are two classes of cells: eukaryotic cells that have a defined nucleus and prokaryotic cells that do not.

[40] http://www.sciencedaily.com/releases/2011/11/111129112329.htm

a gene made using one strand of the DNA as a template. The double-helix becomes unzipped while one strand is copied.

Though a complementary copy, the mRNA is a molecule built of a different type of nucleic acid. Like DNA, the RNA is composed of nucleotide bases; however, RNA contains uracil (U) in the place of thymine (T), which like the latter pairs with adenine (A). The genetic information present in the mRNA is the same as in DNA because the sequence of bases in DNA and mRNA are the same. The mRNA carries its "message" to units called ribosome which will decode the RNA to produce amino acids, which are chained together to build proteins. We discuss this below.

2.2.2 Translation

The information that has been copied on to the mRNA must be translated into an amino acid sequence. The decoding of mRNA to make amino acids is called translation. The mRNA along with transfer RNA (tRNA) and ribosome work together in translation. Ribosome is the site where the translation takes place. The tRNA is the initiator of the translation. As the ribosome "reads" the amino acid sequence in the mRNA, the tRNA recognizes the mRNA codons and brings the corresponding amino acids to the site, which are then assembled – in the same order to complete the protein corresponding to the sequence in the transcript. The chain of amino acids then folds itself up into a distinctive shape depending on its sequence to form a protein molecule. The ribosome will translate the mRNA molecule until it reaches a termination codon (or STOP codon) on the mRNA. In this manner every gene is translated into a protein.

However, the STOP codon is sometimes overridden to insert a non-standard amino acid into the protein chain. "Stop codon readthrough is a phenomenon in which the translation process does not terminate at a stop codon, and an amino acid is inserted there instead. In some cases, the inserted amino acid is not one of the 20 amino acids but a noncanonical one. Two such amino acids have been discovered to date: selenocystene and pyrrolysine" (Fujita et al. 2007).

2.2.3 Splicing

In most eukaryotic genes, the initial RNA that is transcribed from a gene's DNA template is processed before it becomes a mature mRNA. One of the steps in this processing is called RNA splicing which is for the removal (or *splicing out*) of the introns (the noncoding sequences in the DNA). Thus the final mRNA will have only the exons which are connected to one another through the splicing process. The removed introns are rapidly degraded in the cell by enzymes that break them down into components for reuse in the cell[41].

[41] Mark Woelfle on MadSci network, http://www.madsci.org/posts/archives/1999-04/923669307.Mb.r.html

There is also another kind of splicing called *alternative splicing*. The recent human genome project has revealed that there are only about 25,000 to 30,000 genes in the human genome. How do humans produce around 150,000 different proteins from their 25,000 to 30,000 genes? The answer to this question is alternative splicing. During the RNA splicing event different combinations of exons are joined together to create a diverse array of mRNAs from a single pre-mRNA. While the RNA splicing yields a mature RNA transcript, the alternative splicing results in the production of multiple transcripts. These processes are illustrated below.

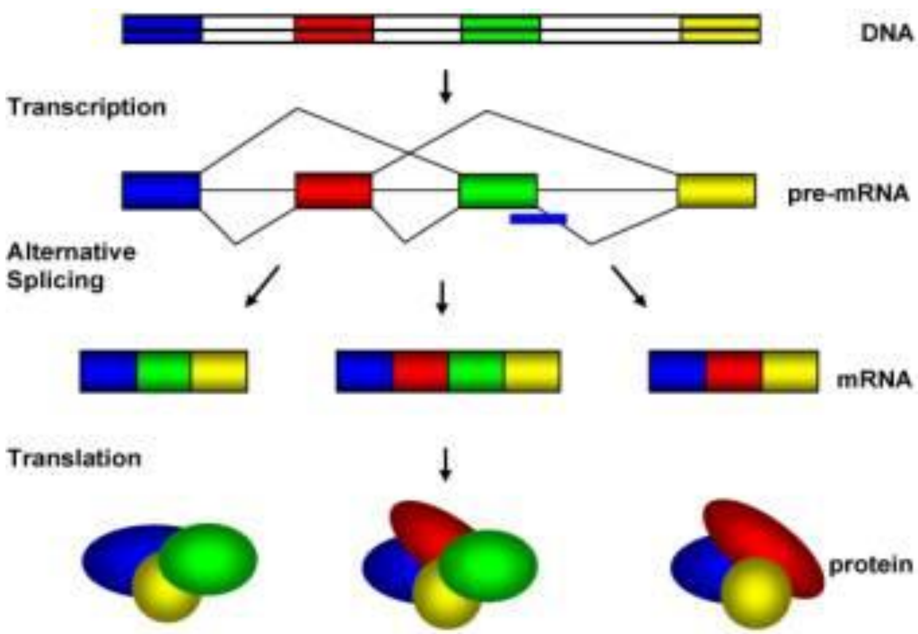

Fig.7. Alternative splicing in DNA[42]

The white spaces in the DNA (illustration) are the introns that are removed. The colored spaces are the different exons within a single pre-mRNA that are spliced together in alternate patterns to yield different functional mRNAs (Clancy 2008). The multiple transcripts produced from a single gene through alternative splicing are translated to produce many different proteins which do different functions. This means a variety of different proteins result from one gene only. That the genes of complex organisms can be edited this way is understood as a mark of incredibly higher efficiency because information can be stored much more economically.

[42] http://onthuhlist.wordpress.com/tag/molecular-biology/

2.3 Classification of Amino Acids:

We mentioned in the introduction to this chapter that amino acids serve as the building blocks for protein. Amino acids are linked together in a short chain called peptide or longer chains called polypeptides or proteins. Proteins are usually linear chains of amino acids. Amino acids can be linked together in varying sequences to form a vast variety of proteins. Though more than 500 amino acids exist in nature, the proteins in all species, from bacteria to humans, consist mainly of only 20[43]. Together with hundreds of other minor ones, they sustain our lives. The major ones are called the standard amino acids. In this section we discuss the classification of the standard and nonstandard amino acids to the extent that is relevant to our purpose.

2.3.1. Standard Amino Acids

As amino acids often share common properties, several classifications have been proposed based on size, shape, polarity, charge, chemical reactivity, hydrophobicity etc. The major factor for amino acid classification is the size of the *side chain*, closely followed by its hydrophobicity. Hydrophobicity is about the tendency to either interact in an aqueous environment (hydrophilic) or their preference to reside mostly inside the protein (hydrophobic). The side chain is the part of an amino-acid's chemistry that differentiates it from other amino acids, for each amino acid has a unique side chain. For example, while the amino acid *Alanine* has the simplest side chain that is just one carbon atom with three hydrogen atoms, some other side chains contain sulfur, and some others contain nitrogen. Some side-chains branched and some are ring shaped. Side chains are usually designated by the letter "R" and hence the classification based on side-chains is known as classification by R-Group.

2.3.1.1 R-Groups

The following is the classification of the 20 standard amino acids on the basis of R-Groups[44]. The classification made on the basis of side-chains shows amino acids as being of two major kinds: non-polar and polar. The "polar" amino acids are classified further as charged and uncharged.

a) *Non-polar (hydrophobic) (9):*

Alanine, Glycine, Leucine, Valine, Isoleucine, Phenylalanine, Tryptophan, Methionine, Proline.

b) *Polar (hydrophilic):*

Uncharged (6): Asparagine, Glutamine, Cysteine, Serine, Threonine, Tyrosine.

[43] http://en.wikibooks.org/wiki/Structural_Biochemistry/Proteins/Amino_Acids

[44] http://webspace.webring.com/people/ee/eden/health/classification.html

Charged (5): Acid: Aspartic acid, Glutamic acid.

Bases: Arginine, Histidine, Lysine.

The above is taken from Betts and Russell (2003), where the authors point out that it is very difficult to put all amino acids of the same type into an invariant group because they have overlapping characteristics and combinations of properties. Apparently some can be hydrophobic and hydrophilic at the same time. I have noticed that while most scholars classify Methionine (Met) in the non-polar group (e.g. Betts and Russell 2003), others put Met in the polar group[45]. Similarly, Tryptophan (Trp) is in the non-polar in some lists and in the polar in some others. The listing produced in this paper shows the classification as 9, 6 and 5 wherein the non-polar and polar are 9 and 11. In some other listings, the classification is 10, 5 and 5 wherein the non-Polar and polar are balanced as 10 and 10. Thus, there is obviously some flexibility with regard to the classification of a few amino acids.

There is also the "nutritional classification"[46] based on whether or not the amino acids are essential or non-essential, which we discuss below.

2.3.1.2 Essential Amino Acids

Nine of the standard amino acids are known as ***essential amino acids*** because the human body cannot synthesize them from other compounds at the level needed for normal growth and so they must be obtained from food. The remaining ones are described as semi-essential or non-essential[47]. The nine essential ones are as follows:

> Methionine, Phenylalanine, Tryptophan, Valine, Isoleucine, Leucine, Threonine, Histidine, and Lysine.

Among the 20 standard amino acids, there are a few others that are noteworthy because of their "special" characteristics.

2.3.1.2 Ambiguous Amino Acids

Sometimes techniques that can determine the primary structure of amino acids cannot distinguish two similar but distinct amino acids. Cases where the analysis cannot conclusively determine the identity of a residue are called ambiguous amino acids. These are as listed below where the three letter abbreviations for these are also provided for future reference.

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45 http://en.wikibooks.org/wiki/Structural_Biochemistry/Proteins/Amino_Acids

46 www.duhs.edu.pk/curriculum/.../lec5-sem1-FMweek3-20111210.doc

47 www.duhs.edu.pk/curriculum/.../lec5-sem1-FMweek3-20111210.doc

Table 10: Ambiguous amino acids

Ambiguous Amino Acids	3-letter Abbreviations
Asparagine or Aspartic acid	Asx
Glutamine or Glutamic acid	Glx
Leucine or Isoleucine	Xle
Unspecified or unknown amino-acid	Xaa

2.3.1.3 Single Codon Amino Acids

Among the 20 standard ones, only two are coded by single codons while all the rest are coded by multiple codons. These are Methionine (Met) and Tryptophan (Trp).

2.3.2. Non-standard Amino Acids:

The 20 standard amino acids are naturally incorporated into proteins and these are found in most though not all proteins[48]. As noted earlier, there are a vast number of non-standard amino acids besides the 20 naturally occurring ones. Two specific non-standard ones are made by overriding two of the STOP codons, i.e. TGA and TAG. Selenocysteine and Pyrrolysine are the two that are produced in this manner and are incorporated into some proteins after the translation. Pyrrolysine is made by attaching a pyrroline ring to the end of the side chain of lysine. Selenocysteine is made by replacing the sulfur atom with selenium in cysteine[49]. The discovery of the 21^{st} and 22^{nd} amino acids is relatively recent.

Table 11: Non-standard amino-acids

21st and 22nd Amino Acids	3-letter Abbreviation	Codon
Selenocysteine	Sec	TGA
Pyrrolysine	Pyl	TAG

Let us now turn our attention to the replication of DNA.

2.4 DNA Replication

Since the DNA carries the information for making all of the cell's proteins, and these proteins implement all of the functions of a living organism and determine the organism's

48 http://en.wikibooks.org/wiki/Structural_Biochemistry/Proteins/Amino_Acids

49 http://en.wikipedia.org/wiki/Selenocysteine

characteristics, when the cell reproduces, it has to pass all of this information on to the daughter cells. Before a cell can reproduce itself, it must first replicate, or make a copy of, its DNA. Ridley (1999) has described the genome as "a very clever book", because it can both copy and read itself. While the process of reading is called *translation*, that of copying itself is called *replication*. Replication is a process similar to *transcription* (section 2.2.1). In replication, the two strands of the DNA molecule split apart down the middle and each strand serves as a pattern or template for the assembly of a new strand. New nucleotides, free and unattached, line up along each strand opposite their appropriate partners (one of the two old strands), and join up to form complementary strands along each half of the original molecule as shown in Fig. 8.

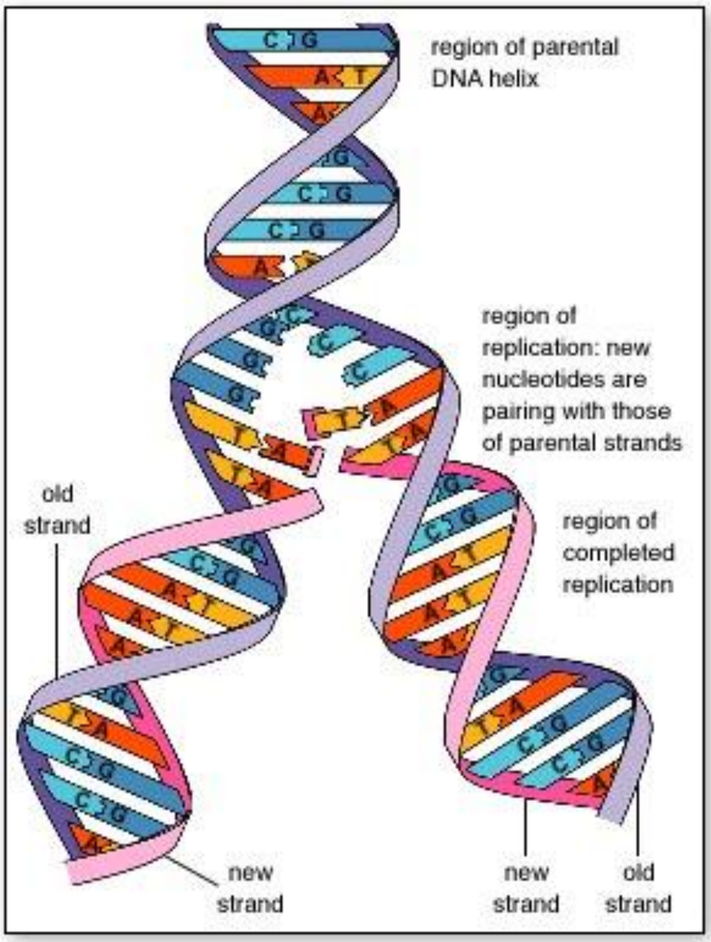

Fig. 8. DNA replication[50]

[50] http://www.mhhe.com/biosci/esp/2001_saladin/folder_structure/le/m7/s1/

The new DNA molecules would be just like the old ones, because each base only pairs with its complementary one. Each pair of strands then winds up again into a double helix, exactly like the original one. The end result of DNA replication is two complete and accurate copies of a cell's DNA. These two DNA molecules each contain one old strand and one newly formed strand. These copies may then be partitioned into daughter cells during cell division. The replication process would be impossible but for the ingenious property of the four bases to bond complementarily. The DNA structure is one that lends itself easily to replication.

Replication is necessary for creation of new cells for the sake of growth and repair of an organism. The human body produces billion of new cells every day through a process called cell division, and all cells must replicate, i.e. must first copy the genetic information contained in the cell nucleus in the DNA, prior to cell division. Because human DNA is so very long (with up to 80 million base pairs in a chromosome), it unzips at multiple places along its length so that the replication process is going on simultaneously at hundreds of places along the length of the chain. These multiple sites in the DNA where the helix becomes untwisted are called *replication origins*. The origin of replication forms a Y shape, and it is called the *replication fork*. The replication proceeds bi-directionally from the origin of replication, going in opposite directions away from the origin. Because replication is bi-directional, two replication forks form at each origin of replication. The open area of the chromosome between the replication forks is called a *replication bubble*. All of this is illustrated in Fig. 9.

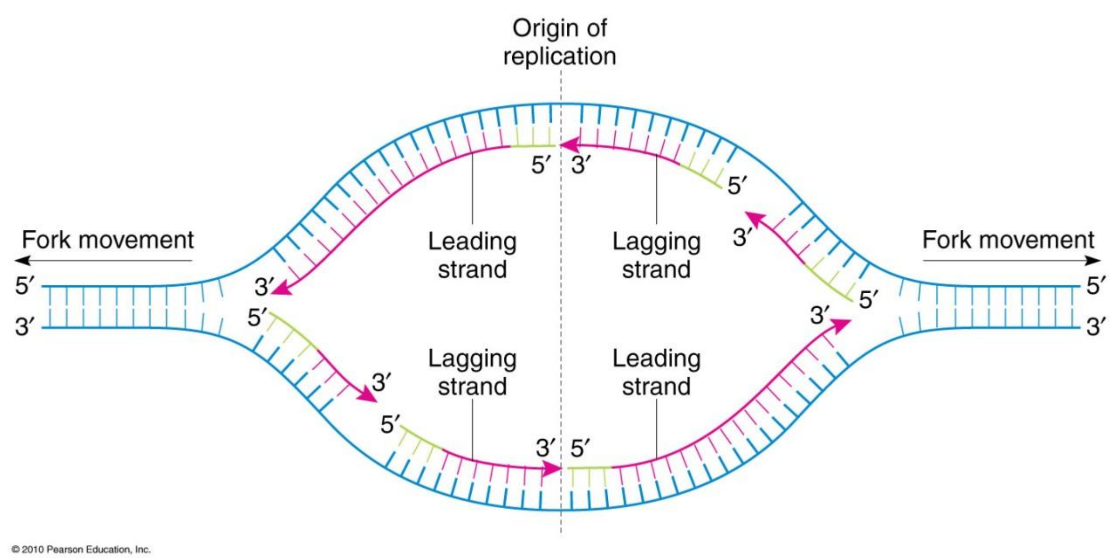

Fig. 9. A replication origin[51]

[51] http://www.mun.ca/biology/scarr/iGen3_03-09.html © 2010 PJ Russell, **iGenetics** 3rd ed.

What are *leading* and *lagging strands* in Figure 5 and why are they there? Since the two strands of the double-helical DNA run in opposite (antiparallel) directions, continuous synthesis of two new strands at the replication fork would require that one strand be synthesized in the 5′ to 3′ direction while the other is synthesized in the opposite (i.e. 3′ to 5′) direction. But since replication can happen only in the 5′ to 3′ direction, it is only in one of the two strands that the replication follows the direction of the movement of the replication fork and this strand is called the leading strand. In this strand, the replication happens continually by placing one nucleotide right after another in a series. This type of replication is called *continuous replication*. In the other strand called the lagging strand, small segments of DNA (known as *okazaki fragments*) are synthesized backwards with respect to the fork movement. Even while each individual fragment is replicated away from the fork, each subsequent piece is replicated more closely to the receding fork than the segment before. Eventually these segments are joined together to form a complete chain, i.e. an intact new strand. This type of replication is called *discontinuous replication.*[52]

The segment of DNA that is copied starting from each unique replication origin is called a *replicon*. Having multiple sites ('origins') for replication helps to create multiple copies of the DNA molecule at the same time and it shortens the time necessary for DNA replication. In humans, DNA is copied at about 50 base pairs per second. The process would take about a month (rather than the hour it actually does) without these multiple places on the chromosome where replication can begin.

Besides the description of the structure, function and dynamics (replication) of DNA, there is another thing that is of interest to us. It is the organization of the DNA, to which we turn our attention now.

2.5 Organization of the DNA Molecule

The human body contains a 100 trillion meters of DNA, and each human cell contains about two meters of it. How can that much of DNA be contained in a microscopic space, i.e. the cell nucleus? The DNA is systematically packaged into chromosomes through several levels of coiling making it an extremely compact packaging. The DNA is wrapped around proteins and the resulting DNA-protein complex is called chromatin. These chromatins form X shaped chromosomes when the nucleus prepares for cell division. Such organization of DNA in eukaryotic cells allows for DNA to be accurately replicated and in an orderly manner, and to be sorted into daughter cells without much error and tangling during the cell division.

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[52] This description of the origin of replication is paraphrased from SparkNotes. SparkNotes Editors. "SparkNote on DNA Replication and Repair." SparkNotes LLC. n.d.
http://www.sparknotes.com/biology/molecular/dnareplicationandrepair/

Chromosomes occur in species-specific sets called karyotypes. The human cell has 23 pairs of chromosomes, 22 of which are autosomes while one is a sex chromosome. The chromosomes are depicted (by rearranging a microphotograph) in a standard format known as a *karyogram* in pairs, ordered by their size, and then by position of centromere for chromosomes of the same size.

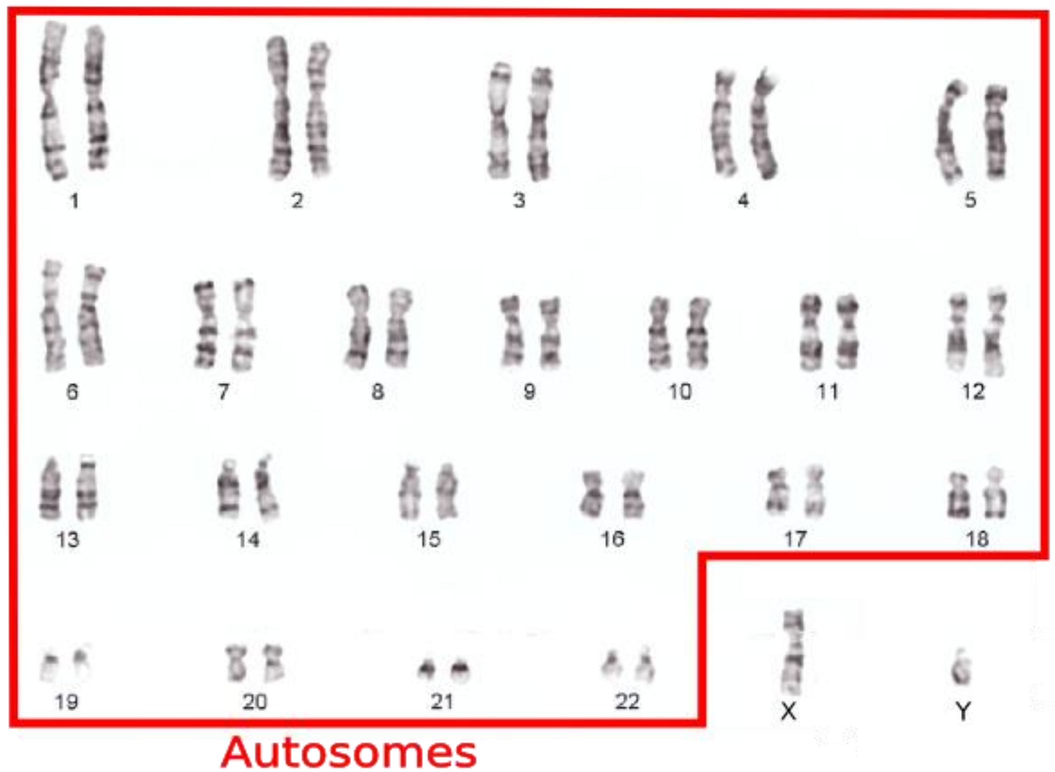

Fig. 10. Human karyogram[53]

All that we have been discussing so far in this chapter apply to the nuclear DNA (i.e. that found in the nucleus of a cell). There is also another type of DNA called mitochondrial DNA which we will discuss below.

[53] Taken from http://education-portal.com/academy/lesson/autosomes-definition-lesson-quiz.html#lesson

2.6 Nuclear and Mitochondrial DNAs

Mitochondrial DNA (mtDNA for short) exists in the cell but outside the nucleus. The nDNA and the mtDNA are different from each other with regard to their location, shape, number and inheritance. The mtDNA is composed of the same stuff (the same four bases), and is strung together in a double helix configuration. But the two strands of the mtDNA are differentiated as heavy and light strands (known as the H-strand and the L-strand) on the basis of their nucleotide content. We have already noted that the purines are larger than the pyrimidines, and the purines are also heavier (because of the extra ring in them). The H-strand is Guanine-rich and so is heavy whereas the L-strand is Cytosine-rich and therefore is light. The entire human mitochondrial DNA has been mapped, and it has been found that in humans (and some reports cite mammals) "the heavy strand of mtDNA carries 28 genes and the light strand of mtDNA carries only 9 genes"[54]. Secondly, the ends of mtDNA are tied together forming a circle, whereas nDNA is open-ended. Besides, while the nDNA is organized into chromosome structures, the mtDNA is found inside the mitochondria. The following illustrations are helpful.

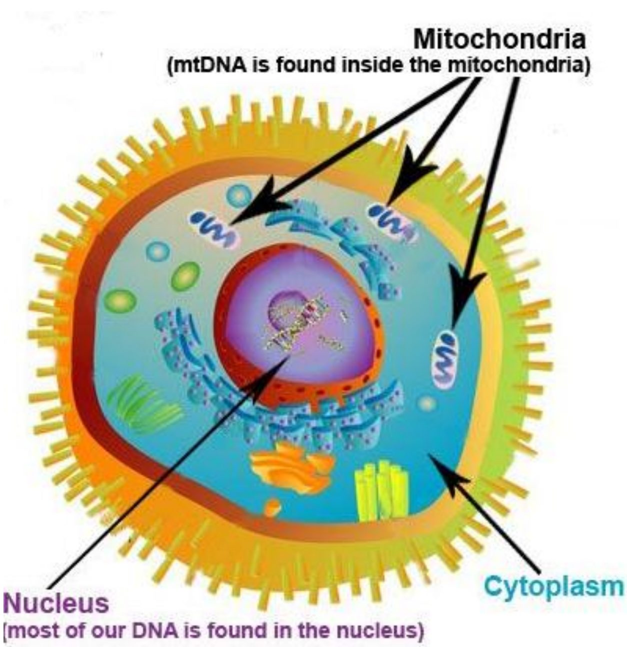

Fig. 11. Location of MtDNA in the cell[55]

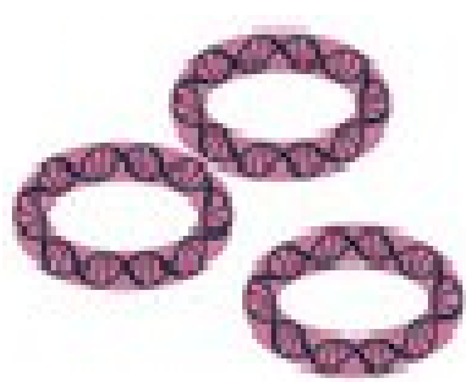

Fig. 12. Circular shape of mtDNA[56]

[54] Taken from http://en.wikipedia.org/wiki/Human_mitochondrial_genetics

[55] http://www.theblaze.com/stories/2012/01/20/children-with-dna-from-three-parents-only-three-years-away/#

Another significant difference is that while the nDNA make up the 20,000 to 25,000 thousand active genes in humans, the mtDNA consists of only 37 distinct genes. There is anything between 100 and 10,000 copies of mtDNA present per human cell, but each mtDNA has only 37 genes, no more and no less. The mtDNA is rearranged via recombination and remains unchanged when being passed on from parent to offspring. Through mtDNA it is possible to track down hundreds of generations. A remarkable fact about the mtDNA is that in most species, including humans, the mtDNA is inherited exclusively from the mother. Hence the mtDNA is like a registry or a catalog of the agnate lineage.

It is also important to point out here that the nuclear and the mitochondrial DNA are thought to be of separate evolutionary origins [57]

2.7 Summary

This chapter includes a brief description of the essential features of the DNA's structure, and how its unique structure easily lends to the replication process. The function of the DNA in coding for the amino acids, and the classification of the amino acids are also included. The organization of the nuclear DNA into chromosomes, and how the DNA in the cell nucleus is different from the mitochondrial DNA are described.

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[56] http://forensics.psu.edu/research/dr.-mitchell-holland/projects

[57] http://en.wikipedia.org/wiki/Mitochondrial_DNA

CHAPTER 3

COMPARISON OF MADIA KINSHIP WITH THE DNA MOLECULE

The comparison of the DNA and the Madia kinship takes into account the structure, function and dynamics of the nDNA, particularly the eukaryotic type, and the organization of the human genome in the human cell nucleus because these aspects of the nDNA show similarities to the structure, function, and dynamics of the Madia kinship structure in sociocentric view and also to the Madia clan organization. While laying out the many similarities between the two, I will also point out to key differences as far as I am able to identify these. While the comparison between the nDNA and the processes of kin categorization and classification (as can be seen from the study of the address terminology) comprises the major portion of this chapter, we will also study the similarities between the mtDNA and the reference terminology.

3.1 Comparison of Structures

In the following sections, I list six pairs of corresponding elements from the two structures concerned and present my observations on each of these; while the relevance of some of which may be immediately evident, some others may become evident only later towards the end of the paper.

3.1.1 Base-pairs and Sibling-pairs

In the DNA there are four bases (A, C, G and T) that bond complementarily, A with T, C with G, thus making 2 base-pairs. Similarly, in the cross-cousin marriage alliance too, and as we have noted in section 1 of Chapter 1, there are two sibling-pairs that are basic to the alliance. The two parents (F, M) and parents' opposite sex siblings (FZ, MB) make up the two sibling-pairs: the F and FZ is one pair of siblings and the M and MB is the other pair. While this is basic to any cross-cousin marriage, whether bilateral, patrilateral or matrilateral, it is the kin terminology of the Madia patrilateral marriage (FZD-MBS) which is our focus in this paper and which alone compares with the base-pairing as well as with other features of the DNA structure.

The Fig. 8 (a south-Indian *kōlam*) in Chapter 1 which was used as an illustration for the direct complementation process is also helpful to illustrate the base-pairing in the Madia kinship. The four kintypes that make up two sibling pairs, i.e. F (*thape*) and FZ (*ātho*), and M (*thalox*) and MB (*māmal*) are found right in the middle of the *kōlam*. The *kōlam* shows the two sibling-pairs on each of the two "strands". Even as two (A and G) among the four bases are *purines* (the larger ones) and two (C and T) are *pyrimidines* (the smaller ones), two of the four kintypes in the sibling-pairs are from Ego's *father's side* (F and FZ) and the other two are from the *mother's side* (M and MB). In the DNA, a purine in one strand must always be opposite a pyrimidine in the other, because bonding between two large ones or two small ones is not possible given the limited space between the two phosphate-sugar backbones. Similarly, in the kinship system, a kintype from Ego's father's side complements with a kintype from the spouse's mother's side, and a kintype from Ego's mother's side a kintype from the spouse's father's side.

The base-pairing in DNA is even more precise because the purine A always pairs with the pyrimidine T, while the purine G always pairs with the pyrimidine C. The pairing is never between A and C, or between G and T. In the kinship too, the complementation is very precise as it is based on the dimension of sex: *thape* (F) can complement only with *māmal* (MB), and *thalox* (M) can complement only with *ātho* (FZ). Therefore, if we consider that Ego's F is like the base A, then the MB on the spouse's side is like the base T. If Ego's M is like the base G, then the FZ on the spouse's side is like the C. The sex criterion is important in the complementary process because two kintypes of same sex merge terminologically but kintypes of the opposite sexes cannot do so. I present these as equations below:

$$EF = MB \neq FZ$$

$$EM = FZ \neq MB$$

The reason why the spouse's *thape* (EF) is like Ego's *māmal* (MB), but not *ātho* (FZ) is that the latter is a female kintype. Similarly, the spouse's *thalox* (EM) becomes like *ātho* (FZ) but not like the *māmal* (MB) because the latter is a male kintype. Such preciseness/ precision of the terminological bonding between the sibling-pairs is similar to that of the base-pairing rules in the DNA.

The above comparison between the DNA's four bases and the two sibling-pairs presumes a cross cousin alliance. But what about *new* alliances, i.e. that between previously unrelated families? The answer to this question is that in a new alliance the two sets of parents (one set of parents from the bride's side and the other set from the groom's side) become like the sibling-pairs after the marriage. How does this work?

Through the marriage alliance, Ego's father and the spouse's mother become like siblings, and so do Ego's mother and the spouse's father. Thus the four parents involved in a new marriage alliance form two pairs of opposite-sex sibling categories. This is to say that whether or not the parents of the bride and groom are actually related *prior* to the marriage alliance of their children, they do relate as siblings, by using address terms meant for sibling kintypes and behaving accordingly, *after* the marriage of their children. This is the reason why the following equations are found in the Madia kin terminology (refer to Tables 4 and 5 in Chapter 1):

CEFe ws = eB *dhādha*
CEFe ms = eZH *bāto*
CEMe ws = eBW *ange*
CEMe ms = eZ *aka*

Thus, in the case of newly arranged marriage alliances, the two sets of parents function like the sibling-pairs. Therefore we conclude that whether it is a new alliance or an old (cross-cousin) alliance, the *bases* are the two sets of parents (the bride's and the groom's) who are either siblings already or relate as siblings following the marriage.

The similarity between the sibling-pairs and the base-pairs is like a precursor to all other similarities between the Madia kinship and the DNA that we discuss in the following sections. I have said in the conclusion of the complementation of Madia kintypes (section 1.1.4) that complementation is also found in the bilateral alliance system though only to a limited extent (found only in G^{+1} and G^{0} levels, but not in $G^{+2,\ +3,\ -2,\ -3}$ levels). Madia kinship is unique not only because of the extent to which complementation works in this system, but also because of the numbers involved in this kinship structure which allow for the comparison between this kinship and the DNA. In the next few pages we will discuss different components in these two structures that seem to correspond.

3.1.2 Codons and Kintypes

We have seen that it is a total of 64 kintypes from the bride's and the groom' sides which merge complementarily (section 1.1) and which fall into 20 standard kin categories and 2 non-standard ones (section 1.2). This is similar to how the four bases in DNA form 64 codons that code for 20 standard amino acids and 2 non-standard amino acids. Besides this main one, there are other similarities too which we shall discuss below.

Multiple codons for most amino acids results in a phenomenon called *redundancy* in the genetic code. Similarly, we see in Table 5 that there are multiple referents for each kin category, a situation in kinship which we can compare to the redundancy in the genetic code. The redundancy in the kinship coding is not shown in the kin terminology but in the key referents. Interestingly, the total number of key referents that appear in Table 5 is 61, which is the same as the total number of codons that code for the 20 amino acids. It is also interesting to note how two of the amino acids as well as two of the kin categories are non-redundant, i.e. coded by a single codon and single key referent.

The difference here is found in the *distribution* of codons and that of the key referents. The codons are distributed in such a way that the amino acids have either 1 or 2 or 3 or 4 or 6 codons. The key referents for the kin categories are either 1 or 2 or 3 or 4 or 6 or 8. The number of amino-acids that have a specific total number of codons and the number of kin categories that have the same specific number of referents are sometimes matching but not always. For an example, there are five amino acids having 4 codons each, and similarly there are five kin categories that have 4 key referents each; thus this is a case where the numbers match. The following is an example of mismatch: the number of amino-acids that have 6 codons each are 3, but there is only one kin category that has 6 referents. But in spite of such mismatches, the total number of coding codons is the same as the total number of referents for standard kin categories, both are 61.

Let us consider another similarity. We have seen that among the 64 codons, three codons serve as STOP signs during the translation process and that two of the three stop codons are sometimes overridden to incorporate 2 more amino-acids (section 2.3.2). There is a similar process in the kinship too. The three kintypes (*exundi* HyB, *kōkaɽ* WyZ and *koyaɽ* yBW/SW) listed for the two non-standard categories *pēka* and *pila* (section 1.2.2.1 and Table 6) are all affinal kintypes but two of these (spouse's younger siblings) can still be unmarried, and can be potential spouses of the male or female Ego who is widowed. A deceased man's yB, if still single, is expected to inherit the young widow of his eB, and therefore HyB-eBW "marriages" are common in the Madia society. Not quite as common, and certainly not covered by any such cultural rule, is the marriage between eZH and WyZ, which is permissible in case the first wife is barren and her yZ is still single and available and willing for such a marriage. Such marriages would change the kin statuses of these two kintypes (*exundi* HyB and *kōkaɽ* WyZ) as these kintypes will no more be the same kind of relative to Ego but would become either H or W following the second marriage. These two potentially marriageable kintypes gaining new kin statuses amounts to their original statuses in relation to male/female Ego being overwritten by their marriages to male/female Ego. The two kintypes (*exundi* HyB and *kōkaɽ* WyZ) can be compared to the two STOP codons (TGA and TAG) that are sometimes overridden, and the two non-standard kin categories *pēka* and *pila* can be compared to the two non-standard amino-acids Selenocysteine and Pyrrolysine.

The third kintype listed for the two non-standard categories is *koyaɽ* (yBM, SW). One of the two key referents for *koyaɽ,* i.e. the yBW, is an *avoidance* category (section 1.2.1.5) with no possibility at all of a second marriage with the male Ego because a man is tabooed from marrying his yBW. Another key referent for *koyaɽ*, the SW, marks the formation of a new nuclear family in the descending generation (G^{-1}) which eventually will mark the end of an old lineage and the branching out of a new lineage. For these two reasons, we may say that the third kintype *koyaɽ* corresponds to the third and complete STOP codon (TAA) which marks the end of translation of a particular amino-acid sequence and the beginning of a new sequence. Thus we conclude that the three kintypes (*exundi, kōkaɽ* and *koyaɽ*) are like the three STOP codons, two of which can have their kin statuses transformed but not the third one.

3.1.3 Exons and Kin Categories

Exons are parts of the genes (in most eukaryotic type cells, which include human cells) that code for proteins. Exons are composed of numerous short sequences embedded within stretches of non-coding sequences called introns. Exons can be compared to the address terms which stand for (or "code for") kin categories. We have seen that out of the total 37 reference terms, only 20 are used as standard address terms, which is a little more than half the number of the total (about 54%).

But there is another important point to note here, and it is that when taken together, the 20 standard and 2 non-standard categories (presented in Tables 5 and 7 in Chapter 1) show a total of 29 kintypes which make it to being included in kin categories. However, as we have seen in the preceding section on *Codons and Kintypes*, one of 3 kintypes "coding for" the 2 non-standard kin categories, i.e. *koyaɽ* (yBM, SW), works like a complete STOP sign and therefore is not a "coding" kintype. Thus there are really only 28 kintypes that "code for" kin categories and thus make up the "exons" of the kinship system.

3.1.4 Introns and Non-categories

Introns are parts of eukaryotic genes that do not code for proteins. The reference terms which are *not* used as address can be described as the "introns" in the kin terminology. The *distribution* of exons and introns in the DNA is very similar to that of the address and reference terms. In the DNA, the average exon content is only slightly more than that of the intron content in a human gene. An average of 8.8 exons and 7.8 introns are found in human genes[58]. This is calculated as 53% exons and 47% introns. On the other hand, in the Madia kinship system, the reference terms that are not being used as address are 17 (that is, 37 – 20), and this is 46% of the total number of reference terms. The number of terms used for address is only slightly more (20, or 54%) than that of those not used for address.

Now the above calculation is about the proportion of reference and address terms in the Madia kin terminology. Let us also consider the number of *kintypes* included and excluded from the address terminology. In order to calculate this we must refer to the column 4 in the Tables 5 and 7 in Chapter 1. Only 29 of the 37 kintypes are listed in these two tables as categories. However, even one of these kintypes, i.e., the *koyaɽ* (yBW, SW) which is listed in Table 7, is compared to the complete STOP sign as we discussed in section 3.1.2 above, and therefore must be counted along with the non-categories. Other non-categories are as accounted for in section 1.2.3 of Chapter 1. The "children" kintypes that have address terms which are simply words of endearment, are four (refer to Table 9). The cross-cousin kintypes, which are transient categories, and therefore non-categories account for two (Table 8). The two remaining ones are the H and W, which do not have address terms at all (Table 4 in section 1.3).

Thus, the total number of kintypes that are kin categories are 28, while the number of kintypes that are non-categories are 9. The 9 kintypes that fall under non-categories (which are H, W, FZS/MBS, FZD/MBD, S, D, BC, ZC, yBW/SW) are not in any way less significant than the rest of the 28 kintypes that do. The non-categories are invariably found in any and every genealogy. Therefore, even though non-categories correspond to the introns in DNA, the description sometimes of the introns in the DNA as an "artifact" with no real function, would certainly not apply to the nine 'non-coding' kintypes. Cross-cousins and spouses are what the

[58] http://www.news-medical.net/health/What-are-introns-and-exons.aspx

kinship system is all about. Children grow up and marry to keep replicating the kinship system and keep replenishing the society.

Going beyond the kin terminology, introns can also be compared to one's distant relatives for whom it would take four or more letters in the kinship notations (such as FZHZS, FeBDSD, MMBSDD etc). These distant relatives or *not-key-referents* are certainly part of one's genealogy map, but these relations are not as definite as that of the *key referents* because it is possible that the distant ones are related in more than one way and therefore these cannot be referred to with a single definitive kin term. All this is simply to say that a distant relation is contingent and unpredictable. Since the distant relatives are either difficult or impossible to code for with a specific kintype, they can be described as *non-coding referents*. Without first being a specific kintype, it is not possible for a distant relative to fall into a specific kin category. The number of non-coding relatives (distant relatives) can be expected to be higher than the number of relatives who are primary.

3.1.5. Two Strands and Two Social Categories

The DNA is made of two complementary strands. So is the Madia kinship system in the sociocentric view. There are only two kinds of relatives based on marriageability, i.e. *jīva* and *eṛmi*, and all the kin categories fall into either one of these two social categories (section 1.3.2). Complementary bonding is the basis to both DNA and the kinship.

Moreover, in section 1.4.1 we have seen how the interaction between the two social categories can be depicted as a double helical structure because of the fact that the flow of the bride is reversed systematically after an interval of a single generation, and because in the sociocentric view the FZD exchange is bidirectional and symmetric. We have also seen (section 1.4.2) how the dual social organization is encompassing the whole society, i.e. the entire Madia population under the god-group system which is an arrangement so that the clans which have the same number of gods are *jīva* to one another, and all those with a different number of gods are either *eṛmi* already or are potential *eṛmi*.

3.1.6 Junk DNA and the Ritual-kin

About 98% of the total amount of DNA in the human genome is non-coding. The non-coding DNA (or the so-called junk DNA) can be compared to all the people in the society who are not one's relatives through the three fluids of identity (blood, milk and semen), but who, in spite of being "unrelated" in that sense, are perceived as related through the *god-number* system (as discussed in section 1.4.2) and therefore can be described as the *ritual-kin*.

Speaking of *structure*, the non-coding DNA, which is sometimes described as the "genetic gibberish", is also part of the double helical structure. Similarly, the vast number of ritual-kin in Madia society is also part of the dual kinship structure just as are the kin, which is possible because of the god-group ritual kinship as noted in the section above. Because of the god-group organization in this society, any stranger (if adult) can be and usually is *addressed* using age-appropriate kin terms avoiding use of personal names which is considered inappropriate.

Now let us consider the question of *function*. The ritual-kin are all potential relatives as they could engage in marriage exchanges guided by the god-number system, and in all probability, the ritual-kin were alliance partners in the remote or unknown past (for there are only four sections to give and take from). It is a fact that any one family or lineage cannot possibly strike alliances with *all* of the ritual-kin in the society, and cannot even do so with many of them. However, it would still be very important for any lineage to have a vast number of unrelated people (but ritual-kin) in the society, exceedingly far more people than what one can actually relate to as kin, for such an organization serves as the necessary background to provide considerable options for families within a lineage who try to arrange new alliances for their young men and women. And the alliance exchange process must go on continually because of the natural course of continual birth, growth and death. Thus the ritual-kin are an essential part of the social organization necessary for regulation of marriage alliances in the society.

It is hard to imagine how marriages can be arranged in the Madia society without this vast reserve of ritual-kin, i.e. of previously unrelated young men and women to choose from in making new marriage alliances. The ritual-kin are functionally absolutely crucial in the Madia social system, and so are far from the description as "junk". How does this social situation compare with the function of the biological DNA sometimes described as junk? The function of the junk DNA is still a matter of speculation, and therefore is inconclusive. However, what is claimed by the ENCODE project about the function of the non-coding DNA in the "organization and regulation of our genes and genome" may be something that can be compared to the organization of the Madia population under the ritual kinship and its function of marriage regulation.

3.1.7 Conclusion

Each of the main components of the DNA's structures has a corresponding component in the Madia kinship. We have compared the base-pairs with the sibling-pairs, the codons with the kintypes, the exons with the kin categories, the introns with the non-categories, the two strands with the two social categories, and the junk DNA with the ritual-kin. Though many or all of these kinship components can be found in other Dravidian kinship systems, the numerical correspondence between the Madia kinship and the DNA structure, which we will be discussing in the remaining sections of this chapter, does seem to set it apart as a unique kinship system.

So far we have covered only the structural properties of the DNA coding. Let us now move on to discussing the functional properties of the Madia kinship and the DNA.

3.2 Comparison of Functions

The function of the DNA coding is protein synthesis, and proteins make up all living organisms. The function of the Madia relationship code is to regulate marriage alliances in the society and build the specific type of families and lineages found in the Madia society.

3.2.1 Transcription, Translation and Splicing

Transcription and translation are two main processes both in the decoding of the genetic code as well as in the Madia kin categorization. These concepts apply very appropriately to both the DNA and the kinship. But there is a difference in how these processes are handled by the two. In the DNA, *all* the codes in the exons are first transcribed and then *all* the codons (except the STOP codons) are translated into the 20 standard amino-acids. But in the Madia kinship complementation occurring in a marriage alliance, not all but some of the kintypes are directly complemented and transcribed while some others (i.e. the affinal kintypes) are indirectly complemented and translated (section 1.1). It has to be different with the kinship system because the four parents (or the two sibling pairs) are people and unlike the four bases (or, like the letter codes that stand for the four bases), these four people could not be arranged in 64 different ways! The Madia kinship works in many ways like the DNA while allowing for the fact that its fundamental elements are people and not chemicals. The kinship structure has comparable components which go through similar processes, but we must say that the kinship system handles the two processes in ways suitable for its elementary constituents.

What about processes such as RNA splicing and alternative splicing? We have seen that the RNA-splicing removes the introns from the pre-RNA to yield a mature RNA while the alternative patterns of splicing within a single pre-mRNA molecule could yield different functional mRNAs (or multiple transcripts). We have already compared the kintypes that are non-categories with the introns; their “disqualification” so-to-speak from being kin categories being like the removal process in RNA splicing. Similarly, we can compare the alternative splicing to the possibility of alternative translation of some affinal kintypes into either one or another of the standard kin categories, a process that allows for multiple translations (refer to latter part of section 1.1.2).

Going beyond the kin terminology, we can also compare alternative splicing to the formation of families or lineages. Even though any new lineage formed in the Madia society will have the same kin terminological structure, no two lineages will have the same *number* of relatives or kintypes or categories. While there will always be a maximum of only 37 kintypes and 20 standard categories, it is possible that some kintypes and therefore some categories can be missing from individual families and individual lineages. For example, one person may not have a FZ and therefore not have a FZH. If an individual is a single child to his/her parents, then he/she would not have sibling kintypes and therefore no siblings’ spouses or siblings’ children. That is why we can expect that lineages will differ from one another in composition. Just as alternative splicing within a single pre-mRNA molecule can yield multiple transcripts which makes possible the production of a vast number of proteins from limited amounts of genes, a specific number of kintypes (37) and categories (20), when combined in innumerable ways, produces countless families and lineages of varying compositions within a society. A limited number of kintypes and categories can account for rather unlimited variations of families and lineages.

Once again, all the three concepts considered here (transcription, translation and splicing) can apply to central and south Dravidian kinship systems too. However, if we consider the end-products of these processes, i.e. the amino acids – their numbers, their descriptions and their classifications, the Madia kin categories prove to be similar to the DNA while the south Dravidian systems would not. Even among the central Dravidian systems, how similar or different are the Bison-horn or Dhurwa or Muriya kinship system compared to Hill Madia kinship, is still to be investigated.

3.2.2 Classification of Amino-acids and Kin Categories

There are many ways in which the amino acids and the kin categories are similar - in their description and classification. First let us consider the fact that each amino-acid is coded for by codons which are triplet codes. How about the kin categories? We have seen how the basic criterion for standard kin categories seems to be marital status (section 1.2.1.7). We have also seen how the social identity of a married Madia individual is threefold because his/her identity is composed of kinship connections from on three sides – Father's side , Mother's side and Spouse's side (section 1.3.3). Because the standard kin categories have three-way kinship connections, these too are like triplet codes.

Secondly, while most of the 20 standard amino-acids are represented by multiple codons (described as degeneracy or redundancy), there are only two amino-acids each coded for by only a single codon, and these are Methionine (Met) and Tryptophan (Trp). Similarly, in the kinship system, the F and M are the two non-redundant kin categories that have each only a single referent, while the rest have multiple key referents, ranging from two to eight (see Table 5 and section 1.2.1.4).

Thirdly, three of the standard amino-acids are described as ambiguous, because their identity is sometimes indeterminable in analysis (section 2.4.1.2). Similarly, three of the four kintypes in G^{+2} are ambiguous kin categories in their usage (i.e. address) because these have alternative address terms from G^0 (section 1.2.1.2). The fourth amino-acid in Table 10 that is labeled as the "unknown or unidentified" amino acid with the abbreviation Xaa corresponds to the fourth kintype in G^{+2} (i.e. FF *thādho*) which indistinguishably merges with the kin category *dhādha* (eB). The FF *thādho* is a kintype (a codon equivalent) which does not exist as a distinct kin category (amino-acid equivalent) but is rather merged into another category, *dhādha* (eB).

Fourthly, even as there are 9 amino acids described as 'essential' (section 2.4.1.2), there are correspondingly 9 "root" kin categories (section 1.2.1.3) which are among the twenty standard ones and which are "essential" or indispensible in any Madia person's lineage. These "essential" kin categories are from three G levels above Ego and are irrevocably present in everyone's lineages because a Madia person could not have come into existence without these 9 categories. In biology, the "essential" amino acids are so called because these are not synthesized in the human body and must be obtained from food we take in. With regard to the kinship, I have used the term "essential" to mean that, while Ego does not produce the categories in G^{+1}, G^{+2} and G^{+3}, these people have existed before him/her, and he/she exists because of them, so that he/she could not have come into being except through them. These 9 kin categories do not refer to nine individuals but rather to all of Ego's ancestors from Mother's as well as Father's sides. No matter how far back one can trace his/her lineage, there are found only 12 kintypes and 9 kin categories and this is because of the alternate generation merger of kintypes.

3.2.3 R-Groups and Social Categories

The classification of the 20 amino acids into R-groups based on *hydrophobicity* is similar to the classification of the 20 kin categories into social categories on the basis of *marriageability*. The non-polar group (hydrophobic) of 9 amino-acids corresponds with the 9 non-joking or *jīva* group who do not partner in marriage alliance. The polar group of 11 amino-acids corresponds to the 11 kin categories that fall under the *eɽmi* group where the 6 uncharged correspond with the six kin categories that are the *putulthor* (mother's side relatives) and the 5 charged ones correspond with the 5 kin categories that are purely *eɽmi* (or affinal relatives).

Even as biologists warn about putting all amino acids of the same type into an invariant group, so it is with the kin categories. Broadly speaking, the *eɽmi* are the *joking* categories and the *jīva* are the *non-joking*. However, and as already mentioned, the FZ (a *jīva* kin), which is one of the non-joking types, can sometimes tease the female Ego. Similarly, the *ane* (yZHws and DH) (an *eɽmi* kin) falls in the *eɽmi* described as the joking group, but the *ane* is not a joking kintype.

We have discussed in section 1.3.1.3 that there is a seeming ambiguity about the category *ava* (M). When the M is included as a kin category among the *putul*, the number of categories in the three groups (*jīva*, *putul*, *eɽmi*) is 9, 6 and 5, which is the same as saying that the *jīva* are 9 and the *eɽmi* are 11 (because *putul* is part of the *eɽmi* group). Instead, if the M were to be included as a category in the *jīva,* group, then the numbers would be 10, 5 and 5 for the three groups, wherein both the *jīva* and *eɽmi* would be 10 each, which is what some classifications of the amino acids show it to be (refer to section 2.3.1.1). The point to be made here is that the two Madia kin classification and the amino-acid classification correspond even in the area where there seem to be some ambiguity, which is again remarkable.

3.3 Comparison of Dynamics

In DNA replication, the two strands separate and bond with newly built complementary strands to create two DNA molecules in the place of one, and this process is necessary for cell division which occurs constantly in a living organism. We have seen how the two strands work differently during replication. Moreover, because the DNA of all eukaryotic cells (which included human cells) is very long, the replication occurs simultaneously at multiple sites (recall *replication origins*) so as to shorten the time for creating multiple copies. Let us see how far these dynamics compare with the Madia kinship and alliance.

Firstly, a Madia lineage (known as *thexa*) is about 3 or 4 generations above Ego and one or two generations below (i.e. a total of about 5 to 6 generations) and every lineage must eventually branch out into new lineages. This process can be compared to gene replication.

Secondly, every marriage duplicates or repeats the complementary bonding of relatives from the two sides as described in section 1.1, and the entire kinship (terminological) structure can be said to replicate. Every marriage in the society may not be an FZD alliance but every marriage follows the complementation process in the kin terminology as though it were an FZD alliance. (Let me add here that this is also true of any society with a positive marriage rule). Therefore we may say that the kinship coding is duplicated. Even as the DNA replication is an endless process in the lifetime of an organism, the Madia kinship structure is repeated generation after generation, and it will be so for as long as the FZD alliance (the practice and exercise of the right to marry the *putul pila* or FZD) is the basic assumption for kin classification in this society.

The third similarity has to do with how the two DNA strands work in replication. One of the two strands in the DNA is called the leading strand where the replication is continuous and the other is called the lagging strand, where the replication is discontinuous. The Madia being a patrilineal society, it is the patrilineage or the *genealogical connections* (i.e. the *jīva*) between successive generations of male members which is perceived as *a continuous and unbroken line* (for as long as there are male children born in a given lineage). So, the patrilineage is like the leading strand. On the other hand, the *affinal connections* with the spouses' families (i.e. the incoming women and their immediate families as well as the outgoing 'sisters' and their husbands' families) who make up the *eɽmi*, the ties with whom are seen as discontinuous because each new generation engages different families of different lineages as *eɽmi*. There can be no unbroken continuity here over several generations. Any given lineage is made of *one unbroken line of patrilineage* but *several discontinuous affinal ties*. All new lineages of a particular family tree that have branched out can be traced back and be joined with the older lineages, but it cannot be so with the affinal ties. What hold all the numerous affinal ties in a lineage in their respective places are the unbroken genealogical connections. Therefore the affinal ties can be compared to the lagging strand in the DNA replication.

The fourth similarity may be a significant one as it relates to a distinct characteristic of the Madia alliance. All the three points made above can also be true of other cross-cousin alliances and the kin terminologies associated with them. How then is the Madia or the FZD alliance alone comparable to DNA replication? The answer to this question is found in the distinctive mechanism or technique that the FZD alliance exchange follows. Much like the replication in the DNA of eukaryotic cells, the FZD kinship maintains the *shortness* of its cycle. The FZD alliance is by definition a short cycle because it can involve only 2 generations and 'expire' just after that. While it is possible to imagine its counterpart, the MBD marriage, as well as the bilateral alliance, as systems of *continual* affinal alliance, the FZD can only be "a short term arrangement" as defined by Parkin (1997:103).

The shortness of the cycle allows for *multiplicity* or frequency of the occurrence of FZD alliances. There may be a few FZD marriages occurring simultaneously within a lineage, or even within an extended family. There is a high chance of multiplicity or frequency of the FZD cycle in a lineage, or generally in a society, because every new marriage alliance has the potential to become one in the very next generation. This would mean that the number of FZD alliances would only be a little less than the number of new alliances (meaning those between people who are not related). This is found to be true of three societies practicing the FZD alliance (see section 4.6.3 in Chapter 4) and this seems to be another fact that can support the current comparison between the dynamics of the two structures.

3.4 Comparison of Organizations

Even as several hundreds or thousands of genes are packaged and organized into structures called chromosomes, hundreds or thousands of Madia lineages are organized into *jama* 'clans'. There are 23 pairs of chromosomes in a human cell where 22 pairs are autosomes (i.e. non-determinative of sex) while the 23rd one is a pair of sex determining chromosomes. The fact that there are only 22 main clans that cover the entire Madia tribe (section 1.4.2) allows for these to be compared with the autosomes. (Needless to say perhaps, there could not be an equivalent of the sex determining chromosome because societies are asexual.)

Here again, it is interesting to note that the organization of clans into four god-groups where each group has either 4 or 5 or 6 or 7 clans seems to correspond to the representation of human chromosomes in the standard karyogram which shows a four layered division with the number of chromosomal pairs in each layer the same as in the clan organization (i.e. 5, 7, 6 and 4). Because of such a similarity, we can compare the Madia society to a human cell[59].

[59] One cannot help but be reminded of Durkheim's (1933) , Malinowski's (1922) organic whole and Radcliffe-Brown's (Radcliffe-Brown 1952) analogy of a living organism – all of which applied to kinship based societies.

There is yet another fact about the DNA that makes for an interesting observation and comparison with the Madia kinship and we will discuss it below.

3.5 Mitochondrial DNA and Reference Terms

Throughout this chapter so far, our focus has been more on the address and less so on the reference terminology. But in the current section we will consider the reference terminology. If the address terminology, in its features, its numbers and classification, can be compared to the nuclear DNA, the reference terminology can be compared to the mitochondrial DNA.

First of all, the mtDNA has only 37 distinct genes, no more and no less, just as the reference terminology has only 37 terms, no more and no less. The *numerical similarity* is only one issue. The other issue is the *function* or the protein synthesis. Protein synthesis is the main purpose of the nuclear DNA coding and the address terms stand for the standard kin categories whose number and classification are comparable to that of the amino-acids. On the other hand, the mitochondrial DNA does not produce many of its proteins, but the vast majority of the proteins they require are encoded in the nuclear genome. Though families consists of kintypes (reference terms), for all practical purposes, like daily direct interactions, only the address terms are useful.

For another point of similarity, there is a sense of "remoteness" in reference as compared to the closeness or proximity when the same terms are used as address. The vocative nature of the address terms makes the difference. The mtDNA's association with ancestry too gives a sense of remoteness to it. In a less significant way perhaps, the mitochondrion's location outside of the cell nucleus too seems to suggest the same. The mtDNA is like a register of one's ancestry, and likewise the reference terms are like a list or roll-call of all possible types of relatives in a society.

With regard to the shape of the mtDNA, it is *circular* and *closed* unlike the nDNA which is linear and open. While we cannot talk about shape with regard to kin terminologies, it is possible to compare the circularity of the mtDNA with a certain feature of the reference terminology known as the alternate generation merger, which renders the kinship structure circular in a sense. A circular shape is associated with symmetry. How the reference terminology contributes to the symmetrical nature of the Madia kinship is a topic in itself deserving a separate discussion which we do in Chapter 4, but it seems relevant to just mention this much here.

Moreover, the reference terminology is also a "closed" system because there are only 37 of them, and each and every relative, from the past, present and future should fall into any one of these 37 kintypes. It is different with the address terminology because options do exist sometimes with regard to address. How so? Let us recall (i) alternative translation of certain kintypes, (ii) some address terms being contingent on kin-distance, (iii) some address terms being transient, and (iv) the terms of endearment being non-universal and not limited in number, as people can be inventive about addressing their little ones. These suggest a certain openness and therefore the address terminology (the nDNA equivalent) can be described as being 'open', or at least relatively so in comparison to the reference terminology.

There is one more fact about the mtDNA that helps to draw yet another parallel with the reference terms. Superficially, this is about numbers. But there can also be a deeper parallel here. The two strands of the mtDNA are differentiated as the heavy and light strands, and it has been found that in humans (and some reports cite mammals) "the heavy strand of mtDNA carries 28 genes and the light strand of mtDNA carries only 9 genes"[60]. This fact too helps draw a parallel between this and the kinship system because out of the total 37 kintypes, 28 of them fall under kin categories (standard or otherwise) while the remaining 9 kintypes are non-categories. The difference between the heavy and light strands in the mtDNA "is not known to have any functional significance"[61]. However, in the Madia kinship structure this difference accounts for the difference in the proportion of the "coding" kintypes as against the "non-coding" kintypes.

Now let us turn our attention to the possibility of a deeper parallel. It is about the *relation between mtDNA and nDNA.* Why two types of DNA are needed is not clear, but how the two are related has been pondered. As we have noted in Chapter 2, while *interactions* between the two seem to be well known, what kind of relation or *connection* exists in their evolutionary path(s) is being speculated. According to some, the nuclear DNA and the mitochondrial DNA may have had separate evolutionary origins.

With regard to the kinship system, however, it is very clear how the address and reference terminologies in Madia (our equivalents of nDNA and mtDNA) are fundamentally interconnected. All the standard address terms are reference terms too, with a few of them dropping the final consonant (e.g. *kākal* (FyB) is reference and *kāka* is address, *thamox* (yB) is reference and *thamo* is address). In our analysis in Chapter 1 the address terminology could not be described or explained without relating these to the reference terminology. Let us recall that our discussion of complementation in Madia kinship began in section 1.1 with the observation that it is a total of 64 kintypes, counted from the two sides, most of which merge complementarily to fall into the 20 standard kin categories. Not only do the reference terms (kintypes) provide the starting point in the analysis for understanding the complementation (i.e. which kintypes merge complementarily with which ones), and consequently the kin categorization (i.e. which kintypes complement and which ones do not complement), but the *number* of kintypes (i.e. the total being 37) is also fundamental to how we arrive at *all the other numbers*, such as that of kin categories, classes of categories and even that of key referents. We had to begin with the 37 reference terms in order to be able to follow how the kinship coding

[60] Human Mitochondrial Genetics: From Wikipedia, the free encyclopedia.
[61] Heavy Strand: From Wikipedia, the free encyclopedia

works to produce the kin-categories (denoted by address). Thus the reference and address are inseparable in our analysis in the Chapter 1. However, in the forthcoming Chapters (4 and 5) which will focus on analyzing the reference terminology, we will not refer to the address terminology as much. Chapter 4 will need to do address terms only in one or two places. This may be interpreted as a structural *necessity* or *dependency* of the address terminology on the reference. Since no such relation is known to exist between the nDNA and the mtDNA, making a comparison on this point is currently impossible. All the same, this point seems worth a mention in this comparative study.

3.6 Summary and Conclusion

Complementation is the main theme in both the DNA and the Madia kinship structures and it made a comparison of the structures feasible. If cross/parallel distinction is the basis on which complementation in kinship relationships is founded, the purine and pyrimidine distinction is basic to the complementation in the DNA.

In this chapter we have seen how the many features or properties related to the DNA's structure, function and dynamics such as redundancy, triplet-coding, transcription, translation, splicing and replication are all applicable to the Madia kinship, yielding results or products that are comparable too. The last discussed of these, the similarity between the organization of the nuclear DNA into 22 autosomes and that of the lineages into 22 major clans among the Madia as well as the comparison of the mitochondrial DNA and the reference terminology seem to lend further support to whatever discussions went before that.[62] Many aspects of the mtDNA too, relating to its shape, location etc., can be applied to the reference terminology, and here again, the numerical correspondence is striking. Besides, I have also pointed out the differences I am able to see in the way some of the basic features work in the two structures compared.

For our summary, instead of doing a recap of all the main points discussed in this chapter, let me present only the numerical correspondence between the DNA and the Madia kinship. Table 12 below lists the numerical correspondences. As this list is rather long, it would help to remind ourselves that the correspondences have to do with only a few sets of corresponding elements.

Let us recall that in our analysis of the kinship (in Chapter 1) we discussed about *kintypes*, *kin categories*, *non-categories* and *social categories* besides the *ritual kinship* through the Madia god-group system. In Chapter 2 we saw that the nDNA comprises of two complementing *strands* made of *nucleotides* where the backbones of the strands facilitate the

[62] It seems relevant to point out here that while some of the key ideas here may also apply to other central or south Dravidian kinship systems, the numbers involved in the Madia terminological structure and Madia clan organization sets this kinship system apart and as the one comparable to the nuclear DNA.

complementation of the four *bases*, and where parts of the sequences of nucleotides are either *exons* or *introns*, besides a huge proportion of sequences which are non-coding are called *junk DNA*.

Presented below is a list of the main elements in these two structures which also pairs each element in the kinship structure with that which it corresponds to in the DNA structure.

1. Sibling-pairs → a. Base pairs
2. Kintypes → b. Codons
3. Kin Categories → c. Exons
4. Non-categories → d. Introns
5. Social Categories → e. Two Strands
6. Ritual-kin → f. Junk DNA

Table 12 presents the numerical details involving the six pairs mentioned above.

Table 12: Numerical correspondence between DNA and Madia kinship

DNA	***Madia Kinship***
2 base-pairs	2 sibling pairs
Total of 64 codons	Total of 64 kintypes to be sorted out as complementary and non-complementary.
3 STOP codons.	3 kintypes in non-standard categories
Exon and intron distribution: 8.8 and 7.8 per gene, which is 53% and 47%	Out of the 37 terms, terms used as address are 20, and terms used only as reference are 17. This is 54% and 46%
20 standard amino acids	20 standard kin categories
2 of the 3 stop codons can be overridden to make 2 non-standard amino-acids	2 of the 3 kintypes in non-standard categories can change in thier kin status
Each amino acid is coded for by a codon that is a triplet code	Each standard kin category has a three-way kinship connection, i.e. a triplet code
2 amino acids are coded by single codons (i.e. non-redundant)	2 kin categories have single referents (i.e. non-redundant)
3 ambiguous amino-acids and 1 said to be unknown or unidentified	3 ambiguous kin categories and 1 which is indistinct
9 essential amino-acids	9 essential kin categories
Amino acids classified into 2 major classes (R-groups)	Kin categories classified into 2 major social categories
R-groups of amino acids numbering 9, 6 and 5 (with a few overlapping features)	Social categories numbering 9, 6 and 5 (with overlapping kin behaviour)
All the genes in the nucleus of a human cell packaged into 22 autosomes and a single sex chromosome.	The entire Madia population (of about 130,000) is organized into just 22 main clans.
Chromosome karyogram showing 5, 7, 6 and 4 chromosomes in order of size	In order of the size of clan memberships, the four god groups fall as 5, 7, 6 and 4
37 distinct genes in the mtDNA	37 kintypes or terms of reference
In mtDNA of mammals (including human), 28 genes are carried in the heavy strand and 9 genes in the light strand	Among Madia relatives, 28 kintypes form kin categories while the remaining 9 kintypes fall under non-categories.

What we have seen in this chapter is that the correspondence between Madia kinship and the nDNA goes beyond the *structural* aspects because the kin terminological coding also *functions* like the DNA coding (as shown in the discussion of the processes of transcription and translation and classification). It extends to the *dynamics* (between replication of DNA and replication of FZD alliance) as well as of the *organization* (chromosomal organization and the Madia clan organization). It can be said that the Madia kinship coding, alliance and social organization work in ways similar to the nDNA coding, replication and packaging. For all these reasons, we can describe the Madia kinship as the *kinship DNA*.

All in all, the following picture is what emerges (and here we can avoid the technical lingo of social anthropology which I had to depend on hitherto):

The 22 major clans are like (or correspond to) the CHROMOSOMES.

Each clan contains several hundreds or thousands of lineages that are like the GENES.

Each lineage is made up of families where the married adults are like the EXONS, and the youth and children are like the INTRONS.

Families are composed of types of relatives that are like the CODONS.

Types of relations exist because of the alliance the siblings who are like the BASES involve their children in.

PERSPECTIVE II: EGOCENTRIC VIEW

CHAPTER 4

MADIA KIN CONFIGURATION IN EGOCENTRIC VIEW

In our analysis of the sociocentric view of the Madia kinship (Chapter 1), the focus was on categorization of kin and we studied how complementary bonding merged kintypes from the groom's and the bride's sides into kin categories which are designated by the standard address terms. It led us to an understanding of the dual social organization, and its relation to the FZD alliance, and the four section social structure. In the current analysis of the egocentric view, the focus will be on genealogical connections and therefore we will study the 37 reference terms which stand for the 37 kintypes coming from four different generational levels. The purpose of this analysis is to see how these kintypes are configured in the egocentric perspective. It is helpful to do this study in two parts: (i) the system as a whole, and (ii) the system at the core.

The unique features of the Madia (patrilateral) system can be appreciated only when it is studied in comparison with the other Dravidian alliance systems such as bilateral and matrilateral alliances, and therefore in both these parts we will also be dealing with two south Dravidian kin terminologies to the extent necessary for our purpose. Such comparisons, besides revealing what is unique about the Madia kin configuration, could also provide insights into the logical relation between the three Dravidian cross-cousin alliance systems.

4.1 The System as a Whole

4.1.1 Two Ontological Classes

In our study of the kin categories, we saw that the 20 standard kin categories fall into two major social categories or two classes of kin, a distinction based mainly on marriageability, and these are the *jīva* (non-marriageable) and the *eṛmi* (marriageable). Similarly, in the egocentric view too we see that the 37 kintypes fall into two classes. The 37 reference terms or kintypes are from four generational (G) levels, and since our focus here is on Ego's genealogical connections, we can distinguish the kintypes in Ego's own G level from the rest in other three G levels. Let us label these as the EGO (i.e. G^0) and the OTHER (i.e. G^{+1}, G^{+2}, and G^{-1})[63]. The reasonableness of this distinction is in the fact that the kintypes which fall under the OTHER generally show a

[63] This distinction is not the same as the conventional one between *Ego* and *Alter*, which refer to individuals, while I use the terms EGO and OTHER to refer *not* to individuals but to entire generational levels.

tendency for alternate generation merger (AGM, for short), whereas those in the EGO generally do not. If the *jīva* and the *eṛmi* are two alliance classes in the sociocentric view, the EGO and the OTHER are the two ontological classes recognizable in the egocentric view. I present these ideas in a diagram below.

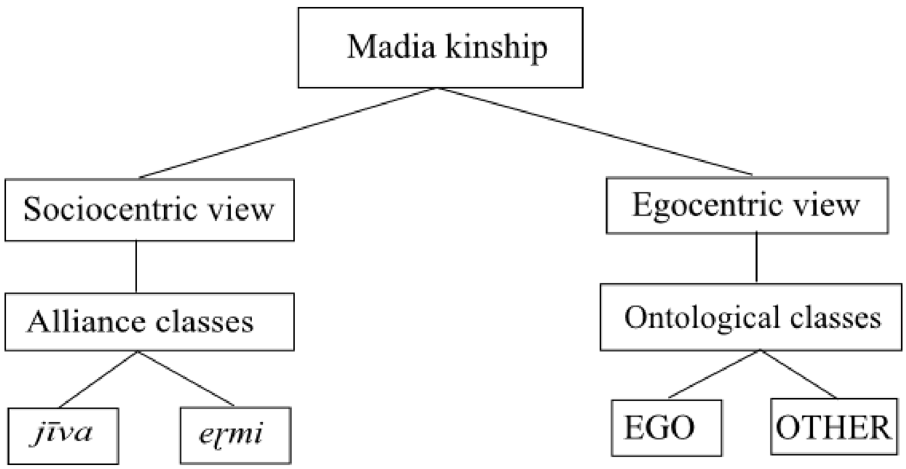

Fig. 13. Dual classification in the two views

This societal level classification is a more explicit one as it is known by indigenous terms *jīva* and *eṛmi,* whereas the dual classification in the egocentric view is rather tacit because there are no indigenous terms that distinguish Ego's own generation (EGO) from all the rest (OTHER). Therefore, the distinction as EGO and OTHER based on genealogical connections is one that we make for the purpose of analysis and the usefulness of this distinction becomes clear in the analysis and description of the Madia kinship presented in the following pages.

4.1.2 Four 'Role-play' Groups

The two ontological classes can be further distinguished based on role-play. Marriage alliance, more specifically who does what in the marriage alliance, provides the framework for distinguishing the roles. If in the sociocentric view we studied *who is like whom* (i.e. the categorization of kin), in the egocentric view we study *who does what* in the marriage alliance, or the *role-play*. The two ontological classes fall into four groups based on the roles the different generational levels play in the alliance exchange. By *role-play* it is meant how these four groups are *functionally related* to each other in view of the marriage alliance, and this is irrespective of whether or not a given group or generational level actually has something to do in the marriage alliance itself. For example, *Children* (G^{-1}) is one of the four groups, but they do not have any direct role to play in the marriage alliance but they are functionally related to the rest in the sense that they are the *products* of the marriage alliance. I present the four groups in a diagram below followed by a brief discussion of their positions in different generational levels and their respective roles.

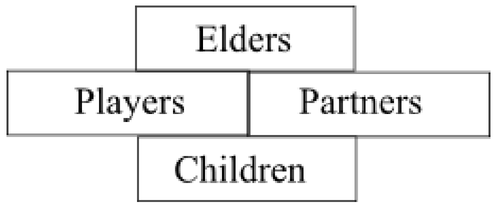

Fig. 14. Four Role-Play Groups

Group 1: The generations above Ego are *Elders* and they are the *facilitators* of the exchange. These are kintypes #1 to #12 in Table 1, and these are discussed in section 4.2.1.

Group 2: The generation below Ego are *Children*, who are the *products* of the marriage alliance. These are kintypes # 32 to #37 in Table 1, and are discussed in section 4.2.3 below.

While groups 1 and 2 together make up the OTHER, the kintypes in Ego's own generational level (#13 to #31 in Table 1) make up the EGO which can fall into two more groups, i.e. 3 and 4.

Group 3: The *potential partners* (i.e. siblings and cross-cousins) are the *Players* in the social game of exchange.

Group 4: The *actual partners* as well as all the *spouse-side relatives* together can be called the *Partners* (*Players* and *Partners* are discussed in section 4.2.2.)

Now let us move on to discussing the four groups: *Elders*, *Players*, *Partners* and *Children*. We will first make observations about each group *individually*, and then consider how each of these falls in its specific place in the *overall* configuration of kin in the egocentric view.

4.1.2.1 Elders

The *Elders* (or above Ego G levels) play the role of *facilitators* for they arrange the marriage alliance. The fig. 11 below shows alternation of the Elder kintypes in the G levels above Ego. Some of my Madia informants were able to recite from memory (for this is primarily an oral society) the names of relatives up to three or four generations *above* their own. What the Madia call a *thexa* 'lineage' is usually about six generations long, made of male members and the incoming women (i.e. their wives). While Ego can have any number of referents (relatives) as *Elders* in his/her genealogy, they are all referred to by only 12 kin terms, as shown in the Fig. 15 below.

The two "branches" in the lineage "tree" in this figure represent the F's side and M's side relatives of Ego. In the analysis of the sociocentric view, where marriageability is the criterion for kin categorization and classification, we saw how the sibling-pairs (of opposite sexes) fall in one and the same social categories. But in the egocentric view, where the genealogical connection is the focus, married couples belong together on the same side (or branch) in the lineage while the female siblings are the 'outgoing women' (i.e. who become wives of the male members of a different group).

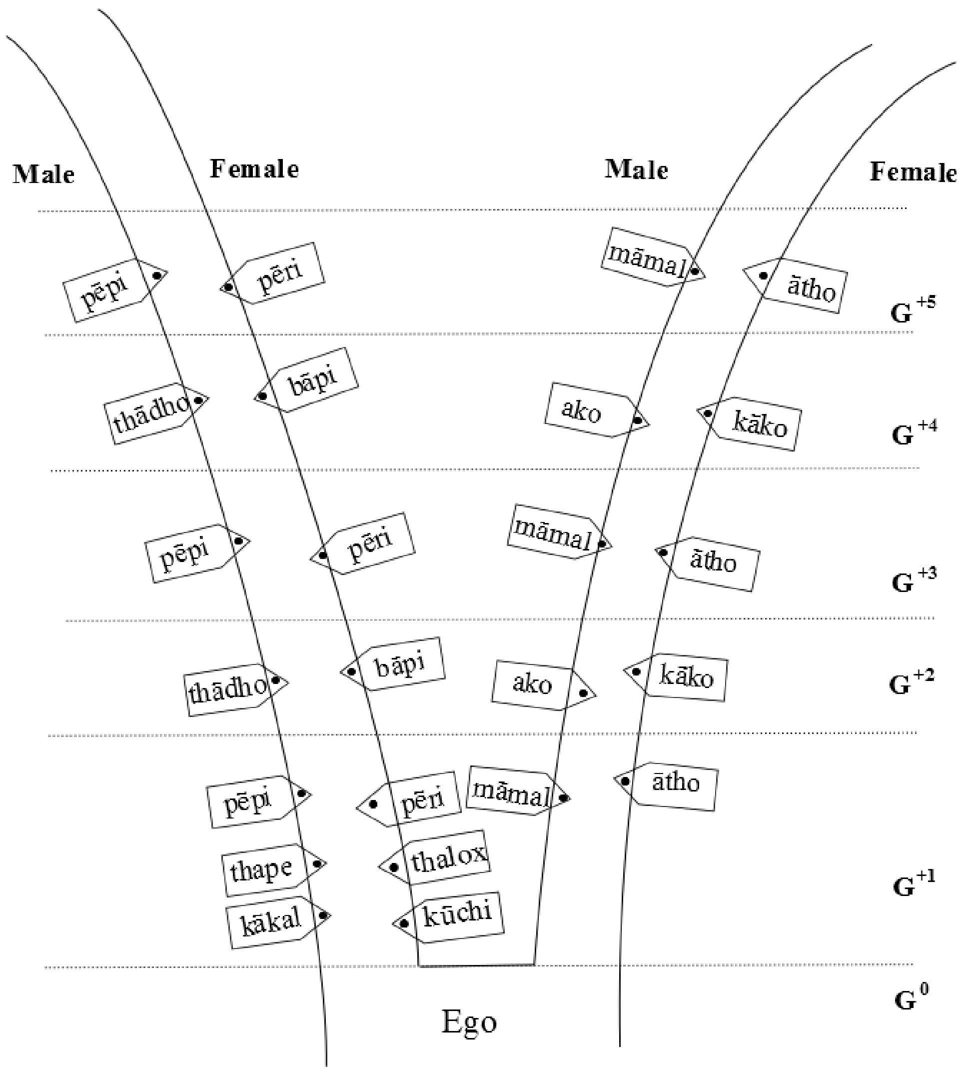

Fig.15. Alternation of Elder kintypes

Though this is not a perfect illustration of what a lineage is, it serves our current purpose which is to show alternation of Elder kintypes. In fact, kinship relations extends to all generations above Ego and apparently all the way up to the founding of the Madia social system in times immemorial. Madia worship their ancestors as their clan-gods, and these gods or deities are referred to using the 12 kin terms for Elders. For example, Kamar-muthe, the main deity of Pungati clan, is *bāpi* (FM) to this clan, while she is *kāko* (MM) to the alliance partners of the Pungati clan. Similarly, this deity's husband, Wachami is *thādho* (FF) to Pungati clan while he is *ako* (MF) to their alliance partners. This shows that crossness extends endlessly to all generations above. Without such transgenerational crossness, alternation could not work as perfectly. The main observation here is that because of alternation, there are only 12 types of Elders, regardless of how many generations above Ego are considered. Eight of these terms are in rotation so that all odd number G levels are the same kintypes, as are all even number G levels. Let us now consider how the Elder kintypes contribute to the symmetric nature of the kinship structure. The 12 Elder-kintypes above Ego fall neatly into three generations.

Table 13: Three generations of Elder kintypes

Gender	G^{+3}	G^{+2}	G^{+1}
Male	*(5) pēpi*	*(1) thādho*	*(7) thape*
	(11) māmal	*(3) ako*	*(9) kākal*
Female	*(6) pēri*	*(2) bāpi*	*(8) thalox*
	(12) ātho	*(4) kāko*	*(10) kūchi*

The column for G^{+1} shows the four kintypes that are *unique to this level* (i.e. *thape*, *kākal*, *thalox*, *kūchi*) whereas the rest are shown in G^{+3} level: *pēpi* (FeB = FFF), *pēri* (MeZ = FFM), *ātho* (FZ = MFM) and *māmal* (MB = MFF). Though the 4 terms unique to G^{+1} do not reoccur in any generation *above* Ego as do the 8 others, the 4 unique to G^{+1} do reappear in the generations *below* Ego but as address/reciprocal terms for grandchildren (Table 1 in Vaz 2010 which is reformatted in Appendix II for the sake of this paper). Considering these facts, *all* twelve of them can be said to be in rotation.

Each G level in Table 13 has 4 kintypes, 2 of which are male and 2 female. Such balanced proportions of male and female kintypes, or say the male/female symmetry, seems characteristic of the Madia kinship structure and this becomes clear in the analysis of the remaining three role-play groups which follows here. The male/female symmetry is not only seen in the number of kintypes but also of the key referents. Besides, there are also other symmetries that we can observe among the *Elders* such as the balancing of the parallel and cross kintypes as well as key referents, and that of the kintypes marked for relative age and those unmarked. Since such symmetries are not obvious either from the lineage tree diagram or from the Table 13, I present another Table below of the Elder kintypes which would help us to see these other symmetries.

Table 14: Symmetry among Elder kintypes

Kintypes		Key Referents on Ego's side	Key Referents from Spouse's side	No. of Referents	Total Referents
Sex	**Kin term**				
Male	*(1) thādho*	FF	EMF	2	18
	(3) ako	MF	EFF	2	
	(5) pēpi	FeB, MeZH	EMB e-r to Ego's F EFZH e-r to ego's F	4	
	(7) thape	F	------------------	1	
	(9) kākal	FyB, MyZH	EMB y-r to ego's F EFZH y-r to ego's F	4	
	(11) mamal	MB, FZH	EF, EFB, EMZH	5	
Female	*(2) bāpi*	FM,	EMM	2	18
	(4) kāko	MM	EFM	2	
	(6) pēri	MeZ, FeBW	EFZ e-r to ego's M EMBW e-r to ego's M	4	
	(8) thalox	M	----------------	1	
	(10) kūchi	MyZ, FyBW	EFZ y-r to ego's M EMBW y-r to ego's M	4	
	(12) ātho	FZ, MBW	EM, EMZ, EFBW	5	
Number of Referents		18	18		**36**

From the table 14 we can observe the balancing of the number of *kintypes* as well as that of the *key referents* on the two sides (Ego's and spouse's) for whichever of the following features or distinctions we consider, the kintypes are 6 and the key referents are 18.

1. *Female & Male:* ----------------------------------6 kintypes each and 18 referents each.
2. *Parallel & Cross:* --------------------------------6 kintypes each and 18 referents each.
3. *Relative-Age Clusters & the Un-clustered:*----6 kintypes each and 18 referents each.

(1) The male/female kintypes are easy to observe as these are shown as separate rows in the table above. (2) The parallel and cross kintypes refer to groups of *sibling kin categories*, the same as we have for the two social categories in Chapter 1 (section 1.3.2): FF, MM, F, FeB, FyB, FZ are parallel and the rest are cross. (3) Relative-Age 'clusters' are groups of the same-sex siblings, i.e. F, FeB and FyB, and similarly M, MeZ, and MyZ (a total of six). The "un-clustered" refers to those kintypes that are *not* marked for relative age.

Through such simple comparisons we can see the symmetric nature of the configuration of Elder kintypes. Now let us move on to studying the kintypes in Ego's G level, which we called *EGO*.

4.1.2.2 Players and Partners

Ego's generation kintypes fall into two types. The 6 *Players* are consanguine, and the rest are affinal kin who are labeled *Partners.* The question arises as to why Ego is male rather than female. Besides being a convention to do so, only the male Ego can show the male/female symmetry which we have been discussing. The *Players* and *Partners* cover kintypes #13 to #31 in G^0 with the exception of # 24 *mujo* (H), the kintype which stands for the male Ego. Note that #21 *eɽmthox* (yZHms) duplicates as WeB and so one of them is given in square brackets.

Table 15: Symmetry among kintypes in G^0

PLAYERS		PARTNERS			
Cross Cousins	**Siblings**	**Spouses**	**Spouse-side Kin**		**Child's Spouses' Parents**
			Spouse's Siblings	**Spouse's Siblings' Spouses**	
(26) mandaɽi (FZD, MBD)	*(13) dhādhal* (eB, FBSe, MZSe)	*(14) ange* (eBW)	*(21) [eɽmthox]* (WeB)		
	(15) akal (eZ, FBDe, MZDe)	*(16) bāto* (eZH)	*(17) mūryal* (HeB)	*(19) exayaɽ* (HBW)	
			(18) pōraɽ (EeZ)		
	Male Ego	*(25) muthe* (W)			*(28) pāri* (CEP)
(27) maryox (FZS, MBS)	*(29) thamox* (yB, FBSy, MZSy)	*(37) koyaɽ* (yBW)	*(22) exundi* (EyB)	*(20) aglal* (WZH)	
	(30) ēlaɽ (yB, FBDy, MZDy)				
		(31) kōval (yZHws)	*(23) kōkaɽ* (EyZ)		
		(21) eɽmthox (yZHms)			

Let us list the symmetries in G^0 level. Among *Players*, 3 kintypes are male and 3 female; the key referents are 8 each. Among *Partners*, 6 are male, 6 are female, and *pāri* is the 1 neutral kintype. However, the number of kintypes among *Partners* is not 13 but only 12 because one of them (#37) belongs in G^{-1}. Key referents for *Partners* are 7 for male and 6 for female –the lone asymmetry. But, how this single asymmetry actually serves the purpose of the *overall symmetry* among key referents in the four role-play groups is discussed in section 4.3.

We have mentioned earlier that the kintypes in Ego's generation generally do not reappear in any other generations. However, the four sibling kintypes tend to do so as address terms: '*dhādha'* eB = FF and SS, '*aka'* eZ = MM and DD, '*thamo'* yB = SSms and DSws, '*ēlo'* yZ = SDms and DDws.

4.1.2.3 Children

The kintypes in G^{-1} are the *products* of the alliance. The G^{-1} consists of 3 male kintypes and 3 female, each of which have 8 referents. The 'Children' refer to *all* in G^{-1} level, including siblings' children and the children-in-law.

Table 16: Symmetry among kintypes in G^{-1}

Sex	Kintypes	Referents	No. of Referents
Male	*(32) max*	S, BSms, ZSws	8
	(34) anemax	BSws, ZSms	
	(36) ane	DH, BDHms, ZDHws	
Female	*(33) mayaṛ*	D, BDms, ZDws	8
	(35) anemayaṛ	BDws, ZDms	
	(37) koyaṛ	SW, BSWms, ZSWws	
Total number of referents			**16**

It is already mentioned that four of the G^{+1} kintypes reappear in G^{-1} as *address* terms. There are no *reference* terms for grandchildren (G^{-2}) and great grandchildren (G^{-3}). But the G^{-2} relatives are equated with G^{+2} kintypes, and the G^{-3} relatives with G^{+3} kintypes in the *address* terminology. The G^{-2} relatives are *referred* either as younger siblings (*thamox* yB and *ēlaṛ* yZ) or as cross cousins. The G^{-3} relatives are referred as G^{-1}, either as *max* S and *mayaṛ* D, or as *anemax* BSws/ZSms and *anemayaṛ* BDws, ZDms. Thus, four of the *Children* kintypes are equated to the *Elder* kintypes. We note the disparity between the number of kintypes in generations *above* Ego (12) and that of kintypes in generations *below* Ego (6).

Two main observations made from the analysis so far in section 4.2 are as follows: One is that the OTHER kintypes typically show a tendency for *alternate* generation merger (AGM). However, there is one kintype that presents a problem. The kintype *koyaṛ* DH in G^{-1} is same as the yBW in G^{0}, which is an "*adjacent* generation equation" and thus is inconsistent with the system's characteristic feature (AGM). The term *koyaṛ* deserves an explanation, which we will reserve for one of the later sections in this chapter where the discussion fits best. Another important observation is about the symmetrical nature of the configuration of kintypes in egocentric view. We have observed many internal symmetries, but the one symmetry that is seen in all of the G levels is the male/female symmetry. In the section 4.2.4 below, we will discuss how this male/female symmetry is made possible.

4.1.2.4 Kintype-Pairs in the Role-play Groups

All Madia kintypes have *opposite-sex counterparts* and we can call these kintype-pairs. The Table 17 below shows that all rows in the two columns have occupants, and not a single spot is vacant. However, the 36 kintypes (leaving out the one neutral kintype (*pāri*)) do not equally divide as 18 each, for there are 19 male and 17 female. How then is there male/female symmetry in every role-play group? The answer to this question becomes clearer in the sections that follow, but I will make a few relevant comments here.

Table 17: Kintype pairs[64]

Role-Play	Male	*Kintype Pairs*		Female	G level
ELDERS	1. *thādho*	FF	FM	1. *bāpi*	G^{+2}
	2. *ako*	MF	MM	2. *kāko*	
	3. *pēpi*	FeB	MeZ	3. *pēri*	G^{+1}
	4. *kākal*	FyB	MyZ	4. *kūchi*	
	5. *thape*	F	M	5. *thalox*	
	6. *māmal*	MB/EF	FZ/EM	6. *ātho*	
PLAYERS	7. *dhādhal*	eB	eZ	7. *akal*	G^{0}
	8. *thamox*	yB	yZ	8. *ēlaɽ*	
	9. *maryox*	PosGS	PosGD	9. *mandaɽi*	
PARTNERS	10. *mujo*	H	W	10. *muthe*	
	11. *mūryal* 12. *eɽmthox*	HeB WeB	EeZ	11. *pōraɽ*	
	13. *exundi*	EyB	EyZ	12. *kōkaɽ*	
	14. *aglal*	WZH	HBW	13. *exayaɽ*	
	15. *bāto*	eZH	eBW	14. *ange*	
	16. *kōval* (ws) *[eɽmthox]* (ms)	yZH	yBW	*[koyaɽ]*	
	pāri (CEP) (Neutral)				
CHILDREN	17. *max*	S	D	15. *mayaɽ*	G^{-1}
	18. *anemax*	osGS	osGD	16. *anemayaɽ*	
	19. *ane*	DH	SW	17. *koyaɽ*	

The table shows that there are two kintypes extra among the male; both are found in G^0 and among *Partners* – one is *eɽmthox* (WeB / yZHms) and the other is *kōval* (yZHws). As shown in Table 15 of '*Players* and *Partners'*, one of the two (say, *eɽmthox*) compensates for the absence of the male kintype *mujo* (H) in the egocentric view. The other one, i.e. *kōval*, does have a female counterpart, i.e. *koyaɽ* but it is a duplicate of SW in G^{-1}. The *kōval* (yZHws) not

[64] Two of the kin terms in this table, i.e. *eɽmthox and koyaɽ,* which duplicate, are given in square [..] brackets. The "row" numbers provided here should not be confused with the code numbers given earlier for the 37 kintypes.

having a *unique* female counterpart (meaning a possible yBW ≠ SW) is not a problem, but rather it is a crucial feature having a specific function to serve in the kin classification as will be discussed in section 4.3.2.4. Similarly, the duplication of the *eɽmthox*[65] both as WeB and yZHms is also an equally crucial feature as it contributes to the symmetry in the FZD system's *core sector* (discussed in section 4.2.1.1). Therefore, even though the inequality of male and female kintypes cannot be appreciated at this point in the paper, when we are done with the analysis in section 4.2 and 4.3 we would have understood how having the two extra male kintypes is necessary for the symmetric nature of the system. However, even that will only point to their *function*. The rule of marriage and widow inheritance alone can explain the *rationale* for the arrangement of kintypes in this system, which is discussed in section 4.4. All in all, it would seem as though the system knows what it is doing, which is all very interesting to observe. But as for now, let us see what conclusion we can draw from the study of the role-play groups.

4.1.2.5 Conclusion: Overall Symmetry in Madia Kinship System

In the section above, we discussed symmetries (i.e. balancing of numbers) *within* each of the four groups, especially the *gender* symmetry that is found in all of these groups. In the present section we discuss the symmetry *between* these four groups with regard to the *number* of kintypes and key referents. In the circular diagram below there are two rungs of numbers where the inner rung shows the number of key referents while the outer rung that of the kintypes.

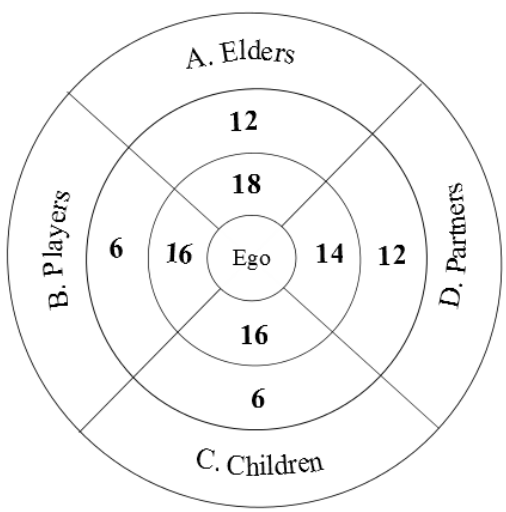

Fig. 16. Overall symmetry in Madia kinship

[65] The kin term *eɽmithox* is translated as 'alliance partner' or more loosely as 'the one who is the key player in the game of alliance'. This kin term shows who the *key affines* are in the FZD system: the WeB is the wife-giver to Ego and the yZHms is the wife-taker who takes the male Ego's sister.

The four role-play groups shown in the diagram as A, B, C and D make six different pairs. Every one of these six pairs is in symmetry with *at least* one other pair.

The vertical and horizontal pairs: AC = BD = 18 kintypes.
Among the four diagonal pairs: AB = CD = 18 kintypes.
AD = BC = 32 key referents.

How may we describe this symmetry?

The *horizontal pair* BD is comprised of the kintypes in Ego's own G level (i.e. EGO). The *vertical pair*, AC, is comprised of all the rest of the G levels put together (i.e. OTHER). Thus the balancing of the vertical and horizontal pairs show the balancing of the number of kintypes between the two *ontologically opposite classes*: EGO and OTHER. Among the four *diagonal pairs*, the CD is comprised of kintypes that can be described as 'relatives through marriage' (whether Ego's marriage or his siblings) which include Partners (D) as well as the Children (C) who are the *products* of marriages. Accordingly, the AB is comprised of "relatives *not* through marriage" (or, relatives from before marriage). In this sense, the AB and CD can be seen as *opposite* kind of kintypes, and these too are held in balance. However, the two remaining diagonal pairs, AD and BC are not as easy to label because the Elders (A) and Partners (D) do not fall together as any specific kind of group and nor do Players (B) and Children (C). Nonetheless, there they are, the diagonal pair AD and BC, balancing perfectly the number of the *key referents* at 32 each. While the other pairs hold in balance the number of *kintypes*, the AD and BC alone balance the *key referents,* thus playing an exceptional role in the overall symmetry.

The conclusion of our analysis so far in this chapter is that the egocentric view of the Madia kinship is one that is extremely symmetrical. This symmetry is achieved by balancing the number of kintypes as well as key referents in the overall configuration, and the male/female members in each group. On the one hand, all this may not appear as anything profound but rather as little acts of balancing the book. But on the other hand, considering the number and the extent of such balancing acts, it does seem that *ultimate balancing* is the central motif of the Madia kinship structure. This structure is so exceedingly symmetric that it can be described as supersymmetric. The four role-play groups partner in creating this *supersymmetry*. As shown in Fig. 13, the Elder kintypes (A) correspond with the Partner kintypes (D), and so do the Players (B) with the Children (C). Therefore we can call these as *superpartners* – A and D are superpartners and so are B and C.

We cannot know if supersymmetry is a unique feature of the Madia kinship unless we compare this with other Dravidian systems. We do this exercise in the following section.

4.1.3 Comparison with South Dravidian Alliance Systems

In this section we will compare the Madia kinship system, a central Dravidian, with two south Dravidian systems. As the Madia kinship represents the FZD alliance, the two south

Dravidian represent the bilateral and matrilineal alliances. The purpose here is to see how far the symmetry of the Madia kin configuration compares with the same of the two other systems.

4.1.3.1 The Data for South Dravidian

The south Dravidian examples come from the Tamil-speaking people of south India and the data used here is what I collected recently from the very same region, namely Thanjavur[66] (formerly Tanjore) as was Gough's data which Trautmann (1981:312, 313) used in his study of Dravidian kinship. Trautmann used non-Brahmin and Brahmin Tamil terminologies from this region as examples of bilateral and matrilateral systems respectively, and I have done the same. My data presented in Tables 18 and 19 below is not different from that found in Trautmann's text except that mine is a bit more detailed for it has more number of terms than provided by Trautmann's source (Gough). Besides, mine show a few differences in the phonetic transcription of the kin terms.

The Brahmins are racially Aryans, but the kinship of the Brahmins living in the southern state of Tamil Nadu is Dravidianized. Even as the Dravidian groups in northern India are Aryanized in their kinship (for example Kurukh and Malto as mentioned by Trautmann. 1981:143, 146), the Brahmins in southern India are Dravidianized, speaking Dravidian tongues and adapting Dravidian alliance and kinship. While cousin marriages are prohibited among Brahmin communities living in northern India, the same *varna* or caste group living in south India has assimilated to cross-cousin (specifically, matrilateral) and eZD-MyB alliances.

The data collection for the south Dravidian systems presented a problem that I did not have to face in collecting the Madia data. The Madia kin terms are the same throughout the tribe and the reference terminology is a total of 37 terms, no more, no less. Moreover, data from the younger and older generations of Madia are consistent with each other. This is probably so because Madia is a relatively small tribe and with limited opportunities for cross-cultural contacts. On the contrary, a few discrepancies do exist in Tamil kin terminology as used by the younger and older informants. Some of the older terminological distinctions are glossed over by today's youth, especially by those brought up away from rural community life. For an example, city-bred girls seem to avoid addressing their FZSe and MBSe as *athān* because *athān* is also the address term for H; these girls would rather address their male cross-cousins as *annā* (eB). The data presented here is collected from informants who are middle aged, neither very young nor very old.

[66]Thanjavur is where I was born and brought up as part of the bilateral kinship system. Since 1995, my husband and I have been working with the Madia, relating with them and being part of their kinship system. I have also had a fair exposure to the matrilateral kinship system when I lived six years as a resident student in S. R. College (Tiruchchirappalli a city close to Thanjavur) in an atmosphere dominated by the south Indian Brahmin subculture. Exposure to these three systems has certainly helped me in my comprehension of them.

The Tables 18 and 19 of Tamil kin terms given below use the same color coding as used in the table of Madia terms for the four distinct *role-play groups* so that the total number of kintypes in each role-play group, especially that of the two groups within G^0, is easy to count.

Table 18: Thanjavur Tamil non-Brahmin kin terminology[67]

Gen.	Male Kintypes	Referents		Female Kintypes
G^{+3}	1. *pāttan / koḻḻuthāthā*	FFF	FFM	1. *pātti*
G^{+2}	2. *thāthā*	FF, MF	FM	2. *appāyi*
			MM	3. *ammāyi*
G^{+1}	3. *periyappan*	FeB	MeZ	4. *periyāyi/periyammā*
	4. *chithappan*	FyB	MyZ	5. *chināyi /chinammā*
	5. *appan*	F	M	6. *āyi/ ammā*
	6. *ammān / māman*	MB	FZ	7. *athai*
	7. *māmanār*	EF	EM	8. *māmiyār*
G^0	8. *annan*	eB	eZ	9. *akāḻ*
	9. *thambi*	yB	yZ	10. *thangachi*
	10. *athān [or māman]*	MBSe FZSe	MBDe FZDe	11. *athāchi*
	11. *maithunar / machinan*	WB	WeZ	12. *kozhundhiyāḻ*
			WyZ	13. *machini*
	12. *kozhundhanār*	HB	HZ	14. *nāthinār*
	13. *sagalai*	WZH	HBW	15. *ōrpadiyāḻ*
	14. *kaṉavan / purushan*	H	W	16. *penjādhi / manaivi*
	[athān or māman]	eZH	eBW	17. *aṉṉi*
	15. *māppiḻḻai*	yZH	yBW	-------------
G^{-1}	16. *mahan*	S	D	18. *mahaḻ*
	17. *marumahan*	DH	SW	19. *marumahaḻ*
G^{-2}	18. *pēran*	CS	CD	20. *pēthi*
G^{-3}	19. *koḻḻuppēran*	CCS	CCD	21. *koḻḻuppēthi*
G^0	**Neutral Kintype**			
	41. *sambandhi* (CEP)			

[67] Elderly informants say that terms like *athān* (MBSe/FZSe) and *pātti* (FFM) were not used in their time, which means that the number of kintypes in earlier times would have only been 39 in total.

Table 19: Thanjavur Tamil Brahmin kin terminology

	Male Kintypes	***Referents***		***Female Kintypes***
G+4	1. *eḷḷuthāthā*	FFFF, MFFF	FFFM, MFFM	1. *eḷḷuppātti*
G+3	2. *koḷḷuthāthā*	FFF, MFF	FFM	2. *koḷḷuppātti*
G+2	3. *māmāthāthā*	FMB, MMB, FFZH, MFZH	FFZ, MFZ	3. *athaippātti*
			FMBW, MMBW	4. *mamippatti*
	4. *thāthā*	FF, MF	FM, MM	5. *pātti*
G+1	5. *periyappā*	FeB, MeZH	MeZ, FeBW	6. *periyammā*
	6. *chithappā*	FyB, MyZH	FyBW,MyZ	7. *chinammā*
	7. *appā*	F	M	8. *ammā*
	8. *ammān/māman*	MB	MBW	9. *ammāmi/māmi*
	9. *athimbēr*	FZH	FZ	10. *athai*
	10. *māmanār*	EF	EM	11. *māmiyār*
G0	11. *annan*	eB	eZ, HeZ	12. *akāḷ*
	12. *thambi*	yB	yZ	13. *thangachi*
	13. *athān*	FZSe	FZDe	14. *athāngāḷ*
	14. *ammānji*	MBSe	MBDe	15. *ammāngāḷ*
	15. *maithunar*	WB	WZ	16. *maithuni*
	16. *kozhunthan*	HyB	HZ	17. *nāthinār*
	17. *shaddahar*	WZH	HBW	18. *ōrpadiyāḷ*
	18. *āmbadayān*	H	W	19. *peṇdāti*
	[athimbēr]	eZH	eBW, HeBW	20. *manni/madani*
	------------	yZH	yBW	----------
	19. *sambandhi* or *sambhandimāma*	CEF	CEM	21. *sambandhiammā* or *sambandhimāmi*
G-1	20. *mahan*	S	D	22. *mahaḷ*
	21. *maruman*	ZSms, BSws	ZDms, BDws	23. *marumaḷ*
	22. *māppiḷḷai*	DH	SW	24. *māttupeṇ*
G-2	23. *pēran*	CS	CD	25. *pēthi*
G-3	24. *koḷḷuppēran*	CCS	CCD	26. *koḷḷuppēthi*
G-4	25. *eḷḷuppēran*	CCCS	CCCD	27. *eḷḷuppēthi*

4.1.3.2 An Analysis of South Dravidian Systems

Four observations can be made from the Tamil kin terminologies:

(i) *Lack of alternation*, which is shown by the presence of terms G^{-2} and G^{-3} kintypes.

(ii) *Increase* in the total number of kintypes. Bilateral has 41, and matrilateral has 52.

(iii) The *lack of male/female symmetry* among the terms in G^{+2} which implies a lack of complementation in that G level. Though I have tried to keep these two tables simple by excluding the address terms in these two systems, it is relevant to mention here that in the matrilateral system a married woman *addresses her husband's relatives just as her husband does*. To give just a few examples, we find the following terminological equations in the *address* terms of the MBD system: HM = M, HeB = eB, HeBW = eBW.

(iv) The fourth observation is rather less obvious, and it is the *lack of overall symmetry or supersymmetry*. Such symmetry is not possible without the three features mentioned above (alternation, complementation, and male/female symmetry). We need two diagrams for the south Dravidian systems similar to the one we had for the Madia supersymmetry. The diagrams below show only the number of kintypes and not that of key referents because the lack of symmetry is clear enough just from observing the total number of kintypes in role-play groups.

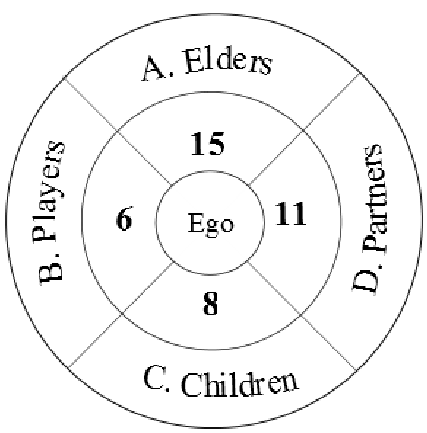

Fig. 17. Bilateral terminology

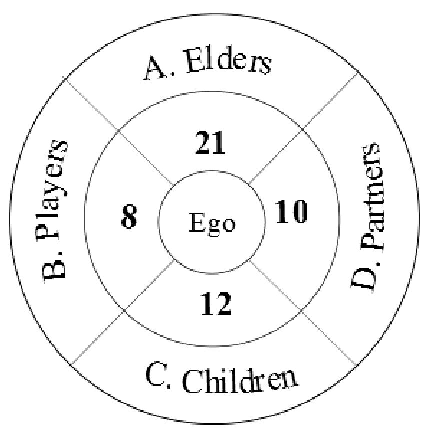

Fig. 18. Matrilateral terminology

These diagrams show that neither of the two south Dravidian systems is supersymmetric:

No symmetry between vertical and horizontal pairs: AC ≠ BD.
No symmetry among the four diagonal pairs: AB ≠ CD and BC ≠ AD.

The four observations listed above are all related. Lack of alternation means an increase in the number of kintypes in the ascending and descending generations (i.e. the OTHER), which is the case with the south Dravidian systems. This increase means a difference or imbalance between the EGO and the OTHER which disrupts the overall symmetry (as well as the male/female symmetry), and this is true of the south Dravidian systems. The increase in the number of kintypes disrupts the supersymmetry.

4.1.3.3 Conclusion and Suggestion of a Sequence

The conclusion drawn here is that the supersymmetry found in the Madia kinship system is unparalleled. How this symmetry is lost or broken will be discussed later on (in section 4.3.1.1). The comparison of the three terminologies suggests that it may be possible to arrange the three systems in *an order of sequence*, doing so purely from the point of view of compactness and its loss, and that would be from patrilateral to bilateral to matrilateral. The FZD is the most compact with the least number (37) of kintypes, the MBD is the least compact (52 kintypes) and the bilateral is in-between (41 kintypes). Note that the Madia (patrilateral) system has only 4 G levels, whereas the bilateral has 7 levels and matrilateral 9 levels, which suggests an unfolding of the generational levels.

What we have done so far is a description of the Madia kinship system as a whole and a comparison of the Madia with two other kinship systems. Now we move on to studying the core sectors of these systems.

4.2 The System at the Core

The differences between the three terminological systems are basically due to the difference in the rules of marriage alliance. Alliance exchange is centered on who the *potential* and *actual* marriage partners are. The sibling and cross-cousin kintypes (potential partners or *Players*) and the spouse-kintypes (actual marriage partners) form the *core sector* of a kinship system. Marriage exchanges can be described as *core interactions*. All kintypes present in the core sectors are then the *core kintypes*, and the fluctuations in the core sectors are the *core dynamics*. What follows in this section is first a description of the core sectors of the three terminologies followed by a comparison of these three. The purpose of this comparison is to see how the core sector of the FZD system may be unique.

4.2.1 A Description of Three Core Sectors

The Tables 20, 21 and 22 present the core kintypes from the three Dravidian cross-cousin alliance systems. The one core kintype missing in these tables is the husband (H); and as mentioned earlier too, the H cannot be shown when it is the perspective of the male Ego. In the discussion that follows, the association of cross-cousin alliance rules with age-biases, either positive or negative, is given due attention because age bias plays a significant role in the core interactions. Positive age bias refers to a preference for groom to be older than the bride and negative age bias to a preference for the bride to be older than the groom. The lateral bias is about whether the female cross cousin preferred as a bride is patrilateral (FZD) or matrilateral (MBD) one.

Table 20: Core sector of the patrilateral alliance system (Madia)

Cross-cousins	Marry Siblings	To become Spouses
mandaṛi (FZD/MBD)	*dhādhal* (eB)	*ange* (eBW)
	Ego	*muthe* (W)
	thamox (yB)	*koyaṛ* (yBW = SW)
maryox (MBS/FZS)	*akal* (eZ)	*bāto* (eZH)
	ēlaṛ (yZ)	*eṛmthox* (yZHms) *kōval* (yZHws)

Table 21: Core sector of the bilateral alliance system (Thanjavur Tamil Non-Brahmin)

Cross-cousins	Marry Siblings	To Become Spouses
athāchi (FZDe/MBDe)	*aṇṇan* (eB)	*aṇṇi* (eBW)
	Ego	------ (W)
	thambi (yB)	------ (yBW)
athān or *māman* (FZSe/MBSe)	*akāḷ* (eZ)	*athān* or *māman* (eZH = MB)
	thangachi (yZ)	*māppiḷḷai* (yZHms)

Table 22: Core sector of the matrilateral alliance system (Thanjavur Tamil Brahmin)

Cross-cousins	Marry Siblings	To become Spouses
athāngāl (FZDe) *ammāngāl* (MBDe)	*aṇṇan* (eB)	*manni* (eBW)
	Ego	------ (W)
	thambi (yB)	------- (yBW)
ammānji (MBSe) *athān* (FZSe)	*akāḷ* (eZ)	*athimbēr* (eZH = FZH)
	thangachi (yZ)	------- (yZH)

4.2.1.1 FZD Alliance and the Absence of Biases

The cross-cousin terms in Madia are not distinguished for relative age and it means there is neutral age bias in the practice of FZD marriage[68]. Neither do the Madia cross cousin terms show a lateral bias because the FZD and MBD are *un*distinguished. Because of the absence of such biases, Ego as well as all four of Ego's siblings can engage the cross-cousins in alliance exchange. The female cross cousin *mandaṛi* can become either the male Ego's W or his eBW or his yBW. Similarly, the male cross cousin *maryox* can become either the H (this kintype cannot be shown here because it stands for the male Ego) or the eZH or the yZHms/ws. Thus, all the *Players* participate in the game and no one is barred. This means there is *perfect coordination* among *Players*.

As a result, the FZD system has the *highest* number of spouse-kintypes among the three systems. Note that the FZD's core sector alone has no gap in the column for spouse-kintypes while the bilateral has two gaps and the matrilateral three. Such integration of spouse-kintypes is possible only because of the lack of any bias, age or lateral, in the FZD system's cross-cousin terminology. In the absence of any bias, it is then the FZD-MBS marriage rule which is single handedly responsible for the integration we observe in the cores sector of the Madia system.

Furthermore, there is much symmetry in the FZD's core sector. The total number of kintypes among *Players* and the total number of Spouses are the same – both have 6 kintypes each. There is also the male/female symmetry. Note that every column of the Table 20 shows male/female symmetry: there is 1 male and 1 female among cross-cousins, there are 2 male and 2 female among siblings, and there are 3 male and 3 female among spouses. As a result there is gender symmetry between Players and Spouses because each group has 3 male and 3 female. Thus there is *perfect gender symmetry*.

That said, we must also consider here another feature of the Madia kinship and alliance, namely the widow inheritance, where there is a nonnegotiable age bias. The restriction about who (or which kintype) can inherit a young widow plays a significant role in the kin terminology of the core sector as well as in the whole of the kin terminological system. Therefore this issue calls for a separate discussion.

Widow Inheritance among Madia

Some notes on the practice of widow inheritance among the Madia are in order before considering what effects it has on the Madia kin terminology.

[68] Elders in this society say that in the generations past, when adolescent children used to be married, an older bride was preferred more because grown up girls could manage well the hard work required at home, farms, and forest (in gathering forest produce). Thus the preference for older brides seems to have been based on utility and was not part of the regulation of marriage exchange.

a. A young widow is to be inherited by her husband's yB, meaning a negative age bias for inheritance. Whenever this is not possible (either because there is no HyB or he is already married or he is unwilling or too young), the dead man's classificatory yB in his extended family (FBSy) may be asked to do so. Even though both the FBSy and the MZSy are both classificatory yB to her husband, only the former is the inheritor and not the latter unless he happens to belong in the same family (or lineage) as the dead man.

b. The "negative-age" bias is *not* about the difference in age of the eBW and the HyB but about that of the dead man's and his younger brother's. The age of a woman, either as a bride or as a widow is not a consideration. Therefore what is defined as "negative age bias" here is simply the relationship between a) the age of an older man who has died, and b) the age of a younger man who marries the widow of the deceased man.

c. This "rule" for inheritance applies *mainly* to widows of child bearing age and not so much as to women past that age who may choose to remain single and live with her grown children. However, it is common for widows even if old in age to "remarry" and the same goes for widowers too.

d. Widow inheritance is not same as the levirate marriage where the children born of the second marriage is attributed to the first husband even as Parkin has explained (Parkin 1997:43). The children born to the widow through her HyB will belong to the HyB and will refer to their mother's older husband as *pēpi* (FeB).

e. There is no wedding ritual for the widowed eBW and her HyB, who may simply begin living together. But when a widow is inherited by someone outside of the dead man's lineage or clan, a ritual for "widow transfer" is mandatory, which involves the classmen of both the older and new husband of the widow. By involving the priests of the clan-gods to perform this ritual it is made sure that the widow transfer is done without violating the god-group exogamy. In case of "widow transfers", the new husband must acquire the widow from her former husband's family by paying an amount equal to the bride-price that was originally given to her parents.

Now let us consider the question – What effects does the negative age bias for widow inheritance have on the Madia terminology? This is an important question as the answer to it can help explain the relative age dimension in the Madia kin terminology.

The negative age bias for widow inheritance is responsible for the HeB and yBW behaving as an avoidance pair, not only prohibiting marriage of the two but also prohibiting activities that require physical closeness or might cause emotional closeness between the two[69].

[69] Breaking the HeB-yBW avoidance taboo is a serious offence entailing financial sanctions and requiring pacification rituals (before the clan-gods) for cancellation of guilt if readmission into the ritual community is sought.

The HeB is made a sibling category in the address terminology – the address term *dhādha* is used both for HeB and for eB as is shown in Table 3 in Chapter 1). Moreover, the yBW is made a namesake of the SW (both these women are referred as *koyaṛ* and addressed as *pila*), and the yBW = SW equation is an indication of the negative age bias for widow inheritance.

The widow inheritance is also the reason for the distinction of HeB as *mūryal* and the WeB as *eṛmthox* instead of these two referents having a common (i.e. single) term for both HeB and WeB as is the case with the *pōraṛ* (EeZ) which is not distinguished as HeZ and WeZ. In the column for the "spouses' siblings" in Table 15, the terms *pōraṛ*, *kōkaṛ* and *exundi* refer respectively to EeZ, EyZ and EyB. This means HeZ = WeZ, HyZ = WyZ, and HyB = WyB. The lone distinction of the EeB as HeB *mūryal* and WeB *eṛmthox* (meaning HeB ≠ WeB) can be understood as a necessity because of the practice of widow inheritance by HyB and the need to mark an affinal relative, i.e HeB, as a sibling or a parallel kin category in the address.

Furthermore, the reflection of the distinction of HeB from WeB is seen in the distinction of the yZH as yZHms *eṛmthox* and yZHws *kōval*. How is the latter a reflection of the former? If the HeB is an avoidance category, so is its kintype counterpart, the WeZ. This is why the WeZ - ZHws is nearly as much an avoidance pair as is the HeB - yBW. Therefore, similar to the equation yBW = SW, the system also has the equation yZHws = DH '*ane*' (see table # 4 of kin categories). Thus, the yZHws is relegated to the same fate or status as that of the yBW as these two are the kintype pair or kin counterparts. If the yBW is a tabooed category for her HeB, the yZH is an equally tabooed category for his WeZ meaning prohibition of (re)marriage between these kintypes or sexual access.

There is a principle of equivalence at work in all of this and it contributes to yet another symmetry in the egocentric view of this kinship system, i.e. the numbers of the *potential* partners (Players) and that of the *actual* partners (Spouses) are held in balance, each numbering 6. This balance or symmetry is not possible without the distinction of yZH as 'ms' (*eṛmthox*) and 'ws' (*kōval*). Nor will there be the male/female symmetry among the 6 spouse-kintypes themselves where there are 3 male and 3 female.

Finally, the negative age bias for widow inheritance seems to be the sole rationale for the presence of relative-age distinction among the sibling kintypes[70]. In other words, there seems no other function for relative age distinction in the terminology other than the regulation of widow inheritance. There is no age bias for the cross-cousin marriage, and generally the husbands and wives are close in age and are not significantly older or younger. The relative age distinction

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In fact, the HeB-yBW avoidance and the eBW-HyB widow inherence appear like stricter "rules" than the FZD alliance rule in view of the punishment given for failure to abide by it.

[70] Similarly, the positive age bias for marriage in the bilateral and matrilateral systems can be cited as the reason for the relative age distinction in the sibling kintypes of these systems.

among *all* the other kintypes, both in G^0 and in G^{+1}, can be seen as the ripple effect of the relative age distinction in the G^0 among the sibling kintypes. How so? It makes sense that if the siblings are distinguished for age, so would be the siblings' spouses, and the spouses' siblings. The relative age distinction in G^0 is extended to the parents in G^{+1} level, where again it serves the same function of regulating widow inheritance doing so with the same bias (negative age). The G^{+1} is where more number of widows and widowers are likely to be found.

The main observation here is that the negative age bias for widow inheritance can explain the relative age dimension in the *entire* kin terminological system of the Madia. Why the practice of widow inheritance is so important in Madia society will be discussed later on in section 4.3.2.4.

Conclusions

Two conclusions can be drawn about the FZD's core sector. One is that the absence of biases (which is shown in the FZD cross cousin terminology not being marked for age and or laterality) is the reason for this system having the highest number of spouse-kintypes. This is because the core interactions are perfectly coordinated, and the result is that core kintypes show male/female symmetry. The other conclusion is that the equation yBW = SW is based on the negative age bias for widow inheritance, and this bias explains the relative age dimension not only in the core sector but also in the rest of the terminology because of what can be called a principle of equivalence.

4.2.1.2 Bilateral Alliance and Positive Age Bias:

The term *athachi* for FZDe and MBDe shows that the *elder* female cross-cousins alone are kintypes whereas the younger ones (FZDy/MBSy) are not kintypes. The same goes for male cross-cousins too. There is a strong preference in the Tamil culture for the groom to be older than the bride by at least a few years. Because of this positive age bias the *athachi* (FZDe/MBDe) cannot be married either to Ego or to his younger brother, but only to Ego's eB. The male sibling *aṇṇan* (eB) can marry *athachi* (FZDe / MBDe), and the female sibling *akāḷ* (eZ) can marry *athān* (FZSe / MBSe) provided the man is older than the woman. (How the positive age bias may come into being is discussed in section 4.3.2.1).

Why is the term for W missing in this table? Ego can marry the FZDy or MBDy, but these are *not* kintypes and therefore are not represented in the Table 21 which is meant for showing the cross-cousin kintypes becoming spouse kintypes. This is the reason why the Tamil kin term for W (*penjathi* or *pendāti* or *manaivi*) is missing in this Table[71].

[71] As an additional note, it seems interesting to note that the Tamil terms for wife, *penjathi/pendati* or *manaivi* (W) are meaning based, because these are glossed as the 'woman kind' and the 'woman of the house', respectively. Therefore, in a sense, these Tamil terms for W are not proper kin terms (i.e. if we see these as descriptive words).

The yBW too could not be in the Table for the same reason because the yB marries the non-kintypes, i.e. FZDy or MBSy. However, it is also because of the fact that there is no kin term for yBW in the Tamil language and therefore the yBW is not a kintype either in the bilateral or the matrilateral system.

Let us now move on to considering the eZD-MyB alliance (or avuncular marriage) prevalent in the Tamil society.

The eZD Marriage

The eZD marriage coexists with the bilateral alliance, and manifests in the terminological equation *māman* = MB = eZH. The term *māma* is also used for addressing H as well as MB, which again is due to the practice of eZD marriage. The equations MB = eZH = MBSe = FZSe both in reference and in address are all effects of the eZD-MyB marriage.

The disappearance of yBW as a kintype in the south Dravidian systems seems to be an effect of the avuncular marriage. I offer the following explanation for the "deletion" of yBW as a kintype in the Tamil terminologies. The eZD who becomes either Ego's W or Ego's yBW, originally belongs in the G^{-1} but gets 'transported' to be a kintype in the G^0 level (i.e. W or yBW) because she is married to a man in the G^0 level. While basically a kintype from the G^{-1} level, she is pulled up to the G^0 level only through the oblique marriage. Therefore, it makes sense why she cannot have kin status equal to all others in the G^0, who are actually her 'Elders', genealogically speaking. Lacking equal kin status with other in G^0, she is not to be a kintype in this G level, and therefore she is not identified by a kin term. It is absolutely acceptable in Tamil culture to refer or address the yBW by her first name.

Widow *inheritance* is not known in Tamil culture. But widow's remarriage is. A young widow returns to live in her father's or her brother's house who might, though it is extremely rare among the Hindu communities, arrange for a second marriage for her. An older widow with grown children stays on in her husband's house.

Conclusions

The presence of positive age bias restricts the number of spouse-kintypes in the bilateral alliance. The positive age bias may be an effect of the eZD marriage which now coexists with the bilateral alliance but which may have preceded the bilateral alliance (as discussed in section 4.3.2.1). The deletion of the yBW too as a kintype can be attributed to the eZD marriage.

At least, these are not kintypes in the same sense as the Madia *muthe* is, which is not meaning-based. Similarly terms for H, *purushan* simply means 'man' and is meaning-based too.

4.2.1.3 Matrilateral Alliance and the Age and Lateral Biases

The MBD system has another bias in addition to the positive age-bias, which is the lateral bias with the preference for MBD. As a result, the cross cousins terms get further distinguished and the system ends up with four distinct cross-cousin kintypes: *athāngāl* (FZDe), *ammāngāl* (MBDe), *ammānji* (MBSe) and *athān* (FZSe). These distinctions themselves do not show that the MBD is the preferred bride. Then how can we know there is a matrilateral bias? The equation eZH = FZH ≠ MB is the one to indicate the matrilateral bias. In order to understand this, it is necessary to compare few of the equations in the bilateral and matrilateral.

In the bilateral system we observed the equations such as MB = eZH = MBSe = FZSe, which are effects of the eZD-MyB marriage. But in the matrilateral there are no such equations, but rather it is MB ≠ eZH ≠ MBSe ≠ FZSe, which indicate the disappearance of eZD-MyB marriage. Informants from the Brahmin communities say that eZD marriage is extremely rare.

What indicates the presence of matrilateral bias? The equation eZH = FZH can also be a clue as to the shift from bilateral to matrilateral alliance. How so? The eZD and the FZD are both daughter of a kintype known as *athimbēr*. The eZD is the daughter of the eZH, and the eZH *athimbēr* is the same kintype as the FZH. When the daughter of one *athimbēr* (eZH) is not a preferred, the daughter of the other *athimbēr* (FZH) too may share the same fate. Thus, even though the eZD is not same *kintype* as the FZD, these may be seen as similar *kin categories* as both are born to the kintype *athimbēr*. This seems to indicate why the FZD may be falling out of favor, with the result of a growing preference for her counterpart, the MBD. For another consideration who is the wife-giver in the MBD alliance? It is her father, the MB. The distinction of MB from the FZH (MB ≠ FZH) shows that the wife-giver and wife-taker are permanently distinct as kintypes, which is so only in the matrilateral alliance. In the bilateral these two are indistinct (MB = FZH). In the patrilateral alliance, these are not even the key affine. As mentioned in footnotes #25 in chapter 1 and #65 in the current chapter, the Madia kin terminology shows that the key affine in the patrilateral alliance are WeB and yZHms.

This matrilateral alliance has the maximum number of biases or restrictions, and consequently the least number of spouse-kintypes. The reason for the absence of the W and the yBW are the same as given for their absence in the bilateral system. The lack of a kin term for yZH is something my Brahmin informants were not able to explain; nor does it seem crucial to the arguments presented in this paper.

About widow-remarriage, traditionally speaking it is tabooed in the Brahmin community. Even child widows remained so for their entire lives without marrying again. It is history that widow burning ritual known as the *sati* was a practice associated with the higher caste groups in northern parts of India.

Even when the MBD is the preferred bride in the Tamil Brahmin community, there is no ban on marrying the FZD. All of my informants have said that FZD marriages are not as such prohibited but are less common compared to the MBD-FZS marriages. This situation is similar to what I find to be true of the FZD marriage in the Madia society. Though the FZD alliance is enshrined in the concept of *putul pila* (i.e. FZD), which is based on the "debt of milk" from the generation above, the MBD-FZS marriage is not banned among the Madia. Though permitted, the MBD marriage is not backed up by the right to claim a bride as is the case with the Madia FZD, and so is rare. There is an important point to note generally about cross-cousin alliances in Dravidian societies.

What we have done so far is an analysis and description of the *core sectors* of the three kinship terminologies. This analysis paves the way for a comparison of the three systems which follows.

4.2.2 A Comparison of Three Core Sectors

A comparison of the three core sectors reveal two things: (1) how distinct the FZD alliance is, and (2) how the core dynamics suggests a sequence.

4.2.2.1 Distinctive Character of the FZD's Core: Unification

A perfect coordination of all the *Players* is seen only in the FZD's core sector and not in the other two. Only in the FZD alliance do we see that all possible spouse-kintypes are present, which may be described as integration of these. There is perfect symmetry between male and female kintypes as well as between total number of kintypes among Players and that among Spouses. Integration and symmetry are unique features of the FZD's core sector, which is the effect of having but *a single rule* of marriage as the basis for alliance interactions, with no additional biases and no accompanying oblique marriage. Therefore we can describe the FZD's core as *unified*. The additional biases in the south Dravidian systems mean these are *not* unified.

4.2.2.2 Fluctuations in other Core Sectors or Core Dynamics

The core sectors of the bilateral and matrilateral alliances are not as coordinated or integrated or symmetrical because the presence of age and lateral biases in these alliances put more and more restrictions on how (or how many of) the siblings and cross-cousins interact through marriage alliance.

Loss of coordination: The three alliance systems have an equal number of sibling-kintypes which are 4. While all the 4 can engage in marriage in the FZD alliance, only 3 can do so in the bilateral and only 2 do so in the matrilateral.

Loss of integration: The total number of spouse-kintypes goes down from 6 in the FZD system to 3 in the bilateral system and 2 in the MBD system.

Loss of male/female symmetry: In the FZD's core sector, the male/female symmetry is found not only in every column but also between the *Players* and the *Spouses*. But such symmetry is lost or broken in the other two systems. In the bilateral, there are 3 male and 3 female among Players, but only 2 male and 1 female among Spouses. In the matrilateral, though male/female symmetry is present in every column, it is absent between the *Players* (4 male and 4 female) and the *Spouses* (I male and 1 female).

Loss of kintypes symmetry: There are changes resulting in an imbalance between the number of *Players* and *Spouses*. The *Players* and *Spouses* are held in perfect balance in the patrilateral at 6 and 6 respectively; but that balance is lost in the bilateral (6 and 3) and in the matrilateral (8 and 2).

The loss of unification manifests in the loss of coordination, integration and symmetry in the core sector.

4.2.2.3 Conclusion: Core dynamics and the Suggestion of a Sequence

As mentioned earlier, *core dynamics* refer to changes or fluctuations in the core kintypes which is caused by the changes in the core interactions (or marriage alliances) that seek to engage the *Players* in different ways. The three core sectors can be arranged in an order of a sequence from the perspective of original unification and its subsequent loss. Such a sequence would be from patrilateral to bilateral to matrilateral – from the most unified to the least so.

Let us recall here an earlier comparison of the three Dravidian terminologies for overall symmetry (section 4.4), which concluded with a suggestion of a sequence which was the same as mentioned here. But that conclusion was made purely from the perspective of original symmetry and compactness and their subsequent loss. How can we relate these two conclusions? How is the loss of unification in the core related to the loss of supersymmetry and of compactness of the whole system? And what about the loss of alternation, of complementation, and of male/female symmetry in individual role-play groups which are observed in the south Dravidian terminologies (section 4.4). How are all these related? We discuss this relationship in the next section.

4.3 Relationship between the Core and the Whole

The Madia kinship system as a whole is supersymmetric and compact (section 4.1). And this system is unified at the core (section 4.2). Unification and supersymmetry are unique features of the Madia kinship because the other Dravidian systems have neither. The fluctuations that are observed in the core sectors of the south Dravidian are but few, and these seem like minor ones because the increase or decrease in the numbers is often just by one or two. But these fluctuations are related to the major and the more obvious shifts and changes in the equations and distinctions in the south Dravidian kin terminologies. (Such changes are commonly known as *transformations* of kinship.) We have described the fluctuations in the core or what we called the core dynamics in terms of "losses". And we can also describe the changes that occur in the whole structure of the southern systems in the same way, i.e. in terms of losses. What follow is first a description of the many losses in the southern terminological systems, then of the relation between the changes (or losses) in the core and in the whole, and finally a description of the major shifts as phase transitions in the development of Dravidian kinship which includes a discussion of how the phase transitions may have occurred.

4.3.1 Description of the Losses

In this section we will consider first how the loss of unification breaks the supersymmetry and then how the major or more obvious changes (or losses) in the terminology are caused.

4.3.1.1 Loss of Unification and Loss of Supersymmetry

The *loss of unification* (or the presence of biases) manifests as changes in the first column (of cross-cousins) and the third column (of spouses) in Tables 20, 21, and 22. These changes can be seen as losses as are already listed in section 4.2.2.2. As a result of these changes, the number of kintypes in the role-play group we call *Partners* goes down in the south Dravidian systems. Partners are 12 in patrilateral, 11 in bilateral and 10 in matrilateral (refer to Figures 14 and 15). The number of *Players* remains the same in the bilateral (6), but goes up in the matrilateral system (8). Recall that the *Players* and the *Partners* together make up the EGO. The changes that occur in the core automatically mean that in the south Dravidian systems there will be no more balancing of either the *kintypes* or the *key referents* among the four role-play groups or, more specifically, between the EGO and the OTHER. This is how the supersymmetry gets broken – because of fluctuations in the core sector due to changes in the core interactions. But this is not all. It only seems to be a forerunner of many other losses that we discuss in the next section.

But before we move on to discussing the other losses, some clarification may be necessary here about the relation between unification and supersymmetry. That the loss of u*nification* disrupts the supersymmetry does not mean unification is responsible for the supersymmetry. Unification itself is a function of the FZD rule. That which is responsible for unification is also responsible for supersymmetry. The FZD exchange keeps many of the kintypes in rotation (or alternation) and thus limits the G levels to just four, and it also keeps the complementation working for most of the kintypes in G levels 0, +1 and +2. The vertical and horizontal mergers create the supersymmetry as well as the compactness. Therefore, supersymmetry and unification are both functions of the FZD exchange. (Unification or the absence of biases in the cross-cousin terms is a crucial factor in the FZD terminology, and it ensures that there is no interference to the supersymmetry created by the FZD exchange. This shows that the patrilateral alliance not showing the patrilateral bias in the cross-cousin terminology is for a reason.)

4.3.1.2 Other Losses

The presence of the positive age bias causes loss of integration and coordination and symmetry at the core (as the W and yBW go missing), but it cannot cause the loss of alternation. While the loss of unification cannot cause loss of alternation, the introduction of the oblique (eZD) marriage can (as discussed in the paragraph below). However, the presence of the positive age bias itself can be explained as an effect of the oblique marriage (section 4.3.2.1). Therefore, the loss of unification and the loss of alternation could be seen as happening simultaneously.

The introduction of eZD-MeB marriage results in the many *adjacent* generation mergers in the south Dravidian showing in equations such as MB = H, MB = eZH, MB = FZSe/MBSe, FZH = eZH etc. Note that the referents in these equations are all male. Tamil terminologies show no adjacent generation mergers among female kintypes; there are no equations such as FZ = W or FZ = FZDe/MBDe. As a result, there are more female kintypes in the south Dravidian systems, which is the opposite of what we observed to be the case in the central Dravidian. The male kintypes are more in the patrilateral (19/17), but the situation is different in bilateral (19/21) and in the matrilateral (25/27). The increase of female kintypes results in two things: one is the *loss of the male/female symmetry* in the individual role-play groups, and the other is some of the male kintypes not having female kintype-counterparts (thus affecting the kintype-pairs).

Adjacent generation mergers in the south Dravidian replace alternate generation mergers in the patrilateral system. Alternation in the Madia terminology can be explained by the FZD alliance which means a *reversal* in the direction of the exchange in the very next generation, wherein the male and female Egos are *repeating* the marriages of their FF and MM respectively, thus *replicating* the kin relations *two* generations above them. This can explain why many kintypes in alternate generations tend to merge in the FZD terminology while the kintypes of adjacent generations are kept distinguished. This can also explain why crossness is maintained even in the polar G levels. The change from the FZD rule to bilateral alliance seems to be the reason why not a single case of alternate generation merger is to be seen in the south Dravidian terminologies. The *loss of alternate generation merger* causes an unfolding of generational levels, which shows in the increase in the number of the generations of kin terms. While the patrilateral terminology has only 4 generational levels, the bilateral terminology has 7 G levels and the matrilateral 9 G levels. Such unfolding of generational levels can be described as an *expansion* of the system, which means the loss of original compactness.

The loss of the FZD rule which leads to the loss of replication of relations in alternate generations may also lead to the *loss of crossness dimension* in the polar G levels of the bilateral system. Alternate generation mergers would depend on crossness dimension being present in the ascending and descending generations (as it is the case with the Madia terminology), and therefore with the loss of alternation, the crossness in polar G levels would have lost its function.

If we can see FZD alliance as the reason for crossness in polar G levels, the loss of the latter can be explained by the loss of the former.

Moreover, the limitation on the range of crossness means there can be no complementation in the polar levels because parallel and cross distinctions are needed for complementation to work. The *loss of complementation* is shown in the equations such as FF = MF, FM = MM in both bilateral and matrilateral as well as in the distinctions such as MF ≠ FMB, FFZ ≠ MM in the matrilateral system. (In the matrilateral system, the wife *addresses* her husband's side relatives just the same way as her husband does, which means there is a significant loss of complementation in this system.)

Thus, all the losses mentioned above (of alternation, gender-symmetry, compactness, and complementation) are related and it is the loss of unification which seems to be the forerunner and set the ball rolling for all other losses. The loss of unification and supersymmetry must be simultaneous whereas some of the others seem like a series of losses.

4.3.1.3 Relation between Unification and Expansion

It is also interesting how the loss of unification at the core and the loss of compactness (or the expansion) of the system as a whole are related. We have seen how the unified core of the patrilateral alliance has the highest number (6) of spouses, and it *goes down* to 3 in the bilateral system and 2 in the matrilateral system. This shows the loss of unification, which appears to be a rather steady process when we consider instead the sibling kintypes - all the 4 siblings in the FZD participate in marriage interactions while only 3 can do so in the bilateral and only 2 do so in the matrilateral. On the other hand, the total number of kintypes in the system (or the whole) *goes up* from 37 in the patrilateral, to 41 in the bilateral and 52 in the matrilateral. Let us also recall the fact that the patrilateral system has only 4 G levels, while the bilateral terminology has 7 G levels and the matrilateral has 9 G levels. Thus what happens in the *core* and what happens on the *whole* are inversely related.

Another point to not here is that while the loss of unification is a steady process, the expansion is not. The increase of the number of the total kintypes from patrilateral to bilateral is only by four. But from bilateral to matrilateral it creases by 11 additional terms.

4.3.2 Description as Phase Transitions

On the basis of the preceding analysis it is possible to see three cross-cousin alliance systems as three distinct phases in the development of Dravidian kinship. The logical relations between the losses suggest that the central Dravidian is an original phase while the two south Dravidian represent two major shifts or later phase transitions. The three cross-cousin alliance systems represent the completed states of the transitions. Are there intermediate stages? It will be discussed in the following section how the MyB-eZD alliance seems to have preceded the bilateral alliance. However, the eZD marriage does not represent a distinct phase, firstly because its practice is not known to exist by itself in the Tamil society but rather it only coexists with the bilateral and the matrilateral systems, and secondly because it is not even a cross-cousin alliance.

Thus we know something about *what* phase transitions involve. It involves a series of losses in the path of a movement from being a unified, supersymmetric and compact phase to becoming increasingly dis-unified, non-supersymmetric and expanded phases. The phase transitions show that there is a certain direction to transformations in Dravidian kinship and a reverse of this direction seems logically impossible[72]. The three major processes in the phase transitions are disunification, supersymmetry-breaking and expansion. But what we have observed so far would not completely answer the question *how* the phase-transition occurs. Therefore we will do some further investigation on this.

First, let us examine the original phase (FZD system) to see what might predispose it to a phase transition. The transition may be related to demography. The FZD exchange could work well for a relatively small society, which the Madia is. While an increase in the population itself need not necessarily work against its practice, the eventual dispersal could make communication challenging and the waiting period of a generation for reciprocity impractical. But our interest at the moment is not about the demographic reasons for transitions in Dravidian kinship. Rather, we want to find out if there is anything in the FZD kin terminology itself that might destabilize it or predispose it for a transition. What makes the original phase unstable? There indeed seems to be is at least one weak link in the FZD terminological structure and the following discussion focuses on that.

4.3.2.1 The Single Weak Link in the FZD System

In spite of being such an elegantly supersymmetric and integrated system, the FZD kinship seems to have at least one weak spot, and that is the kintype *koyaṛ* (yBW/SW). Interestingly, it is the same one that stood out as the anomalous kintype both in the sociocentric view (section. 1.2.1.6) and in the egocentric view (section 4.1.2.2). Now let us consider how this kintype is a weak link. The yBW = SW equation is the *only* adjacent generation merger, which is totally inconsistent with the character of the Madia kinship system where alternate generation merger is dominant and one of the defining features. Moreover, this *single inconsistency* has the potential to act as an 'adversary'. I shall explain.

The equation yBW = SW conversely would suggest that the woman who can be SW can also be yBW. Who becomes SW wife in the FZD alliance? It is the ZDms. But the equation SW = yBW would seem to suggest that the ZDms can also become Ego's yBw[73]. While this is

[72] Disruptions of equations and irreversibility of losses were also proposed by Allen (2004).

[73] When someone is talking about his/her *koyaṛi*, and if it is not clear from the context itself as to who is being referred, then the listener may ask, "which *koyaṛi* of yours are you referring to?" and the speaker may clarify whether it is the *thamin* (meaning yB's) *koyaṛi* or *maxayin* (meaning S's) *koyaṛi* that is being talking about.

not allowed in *actual* practice, the equation SW = yBW makes it appear as though an adjacent generation marriage (between a man and his ZD) is permissible. The truth is that marriage between any two kintypes which are in *adjacent* generations is unacceptable to the Madia mind[74]. On the contrary, a marriage between MF and his DD is permitted in the Madia society when these two individuals are close in age (which they can be in case of classificatory kintypes making possible a marriage between MFyB - BDDms). Technically this would be an *alternate* generation marriage, and such a possibility was also reported by Grigson (1938:245). Alternate generation marriage goes along with the character of the FZD kinship structure because alternate generation mergers of kintypes can allow it. In such a situation, the equation SW = yBW which can imply an adjacent generation marriage is a potentially problematic one because it leaves the door open for the eZD marriage to be introduced. Thus, logically speaking, it is possible that the introduction of oblique marriage was the first change to occur in the transformation process, cutting the pathway for the transition from FZD alliance to bilateral alliance.

The logical priority of the eZD marriage can also explain the presence of the positive age bias in the later two alliances. Bilateral and matrilateral alliance themselves do not seem to logically require the positive age bias. But the MyB-eZD marriage, which involves a groom who could be significantly older than his bride, may have led the way for the introduction of a strong positive age bias for marriages in general. This is understandable when we consider a fact that without the positive age bias strongly in operation, the age difference between the husbands of sisters could be significant where one sister's husband is a MyB and another sister's husband is a MBSy or FZSy. Significant age difference between the husbands of women who are sisters is a problem because these men (or WZH who is *aglal* in Madia and sagalai or shaddakar in Tamil) are sibling kin categories in both kinship systems. Since the MyB and the MBSe and FZSe are more likely to be closer in age, a positive age bias in cross-cousin marriage is more functional and therefore preferable.[75]

Is there any evidence for the *historical* priority of the eZD marriage over the bilateral alliance? The history of the term *athān* for the elder male cross cousin (MBSe/FZSe) may provide an answer for this question. The term *athān* for the male cross cousins (MBSe/FZSe) and husband (H) had been unknown among the non-Brahmin Tamil communities of two

[74] Madia informants were shocked to hear and some responded with disgust when I told them of the practice of eZD-MyB marriages in my original culture and society (Tamil). My Madia friends do not hesitate to tell me it is sin for a man to marry one's ZD for she would be like his MyZ (both *addressed* as *kūchi* in Madia, which is, by the way, an alternate generation merger). Quite to the contrary, in the Tamil society a man can marry a classificatory MyZ (e.g. FMBD) if she is younger to the man. But such a marriage would be a punishable offence among the Madia.

[75] The above is a description of how the eZD marriage may have preceded the bilateral alliance and how the bilateral may have come into existence. But it does not mean this is the only way it could have happened with the Dravidian kinship transformations. An analysis of the other central Dravidian kinship systems and a historical study of the development of the south Dravidian systems may reveal more to this process. Here since we take only the kin terminologies as the evidence to this process, the key to transition is found in the SW = yBW weak link in the FZD system.

generations ago (as mentioned in footnote 66 to Table 18). Even today the term *athān* is not in use among the elderly people who grew up using the term *māma* for kintypes such as MBSe, FZSe, eZH, H and MB, and who continue to do so. It is interesting that the same is true of some rural communities in the interiors of Thanjavur district where the term *athān* is not in use even among the young people[76]. All this goes to show that the term *athān* for male cross-cousins, H, and eZH was a later addition in the place of the term *māma* which had been an older practice. If this old practice has endured in some communities it is because of the eZD marriage is still an acceptable practice in Tamil societies, and because it can and does coexist with the bilateral and matrilateral alliances.

What we have seen so far is that logically as well as historically the MyB-eZD marriage seems to have preceded the bilateral alliance. Now, the question arises as to how the bilateral alliance may have come into practice. We discuss this below.

4.3.2.2 First Phase Transition

The first phase transition begins with the introduction of eZD-MyB marriage which shakes the unified kinship structure at its *core* (because eZH = FZSe/MBSe = MB) as well as destabilize the organization of kintypes on the *whole* because it would produce many adjacent generation equations. Adjacent generation equations abound in the Tamil bilateral kinship system and examples like HeZ = MZ, HZH = FB, DH = yB, DHM = MyZ, SWM = D which are all in the Tamil address terminology (not listed in the tables of reference terms) shows how kin categories are reconfigured in the bilateral alliance. Adjacent generation equations would make the FZD alliance impractical, for FZD marriage depends on clear demarcation of generations and distinction of the adjacent ones.

The eZD marriage too involves a delay by a single generation for the bride to be returned to the source, but the delay does not work exactly as does the FZD marriage. In the FZD marriage, a man gives away his sister and takes back his sister's daughter for his son. But in the eZD marriage, a man gives away his sister and takes back his ZD for his yB instead of his S. Thus, in the eZD marriage, the systematic delay by a generation is one-sided whereas it is both-sided in the FZD. (Though this may seem like a minor modification, it changes who the key affine are – an issue referred to in section on 4.2.1.3). It is not hard to imagine that even this one-sided delay must have been eventually cancelled resulting in immediate (or direct)

[76] This is not the same as the situation among the city-bred modern day Tamil youth some of whom prefer not to use the term *athān* for elder male cross-cousins anymore. With love-marriages and arranged marriages with non-relatives becoming more and more common, modern young women prefer to reserve the term *athān* only for their husbands thus leaving out the elder male cross-cousins whom they might simply call '*anna'* meaning elder brothers. Further investigation into the earlier appearance and current disappearance of the term *athān* may reveal even more about the dynamics in the intermediate stage. But it is not necessary for our current argument to dwell more on this issue.

reciprocity, which is what the bilateral exchange is. Bilateral alliance marks the completion of the first phase transition.

4.3.2.3 Second Phase Transition

How does the matrilateral alliance relate to this process? Once again, the transition to matrilateral alliance system may be connected to demographic changes, i.e. from being a localized, egalitarian, hunting gathering, horticultural forest dwelling community to a dispersed, hierarchical, feudalistic, agricultural and trading community.[77] But we should stick with our interest here – the relation between the core dynamics (alliance interactions) and the phase transition.

The second phase transition can be explained using two examples. One is from the perspective of a male ego and another from the female ego.

1. In a situation where the bilateral and eZD marriage coexist, the son born to a couple who are eZD-MyB, will have two options for finding a bride for himself – (a) either his female cross cousin (FZD or MBD), (b) his own eZD. While there may be no problem for this young man to marry his own eZD, marrying a female cross cousin marriage

[77] There are at least a few things that suggest this with regard to the transformations in the Dravidian. (i) The FZD alliance is a practice reported mostly for the tribal populations in central India, besdies a lower-caste group in south India, the Paraiyars of Devakottai region, (Deliège 1987) who are called so because they are an "untouchable" group, while FZD is not reported among the higher caste groups. Tribal communities are traditionally egalitarian. The caste-system (which is a hierarchical social system) is believed to have come here after the Aryan invasions on what was largely tribal populations centuries ago. (ii) In the matrilateral alliance, the wife giver and the wife taker *remain distinct* in the terminology (MB ≠ FZH). Not only that, the equation FFZH = FZH = eZH = *athimbēr* shows that the wife-taker in every generation are lumped together in one and the same kintype *athimbēr*, who is to *remain* distinct from the wife-giver MB *māman*. In the FZD alliance too, the wife-giver and wife taker are distinct in the acting out of the game of alliance, but they *do not remain* distinct as in the MBD alliance because the two switch places in the very next generation (and hence the egalitarian status). Since this distinction is only temporary, it is not shown in the terminology wherein MB = FZH. (In any case, in the FZD alliance the wife-giver and wife-taker are not the MB and the FZH but rather the WeB and the yZHms both of whom are the kintype *eṛmthox* (literally means 'the one who engages in the 'alliance exchange', and the WeB = yZHms points at only one marriage happening at a time.) Is there a meaning to this enduring distinction in the MBD system is a question that leads us to the next point. (iii) The distinction between wife-giver and wife-taker is about who is superior and who is inferior. The wife-taker is always superior to the wife-giver (indicating enduring hierarchy) and the predominant dowry system in the Brahmin community practiced even today, wherein the bride is to be sent to the groom's house along with gold and cash etc., is evidence of the hierarchy and maybe of the influence of feudalism. On the contrary, in the FZD exchange, it is the wife-giver who is always superior to the wife-taker and the latter must not only give a bride-price but also be willing to endure the ceremonial *pāskna* 'mocking and insulting' at the Madia weddings which is meted out to the wife-taker because he is inferior. (The superior–inferior roles of wife givers and takers was also discussed by Needham (1962:113). The association of FZD marriage with lower-caste and tribal groups and that of MBD marriage with higher-caste and non-tribal groups indicate not only how kinship may relate to other features of society – such as religion, economics, etc., but also to a specific direction in the general movement of societies.

would pose a problem. Who is this young man's FZD? It will be none other than his own Mother and his mother's sisters (because his FZ and his MM are one and the same woman). Marriage with the MyZ is unheard of in Tamil societies. (In any case, this woman can be expected to be significantly older than the man who is her eZS, and the positive age bias will also prevent such a union.) Therefore in a social situation where the practice of eZD marriage is widespread, the FZD marriage would become largely impractical, and this would turn things in favor of the MBD-FZS marriage which is practicable and therefore becomes the preferred alliance.

2. Similarly, a daughter born to a couple in eZD-MyB marriage, will have two options: (i) to marry her male cross-cousin or her own MyB. For this young lady, her MyB will also be her FZS – a doubly strong relation that would encourage a marriage with this man. On the contrary, this young lady's MBS (= FZSS) can be expected to be significantly younger to her because her MBS is also her FZSS – a relative in the generation below than her own. Again, this cannot happen due the positive age bias. In such a situation, a marriage with the man who doubles as her MyB and FZS will be the most workable solution.

Therefore, both from male and female Egos' perspectives, it is the FZS-MBD marriage that would be more practical than the MBS-FZD marriage. The conclusion we draw here is that eZD marriage was responsible for creating a situation where the MBD automatically becomes the preferred bride. What would follow are changes in the kin terminology to show the matrilateral bias, and the MBD terminology would mark the completion of the second phase transition.

So far in this section we have considered how a weak link, so to speak, in the unified and supersymmetric kinship system seems to predispose the system for a transition, and how the two phase transitions seem to occur. In the following section we discuss how the weak link seems necessary in the system.

4.3.2.4 Functions of the Weak Link

What significant purpose the equation yBW = SW must serve in the FZD kinship? This question cannot be answered except by considering the interplay between kinship, marriage, widow inheritance, kin behavior, and Madia social organization. The following is a brief discussion of this interplay.

A young man is duty-bound to inherit his eB's widow, and it is not uncommon that he is forced to do so. In the most recent case of this happening in the Bhamragarh region, a young widow had threatened to burn down her father-in-law's house down because her HyB was not willing to take her. While she was in late twenties and had 2 young children from the dead man, her HyB was about 16 years old. It turned out that this young man fled from his own home and village in order to free himself from the pressure to accept his eBW as wife.

On the contrary, a man could *never* inherit the widow of his yB. The Madia are so strict about the negative age bias for widow inheritance that a man taking his widowed yBW or a widowed woman living with her HeB is unheard of. Cases of eBW (widowed) and HyB unions are plenty; in fact, such cases can be found in every lineage.

The effect of this practice of widow inheritance shows in the kin behavior and in the kin terminology. Behaviorally, the HeB and yBWms are avoidance categories and violation of avoidance taboos is punished with a fine of cash and cattle, and shaming in public. This is in sharp contrast to the permissible behavior of the eBW and HyB, the duo that was described as the aggressively joking in section 1.3.2 of Chapter 1. Both the avoidance and the aggressive behaviors are meant to reinforce the negative age bias for widow inheritance. Terminologically, by equating yBW '*koyaɽ*' to a kintype in the adjacent G level (SW who is also '*koyaɽ*'), the possibility of a man taking his yB's widow is averted. (We have already covered how adjacent generation marriage is simply not done in the Madia society.)

We can understand that the function of the weak link, i.e. the equation yBW = SW, is to safeguard the negative age bias for widow inheritance. But then, what function does the practice of widow inheritance itself serve becomes the question. It helps to ask the question differently: what could happen if there were no restriction about widow inheritance and if widows were allowed the same freedom that the youth in the Madia society have for choosing a life partner? The answer to this question requires a few comments on the different kinds of marriages among the Madia, the distinction of arranged marriages as new and old alliances, and on how marriages are regulated among the hundred or so clans in the Madia society. It is by understanding the social organizational and structural background to the issue of widow inheritance that we can understand its function.

The Madia youth often marry their cross-cousins against their wish and due to family pressure. On the contrary, when it comes to 'new' marriage alliances (i.e. that between people previously unrelated), the youth have much freedom in choosing a life partner. Though a new alliance arranged by elders in the family has its own prestige in the society, non-arranged marriages such as eloping, bride-capturing (real or ceremonial), marriage followed by bridal-service (when the groom serves the potential father-in-law by working in his farms for a few years), and living together without a wedding ceremony, are all quite common. If bride-capturing is one thing, a young woman can also move into the house of a potential husband and do the house chores well in order to win the hearts of his parents so that they would accept her as their son's wife, all of which amounts to 'groom-capturing' even though it is not called as such. Thus there are many kinds of 'marriages' that make up new alliances.

However, new alliances are not made randomly but are done in conformation to the god-group exogamy. As mentioned in section 1.4.2, the hundred or so Madia clans fall into four god-groups, each a specific number of gods, ranging from 4 to 7. The youth may have much freedom to choose their life partners, but restricted only by the god-number. This four sections social structure is the background that serves to regulate 'new' alliances between the many clans in the Madia society.

With this knowledge of the social organization and god-group structure as the background, let us now consider the issue of the young widow and her freedom of choice for taking a second husband. A young widow must consider not only her father's god-group but also her husband's god-group. Since an *eṛmi*'s *eṛmi* is like a *jīva* (i.e. one's alliance partner's alliance partner is one's brother), the immediate families that her dead H's family has either given a wife to or taken a wife from are like *jīva* 'brothers' to her, even if these men are marriageable to her when considering *only* her father's god-number. Here it helps to recall our question: *What could happen if a young widow is allowed the same amount of freedom that the youth enjoy?* Since there are only four god-groups in the Madia society, there is a risk that a 'un-inherited' young widow might end up with a man who is a close relative as an *eṛmi* of her dead husband. Let us say that she ends up marrying her dead husband's classificatory ZH who are his *bāto* (eZH) or his *eṛmithox* (yZH). What will happen when she has sons with her second husband? These would be like *jiva* 'brothers' of her children with dead husband while actually belonging in the *eṛmi* group of her previous husband. Perhaps we can imagine the confusion when children born of the same womb end up in two different groups that are technically alliance partners to each other. This will be inconsistent with the Madia social organization.[78] One of my informants, Oxsal Kūtal of Arewada village, who is known for his orator skills and is a leader much sought after to settle all kinds of disputes, says that cases like this (example given above) are one of the worst threats to Madia culture, kinship and social organization. He poses the following question with the passion of a criminal lawyer: "How can a family that takes our daughters take our widowed wives too?" If we can imagine how confusing such a scenario might seem in the Madia mind, then we can understand why it becomes important for them to keep the young widow, *as much as possible*, within her dead husband's own or extended family. It is not always possible to do so because a widow may not have a HyB single and eligible to take her, and even if there is one he may refuse to take her in spite of family pressure. Besides, a young widow could also choose not to care about the inheritance issue. Incidentally, there is nothing in the kin terminology that would prevent her from marrying a classificatory HZH because the HZH is not even a kintype in Madia. Thus there are chances that confusions like the one mentioned above can sometimes occur. The practice of widow inheritance certainly helps to avoid such confusion situations from arising. There is a saying in Madia: "where a woman goes, there she gets stuck". The rule for the regulation of widow inheritance (i.e. the eBW – HyB

[78] The same situation arises when two sisters marry into different god-groups. Their children (MZC) are *jīva* "siblings" even when they belong in different god-groups. But in this case, the children are at least not from one and the same womb.

union) is meant to keep the married woman "stuck" in her husband's family and lineage, or at least within the clan, just in order to prevent possible confusions in kinship relationship between her children. Since the practice of widow inheritance acts as a preventive measure against anticipated confusions and is meant to preserve and maintain the dual social organization, we can say that it functions like *a maintenance system* (though this is not its only function).

But all this explanation has still not answered our question completely. For we can still ask: Why the *negative* age bias for widow inheritance, and why not neutral or positive age bias? The simple logic here is that a dead man's younger brothers (own or classificatory) are more likely to be still single and thus available for marriage. Moreover, speaking of natural deaths due to aging, number of surviving younger brothers (in the extended family or lineage) would be more than that of the older brothers. Thus the negative bias definitely increases the chances for her inheritance and for keeping the widow within her husband's family and clan. Therefore it is a better bargain than leaving the age bias optional and running the risk of letting the young widows "roam" like the *free radicals* in the body that can cause cellular damage. The HyB are the like the antioxidants who safely absorb the free radicals and prevent possible discrepancies in the dual kin classification.

Somewhat ironically however, what is put at risk in this bargain for safeguarding or maintaining the *integrity* of the social organization is the *stability* and *longevity* of the alliance system. The equation yBW = SW, which ensures the negative age bias for widow inheritance is the weak link in the entire structure that predisposes the FZD system for a transition[79]. This may look as though it is a case of a safety or maintenance system back-firing on the main system that it is meant to support and sustain.

But, on the other hand, this weak link is integral to the kinship system and plays significant roles. Even though this equation is a single inconsistency in the entire structure and thus the single weak link that puts the system at 'risk' for a transition (under some demographic conditions), it seems like the best bargain considering its function in maintaining the integrity of the dual kin classification (or social organization), as well as its contribution to the supersymmetry. Let us recall another significant fact that we considered a while ago (section 4.2.1.1) – that without the negative age bias for widow inheritance, there may be no relative age dimension in the Madia kinship system. And without the relative age distinction, there would be less number of kintypes on the whole, and it means there will be no symmetry of any kind, let alone supersymmetry. Besides, even if all the other kintypes marked for relative age were there in place, if this equation yBW = SW wasn't there, there would have been an additional kin term

[79] If the FZD system has survived among the Madia, it must be because of the following factors: the tribe's relatively smaller population, the four god-groups or marriage sections that seem to facilitate and ensure the practice of the FZD quadrilateral exchange, and the minimal outside cultural contact until recent times as a result of a terrain that is hard to access by outsiders..

for yBW (i.e. yBW ≠ SW), and then again what happens to the supersymmetry among kintypes in the four role-play groups or the two ontological classes?

Thus, the "weak link" has at least two significant functions: (1) relative age dimension which, through the principle of equivalence creates many inner symmetries contributing to the supersymmetry in the egocentric view, and (2) maintenance of the dual kin classification in the sociocentric view. Therefore, even though it predisposes the system to transition, the weak link is not to be seen as a defect in the kinship system. Rather, the weak link is as an essential part of the fine-tuning of the system.

4.3.2.5 Summary and Conclusion

This section began with the question, what might predispose the FZD system to transition or what might render the system unstable. The answer seems to be the kintype *koyaṛ* (yBW, SW). The only adjacent generation equation (yBW = SW) in the Madia system is the single inconsistency or the weak link in the FZD kinship structure and this leaves the door open for the introduction of the eZD marriage. This weak link can explain the historical priority of the eZD marriage which, in turn, can explain the presence of positive age bias in the later systems. The eZD also explains adjacent generation mergers which replace of the FZD alliance with the immediate or direct reciprocity (or bilateral exchange) with which the first phase transition becomes complete. The presence of eZD can also explain how the MBD eventually becomes the more practical and preferred alliance, which completes the second phase transition with relevant changes in the kin terminology. We also saw how the positive age bias played a key role [80] in the process. The phase transitions seem like a spontaneous process where one change leads to another, allowing the process to move in a specific direction, i.e. from FZD alliance to eZD marriage to bilateral and then to matrilateral cross cousin alliances.

The understanding of the development of Dravidian kinship as phase transitions is helpful to see how distinct a phase the Madia (FZD) kinship is. It is in comparison with the south Dravidian systems that we are better able to see the Madia system's unique features such as unification and supersymmetry. However, our analysis of the Madia kin configuration in the egocentric view cannot be complete without considering the central organizing principle that seems responsible for the structure of the FZD kinship.

4.4 The Central Organizing Principle

The FZD rule, together with the negative age bias for widow inheritance, renders the Madia kin terminology entirely comprehensible. How? All the terminological equations and

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[80] Apparently, the role of age biases in transitions from FZD to MBD marriage has already been argued for. Denham (2012:7) cites Hammel and Rose as having said that age biases, either positive or negative, "predispose a society toward marriage with MBD and away from marriage with FZD".

distinctions in Madia that are relating to two of the four dimensions, i.e. *sex* and *crossness*, are due to cross-cousin alliance (in general, and not specifically to FZD). The dimension of *generation*, or more specifically, the alternation of generations, can be explained with the alternation of the wife-giving and wife-taking in every successive generation (following Levi-Strauss (1969)). Let us recall how in the FZD alliance the male and female ego are repeating the marriages of FF and MM respectively, thus replicating the kin relations two generations above them and this provides the rationale for distinguishing adjacent generations and merging alternate generations. We have also seen how the remaining dimension, i.e. of *relative-age*, is an effect of the regulation for widow inheritance (section 4.2.1.1). (Let us note that the regulation of widow inheritance not *an additional marriage rule* within the FZD alliance system as are the oblique marriages found in the bilateral and the matrilateral alliance systems). The FZD marriage seems to be the single basic assumption on which the Madia kinship system is organized.

Though the FZD exchange is conventionally described as an asymmetric alliance, it can be seen as a symmetric exchange too. If it is asymmetric, it is so only temporarily; but when the cycle of reciprocity is completed after the gap of a generation, it becomes a symmetric one. If we look at the stage 1 of the exchange it is an asymmetric one, but if we look at the end of the story (i.e. the scene 2 of the play) it is a symmetric finish. Therefore, to label FZD as an asymmetric alliance may not be accurate.

4.4.1 Fundamental Features of FZD Rule

Let us discuss the FZD alliance rule further to identify certain aspects which are definitive of the FZD alliance and which distinguish it from the other Dravidian alliances. In order to do this, we must consider how the basic interaction of bride-giving and bride-taking actually works in the three Dravidian exchanges.

Firstly, the FZD alliance involves a *systematic delay by a single generation* in the exchange of brides. While it may be true that the bilateral exchange too can sometimes involve a delay (Parkin 1997:103), and a bride may be given in return after a gap of a generation or two, this would only be *an arbitrary delay* and never an essential feature of the exchange. It is impossible that such an arbitrary delay in exchange can influence a kin terminology in any way. If one wishes, one can describe the FZD marriage as ‘a bilatreal exchange with a built-in delay of a generation’. What this paper underscores is that the two kin terminological structures, based on the immediate exchange and the delayed exchange, are fundamentally different. For this reason, we need to look beyond the labels.

Secondly, in the FZD alliance the wife-giver in one generation becomes the wife-taker in the very next generation. Thus there is a *switching of positions* between, or in other words *a role-reversal* for the two alliance partners. This role reversal usually happens just once for by definition the Madia *putul-pila* (FZD) marriage means paying back the debt of a bride in a previous generation. Though an FZD alliance involves only two generations, it is not uncommon in the Madia society that the exchange is continued to involve three or four generations. There is no restriction on the maximum number of generations to continue the FZD alliance. The main point to be made here is that, regardless of how many generations the FZD exchange is carried on, the direction of the movement of the bride is opposite in every successive generation and that at any point in the chain of such exchanges, the bride-giver and the bride-taker will always be *distinct* and are never the same. On the contrary, the bilateral exchange which involves an *immediate reciprocity*, the wife-giver can also be the wife-taker, and thus the two are *indistinct*.

In the MBD system, the basic interaction is different from the other two because here the wife-giver is *always* the wife-giver and the wife-taker *always* the wife-taker. There is *no role-reversal* here, and in fact we may also say that there is no real reciprocity in the MBD alliance because the basic interaction (exchange) is not exactly a mutual one. (How these dynamics reflect in the terminology for the key affine in the respective systems is discussed in section 4.2.1.3).

To sum up, we have observed *two defining features* of the FZD alliance: (1) the systematic delay in reciprocity and (2) the role-reversal. Since the latter occurs due to the former, we can say that the former alone is single handedly responsible for the kin terminology structure. So we conclude that *the delayed reciprocity principle* is the single fundamental rationale for Madia kinship structure. It is amazing how a simple delay in reciprocity can engineer such a complex and elegantly supersymmetric kinship structure.

The two defining features of the FZD exchange allows for yet another comparison of the different alliances in Dravidian societies, and the following exercise is an attempt to do that.

4.4.2 Modifications in the Fundamental Features

It seems possible to track the modifications in the two defining features of the FZD alliance which could add to our understanding of the kinship transformation process. I present the modifications in a table format below.

Table 23: Transformation of defining features

Main Features	**FZD**	**eZD**	**Bilateral**	**Matrilateral**
Role Reversal	Yes	Yes	No (but may be)	No
Delay by a Generation	Yes	Yes (but partial)	No (but may be)	No

We can see from this table that modifications to the fundamental principle occur rather gradually than abruptly. The difference in the main features between any two adjacent systems would seem minor.

In the FZD alliance both features are definitive. In the eZD marriage, the wife-giver in one generation does become the wife taker in the very next generation and so the first one is intact; but the second one, i.e. delay by a generation, is partial as it applies only to the bride's side (ZD) but not to the groom's side (MB). This seems like a very small change. (Parkin too has pointed out how his genealogical diagrams for the FZD and the ZD marriages have what he called "a passing resemblance" (1997:106). In the bilateral, even a one-sided delay is not necessary because reciprocity can be immediate; and while there may sometimes be a delay in working out the reciprocity it is not so as a principle. The "no, but may be" makes it seem that the modification to the exchange is not major. In the MBD alliance, the first one is absent and therefore the second is irrelevant, which is quite different from the FZD but not so much from the bilateral. The alterations to the basic principles of exchange seem minor at any given point in the process. Thus it seems more like a natural or spontaneous process. Yet, according to the analysis in this paper, the minor modifications in the principles of alliance interactions usher in such major changes in the kin terminologies that the three systems are radically different.

4.5 Summary and Conclusions

4.5.1 Summary

We began the analysis of the egocentric view of the Madia kinship with the study of the system as a whole. A distinction was made of the 37 kintypes as two ontological classes: the EGO and the OTHER. While the kintypes in any of the three Dravidian alliance systems can form four role-play groups, it is only in the Madia (or FZD) system that we could observe an overall symmetry or supersymmetry between these four groups and in effect, between the two ontological classes, besides other internal symmetries. We concluded the first section with two main observations: (i) the loss of supersymmetry in the south Dravidian alliance systems and the increase in the number of kintypes in these systems seem to go together, and (ii) the three cross-cousin alliance systems can be arranged in an order of sequence from the point of view of original supersymmetry and compactness and the loss of these resulting in an expansion of the system, and that sequence was from patrilateral to bilateral to matrilateral.

In section 2, we turned our focus on the core sectors of the three alliance systems. After a description of the three core sectors and a comparison of the same we concluded that it is only in the FZD system there is a perfect coordination and symmetry of kintypes that are potential and actual partners, which we described as the unified core because it is based on a single alliance rule with no biases and no oblique marriage. Once again, it was possible to arrange the three systems in a sequence from the point of view of unification and its loss and this sequence is the same as suggested in the analysis of supersymmetry.

In section 3, we discussed how the transformations in the core as well as the whole can be described in terms of losses and how these losses are all related. We saw how the loss of unification at the core and the expansion of the system as a whole have an inverse relation. While loss of unification occurs in a steady fashion, the expansion does not. Based on the directionality suggested by all these analyses, we described the transformations of Dravidian kinship as phase transitions where the Madia or patrilateral system is the most original phase and the two south Dravidian are later phase transitions. Then we identified the single weak link in the FZD terminological structure which seems to predispose the FZD system to instability and transition, by opening the door for the eZD marriage to make entry. The first and second transitions were discussed in detail which also highlighted the role of positive age bias in the phase transitions.

In section 4, we defined the principle of systematic delay in reciprocal alliance as the central organizing principle of the FZD kinship structure. The apparent minor modifications in the central organizing principle that lead to the eventual disappearance of the original principle confirm too the directionality and the spontaneity suggested by the preceding analyses.

4.5.2 Conclusion: The Dravidian Schema

The above summary of the many conclusions made throughout this paper have to do mainly with two things: (1) the distinguishing features of the Madia kin configuration in egocentric view and (2) its relation to south Dravidian cross-cousin alliance systems. The following is an attempt at presenting a concise description of what may be called the Dravidian schema based on the conclusions summarized above. Though this may not be a totally adequate description, it is an attempt to capture the main points.

> *A supersymmetric kinship system, highly compact, unified at its core, and built on the basis of the single fundamental principle of delayed reciprocity in cross-cousin marriage alliance goes through two major phase transitions following changes in the alliance rule that causes simultaneous loss of the unification and of the supersymmetry resulting in an unfolding of the originally compact system, which means an irreversible process of expansion of the same.*

The analogy from the Big Bang theory is perhaps obvious. An earlier paper titled *The Big Bang of Dravidian Kinship* (Vaz 2011) has also mentioned the loss of vertical and horizontal mergers and subsequent expansion, but that paper was written based on the study of a few *selected* kintypes from the south Dravidian systems. The current analysis has taken into account not only the *entire* terminological structures (i.e. the whole systems) of the three kinds of cross-cousin alliances, but has also taken into considerations new parameters such as supersymmetry and unification.

4.6. Implications for the Debate on FZD Alliance

The analysis presented in this paper may provide an answer to the old question about patrilateral cross-cousin alliance – whether or not the FZD is a *distinct* form of cross-cousin alliance system. For so long the FZD alliance has generally been seen as simply a variant of the bilateral system because it has proved difficult to relate the anthropologist's model of FZD alliance to actual field situations despite the fact that reports "specifying preference for a genealogical or classificatory FZD as marriage partner have been recorded in the field often enough for us to be compelled to take them seriously" (Parkin 1997:103). That difficulty seems mainly due to three issues as has been neatly laid out by the same author.

4.6.1 Issue 1: The Terminology for Cross-cousins

"Only matrilateral (MBD/FZS) prescriptive terminologies seem to occur; 'pure' patrilateral (FZD/MBS) terminologies are unknown" (Parkin 2012:192). The FZD system presents a problem to the anthropologist's model because it does not show laterality (i.e. distinguish the FZD from the MBD) as its counterpart, the MBD system, is known to do. Because the FZD and MBD are indistinct in the patrilateral system it *looks like* the bilateral terminology. But, as shown in the Tables 20 and 21 of this chapter, the cross-cousin terminology in the patrilateral and bilateral systems are *not really* the same because the bilateral cross-cousin terms show a positive age-bias which is absent in the FZD terminology. We have already considered how crucial the absence of age bias is in the patrilateral system. How the addition of such an age-bias plays a significant role in the transformation of kinship, specifically the loss of unification and male/female symmetry. Moreover, the cross-cousin terms *not* being distinguished for laterality in FZD kinship system is absolutely fundamental to its supersymmetric structure, for if it were, there would be two more additional terms in the Players sector, which would be *disrupting* the overall symmetry of kintypes and of key referents. Neither would it be what it is in the core sector – unified. Thus it would *not* be a unified and supersymmetric kinship system but for the *absence* of age and lateral biases in the cross-cousin terms. Therefore, a "'pure' patrilateral terminology", if what is meant by that is an ethnographic case of FZD marriage practice with a cross-cousin terminology showing lateral bias, would be a contradiction of sort in the light of what is laid out in this chapter as the unique and defining features of the FZD terminology. Treating a kin terminological system as a whole can reveal more than when we place all the emphasis on the cross-cousin terms. Therefore, understanding the FZD alliance system on its own terms is what is needed rather than projecting our best hypothesis on to it.

4.6.2 Issue 2: Delay in Reciprocity

"[A] degree of delayed reciprocity will often be a feature of working systems of bilateral cross-cousin marriage…" (Parkin 1997:103). The delay in the FZD alliance is a *systematic* one in the sense that the bride is returned only after the gap of a single generation. While there may occasionally or even often be a delay in reciprocity in the bilateral alliance, in the FZD exchange the same is a necessary or compulsory part of the exchange cycle. A delay in the bilateral exchange is only arbitrary which cannot and does not influence the kin terminology. But the systematic delay in the exchange is what, in my view, creates the supersymmteric structure. How this delay causes replication of relations in adjacent generations and limits the number of kintypes to four generations and facilitates complementation to work in three of the four G levels are all already covered in section and therefore do not need repetition here.

4.6.3 Issue 3: Shortness of the FZD Cycle

It is about the difficulty of a *continual* reversal in the direction of the alliance over many generations. While the FZD alliance being "a *short-term* arrangement" (ibid) may seem like a disadvantage, it really is not. In fact, the shortness of the FZD exchange cycle helps the frequency with which it can be repeated. How frequent is an important question. It is part of the definition of the FZD alliance that it started off in the previous generation. Let us recall that the FZD marriage is scene 2 in the play of marriage exchange. This means a society seriously practicing the FZD alliance can be expected to have *nearly as many* FZD marriages as there are new alliances (i.e. between people previously unrelated) for it can never be more than the new alliances. This indeed seems to be the case ethnographically. The following is the report of a survey conducted by a British administrator in the former Bastar region (present Chhattisgarh) during the first half of the last century. "Of 105 Hill Maria marriages investigated, fifty-seven were marriages between cross-cousins, …. the remaining (is) 46 percent, in which the marriage marked the start of new affinities..." (Grigson: 1938:234). Among the fifty-seven cross-cousin marriages (which is 54% of all marriages), Grigson reports that the "commonest form is marriage between a daughter and her mother's brother's son" and that "the *gudapal*" or the debt of the mother's milk is the reason for such an alliance (ibid: 247). Referring to another one of the central Dravidian tribes, Grigson has said, "The proportion is not much less among the Bison-horn Marias" (ibid). The same is also reported by a different ethnographer, Thusu, about yet another tribe, the Dhurwa, which is also central Dravidian (Thusu 1965:100-101). Here, a survey undertaken by the government of India in the latter half of the last century, showed that among the 133 arranged marriages investigated, 65 were new alliances and 68 were cross-cousin alliances, out of which 56 marriages were FZD alliances and 12 were MBD alliances (ibid.)[81]. According to this survey, 48% of all arranged marriages were new alliances, and among the 52% of old (i.e. cross-cousin) alliances, 42% were the FZD marriages and 10% were the MBD marriages. Both Grigson's and Thusu's reports show that the FZD alliance was a dominant practice among the central Dravidian tribes because the frequency of the FZD alliance is very close to that of the new alliances. Let us recall that while every marriage in the Madia society is not a FZD marriage it has the potential to become one because of the strong *putul-pila* tradition

[81] While working out the percentage however, Thusu has made incorrect calculations to say 42% are new alliances while his data actually works out to be 49% new alliances (i.e. 65 out of 133) and 51% cross-cousin alliances (i.e. 68 out of 133).

(which underscores a man's claim on his FZD). Surveys form the actual world proves the same. While it may only be a *short-term* arrangement as far as the two families involved are concerned, the frequency of it occurrence shows how *widespread* it is in the societies that practice it. The shortness of its cycle helps its frequency, and the frequency seems to have kept it alive and well in central India. Thus the shortness of the cycle works *for* the alliance system and not *against* it, and therefore need not be seen as a problem.

4.6.4 Conclusion

Neither the absence of laterality in cross-cousin terms in the FZD system nor the shortness of its cycle makes the FZD marriage any less of an alliance system. The analysis in this paper shows the FZD terminology's uniqueness among the Dravidian alliance systems. In conclusion, may I also say the following? The frequency of the FZD alliance among the Dravidian societies in central India should make this a good place for field work to further investigate and analyze the FZD alliance system - its origin, possible variants, its relation to the marriage sections, are open questions. It would be satisfying if this paper kindled someone's interest for further study of the central Dravidian, of which Trautmann had made a prophetic remark: "the future of the inquiry into the nature, and necessarily also the history, of the Dravidian kinship system lies in Central India" (1981: 236).

CHAPTER 5

THE SUSY MODEL OF THE EARLY UNIVERSE

The configuration of the kintypes in the Madia system, which we studied in the last chapter, is very similar to the configuration of elementary particles as proposed by physicists for the very early universe, which is at or immediately after the Big Bang. The suggestion of a comparison between the two structures may cause some of my readers to wonder: *What can be common between relatives and particles?* Well, we can say that people are to a society what particles are to the universe: fundamental constituents! However, our interest is really in exploring how similar in character and behavior the constituents of these two complex structures are.

As we shall see in the next chapter, a comparison of the Madia kinship structure with the early universe's structure can reveal many structural, behavioral, interactional and dynamical similarities. But that discussion would not make much sense to my readers unless they are already familiar with the basics of particle physics, and therefore I present in the current chapter a brief account of the fundamental particles.

The content of this chapter are mostly quotes from authors like Hawking (2009) and Greene (2003), who have explained the amazing wonders of the physical universe and the complex facts about elementary particles in simple and ordinary language, avoiding scientific jargon, so that lay people can understand them. I have also benefitted from articles in science websites and news magazines that report on the new findings in this field (such as Mukhi 1999, Rajasekaran 2012). The description that follows is compiled from all these different sources.

We will begin this chapter with a description of the elementary particles and their classification as it is in the Standard Model. This simple description will serve as an introduction to the supersymmetric (SUSY) model of early universe, the description of which is the goal of this chapter, so that we can discuss the structural and dynamical similarities between the early universe which evolved through the Big Bang process and the Madia kinship with which we attempted to trace the development of south Dravidian kinship systems.

5.1 Introducing Elementary Particles

Elementary particles are "the ultimate building blocks of nature" (Hawking 2009:chap 5). Every elementary particle is either a matter particle known as *fermion* or a force-carrier (i.e. energy) particle known as *boson*. Fermions make up the matter of the universe, and bosons are carriers of fundamental forces. Physicists have recognized a pattern among the fundamental particles as shown in Figure 17. There are 12 elementary matter particles which are classified, according to how they interact, as quarks and leptons, each numbering six. Pairs from each classification are grouped together to form a "family" or "generation" because these exhibit similar physical behavior. Physicists have now shown that "everything encountered to date – whether it occurs naturally or is produced artificially with giant atom-smashers – consists of some combination of particles from these three families and their antimatter partners" (Greene 2003:9).[82]

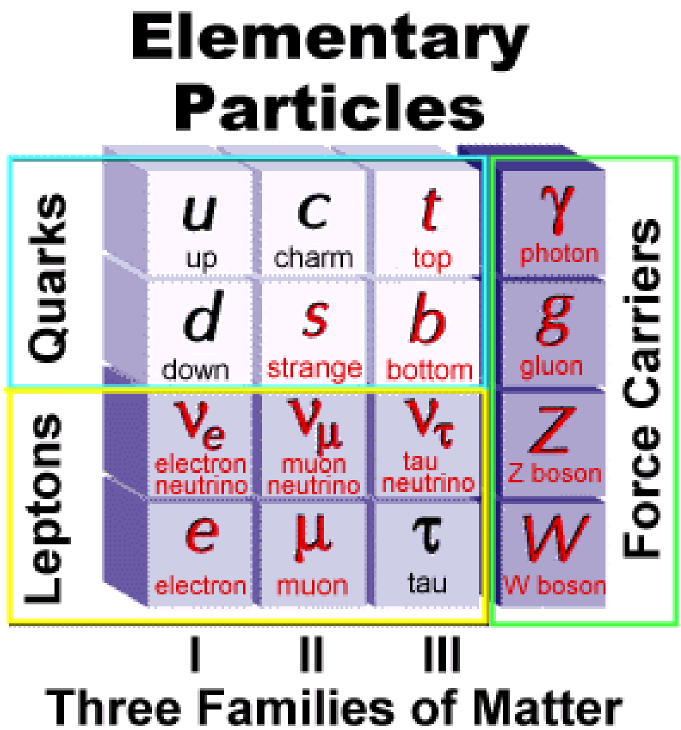

Fig. 19. The Standard Model elementary particles[83]

The above table lists only four of the known force carrier particles. But there are also the two other *hypothetical* bosons, one is called the Higgs boson (which may have been detected by

[82] Antimatter is material composed of antiparticles. Most kinds of particles have antiparticles which have the same mass but opposite charge. There is no evidence of antimatter in the present universe which is made entirely of matter.

[83] http://durpdg.dur.ac.uk/vvc/theory/fundamental.html

experiments at the Large Hadron Collider in Geneva in June 2012), and the other is an evasive one called the graviton.

How are fermions and bosons related? Quantum mechanics indicate that fermions interact by exchanging bosons, that for each interaction there is a messenger particle, and that the interactions gives rise to forces in nature. There are four fundamental forces in nature and all of these involve the exchange of one or more particles, as shown in the table below[84]:

Table 24: Fundamental forces and force carriers

Force	**Exchange particle**
Strong Nuclear Force	gluon
Electromagnetic Force	photon
Weak Nuclear Force	W± Z
Gravity	Graviton

The list shows only five bosons that are believed to be responsible for mediating the four forces of nature, but there is a sixth one, called the Higgs, which is a scalar field. Higgs is believed to be responsible for the elementary particles acquiring mass. It is discovery is as recent as March 2013 when it was confirmed tentatively.

With this brief introduction to particles, now we will turn to look briefly at the rationale/basis for the classification of particles as fermions and bosons.

5.2 Structural Properties of Elementary Particles

The basis of the distinction of particles as fermions and bosons is ontological. It is a distinction based on a property that particles have, called spin. Now, what is spin? Hawking has explained spin in a simple way using helpful example and therefore I present below both his description of and his illustrations for spin: (Hawking: 2009:37-38)

> "One way of thinking of spin is to imagine the particles as little tops spinning about an axis. However, this can be misleading, because quantum mechanics tells us that the particles do not have any well-defined axis. What the spin of a particle really tells us is what the particle looks like from different directions. A particle of spin 0 is like a dot: it looks the same from every direction. On the other hand, a particle of spin 1 is like an

84 .sciencepark.etacude.com/particle/**forces**.php

arrow: it looks different from different direction. Only if one turns it round a complete revolution (360 degrees) does the particle look the same. A particle of spin 2 is like a double-headed arrow, it looks the same if one turns it round half a revolution (180 degrees). Similarly, higher spin particles look the same if one turns them through smaller fractions of a complete revolution. All this seems fairly straightforward, but the remark-able fact is that there are particles that do not look the same if one turns them through just one revolution: you have to turn them through two complete revolutions! Such particles are said to have spin ½." (ibid.)

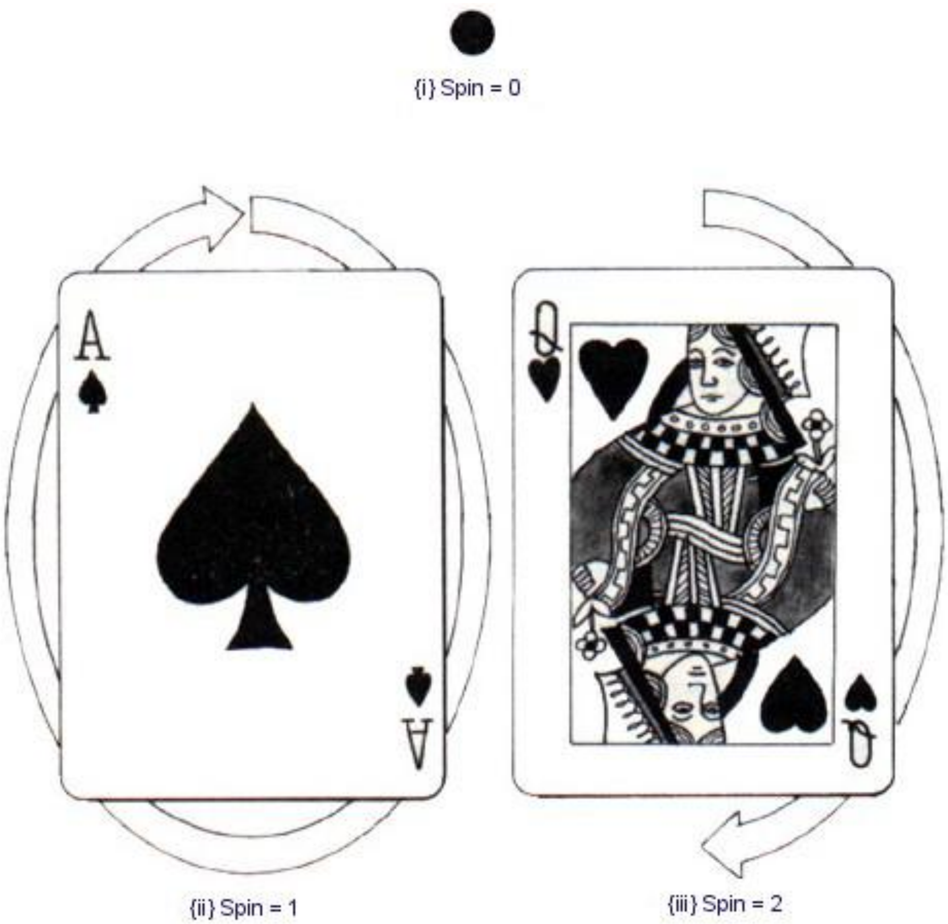

Fig. 20. Hawking's illustration of spin in particles

The three illustrations provided by Hawking show that the spin 0 particle is like a dot (i) looking the same from every direction, the spin 1 particle is like a an arrow (ii) needing a complete revolution (360 degrees) to look the same and the spin 2 particles (iii) is like a double-headed arrow, looking the same if one turned it round half a revolution (180 degrees).

It is on the basis of this property called spin that all the known particles are divided into two groups. Fermions or the matter particles are the types that take two complete revolutions (720 degrees) to look the same, and therefore these are particles of spin ½ (or half-integer spin). It is hard for us to imagine such an object for there is nothing in the physical world that fits this description. On the other hand, the bosons or the force carrier particles are of integer spin such as 0, 1, and 2. Thus, *spin* is the basic property with which all known particles in the universe are divided into two groups: matter and force particles.

Besides the spin, there is another basic distinction between the fermions and bosons. These have fundamentally different natures. Bosons are said to be gregarious because tend to group together, while the fermions are solitary. The solitary property of the fermions is explained with what is called the Pauli Exclusion Principle, which is a quantum mechanical principle that no two identical fermions may occupy or exist in the same 'quantum' state simultaneously. On the contrary, the bosons follow the Bose condensation principle which states that the bosons "may overlap in the same quantum state, and in fact the more bosons that are in a state the more likely that still more will join."[85] Functionally speaking, the fermions are "the skeletal scaffolding of the cosmos", and bosons "what bind it together". (ibid)

Particles have so many other intrinsic properties such as mass, range etc., but the properties of spin and sociability are basic to their distinction as fermions and bosons. The many mathematical properties of particles which may be of fundamental importance in physics but which are excluded here because these are irrelevant to the comparison we make later between particles and Madia relatives (kintypes).

5.3 The Supersymmetric Model of Early Universe

Our universe is the way it is because the matter and the force particles have the properties they do, and that it "would be a vastly different place if the properties of the matter and force particles were even moderately changed" (Greene: 2003:13). Though the current understanding of elementary particles marks the great success of modern physics, so far there is no scientific explanation for *why* the particles and forces have the properties they do. Scientists are still faced with the "innumerable 'whys'" (Greene 2003:9) that have risen out of the new discoveries about

[85] http://nonlocal.com/hbar/bosonfermion.html

particles. Why are there three generations of matter particles? Why only four forces and why not 3 or 7? Why do particles have the particular spin they do? Are these random numbers or are there fundamental reasons for these being the way they are? Modern physics has been preoccupied with answering these questions.

What has become clear in recent years is that any understanding of the reasons for these phenomena which occur in the universe in the large will be based on our understanding of elementary particle physics at the smallest level. Physicists have been working on models and theories that would show the various particle properties and forces as the manifestations of a single fundamental law or an underlying principle upon which the universe is constructed. If they can understand the universe in its most microscopic state then they would have *the unified theory* which also known as the "theory of everything". The search for this "ultimate" or "final" theory (Greene 2003:16), is the central quest of modern physics. No unified theory that has been proposed so far has gained broad acceptance. Supersymmetry (SUSY) is one such unified field theory, and a brief description of this model follows.

The SUSY model of early universe is an attempt "to unify the fundamental forces by postulating a symmetry relating the known fermions to hypothetical bosons and the known bosons to hypothetical fermions." [86] Even as the name suggests, this theory is all about symmetry. It shows the bosons and fermions in perfect symmetry. One of the primary implications of supersymmetry is that instead of the 18 fundamental particles in the Standard Model, there must be "at least 36 fundamental particles" (Jones and Robbins 2009). Without a total of 36 fundamental particles, the proposed symmetry between fermions and bosons is not possible. Moreover, physicists say that "if the universe is supersymmetric, the particles must come in *pairs* whose respective spins differ by half a unit" (Greene 2003:173). These pairs are partners in the supersymmetry, and are called "*superpartners"* (ibid). Thus the fermions must have boson superpartners and the bosons must have fermion superpartners.

The definition of the SUSY model quoted in the paragraph above says that it is an attempt, like any other unified theory, to "unify the fundamental forces". Now, what is meant by *unification* of fundamental forces? It is meant that the four fundamental forces of nature, which are electromagnetism, gravity, strong force and weak force, can be explained as manifestations of a single physical principle[87]. As Hawking has explained, the unified theory is one that will be able to show that all four forces are but "different aspects of a single force." (Hawking 2009 :chap 5). In other words, a unified theory will show these four forces as the four different aspects of one and the same interaction. One interaction explains all forces and hence 'unified'.

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[86] definition by American Heritage® Dictionary of the English Language, Fourth Edition

[87] http://www.thefreedictionary.com/unified+field+theory

The supersymmetric framework unites the forces as well as the matter constituents proposing the "greatest possible symmetry" between them – and for this reason called supersymmetry model (Greene 2003:167). It attempts to describe the nature of the very early universe, which is the universe at, or immediately after, the Big Bang, which was a *size zero* universe and an infinitely hot one (Hawking 2005:80). Supersymmetry is a significant because it is the basic assumption of other most recent proposals for unified theory, such as string and brane theories.

Now the question arises naturally as to how the universe got to be what it is today, non-supersymmetric and non-unified? The physicists' answer to this question is given in the following section.

5.4 Phase Transitions: Loss of Unification and Symmetry

The SUSY model gives the framework within which the events of the Big Bang from the earliest phases to the present can be described. Accordingly, the early supersymmetric universe went through two phase transitions and became what it is today. The following is a very brief and simple account of that.

The cosmic timeline as pictured by astrophysicists suggests that the loss of unification and corresponding loss of symmetry happened in the two phase transitions which occurred/happened in the very first moments of the birth of the universe, or the Big Bang. The following is the outline of the Big Bang events[88]:

> *Phase 1*: Since "our physics cannot yet ask questions about times earlier than the start of the *Planck Epoch* (before $t=10^{-43}$ seconds)", it is the earliest phase, which is immediately after the Big Bang. At this phase, the forces were unified or undifferentiated, or as some have explained this is when the four forces were different aspects of a *single* interaction.
>
> *Phase 2*: The next phase called the *Grand Unification Epoch* (at $t=10^{-43}$ seconds) is when gravity has separated and the other three (strong and electroweak) still remain unified.
>
> *Phase 3*: The following phase known as *Inflationary Epoch* (at $t=10^{-35}$ seconds) is when the strong force separates and the electromagnetic and weak forces are still unified as electroweak force. It is called the inflationary epoch because the universe grows exponentially at this stage. At the end of this phase, (at $t=10^{-12}$ seconds) the electroweak force separates into electromagnetic and weak forces, and we there are the four distinct forces!

[88] Taken from http://www.astronomy.ohio-state.edu/~pogge/Ast162/Unit5/early.html, © Richard Pogge

It is later on in the cosmic timeline that matter as we observe today finally emerged, a point that we are concerned with here.

The two main points to be noted about the cosmic timeline for the purpose of comparison later are: (1) there are three phases in the cosmic timeline before or as the universe came to be what it is today, and (2) that phase transitions are about the loss of unification and the symmetry-breaking.

5.5. Summary

This chapter is a compilation of the most fundamental and significant facts about the elementary particles and a description of the basic features of the SUSY model of the early universe which has been proposed for the very first moment of the cosmic timeline. Once again, the description here is very basic, unaccompanied by all the complex and intricate details about the early universe and the Big Bang process. In Chapter 6 we will compare the SUSY model of the early universe with the configuration of Madia kintypes as seen in the egocentric view.

CHAPTER 6

COMPARISON OF MADIA KINSHIP WITH EARLY UNIVERSE

The configuration of kintypes in egocentric view of the Madia kinship is similar in many ways to the configuration of elementary particles in the supersymmetric (SUSY) model of the early universe. This chapter is an attempt at a comparative study similar to the one carried out in chapter 3 which detailed the correspondences between Madia kin classification in sociocentric view and the structure, function, dynamics and organization of the chromosomal DNA.

6.1 Madia Kintypes and Elementary Particles: Structural Behavioral Similarities

Let us recall the distinction of two ontological classes of kintypes: the EGO and the OTHER. This distinction compares well with the classification of the elementary particles as fermions and bosons. What follows is an account of the structural similarities and analogous behavior between Madia kintypes and elementary particles.

6.1.1 Elders as Fermions

6.1.1.1 Comparison of Structure

The 12 fermions fall into three distinct “families” or “generations”, and similarly the 12 Elders kintypes too fall neatly into three generational levels (see Table 13 in section 4.1.2.1). Each ‘generation’ of particles has four constituents which are of two basic types: 2 quarks and 2 leptons. Similarly, there are four kintypes in each of the three generations of Elders where two of these are male and the other two are female. Thus we can say that the classification of the fermions and that of the Elder kintypes have equal parts.[89] What we have noted is a numerical correspondence but there also seems to be a deeper structural correspondence, and this has to do with the particle spin.

We saw earlier that the fermions have half integer spin. Let us recall Hawking’s description of half-spin particles: Fermions are “particles that do not look the same if one turns them through just one revolution: you have to turn them through two complete revolutions!” The physical property of half-integer spin, meaning *a double-revolution* can be compared to an unique property of the Elder kintypes – the *alternate generation merger*. We have seen in section 4.2.1 how the Elder kintypes reappear, either as reference or as address, after a gap of a

[89] Let us recall that the male/female distinction is not the only one to give such a configuration, but that even if the parallel/cross distinction is considered, the Elder kintypes in each generation would fall 2 as parallel and 2 as cross, and in this case it is the parallel/cross distinction that could compare with the quark/lepton distinction.

generation, which is once in two generations. The Elder kintypes have "many lives", so to speak, for they keep reappearing as illustrated in the lineage tree (Figure 15 in section 4.1.2.1). If we can take the average duration of a single Generation as a full circle of a life-span and see it as a single revolution (180 degrees), then these kintypes that "look the same" in every two generations, can be said to a have a double revolution, or in the language of physics, a half-integer spin. This is not a strange idea after all because Allen too, while presenting a structural model known as the tetradic model for early human kinship, has shown how the "cyclical generational time" (referring to the alternate generation merger) can be measured in angular motion, i.e. "180 degrees = 1 generation", even as the linear time is "measured lengthwise in units corresponding to years" (Allen 1989:6).

6.1.1.2 Comparison of Behaviour

The correspondence between Fermions and Elders extends even beyond the structural aspect of spin. Behaviorally too, the Elders "act" like the fermions. We saw that fermions tend to be solitary for they obey what is known as the Pauli Exclusion Principle, which means that two fermions cannot be in the same energy state simultaneously. Hence their description as "antisocial". Similarly, no two Elder kintypes share in the same kin status as each one is a kin category by itself. The table of kin categories (Table 5) shows that all the Elder kintypes listed there remain alone as solitary kin categories. The Elder kintypes are so unlike the kintypes in the G^0 level most of which have at least one other kintype in its own category (section 1.2.1.1).

What about the six Children kintypes in G^{-1} level? Four of these (S and D, and BC and ZC) are like the Elder kintypes, each standing alone by itself. Besides, these four have address terminology which are the same as that of six of the Elder kintypes: M, F, MyZ, FyB, MB, and FZ (see Appendix II). Two kintypes in G^{-1} seem to be exceptions because these are sociable, i.e. the DH (category no. 20 in Table 5) and SW (category no. 22 in table 7), and these two do not reappear. Considering the behavior of the majority of kintypes in G^{-1}, we may say that the *below Ego* G level is like the *above Ego* G levels, comparable to fermions. (Let us recall that the Elders and Children together were defined as the OTHER, a class ontologically opposite to that of EGO).

6.1.2 Ego's Generation as Bosons

In our comparison of the G.0 kintypes with the bosons, we will discuss the behavioral feature first and then the structural ones.

6.1.2.1 Comparison of Behavior

Contrary to the solitary behavior of the fermions, the bosons are described as gregarious because they seem to attract other neighbors and tend to clump together. This description of bosons fit well for the kintypes in Ego's generation (EGO) because, as we can observe from Table 5 in Chapter 1, most of these kintypes share their status as a kin category with at least one other kintype. For an example, one of the sibling kintypes, eB, is in the same category along with five other kintypes. Similarly, the eZ is grouping with four other kintypes. It is for this reason these were described as "sociable categories" (section 1.2.1.1). Thus, behaviorally, the G^0 kintypes are like the sociable bosons. (Just as we noted two exceptions among the G^{-1} kintypes, i.e DH and SW, which do not reappear as do the rest in G^{-1}, there are two exceptions among the G^0 kintypes, i.e. kin categories 18 and 19 in Table 5, because these two are solitary while the rest of the kintypes in G^0 are sociable. This is interesting to note because once again the principle of balance seems to be at work here too).

6.1.2.2 Comparison of Structure

Let us now consider the structural similarities between bosons and G^0 kintypes – the number of constituents and their spin. The comparison we have made of Elders and fermions in the preceding section is quite straightforward because they have the same number of constituents (i.e. 12 each). The comparison of G^0 kintypes with bosons is a bit complicated (and all the more interesting) firstly because the G^0 has many more kintypes than do the above Ego levels put together, which is also more than three times the number of the bosons in the Standard Model, and secondly because the six known bosons do not all have the same spin value.[90]

The kintypes in Ego's G level generally do not *reappear* in other G levels, but are usually confined to their own level. Alternate generation merger is not a property of the G^0 kintypes. Following the earlier definition of a single generation or a full life-span as a single revolution, the kintypes in G^0 can be said to have integer spin.

However, all of the G^0 kintypes cannot have the same "spin value". Why? They cannot because not all the kintypes in G^0 remain in the same kin-status in relation to Ego throughout Ego's life. It is the egocentric perspective we have been discussing, and the fact is that only some kintypes remain the same throughout Ego's life. Some kintypes have their kin status changed *following* Ego's marriage, while still others come into existence *only after* Ego's marriage. If we follow this reasoning, the kintypes in G^0 will have different integer spin, which will be either 1 or 2 or 0. We discuss this below.

Spin-1 Kintypes

The four sibling kintypes can be seen as having spin-1, because these are lasting a full life-span. In the perspective of Ego, a sibling is a sibling all though Ego's lifetime. Sibling relationships remain unchanged throughout Ego's life, regardless of marriage alliances, whether Ego's marriage or Ego's siblings' marriages. For this reason sibling kintypes can be seen as lasting a full circle of a life time, and therefore we can say these have spin-1.

The same applies to siblings' spouses too, because these kintypes remain the same in their relation to Ego, irrespective of whether Ego is married or not. Similarly, the male cross-

[90] The SUSY model proposes at least a dozen more bosons which are still to be observed experimentally.

cousin *mariyox* (MBS/FZS), whom the male Ego may continue to address as *sangi* (section 1.2.3) even after the MBS/FZS is married, can be said to last a lifetime in Ego's perspective.

Thus, the spin-1 kintypes are as follows:

- 4 sibling kintypes
- 5 siblings' spouses kintypes
- 1 cross-cousin (i.e. the male) kintype.

Spin-2 kintypes

The spin-2 kintypes are those that exist either *only before* or *only after* Ego's marriage. Such kintypes can be seen as lasting only a half lifetime in the egocentric perspective. The affinal relatives in G^0 (all of spouse's siblings and spouse's siblings' spouses) come into existence only *after* Ego's marriage. Such kintypes are those for which the notations begin with either H or W (and these kintypes occupy columns 4 and 5 in Table 15).

The same criterion would apply to the female cross-cousin *mandaɽi* as she is a *before* marriage kintype who becomes the W *muthe*. All of these kintypes (the affinal ones and the female cross cousin) have a half life-span in Ego's perspective and so can be said to have spin-2.

Spin-0 Kintype:

The Ego is at the centre of the kinship configuration, in relation to whom all of the 37 kintypes have the kin status they do. As the central point of reference for the entire system, Ego fits the description of a particle with spin zero. But there is a problem in proposing Ego as the spin-0 kintype because Ego is not even a kintype! Ego is simply the designation for any particular individual in a society, whether male or female, whose relationships comprise the kinship system of that society (Parkin 1997:8). Even though Ego is not a kintype (because Ego is not known by any kin term in Madia), Ego is the reason how all the kintypes came to have the kin status they do.

However, there is a sense in which we can identify Ego with the kintype H. We have been dealing with a cross-cousin marriage system and we have been studying the perspective of the male Ego. Since the male Ego marries the female cross-cousin to become the kintype H, it may be possible to see Ego and H as one and the same. Thus, we can propose the kintype H *mujo* as the spin zero kintype. The H is the only kintype that can qualify to correspond to the spin-0 particle.

6.1.3 Conclusion

The conclusion we can draw here is that the idea of spin value can be applied to the G^0 kintypes yielding "values" that correspond to the different spin values of the Standard Model bosons. What is of significance to our comparison between the Madia kinship and the SUSY structure is the "spin value" of the 12 kintypes in the core-sector (Table #20 in chapter 4), and therefore we summarize that below.

> Among *Players*: Spin-1 kintypes are five (the four siblings, the single male cross-cousin) and spin-2 kintype is only one (the female cross-cousin).
>
> Among *Spouses*: Spin-1 kintypes are a total of five (all of siblings' spouses) and spin-2 kintype is only one (W). The spin-0 is Ego, which may be identified as the kintype H but which is actually out of view in the egocentric perspective. It is interesting to note how the spin value showing for the *Spouse* kintypes corresponds to the spin values of the known bosons; but it will be discussed in the next section on dynamical similarities (section 6.2.2).

The rest of the kintypes in G^0, which are all affinal relatives, i.e. spouse's siblings and spouse's siblings' spouses, and which come into existence only *after* Ego's marriage, can be assigned the spin value 2. The only affinal kintype that may seem a bit challenging as to its spin value is the CEP, i.e. Ego's children's spouses' parents. However these do not figure in the following comparison because these correspond to the yet unknown bosons.

6.2 SUSY Universe and SUSY Kinship: Dynamical Similarities

The features that stand out in the description of the SUSY model of early universe are its supersymmetry and unification, and the major one in the evolution of the early universe was the phase transitions. Following is a discussion on how these three concepts apply to the Madia kinship.

6.2.1 Supersymmetry

The SUSY model proposes "the greatest possible symmetry" between the matter and force particles, and it requires at least 36 fundamental particles. In this model the four fundamental forces of nature are unified, meaning they would be different aspects of a single super-force or manifestations of a single interaction or a fundamental law or single underlying principle. The Madia kinship, which we described as supersymmetric on the whole and unified at the core is comparable with the model of SUSY universe.

First of all there are 36 kintypes in the SUSY kinship. The total number of Madia kintypes is 37, but as we have noted often, one of them, the H, cannot be part of the male egocentric perspective – the perspective in which the kinship configuration appears supersymmetric.

Secondly, we have observed that there is a perfect balance between the number of kintypes that comprise EGO (which are boson-equivalents) and those that comprise the OTHER (which are fermion-equivalents), which we described as the overall symmetry of the Madia kinship structure or supersymmetry (section 4.1.2.5). We have also observed smaller or internal symmetries among kintypes as well as among referents based on gender and crossness. The same seems to be the case with the SUSY model of early universe where many symmetries are proposed besides the supersymmetry.

Thirdly, let us also recall that we described certain kintypes as *partners in the supersymmetry:* the 12 Elders (fermion equivalents) are superpartners of the 12 Partners (boson equivalents), and the 6 Players (boson equivalents) are superpartners of the 6 Children (fermion equivalents). About the SUSY universe, it is hypothesized that the 12 known fermions have 12 unknown bosons as superpartners, and the 6 known bosons have 6 unknown fermions as superpartners. Thus there seems a correspondence here too.

6.2.2 Unification

The *unification* of fundamental forces proposed for the early universe has a corresponding state in the Madia kinship system (section 4.2.2.1). We have seen that the unification of kintypes in the core sector of the Madia kinship is made possible by a *single rule of alliance* – the patrilateral cross cousin (FZD) as the preferred bride meaning she is the woman that Ego has a claim on (section 4.4). We have also seen then that the FZD marriage rule, with neither age nor lateral bias, is distinct because of a single underlying principle in reciprocal alliance, i.e. the systematic delay by a single generation or simply *the delayed reciprocity principle*. This single principle for alliance interaction is the reson why we described the Madia kinship as unified. The Madia kinship is a "unified" structure in the same sense the SUSY universe is.

On the basis of the arguments made here as well as in an earlier section on G^0 kintypes as bosons, I present in Table 25 a comparison of unification we described in the core of the Madia kinship system with the unification postulated for the SUSY universe.

Table 25: Unification in SUSY kinship and SUSY universe

Spouse Kintypes	***Forces***
ange (eBW) (spin-1)	Strong force (Gluon) (spin-1)
muthe (W) (spin-2)	Gravitational Force (Graviton) (spin-2)
koyaŗ (yBW) (spin-1)	Weak Nuclear Force (Z) (spin-1)
bāto (eZH) (spin-1)	Electromagnetism (Photon) (spin-1)
eŗmthox (yZH ms) *kōval* (yZH ws) (spin-1)	Weak Nuclear Force (W+, W-) (spin-1)

What are the bases for this comparison?

One of the bases for this comparison is the "spin value" of the G^0 kintypes as discussed earlier. We see that the spin value of the force particles and the spouse kintypes match. For an example, none of the spouse kintypes can match the graviton except the W because the W alone has spin-2.

The other basis is the "strength" of the forces. The fundamental forces are often described in order of their strength. The strongest to the weakest forces are listed as follows: strong nuclear (gluon), electromagnetism (photon), weak nuclear (Z, W +, -) and gravity (graviton). The spouse kintypes too can be listed in order of their "strength", by which we mean their ability to survive through the two phase transitions. I discuss this below.

The core sectors of the three Dravidian systems (i.e. Tables 20, 21 and 22) show which spouse-kintypes are the first to disappear and which ones remain through the first and second transitions. The spin value and the order of strength help us to match the spouse-kintypes with the fundamental forces.

(a) The W is one of the two kintypes to disappear first (not seen in Table 21 or 22). We can assume this is the weakest kintype. We have just noted that the W kintype is equivalent of graviton because both of these have the spin value 2.

(b) The eBW is the one that lasts in all three phases without being equated to another kintype from a different G level, and therefore the most enduring or the "strongest" spouse-kintype. So this can be marched with the gluon, the messenger particle for the strong nuclear force. Incidentally, this is the only kintype which, as a kin category, has 8 key referents (see Table 5 in Chapter 1), which is the same as the number of gluons.

(c) The next most enduring kintype is the eZH, and therefore this is comparable to the photon.

(d) The W+ and W- can be matched only with the kintype yZH ms and yZHws because none of the other spouse kintypes has the distinction on the basis of the sex of the speaker (as ms/ws).

(e) The only ones that remain to be compared are the kintype yBW and the boson Z. The yBW is the first to disappear (along with the W kintype) in the phase transition, and so is one of the weakest. Since it cannot match with the W which is a spin-2 kintype, it must be matched with the Z boson.

The only boson that we have not matched with a Madia kintype is the Higgs boson. Let us recall a point made earlier that the only spouse kintype missing from the egocentric view is the husband (H), and that this may be comparable to the spin-0 kintype. The kintype H that is out of view in the egocentric perspective, and hence does not show up in our Tables, is the one that is equivalent of the Higgs boson which, reportedly, is evading experimental observation and verification in laboratory searches, thus earning the name "God (damn) particle".

Returning to the main point of our discussion here, unification means that there is a *single interaction* as the basic explanation of the entire system. The idea of "interaction" applies to both the SUSY kinship and the SUSY universe. The whole scheme of quantum mechanics is that fermions interact by exchanging bosons and these interactions give rise to forces. No interaction, no forces. Similarly, the Elders from two sides (bride's and groom's) are involved in alliance exchange, in giving or taking of a bride, which give rise to spouses. No marriage, no spouses. As has been mentioned a few times already, the Madia FZD alliance is the rationale behind the SUSY kinship. A single underlying principle, the delayed reciprocity principle is what defines the FZD alliance exchange.

While a more detailed comparison of the SUSY kinship with the SUSY universe with regard to the *basic interaction* should make a very interesting study, a comparative study like that would have to wait because the fundamental law or the single interaction with which to explain the structure of our universe is still being worked out by physicists.

6.2.3 Phase Transitions

The loss of unification, or the separation of the four fundamental forces, is supposed to have occurred in two phase transitions. Similarly, the supersymmetric kinship loses its unification and symmetry in two subsequent major stages in the transformations of Dravidian kinship which occur following changes in the rule of alliance exchange. We can say "two major stages" because only three cross-cousin marriage rules are possible in Dravidian system: patrilateral, bilateral and matrilateral.

The three phases in the development of Dravidian kinship correspond to the three Epochs in the cosmic timeline of events in the Big Bang:

(1) *The Planck Epoch and the FZD alliance system:* Let us recall that the Planck Epoch is the earliest phase, which is at or immediately after the Big Bang, when the four forces were undifferentiated, meaning they were simply "different aspects of a single interaction". This phase corresponds to the 'unification' of the six spouse-kintypes (force-carrier-equivalents) that we observe in the core sector of the Madia kinship system (Table 20 in section 4.2.1).

(2) *The Grand Unification Epoch and the bilateral alliance system*: The Grand Unification Epoch follows the Plank Epoch, and it is the phase when the strong nuclear force, electromagnetic force and the weak nuclear forces still remain unified. This Epoch corresponds to the core sector of the bilateral exchange system in which the kintype-equivalents of these three forces are present as the remnant of spouse-kintypes.

(3) *The Inflationary Epoch and the MBD alliance system*: The Inflationary Epoch which is the last of the three Epochs is so called because the universe grows exponentially at this stage. This idea of *inflation* is applicable to the matrilateral system because, as we observe the increase in the total number of kintypes in the three examples we have used: patrilateral is 37, bilateral is 41 and matrilateral is 52. The difference between phase II and III is three times of that between Phase I and II, and thus the basic idea of *inflation* seems applicable to transformation occurring in the third phase of the Dravidian kinship.

In the cosmic timeline, one "super force" at Planck era becomes two at GU epoch, then three at inflationary epoch and then finally four. Here the loss of unification means the four forces that are indistinguishable initially become more and more distinct. In the transitions of Dravidian kinship, the loss of unification means that a spouse kintype is either lost (examples are yBW and yZH), or is going out of egocentric view (i.e. the W), or is losing its distinctiveness (e.g. eZH becomes equated to MB in bilateral and to FZH in matrilateral system).

The order of the separation of forces and the order in which the spouse kintypes "separate" correspond. The FZD system has all the six kintype that are equivalents of the four forces. The bilateral system has 3 kintypes – the ones that we have discussed as equivalents to the strong, electromagnetism and weak forces. The ones that have gone missing in this phase are the kintypes that are equivalent to gravity (graviton) and the weak force (Z boson).

It is also interesting to note that the two kintypes that are equivalents of the photon and the W boson are the only male kintypes left in the bilateral system (phase II), which is comparable to the electro-weak unification. In the MBD system (phase III), one of these two male kintypes goes missing, which seems like a process similar to the separation of the weak force from electromagnetic force.

Thus, not only do all the known force-carrier bosons match with the spouse-kintypes, but the transformations that the spouse-kintypes go through in the later stages also matche with the order of the separation of the physical forces in the cosmic timeline. As we saw in the previous section, the order of the transformations of the spouse kintypes also helped us match these kintypes with the force carrier bosons, besides their "spin" values and their "sociable" behavior.

Once again, as mentioned in chapter 4, a more thorough study of the diachronic changes that could perhaps show us the intermediate stages between the three main phases in Dravidian kinship could also throw more light on the order of the loss of the spouse-kintypes and the loss of distinctiveness in these kintypes. And further understandings gained by such a diachronic study could possibly help improve the comparisons attempted here. But even whatever the current study can show, i.e. the way in which the two latter stages in the transformations of Dravidian kinship correspond to the two phase transitions in the cosmic outline, seems remarkable.

6.3 Summary

Let us now summarize the main observations made in the comparison of Madia kintypes with elementary particles.

1. The *Elders* and the Standard Model fermions are similar in three respects: (a) These have equal number of constituents (that is, 12) which fall neatly into three generations of four kintypes each. (b) Each generation of *Elders* has two distinct types (male and female) as do the fermions (quarks and leptons). (c) The two basic properties of fermions, half integer spin and their solitary nature, correspond to the Elder kintypes.

2. The G^0 kintypes are like the bosons. In sharp contrast to the point 1 above, the G^0 kintypes tend to clump together as kin categories (or, are being sociable). Like bosons, the kintypes in G^0 can be seen as having integer spin and their "spin value" matching to that of the bosons: 2, 1 and 0.

3. If the unified theory, or theory of everything, hypothesizes that the various particle properties and forces are manifestations of a fundamental law or a single underlying principle or interaction upon which the universe is constructed, the Madia kinship is a structure that is

built upon a single rule of alliance (FZD) because this rule, with the accompanying regulation for widow inheritance, can explain all the features of the Madia kin classification (kin terminology as well as kin behavior).

4. The four fundamental forces correspond to the spouse-kintypes as each force has an equivalent spouse-kintype matching not only in number, and spin value but also the "order of strength" (where "strength" is interpreted as the ability of kintypes to remain as distinct ones through the phase transitions). The lack of kin terms for certain spouse kintypes in later phases compares with the steady separation of the four forces in the Big Bang model.

5. Even as predicted by the SUSY model of early universe, the Madia system has 36 kintypes (in the male egocentric view), which are perfectly balancing as the two ontological classes, EGO and OTHER, each having 18 kintypes. The idea of superpartners, fermions having boson as superpartners and vice versa, applies to the supersymmetric kinship structure.

6. The supersymmetric universe goes through two phase transitions according to the cosmic outline of Big Bang events. Similarly in the transformations of Dravidian kinship, the Madia represents the unified structure (Planck Epoch) and the two later stages, bilateral and matrilateral, compare respectively with to the GUT Epoch and Inflationary Epochs. The ideas such as loss of unification, symmetry-breaking and expansion can be applied appropriately to the particular phase transitions.

There are a few other correspondences which are more general but which are also interesting to observe.

7. People, like particles, are quantized units. Both are whole numbers. We cannot have half a particle. Having 3.217 leptons is meaningless. Similarly, there is no such thing as a 5.12 individual. A comparison between particles and sand is not possible because we can have 3.124 kilograms of sand. But the elements in kinship systems are unitized. This simple idea is itself an important trait or criterion for whether or not comparisons can be made.

8. The offspring produced through marriage alliances will become a part of the kinship system (be a relative, have a kin term) and the children will be one of exactly two sexes. In this sense, the kinship system is a closed system. Particle physics too is a closed system, which means that the output of a few particles will be some particles of the system. This too seems to be a fundamental trait that lends to comparability of the two systems.

9. One of the ways in which fermions interact is by exchanging bosons. This corresponds to the Elders (the fermion equivalents) engaging in alliance exchanges by giving and taking brides for grooms, an action that happens in the Ego's generation (the boson equivalents). Recall we described the Elders' role as facilitators of marriage in Ego's generation.

6.4 Conclusion

The structural and behavioral similarities between Madia kintypes and the elementary particles, and the dynamical similarities between the evolution of the early universe according to the Big Bang model and the development of Dravidian kinship based on the core interactions of the three kinds of cross-cousin alliances seems quite striking.

Let us list the main components in the Madia kinship in egocentric view and those in the basic SUSY model in order to show which one corresponds with what.

1. EGO ⟶ a. Bosons

2. OTHER ⟶ b. Fermions

3. Spouse kintypess ⟶ c. Forces

Regarding the first two items listed above, the fermions and bosons are held in supersymmetry in the very early universe and so are the kintypes we have called the EGO and the OTHER in the Madia kinship. About the third one – the spouse kintypes are 'unified' in the Madia kinship as are the four forces in the early universe. Moreover, how the third one is related to the first two is same in both structures. Thus the relationship among three components of the kinship is comparable to that among the the three components of the SUSY universe. For all these reasons, we can describe the Madia kinship as the *SUSY kinship*.

The correspondences brought out here refer only to the basic tenets of the physical SUSY model. I am aware that the SUSY models in physics are still open to a lot of discussion. The purpose of the comparative study presented in this chapter is to gain a better understanding of the unique features of Madia kinship structure as well as its status within Dravidian kinship systems. The observations made here are based on my limited knowledge of particle physics. Others with expertise in physics as well as in kinship studies will be able to do a much better job at the comparison. It would be satisfying if this study provoked an interest in some who could look more deeply into the correspondences between the two. Moreover, there is much yet unknown about elementary particles and their interactions, and if and when the SUSY model is verified experimentally, further and better comparisons between the Madia kinship (or other Madia-like kinship systems that might be out there in other parts of the world) and the SUSY model may be possible.

SUMMARY, CONCLUSION AND REFLECTIONS

The purpose of this research was to build a structural framework for the Madia kinship – one that would represent in a single sketch the overwhelming number of details about this kinship system. Such a sketch could depict the discreet relationship among the three dozen kintypes, that between the kintypes and the categories and also their relation to the system as the whole, and it could serve as an overview of the entire system. This study has ended up with not one but two frameworks. There is this saying in India: "two mangoes (fell) with one stone". I should say that such a double benefit has been furnished by nature's bounty. The challenge of the central Dravidian still looms large, but insightful paradigms for comprehending it may have been found.

Summary

The analysis of the sociocentric view (Part I) focused on the role of complementary bonding of relatives from two sides, the groom's and the bride's, and it demonstrated that the complementation process is the basis for Madia kin categorization and the dual social organization. Then the configuration of relatives in sociocentric view was compared with the DNA's structure, function, dynamics and organization to find many correspondences between these two structures.

In Part II, by placing the focus on the genealogical connections and the generational levels, we could observe how the balancing in number and gender of kintypes as well as of key referents creates symmetry on different levels, which suggests that balancing or symmetry is the central motif of the Madia kinship structure. The kin configuration in the egocentric view was found to be supersymmetric (overall) and unified at the core, whereas the two south Dravidian examples showed neither of these two features. The configuration of kin in the egocentric view was compared with the configuration of the elementary particles in the supersymmetric (SUSY) model of the early universe and the numerical and functional correspondences were listed.

Neither one of the two natural structures could have described the kinship system completely because the egocentric and sociocentric perspectives of the kinship are incongruent. But together, the two natural structures help in getting a hold on the intriguing complexity of this kinship. Building a single synthetic model for the Madia kinship system that could represent both perspectives simultaneously may be possible, but for now I am content to have found help in natural structures that provided three analytical concepts, i.e. complementation, supersymmetry and unification, which have been useful for comprehending this kinship system in ways better than before (Vaz 2010, 2011).

Conclusion

One of the conclusions we draw from this study is about the *logical integrity* of the Madia kinship system. The two part analysis presented in Chapters 1 and 4 suggests that the system is a coherent and logically consistent one, which lends itself to a comprehensive description. Moreover, the Madia kinship system's similarities with the DNA, a natural structure, and with the SUSY universe, a scientific model, seem to attest to the kinship system's soundness and viability.

The fact that we have present day examples of the FZD alliance system points to its *stability*, by which is meant the capacity to survive and be sustained, given certain demographic conditions. The alliance's capacity for frequent repetition or replication seems to compensate for the shortness of its cycle. *Replicability* is about the ability to engage in newer alliances in order for the pattern to repeat itself, and it is this quality that seems to have ensured its survival. As far as replicability is concerned, the shorter the length, the better. In fact, length is cited as a problem in the DNA replication process and as one of the reasons for the need for 'multiple replication origins' in the DNA. If we were to ask the question as to what has kept the DNA molecule going from time immemorial, the answer is not to be found in its length, but rather in its unique structure that lends itself easily to replication. In the same sense, the shortness of the FZD alliance cycle is a positive aspect and not otherwise. The comparison with the DNA has not only revealed the uniqueness of the FZD's structure among the Dravidian cross-cousin alliances but also perhaps the secret of its survival, which is replicability.

The *logical priority* of the FZD alliance among the Dravidian systems was a conclusion presented in chapter 4. Levi-Strauss wrote about the archaic character of the patrilateral exchange and its logical priority[91] (1969:218-219). An issue that presents a problem in theorizing about FZD alliance is the "worldwide rarity" of the FZD alliance (Denham 2012:10), and one wonders if this rarity can be ascribed to the system's *antiquity*. Dziebel has argued that *superreciprocal terminologies* are "a good candidate for great antiquity" (2007:248) and the five kinds of equations he presents (ibid. 206) to describe such a terminology are all found in the Madia kinship. He has also mentioned the "logical cogency" and the "evolutionary productivity" of such terminologies (ibid. 248), which are descriptions that fit the Madia system as seen through the DNA and SUSY paradigms.

The use of these two paradigms has enhanced the understanding of the Madia kinship by highlighting its uniqueness and complexity: the perfect complementation of opposite kind of kintypes, total integration (or unification) of kintypes in the core and superb symmetry among kintypes on the whole as the fundamental features of this system. The status of these special features within the Dravidian system is discussed in this paper, but the relevance of these to a

[91] Incidentally, Levi-Strauss's association of the patrilateral marriage with "societies which are very poor in the field of social organization" (1969:452) is something the Madia case controverts.

current topic in kinship studies, i.e. origins of human kinship systems and directionality of its evolutionary paths is left an open question.

Reflections

It is beyond my expertise to consider what this comparative study may suggest mathematically, but I see no harm in presenting this question, doing so at least for the sake of my readers.

Are the three structures isomorphic?

Isomorphism comes from the Greek *isos* "equal", and *morphe* "shape". Informally, an isomorphism is a kind of mapping between objects, which shows a relationship between two properties or operations. According to Douglas Hofstadter (1979:49), "the word 'isomorphism' applies when two complex structures can be mapped onto each other, in such a way that to each part of one structure there is a corresponding part in the other structure, where 'corresponding' means that the two parts play similar roles in their respective structures."

We have seen in Chapter 6 that the Madia kinship in egocentric view and the SUSY universe have equal parts, analogous behaviour, and similar dynamics. We have also seen (Chapter 3) that the same is true of the Madia kinship in sociocentric view and the DNA. What then about the DNA and the SUSY universe? We may answer this question by saying that the DNA and the SUSY are like the two sides of the same coin, the 'coin' being the Madia kinship. What has been described as the *kinship DNA* and the *SUSY kinship* is simply the two different perspectives of one and the same kinship structure. Therefore, it may be that the biological DNA and the physical SUSY share a common mathematical construct[92], or that the three structures considered are different expressions of the same or similar mathematical principle. But this is really a question that only a mathematician can answer.

And how may asking this question be useful?

Isomorphism is a powerful analytical tool in the scientific study of complex systems. "Mastering the knowledge of how one system works and successfully mapping that system's intrinsic structure to another releases a flow of knowledge between two critical knowledge

[92] This question is also complicated by the fact that there are two kinds of DNA. The comparative study carried out in Chapter 3 between the Madia kinship and the mtDNA mentioned (see the latter part of section 3.5) that the address terminology corresponds with the nuclear DNA while the reference terminology corresponds with the mitochondrial DNA. In Chapter 6, it is the configuration of the *reference* terms that we have compared with the SUSY model. Moreover, it is the mtDNA that is a *closed* and *symmetrical* (i.e. circular) structure with a total of 37 genes, all of which make it seem that the mtDNA may be the better fit for a comparitive study with the SUSY model.

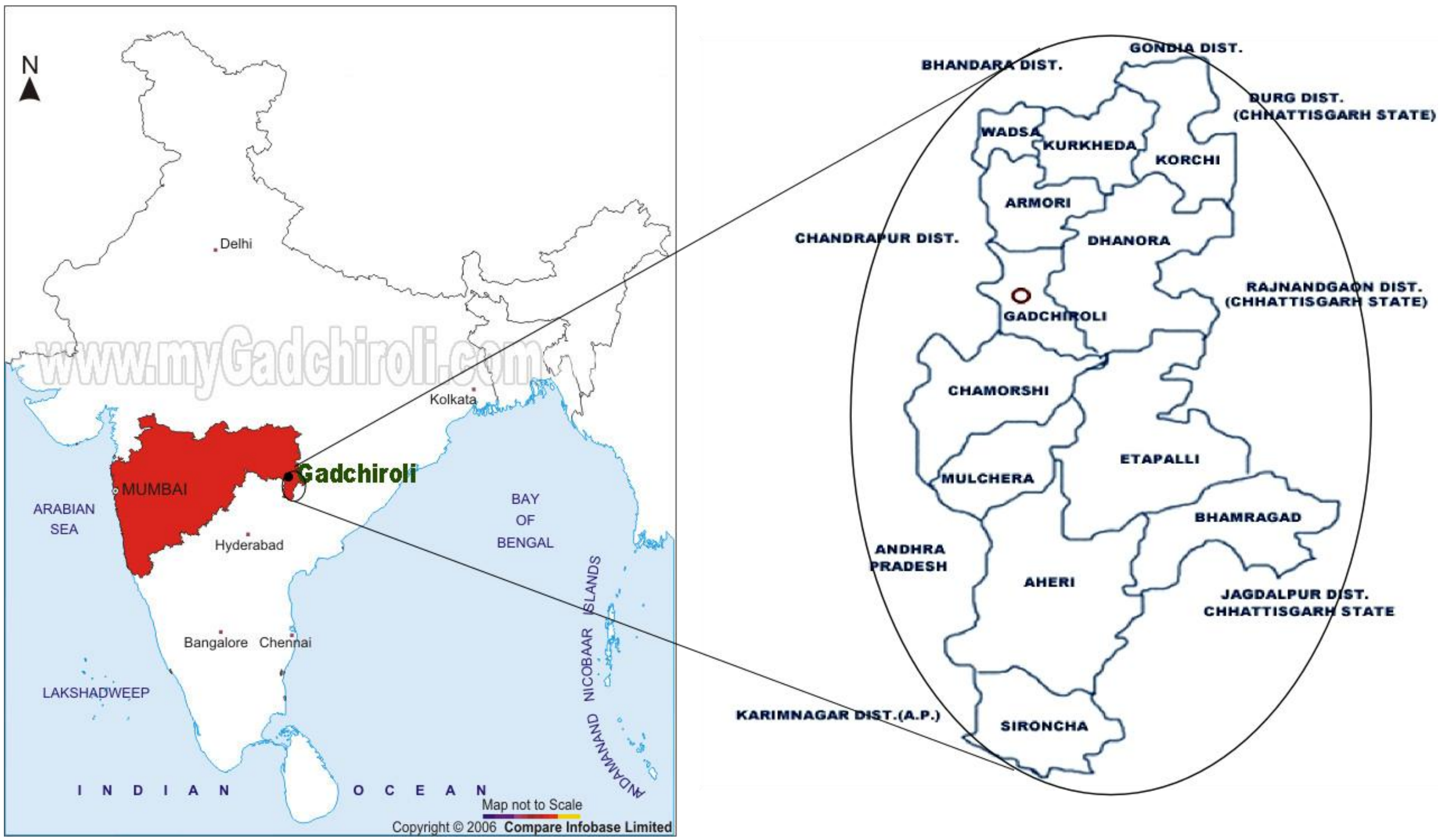
domains."[93] When isomorphism is discovered between a well understood and a lesser known system, analysts "map whole problems out of unfamiliar territory over to 'solid ground,' where the problem is easier to understand and work with" (ibid). The well understood science, where theories have been proved and many methods are available to find answers, can serve as the testing ground for the less understood science.

Therefore the question: Can the Madia kinship system be that "solid ground" on which certain "problems" of physics or biology could become "easier to understand and work with"? The Madia kinship is "here" and "now" whereas the early universe is a primordial structure, of which the most fundamental questions and problems may well be beyond the reach of experimental verification. It may be possible to use the Madia kinship structure to make quantum-mechanical calculations. A similar approach may be used to address questions in biology about the origin of life.

If it can be mathematically verified whether the three structures discussed in this paper share similar mathematical constructs, then there could be useful cross-fertilization between these three fields of knowledge. While such implications are in no way assumed, the potential does exist for the data reported here to be explored further. Even though the DNA and SUSY structures exist in two distinct scientific realms and do not seem amenable for a direct comparison, since both of those realms are mathematically describable structures, one supposes that there must be some ways to compare the two. Perhaps the Madia relationship system can provide a conceptual link between the two. This may be a strange idea, but perhaps one that could be pondered, considering its potential value for scientific studies.

[93] Quoted from http://en.wikibooks.org/w/index.php?title=Systems_Theory/Isomorphic_Systems&oldid=456601

APPENDIX I: LOCATION OF THE HILL MADIA REGION[94]



[94] Adapted from www.MyGadchiroli.com .

The Hill Madia tribe lives in the two *tehsils* on the eastern border of the Gadchiroli district - Etapalli and Bhamragad.

APPENDIX II: MADIA KIN CLASSIFICATION[95]

jīva		*eɽmi*		G
male	***female***	***male***	***female***	
pēpi (FFF, MMF) ‘*pēpi*’	*ātho* (FMM, MFM) ‘*ātho*’	*māmal* (FMF, MFF) ‘*māma*’	*pēri* (FFM, MMM) ‘*pēri*’	**+3**
thādho (FF, EMF) ‘*dhādha*’	*kāko* (MM, EFM) ‘*kāko/ aka*’	*ako* (MF, EFF) ‘*ako/ bāto/ sangi*’	*bāpi* (FM, EMM) ‘*bāpi/ ange / ango’*	**+2**
thape (F) ‘*bāba*’ *pēpi* (FeB) ‘*pēpi*’ *kākal* (FyB) ‘*kāka*’	*ātho* (FZ/ MBW/EM) ‘*ātho*’	*māmal* (MB/FZH/EF) ‘*māma*’	*thalox* (M) ‘*ava’* or ‘*yaya’* *pēri* (MeZ) ‘*pēri*’ *kūchi* (MyZ) ‘*kūchi*’	**+1**
dhādhal (eB) ‘*dhādha*’ *thamox* (yB) ‘*thamo*’ *mūryal* (HeB) ‘*dhādha*’ *aglal* (WZHe) ‘*dhādha* *aglal* (WZHy) ‘*thamo*’, ‘*agla’*	*akal* (eZ) ‘*aka*’ *ēlaɽ* (yZ) ‘*ēlo*’ *pōraɽ* (HeZ,WeZ) ‘*aka*’ *exayaɽ* (HBWe) ‘*aka*’ *exayaɽ* (HBWy) ‘*ēlo*’	*maryox* (FZS/MBS) ‘*sangi*’ *bāto* (eZH) ‘*bāto*’ *kōval* (yZHws) ‘*ane*’ *eɽmthox* (WeB, yZHms) ‘*eɽmthox*’ *exundi* (EyB) ‘*pēka*’ *mujo* (H) ------ *pāri* (CEFms) ‘*pāri*’’	*mandaɽi* (FZD/MBD) ‘*sango*’ *ange* (eBW) ‘*ange*’ *koyaɽ* (yBWms) ‘*pila*’ *kōkaɽ* (yBWws, EyZ) ‘*pila*’ *muthe* (W) ------	**0**
max (S/BSms): ‘*bāba/pēpi/kāka/pēda’* *anemax* (BSws) ‘*bāba/kāka/pēdu*’	*mayaɽ* (D/BDms): ‘*ava/ātho/ pēdi*’ *anemayaɽ* (BDws)…‘*ātho*’	*max* (S/ZSws) ‘*māma*’ *anemax* (ZSms) ‘*māma*’/ *ane* (DH) ‘*ane*’ or ‘*lāmane*’	*mayaɽ* (D/ZDws) ‘*ava/kūchi/pēdi’* *anemayaɽ* (ZDms) *ava*’/*māma/kūchi’* *koyaɽ* (SW) ‘*pila*’	**-1**
(SSms) ‘*thamo*’ (DSws) ‘*thamo / kāko*’	(SDms) ‘*ēlo*’ (DDws) ‘*kāko / ēlo*’	DSms ‘*ako/ sangi*’ SSws ‘*pēka/ sangi*’	DDms ‘*sango/ ako*’ SDws ‘*sango/ ēlo/ pila*’	**-2**
SSSms/ DDSms: ‘*pēpi*’/ *pēda’* DSSws/ SDSws ‘*kāka / pēdu*’	SSDms / DDDms ‘*pēpi/ pēdi*’ DSDws/ SDDws ‘*ātho*’	DSSms/SDSms ‘*māma*’ SSSws/DDSws ‘*māma*’/ *pēdu*’	SSDws / DDDws ‘*pēri’/ pēdi’* DSDms / SDDms ‘*māma*’	**-3**

[95] The data presented in Table 1 Vaz 2010 showed the tripartition of kin as *jīva***,** *putul* and *eɽmi* but here I have included *putul* along with the *eɽmi* because our current understanding (as espoused in chapter 1) allows it. Only the key referents are given here for lack of space.

APPENDIX III: CLANS IN THE FOUR MADIA GOD-GROUPS

<table>
<tr><th>God-number</th><th>7 gods-group</th><th>6 gods group</th><th>4 gods group</th><th colspan="2">5 gods group</th></tr>
<tr><td>Core members</td><td>1. Ēr̯o
2. Metami
3. Kiringal*
4. Bōgami*
5. Jeti
6. Maʔa
7. Dhurva*</td><td>1. Pungati
2. Mūndhal
3. Jukna
4. Jogai
5. Veladhi
6. Vāchami</td><td>1. Thāndo
2. Idamir
3. Emlak
4. Admak</td><td rowspan="2">1. Ārkir
2. Āllami
3. Avke
4. Deda
5. Dhuri
6. Dokko
7. Duggalor
8. Emla
9. Enmanda
10. Gādwe
11. Gatti
12. Gecha
13. Godho
14. Gommok
15. Gosre
16. Gumma
17. Ichami
18. Inguthi Jogi
19. Irma
20. Indhur
21. Johor
22. Jate
23. Kadunga
24. Kalmuti
25. Kasvo</td><td rowspan="2">26. Kodaha
27. Kumoti
28. Kunjami
29. Lēkami
30. Majji
31. Mahkal
32. Micha
33. Nahoti
34. Odir
35. Oxsal
36. Oyami
37. Padha
38. Pallo
39. Pidse
40. Podhar̯i
41. Poyor
42. Pūsali
43. Thador
44. Thima
45. Ūsendi*
46. Varse*
47. Vīr̯pi
48. Wadde</td></tr>
<tr><td>Secondary members</td><td>8. Gōtta
9. Parsa
10. Āthlami
11. Pottami
12. Kathlami
13. Mar̯kami
14. Thelami
15. Agmaki
16. Vedunje
17. Korsami
18. Kawdhor
19. Vedudha*
20. Modiyami</td><td>7. Thāluk
8. Pitor
9. Jogir
10. Kur̯yeti
11. Kangali
12. Kursami
13. Kur̯yemi*
14. Mengami
15. Thopa
16. Uyke
17. Chadme
18. Kudumethe
19. Navdi
20. Dhorpeti</td><td>5. Budal
6. Vental
7. Rapak
8. Kovsi*</td></tr>
<tr><td colspan="4">Total number of clans in 4, 6 and 7 gods groups: 48</td><td colspan="2">Total number of clans in 5 gods group: 48</td></tr>
</table>

:

Some notes on the clan memberships in Madia god-groups

1. The asterix (*) is meant to show that a small breakaway group, usually a single lineage from that clan, is found in another one of the three *god-groups*. For example, the Bogami clan (number 4 in the section for the 7 gods group) is one of the primary members in that god-group. But a section of them living in the Lahiri village (east of Bhamragad village) say they belong in the six gods group. A more recent example of fission in clans is another Bogami lineage (living in Kier village of Arewada panchayat) who have recently been dismissed from the clan membership because of a case of "incest" marriage (i.e. marrying within the 7 gods-group) by one member of the lineage. This break-away lineage is, as of now, a "god-less" group (i.e. without a specific god-number), but they will eventually try to find a secondary (or late-comer) membership in another god-group by paying heftily for the necessary divination ritual and feast in order to gain admission there. The Table of Madia clans given in my doctoral dissertation showed where (or which god-groups) such breakaway groups have been readmitted to. But in this list I mention only the original clan names indicating (with asterix) which of them have a case of fission. Though such fissions and fusions are known, they are uncommon because cases involving incest (i.e. marriages within a god-group) that lead to such divisions are rare.

2. The Table of Madia clans in my doctoral dissertation mentions Idemaxku, Kajamaxku and Gundrumaxku as secondary member clans in the 6 gods group. However, since then I have come to know that these are names of lineages within the Thāluk clan. The word *maxku* is plural of *max* 'son' and these three names only mean 'sons of' Ide or Kaja or Gundru. Thus it was an original mistake that has been corrected here.

3. It is interesting to note here the perfect balance of the total number of clans between the 5 gods-group and all the rest combined, i.e. 48 and 48. Besdies, the numbers here, in every column as well as the totals, are multiples of four (20, 20, 8 and 48). While this is probably just coincidental[96], it does, at the moment, seem like a thing of interest because of the generally "tetradic" nature of the Madia kin, social and clan organization. Here I do not use the term tetradic alluding to N. J. Allen's tetradic theory, but simply to mean that the basic components of the Madia kinship, social organization and societal structure are, at many key points, either just four or arranged in groups of four, even as listed below:

[96] Though I have not travelled to utmost corners of the Madia country, I have taken advantage of occasions where hundreds of people gather, occasions such as weddings, funerals and clan-god festivals, to collect clan names. This data on Madia clans was collected over many years, and I verified it as recently as November 2013 with help from a group of Madia men representing different regions who acted as my consultants for this issue. It is possible that this list is not exhaustive and more clans may still be found. (I have also checked Grigson's (1938:300-305) list of Madia clans from the Chhattisgarh region; there are many names in his list which are unheard of among the Madia of the Gadchiroli region, and in many cases the difference in names seems simply a difference in pronunciation.)

1. The society has 4 sections (god-groups), each with a specific number of gods.

2. The god-number begins with the number 4.

3. The alliance and ontological classes are together 4 (section 4.1.1)

4. The role-play groups in egocentric view are 4.

5. The number of standard *kin categories* in sociocentric view (i.e. 20) as well as that of the *kintypes* in egocentric view (i.e. 36) is both multiples of 4.

6. The kinship structure has 4 quadrants in each and every generation level (including the three middle levels when the *putul* and *eṛmi* are seen as one group opposite *jīva*).

7. There are only 4 generations of kin terms.

8. New marriage alliances require minimum of 4 exchange units (section 1.4.1).

9. Basic to this alliance system are the four individuals (i.e. two sibling pairs: F and FZ is one, and the M and MB is the other).

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